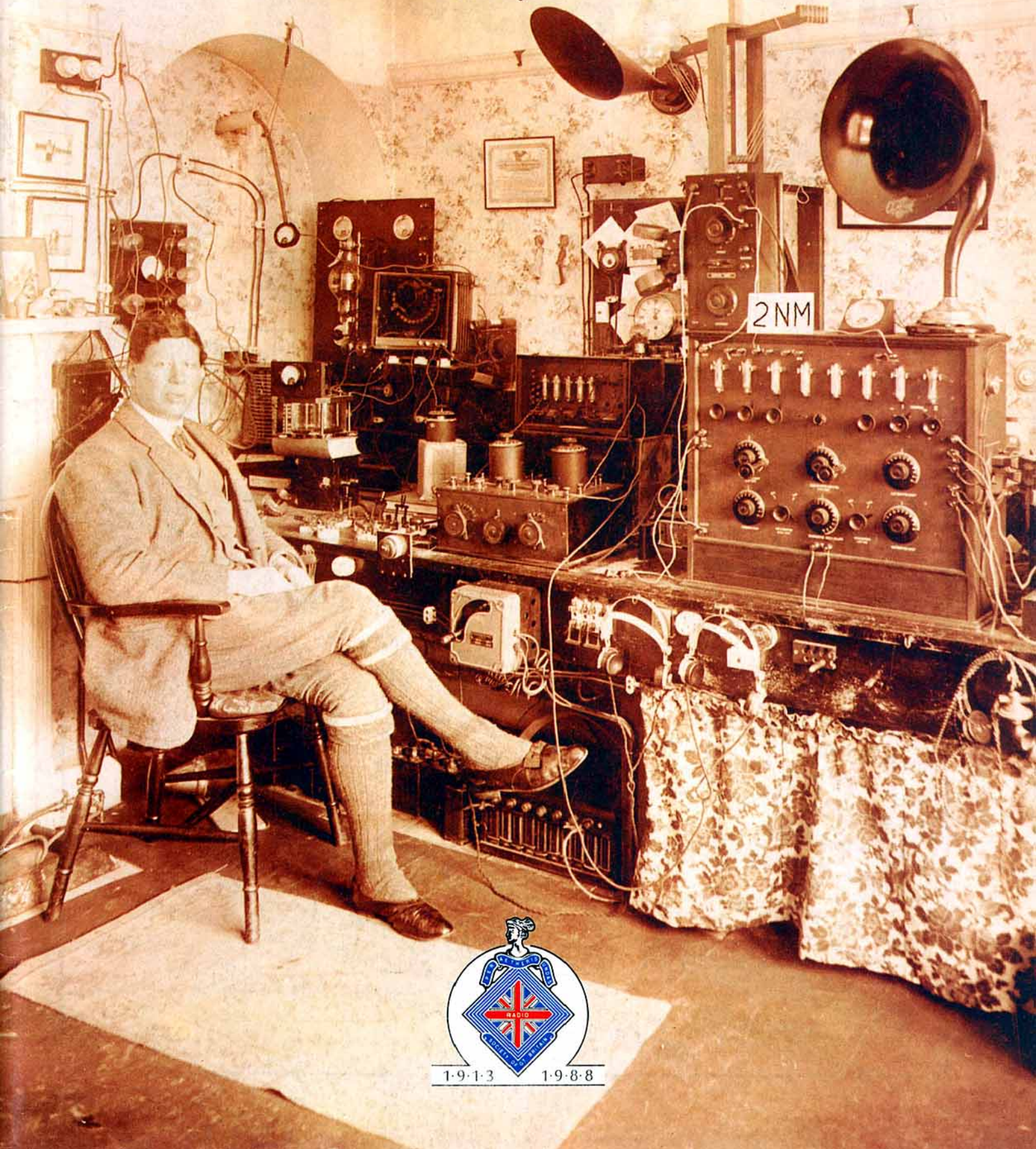


# Radio Communication

February 1988



1-9-13

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FEBRUARY 1988

VOLUME 64

No 2

# Radio Communication

## EDITOR-IN-CHIEF

A W Hutchinson

## Editorial assistant

A C Burrows

## Draughtsman

D E Cole

## Editorial secretary

Mrs M L Brimson

All contributions and correspondence concerning the content of *Radio Communication* should be addressed to:

The Editor  
*Radio Communication*  
Lambda House  
Cranborne Road  
Potters Bar  
Herts EN6 3JE

Correspondence concerning the distribution of the journal, and all other Society matters should be addressed to:

RSGB Headquarters,  
Lambda House,  
Cranborne Road,  
Potters Bar,  
Herts EN6 3JE

Tel 0707 59015  
Fax 0707 45105

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## FRONT COVER

Gerald Marcuse, G2NM, with the equipment he used in January 1924. See *News Bulletin*.

## CONTENTS

- 96 From the secretary's office
- 97 Members' Mailbag
- 98 A mobile antenna for 1.8 to 28MHz – M J Grierson, G3TSO
- 103 Kite-borne antennas for hf portable operation – Dave Lunn, G3LSL
- 106 Technical Topics – Pat Hawker, G3VA
- 112 Technical feedback
- 113 *News Bulletin* – John Nelson, GW4FRX, and David Gough, G6EFQ

## Supplement i-iv – Index to *Radio Communication* Vol 63

- 125 News & Views
- 125 HF – John Allaway, G3FKM
- 127 HF F-layer Propagation Predictions
- 128 VHF/UHF – Ken Willis, G8VR
- 130 SWL – Bob Treacher, BRS32525
- 131 Microwaves – Mike Dixon, G3PFR
- 132 Data Comms – Ian Wade, G3NRW
- 133 Satellites – Bob Phillips, G4IQQ
- 135 Contest News
- 137 Contests Calendar
- 138 Club News
- 139 Members' Ads

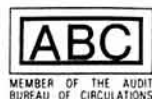
Technical articles on subjects of amateur interest are always welcome and should be sent to: The Editor, *Radio Communication*, Lambda House, Cranborne Road, Potters Bar, Herts EN6 3JE.

All articles received are reviewed for technical merit by the RSGB Technical & Publications Committee, or an acknowledged expert on the subject, before acceptance. Payment at high competitive rates will be made for all articles published.

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The editor will be pleased to send intending authors a manuscript preparation guide and to give any other advice and assistance requested.

*Radio Communication* is published by the Radio Society of Great Britain as its official journal on the last Friday of each month and is sent free and post paid to all members of the Society



36,527 copies per  
issue average  
circulation in 1986

Closing date for contributions  
unless otherwise notified:  
five weeks before publication date

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# The TS-140S from Kenwood



You will remember (I hope) that last month I wrote in enthusiastic terms about the new TS-140S transceiver from Kenwood. Well, the first shipment arrived and was quickly sold, and so far all reports are that the new owners are as enthusiastic as I am. However, I can't help smiling a little, because I quoted some fractured lines from Kipling in the same text, and they seem to have come true.

In a huge centre spread ad. in another magazine, (may I mention Practical Wireless?) we see a slogan reading "The New Face of HF". I looked twice at the photographs under this slogan because I thought that the largest transceiver looked familiar, in fact I thought that it was a TS-940S. WRONG; it was a "new" transceiver from another manufacturer, but the resemblance is uncanny. You TS-940S owners should take a look and see if you recognise the style, the knobs, the S meter, the size, the colour, the main readout, and so on, and so on.

It is said that imitation is the sincerest form of flattery, and I have no doubt that Kenwood are flattered, but of course the TS-940S has been around for two years now so Kipling's line about "sweating and stealing, a year and a half behind" seem oddly appropriate. No offence meant chaps, but I wonder what will follow the lead set by the TS-140S?

Actually, there is another version of the TS-140S around called the TS-680. This was originally intended for the Japanese home market only, and any that have appeared in the UK are of course the product of that well known phenomenon, the shady importer. However, we think that the TS-680 should be made available in the UK, because it is basically a TS-140S but with a 10 Watt 6 metre section added.

The addition of 6 metres obviously increases the cost,

and also carries a small penalty in that the VOX facility disappears (Can't imagine why) but if you want the TS-140S (less VOX) but with added 6 metres (sounds like a miracle ingredient in a washing powder) ask us about the TS-680.

If you already bought a TS-680 from a shady source then Good Luck to Ye Sorr. I hope you trust his service and backup ability. Getting a discount isn't necessarily the end of the story; it's often the beginning of a sorry melodrama.

Soapbox time over. The fact is that the TS-140S and TS-680S are leaders in a new direction for amateur radio equipment, and I predict we are going to see the gradual demise of the complicated HF table topper (that takes you back a bit doesn't it). Table topper for you youngsters under 50 used to mean something of the size, shape, and weight of an AR88, i.e. about a hundredweight (oh, alright 50kg). The TS-140S weighs 6 kg.

Incidentally, we find out more every day. The TS-140S specification reads as though the receiver covers from 500 kHz to 30 MHz, but in fact it tunes 50 kHz to 35 MHz. The performance falls off a bit at the low frequency end, but the coverage up to 35 MHz is really useful for VHF and UHF converters, where the 28 to 30 MHz range is often too limited. Nice touch Kenwood.

Do you get the impression that I rather like the TS-140S? I have to admit that I see it as the ideal transceiver where cost and performance are nicely balanced, and the facilities provided are all that anyone could need. For full details, just send a stamped addressed envelope and we will fire back a leaflet which includes details of all the matching accessory units available. Better still, why not call in at one of our branches and get a "hands-on" ???

G3PCY/5N2AAC

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TL-922 inc tubes... £1495.00 inc VAT, carriage £8.00

### SM-220 station monitor

Based on a wide frequency range oscilloscope, the SM-220 station monitor features in combination with a built-in two-tone generator, a wide variety of waveform observing capabilities. The SM-220 aids efficient station operation as it monitors transmitted waveforms and it also serves as a sensitive wide frequency range oscilloscope for various adjustments and experiments. When fitted with the optional BS-8 panoramic display and connected to one of the following transceivers (TS-940, TS-830, TS-180, TS-820 series) signal conditions in the vicinity of the receive frequency can be seen over a 40 or 200kHz range.



SM-220...£343.36 inc VAT, carriage £8.00  
BS-8...£77.00 inc VAT, carriage £1.50



TR-751E

Amazing - we haven't mentioned Kenwood's most popular transceiver for about a year. Maybe it's because it sells so well on its reputation, but that's no reason for keeping it off the pages of RadCom.

What is Kenwood's most popular transceiver? It's the TR-751E (fanfare of muted trumpets). The TR-751E is THE definitive 2 metre multimode, and carries on the tradition started by the TR-9000 many years ago and maintained by the TR-9130.

If you want a rig that does it all, the TR-751E is it. Full 2 metre coverage, 25 watts, super receiver, use as a mobile or base station, it's all there. I'll make my usual comment that in order to appreciate all it can do, you should see a fully descriptive brochure, and that's available for the cost of a first class stamp. Better still, if you send us £1, we will return the full Kenwood colour catalogue together with all sorts of other useful reading.

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RADIO COMMUNICATION February 1988

## amateur band plus general coverage transceivers

### TS-940S HF transceiver with general coverage receiver

Top of the range, the TS-940S has every operating feature that the discerning HF operator needs. Amateur bands from 160 to 10 metres plus a general coverage receiver tuning from 150 kHz to 30 MHz. Modes of operation are USB, LSB, CS, AM, FSK, and FM. Forty memory channels, each effectively separate VFO and easy keyboard frequency entry make operation and ownership of the TS-940S a pleasure.



TS-940S...£1995.00 inc VAT, carriage £8.00

### TS-930S HF transceiver with general coverage receiver

Much has been said and written about the TS-930S and it now has a place high in the affection of radio amateurs. Modes of operation are USB, LSB, CW, AM and FSK. Providing full coverage of the amateur bands from 160 to 10 metres and including a general coverage receiver tuning from 150 kHz to 30 MHz, the KENWOOD TS-930S is the ideal rig for today's crowded bands.



TS-930S...£1695.00 inc VAT, carriage £8.00

### TS-440S HF transceiver with general coverage receiver

A step forward in compact HF equipment, the TS-440S covers the amateur bands from 160 to 10 metres and is also a general coverage receiver tuning from 100 kHz to 30 MHz. It has keyboard frequency entry, full and semi break-in on CW, one hundred memories and provision for fitting an internal ATU. Modes operation are USB, LSB, AM, FM and AFSK.



TS-440S...£1138.81 inc VAT, carriage £8.00

### TS-830S HF amateur bands transceiver

Needing no description, the KENWOOD TS-830S, which uses a pair of 6146B valves in the PA, is well known on the amateur bands (160 to 10 metres) for its superb signal quality. Modes of operation are USB, LSB and CW. Having variable band-width tuning, IF notch, IF shift and provision for various filters, its receive performance is excellent too. (As you might expect from KENWOOD).



TS-830S...£1098.00 inc VAT, carriage £8.00





## HF 125

Why did we design and produce the HF 125 receiver? Simply to provide the keen short wave listener with a receiver which offered not only all the facilities he or she needed in an HF receiver, but to give at the same time a level of performance which would cope easily with HF conditions likely to be encountered in Europe.

You all know the problems, high power broadcast stations pounding in at night, blotting out the weak signals you wanted to hear – and many of the unwanted signals were generated in your receiver itself. That we succeeded in designing a receiver which could solve the listening difficulties is obvious from comments from reviewers, but we also did it at an attractive price.

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So what did the reviewers say. I'll give you a few comments, but for the full story why not send a stamped addressed envelope marked "HF 125" and we will return a fully descriptive brochure with all the review comments included.

### Quotes.

"What is particularly important is the fact that so much attention has been paid to RF and IF performance; areas so lacking in many Japanese sets. Short Wave Listeners will be particularly pleased about the many choices of selectivity on AM." Angus McKenzie.

"I tuned straight to the 40 metre amateur band to see how it stood up to the battering from high powered propaganda broadcasters when attempting to resolve relatively weak amateurs striving to get contacts. The simple answer was, no problem." Chris Lorek.

"After an hour, drift was less than 50Hz in each instance. This is comparable with receivers in much higher price classes." World Radio and TV Handbook.

"I have no doubt that the Lowe HF 125 represents extremely good value for money, and the performance far exceeds so much of its competition, including some receivers costing rather more." Angus McKenzie.

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The HF125 costs £375 including VAT. Need I say more?

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When I first heard of packet radio, I said "What?", and that is the reaction of many radio amateurs. However, I never expected it to be so much fun, and judging by the demand and the queue to get at our demonstration station here at Matlock, a lot of other people are also finding it truly fascinating. There are several companies offering ready made packet systems, and the descriptions are usually full of terms you don't understand (including some of our own ads in the past). What for example is "enhanced generic command structure"? Sounds very much like something taught at Sandhurst or West Point. From the equipment available, we chose to represent Kantronics, because their units are sheer delight to see, to use, and to enjoy. For full information on this most interesting aspect of our hobby, just send a couple of first class stamps and ask for "Kantronics". Prices range from £159 to £298, and I know I haven't told you what packet radio will do – the experts among you already know; if you are like me, a novice, why not send for the info...



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CN410M

NS660P

NS448

CN460M

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ALD-24E

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### THE RADIO COSTS

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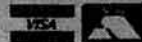
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- Direct keyboard entry
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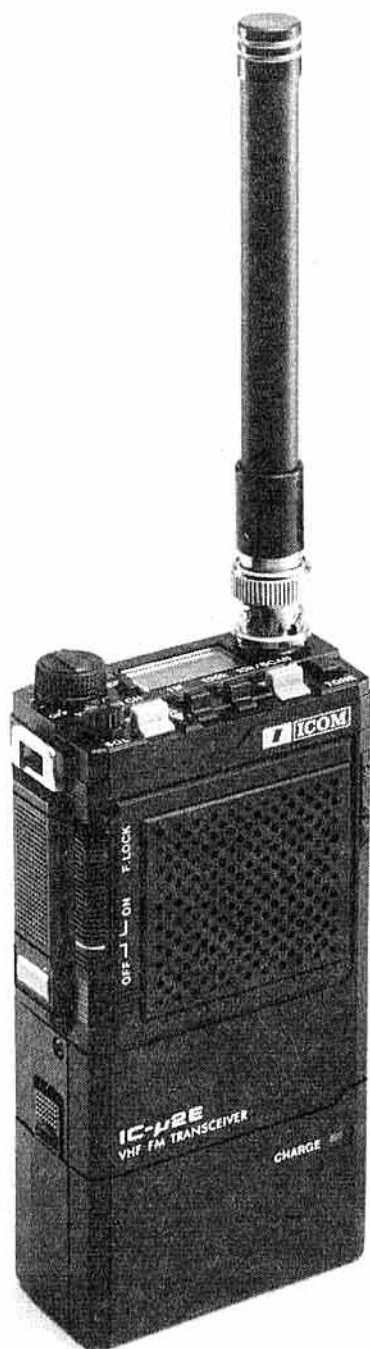
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# ICOM



## VHF/UHF FM Handportables

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This popular handheld from ICOM is still available. For those amateurs who require a straightforward and effective FM transceiver the IC-2E takes some beating. Frequency selection is by means of thumbwheel switches (with 5kHz up switch) simplex or duplex facility. Power output is 1.5 watts or low 150 milliwatts (2.5 watts possible with BP5A battery pack).

### IC-02E/04E 2 metre and 70 cm Keypad Handportable

These direct entry CPU controlled handhelds utilise a 16 button keypad allowing easy access to frequencies, memories and scan functions. Ten memories store frequency and offset, these handhelds have an LCD readout and power output is 2.5 watts or low 0.5 watt. 5 watts is possible with the IC-BP7 battery pack or external 13.8v DC.

### IC-12E 23cm Handportable

Similar in design and style to the 02E/04E this 1296 Mhz handheld utilises ICOM's experience in GHZ technology, gained by the excellent IC-1271E base station. Power output is 1 watt from the standard BP3 bicad pack, external 13.8v DC powering is available to the top panel jack. With the growing number of repeaters on 23cm. The IC-12E makes it an ideal band for rag chew contacts.

Also available for ICOM handportables are a large range of optional extras including a variety of rechargeable nicad power packs, dry cell battery packs, desk chargers, headset and boom mic, leatherette cases and mobile mounting brackets.



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## MOBILE

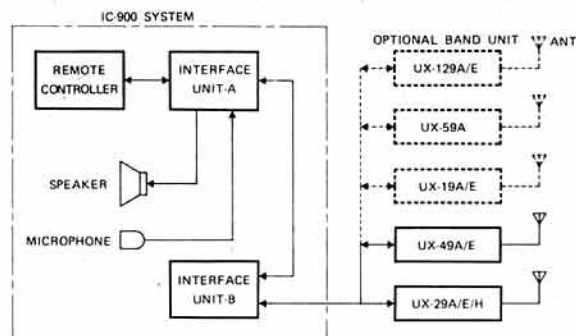
### IC-900 Super multiband FM system

This new addition to ICOM's Ham radio equipment is a multiband FM transceiver system that allows the mobile operator to customize a communications system for his favourite bands. Up to 5 optional band-units can be installed with the IC-900 for instant access to a wide range of frequencies from the 28MHz HF band to the 1240MHz UHF band. Only a small remote controller is necessary for control of all these bands. A flexible optical fibre is used between the Remote Controller and the Interface Unit. The IC-900 has independent full duplex capability on all bands, providing simultaneous receive and transmit operation. The function display on the Remote Controller shows two separate operating frequencies simultaneously. The IC-900 system transceiver is equipped with 10 fully programmable memory channels in each Band Unit. The system can therefore store up to 50 different memory channels. This revolutionary new concept is available from your ICOM dealer. Also feel free to contact ICOM(UK) LTD for assistance or information. The IC-900 Multi-band system consists of a Remote Controller, Interface unit B and a series of specially designed Band Units.

UX19	28-30MHz	10 watts
*UX59	50-54MHz	10 watts
*(No mobile operation allowed in UK)		
UX29	144-146MHz	25 watts
UX29H	144-146MHz	45 watts
UX49	430-440MHz	25 watts
UX129	1240-1300MHz	10 watts



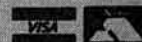
### Multiband system block diagram



**Helpline:** Telephone us free-of-charge on 0800 521145, Mon-Fri 09.00-13.00 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.

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# GAREX ELECTRONICS

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★ 2 watt audio output stage having a low quiescent current.

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Stock Versions: (fully assembled, aligned & tested boards) 6m, 4m, 2m & Weather Sat.: **£49.95** Complete cased versions & special options: details & prices on request. Crystals can be supplied if required; most popular 2 metre frequencies and the currently active Weather satellites are readily available. Crystal prices on request. Mains Power Supply Module **£15.50**

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★ Uses BF981 (0.7dB NF at 200MHz)

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★ Supply voltage 8-17v DC at 5-10mA.

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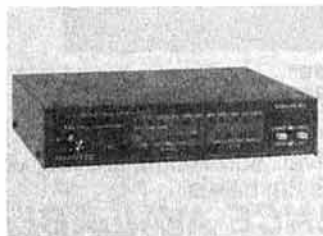
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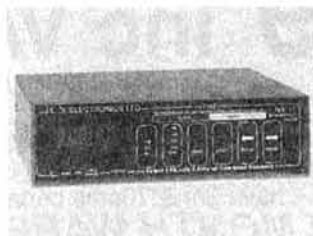
Our products cover just about every facet of data communication over radio. From advanced, multi function terminal units, to user friendly computer applications programs, to easy to use optimised single mode terminal units, to low cost graphics and text printers. We cover the field like no other company in the UK – and it's not only products that we sell! Applications back up assistance is always available over the phone, and we give no quibble 12 months warranty on all products.



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\*() FT711RH  
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FT211RH £309  
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## NEW FROM YAESU



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Smaller than their predecessors these models utilise a new cpu with greatly expanded features, most notable of which are 19 memories and support for the DVS-1 Digital Voice System, which can digitally record and playback from the microphone or the receiver.

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## INTRODUCING THE FT736R FROM YAESU



The FT-736R is a solid-state, frequency-synthesized VHF and UHF amateur transceiver incorporating up to four band modules covering the 50, 144, 430 and 1200 MHz amateur bands. The standard model provides 25 watts RF power output on the 144 and 430 MHz amateur bands in SSB, CW, and FM modes, with any two of the remaining three bands installable as options (10 watts output on the 50 and 1200 MHz bands).

An 8-bit CMOS main microprocessor and 4-bit i/o coprocessor provide exceptional digital integration and control: including selectable tuning rates or mode-dependent channelized tuning in selectable steps for each mode. Operating conveniences usually found only on HF transceivers, such as front panel adjustable IF shift and IF notch, a noise blanker, all-mode VOX and three-speed selectable AGC are included. GaAs FET receiver RF amplifiers are provided in the 430 and 1200 MHz band modules.

The innovative memory system includes one hundred general purpose memories plus ten full duplex cross-band memories, all of which store mode and receive and transmit frequencies independently. In addition, fourteen vfos are provided: two general purpose plus one PMS (Programmable Memory Limit Scanning) on each band, two special-purpose full duplex vfos, and up to four clarifier (receiver offset) memories, one per band.

Each of the two full duplex vfos can be selected so that its receive and transmit frequencies and modes can be displayed and tuned independently, or linked frequencies and modes in the special vfos and ten full duplex memories at all times. Of course, metering of either transmitter or receiver parameters is selectable during full duplex communications. For CW operators, the FT-736R offers quick changeover semi break-in and includes provisions for an optional internal electronic keyer and narrow (600 Hz) CW crystal filter.

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See outside back cover for more details

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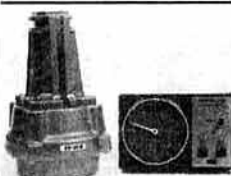


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LPM144-3-180	2m 180W out 3W in	355.00
LPM144-10-180	2m 180W out 10W in	355.00
LPM144-25-180	2m 180W out 25W in	305.00
LPM432-1-50	70cms 50W out 1W in	255.00
LPM432-3-50	70cms 50W out 3W in	255.00
LPM432-10-50	70cms 50W out 10W in	215.00
LPM432-3-100	70cms 100W out 3W in	395.00
LPM432-10-100	70cms 100W out 10W in	395.00
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#### MET ANTENNAS

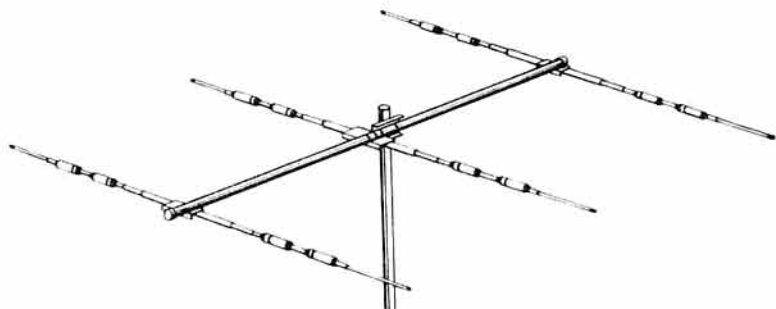
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## LIAISON OFFICERS TAKE TO THE FIELD

In 1913 the Society's first secretary, René Henri Klein, RKX, 2HT, G8NK, envisaged many advantages to be gained from the foundation of a national organisation to foster amateur radio and represent radio amateurs.

Among those advantages envisaged must surely have been the fostering of the amateur spirit whereby one amateur would help his neighbour, and vice versa. Self-help – doing things in groups/clubs – always seems to have many advantages. Somehow the combined effort available seems greater than the sum of the individual effort.

It is a well-known fact that some things are done best at national level – speaking to the DTI for example – whereas other things are best done at local level. It is the realisation of the latter that has given rise to the new RSGB Liaison Officer (RLO) Scheme which came into effect on 1 January this year, replacing the old Regional & Area Representation Scheme.

The RLO Scheme places an entirely new emphasis on the organisation of the Society at local level. This is because the role of the RLO is simply to help you and

prospective members to get the best out of your amateur radio. Basically, if you have a problem, a query or a point of view, the RLO is there to put you in touch with the expert who you need to find a solution. More often than not, putting you in contact with your local club, another local amateur or an RSGB volunteer expert in your area can provide a most effective answer to your question.

Each new RLO has a detailed breakdown of the effort available within the Society. By making contact with your RLO you should be directed to the best advice available, whether it be from HQ staff or a volunteer. Sometimes an RSGB committee can help you, sometimes an honorary officer. Remember that your local RLO – we will have an RLO in each county, Scottish region or main island eventually – is not there to solve your problems; he/she is there to put you in touch with someone who can help.

In addition to helping members, the role of the RLO is to stimulate local clubs to promote amateur radio, in its broadest sense, and to co-ordinate local contact with the media and other organisations.

The new RLO Scheme is only a few weeks old. It will undoubtedly have its teething troubles, but given the right will, and the amateur spirit of self-help envisaged back in 1913, the RLO scheme should become a most effective means of members helping themselves, through an organised local liaison system, to get the very best out of this unique activity.

*David Evans, G3OUF*



# Members' Mailbag

THE EDITOR,  
RADIO COMMUNICATION,  
LAMBDA HOUSE,  
CRANBORNE ROAD,  
POTTERS BAR, EN6 3JE

The views expressed in published correspondence are not necessarily those of the RSGB, and readers are urged to verify independently any factual statements on which they may wish to rely as it cannot be guaranteed that such statements are correct.

## OPERATING ON 50MHz

Sir—I was both delighted and dismayed to read Allan Duncan's letter in your October issue. Delighted, because, as a newly-licensed amateur, I couldn't for the life of me understand why no calling frequency had been allocated and wondered if I was misunderstanding the whole business of calling frequencies. And dismayed because he chose to group all G stations together as the bad guys.

This just isn't true. There are many of us who feel that it's unfair that we should have to listen to other folks' boring QSOs when, for the sake of a 10s delay they could have QSY'd elsewhere. Of course we could try our CQ calls elsewhere as well—but in a new band with few users (as yet) and with most people's scanners set on 50.200MHz, what chance of making a contact on other than that frequency? Virtually nil.

I'm all in favour of persuading other amateurs to stick to 50.200MHz as a calling channel only, but feel that the "powers that be" must stipulate it, if everyone is to abide by the rules. There will always be those who choose to selfishly inconvenience others unless it's a hard and fast rule and part of the band plan.

When I make a successful CQ call, and suggest we — QSY, I'm frequently told "Don't bother—this isn't a calling channel—just a centre of activity". I have now become so annoyed by this selfish attitude that I'm afraid my response is "Sorry OM... local QRM on this frequency... you are 2x2... try decimal 180...". Invariably, it works!

Steve Nicholls, G1YOU

Any further thoughts on this subject?

## CAMERA PSYCHOSIS

Sir—I have recently suffered the experience of having had my all-singing, all-dancing m/proc control camera go berserk while on holiday—(taking shots by itself, not taking any shots, winding-on by itself and then not re-winding, getting hot, and then giving up totally). The camera had worked perfectly until I had had a period of close-proximity handheld transmit operation, (hand resting on top of gadget/camera bag).

Although I am not sure if I had "zapped" the camera's brain, perhaps it may be worth keeping my experience in mind; both for cameras and other "state of the art" equipment. Items on a car parcel shelf could be only inches from a "hot" mobile antenna.

I wonder if any other readers have had similar problems, and suffered costly damage. I must say that my camera was replaced under warranty, much to the maker's credit, even though no claims were made regarding emc in their advertising!

Peter Walton, G4WAL

A very interesting (and worrying) point — anyone else had their camera go into psychosis after exposure to rf?

## RSGB STRAIGHT KEY DAY

Congratulations! This event, on 10 October, was a most enjoyable occasion, and I had the good fortune to chat with one or two very well-known old hands. What nice people there are on cw.

Events like this do much to keep alive the art of conversational morse as distinct from the formal, brief, and consequently impersonal exchange of details in contests.

Use of the straight key is to that of the electronic as is calligraphy to scribbling with a ball-point pen. A straight key day enables newcomers to our hobby to glimpse the delights which lie beyond the dreaded test.

Please, will the Council consider organising it on a regular basis, say quarterly or four-monthly?

D S E Row, G0EUE

Any more views on this one?

## CONTESTING AFTERMATH

Sir—It is midnight, I hear the distant church bells, a new day is here. The annual International All-Band QRM test has drawn to its end, and an eerie silence has settled on the earth.

My friend, G0Plonk, apologises to all plonkers, has made 6.5 million contacts and used half a million units of electricity in the past 48h, and also made four new contacts on Mars. His 940 is now a 1,040, his antenna tips reached melting point, the traps have welded together, and his microphone has crystallised.

His dog growled when he went into the house for his supper, and tomorrow he's off to the doc's for treatment to his piles. Apart from all this, what did you achieve in 1987 CQ Contest?

Mel Evans, G0GQK

Sounds like GB3RS after a 144MHz opening. . . .

## ANOTHER DREADED LURGY

Sir—I wonder if I am alone in detecting a new illness afflicting our hobby; I refer to the dreaded "There" virus. The symptoms are plain. "Over to you THERE", "I wonder what you are using THERE", "How are you copying THERE", and on and on and on. In extreme cases a QSO has more "THERES" than content.

This terrible disease has a secret weapon, those afflicted are blissfully unaware that they have been infected. So beware, it could happen to you, the THERE bug is no respecter of persons.

You have been warned. . . . So there.

M D Glynn, G3AAS

Not a new disease, alas—someone mentioned on the air the other day that its been around since the mid-'fifties at least! Can't we stamp it out once and for all there?

## FIRST RUNG ON THE LADDER

Sir—"From the Secretary's Office", Rad Com November 1987, p283, bemoaning the fact that fewer young people are coming into amateur radio these days and noting the dearth of trained and under-training technicians and engineers proposes a Student Licence low power, limited band/mode to enable beginners to get on the first rung of the amateur radio ladder.

It may be a jaundiced view, but it seems to me that the first and most important thing to be done is to put the "amateur" back into amateur radio, and stop aping the professionals, which is what, in general the amateur radio "movement" is doing these days. Browse through any issue of Rad Com or any other ham magazine and what does one see? Hi-falutin and complex receivers, transmitters, transceivers, "smart" audio filters and keyers etc, not forgetting microprocessors gone mad. There's satellite, packet, fax, computing etc. Reading Rad Com is almost like reading the journal of a professional institution.

Just imagine it through the eyes of an impecunious young beginner, a never-ending vista of exotic, pricey boxes, daunting constructional articles, and lists of second-hand equipment donkey's years old at extortionate prices and no hope of servicing it without a labful of test gear and even less hope of getting it serviced commercially. How is a young person ever going to get a foot on the ladder even if he/she has a Student's Licence.

Ah, "they" say, go for QRP—low power and simple transmitters and receivers. That was possible when I started in 1937. An Eddystone all-world Two and 3-5W into a resonant piece of wire and one could have QSOs galore. Not on today's bands. An inexperienced operator with only 3-5W from a typical suburban plot will be lucky to have one QSO a day. Even making the simple gear is daunting to the inexperienced. Minute components, complicated and small pcbs, transistors by the dozen and chips with everything.

I know we can't go back to the valve era, but we can learn some lessons from it. Large pitch Veroboard and/or tag strips/boards with the components laid out to look like the circuit diagram and to a reasonable size; no chips (individual transistors are easier to fault-find and replace); as near one-to-one correspondence with valve rigs as

possible, ie a three-transistor vfo-buffer-pa and valve type powers, ie 10-30W (it can be done—see G3XSE's three-transistor 10W Top Band transmitters, SWM January 87)—with vmos, 30W is easily obtainable; largish components (so what if that makes it necessary to use a 1W resistor where a 1/8W will do?); forget toroids, let's have old-fashioned coils whose inductance can be varied with a screwdriver (Denco still exist—usual disclaimer); revive the super-gainer receiver in the shape of, say, a 1.6MHz (or 7 or 10MHz) TRF with crystal-controlled converter(s), after all a TRF is good for all three modes cw, ssb, a.m. Talking of a.m, let's revive it on 160, 80 and 10 (how does one "anode modulate" a vmos?).

In short, it wants a determined effort to make it easy for youngsters to get a foot on the engineering ladder and on the bands; it doesn't want a dedicated Student's Licence/band where they will be segregated on their own with the blind leading the blind. There must be some designers out there who can come up with the goods. Who knows, even old-timers with bi-locals and shaky hands and people who are QRT (I'm both) who are deterred by the complexity and/or price of modern equipment may also enjoy putting together a real "kitchen table" rig.

Finally, if beginners are that important why isn't there a regular page or two (or three or four) for them in Rad Com? There is plenty of alternative literature of the amateur "professionals" or should it be "professional" amateurs?

Ron G Taylor, G3AVQ

Sounds like the start of a good debate here—any other views on this topic?

## FAIRPLAY OR FREELADING?

Sir—I was very surprised to learn from the letter by G4PZR in your November issue that only approximately 50 per cent of licensed amateurs are members of the RSGB.

All licensees benefit from the good work carried out by the Society, not least in its good work liaising with the powers-that-be in obtaining our frequency allocations. Surely then, it is only fair that all who benefit should support both morally and financially the people who do this work.

I have no doubt that members pass on their monthly copy of Rad Com to their friends who are non-members, they in turn being only too happy to benefit, at again no cost to themselves, from all the information and technical articles therein. The non-members attitude seems a very selfish one, when, as G4PZR rightly points out, the cost of joining works out at one pint of beer per fortnight, and cheap beer at that.

It's a difficult problem, but it might be advantageous to have a little advert in each issue of Rad Com, appealing to the sense of fairplay of each non-member who might be reading the book, to pay up instead of riding on the backs of the other 50 per cent.

Having been a member for 46 years I think I'm entitled to my opinion.

(NAME AND ADDRESS SUPPLIED)

We couldn't agree more—and it makes us wonder when we hear things like "I'm not a member of the RSGB so I don't need to observe the bandplan" (a G3\*\*\* in Cheshire during a 144MHz opening last November). For once we envy the Eastern bloc, where membership of the national society is obligatory before you can have a licence!

## COUNCIL ELECTIONS

Sir—For some years I have chosen not to use my vote during RSGB elections for members of Council. This is because the information supplied by candidates and nominators with the ballot paper fails consistently to explain why any of the candidates should receive my vote.

It's useful to know what a candidate has done in the past, but what I really need to know is why he or she is seeking election.

I often wonder whether other RSGB members share this view.

Steve Rawlings, GW4ALG

Well, let's ask them—comments anyone?

# A MOBILE ANTENNA FOR 1.8 to 28MHz

M J GRIERSON, G3TSO\*

THE PURPOSE OF THIS ARTICLE is to describe a mobile antenna system developed and constructed to produce the best possible rf performance while remaining as unobtrusive as possible and capable of sustaining motorway speeds without fear of detachment from the vehicle. After some two years of fairly leisurely development, the antenna described has undergone a further two years of road testing covering over 20,000 miles at sustained high speeds and has lived up to its initial requirements.

Before it is possible to say how good or bad an antenna is, it is necessary to have some idea of what sort of performance one might expect to achieve with a particular design. It must be borne in mind that a mobile antenna is considerably shorter than one would normally choose to use from a fixed station, and as a result there will be a penalty in terms of reduced performance. Table 1 illustrates some typical performance figures achievable with a centre loaded mobile whip 9ft long on the lower frequency (1.8, 3.5 and 7MHz) bands and 6ft long on the higher frequency (14, 21 and 28MHz) bands. It can be seen that on 1.8MHz, for example, one could reasonably expect to have a gain figure (relative to a vertical quarterwave) of around -26dB, a low performance may be -32dB, while a high-performance antenna may be -23dB. High performance in this context is therefore relative and not absolute, when we consider that -23dB represents an efficiency of only 0.5 per cent, or 500mW radiated power for 100W input power. Optimising the performance of a mobile antenna is essentially the art of reducing the losses to a minimum. An interesting rule of thumb which emerges from Table 1 is that doubling antenna length is worth a 6dB gain improvement, and correspondingly halving antenna length will reduce the gain by approximately 6dB.

**Table 1. Typical performance figures for a mobile antenna**

Band	Ant length Wavelength	Gain (dB) rel ¼ Vertical	Efficiency (%)	Transmitter power output	Effective radiated power
160	1/57	-26	0.25	32W	80mW
80	1/29	-20	1.0	100W	1W
40	1/15	-14	7	100W	7W
20	1/10	-10	10	100W	10W
15	1/7	-6	25	100W	25W
10	1/5	-2	63	100W	63W

Antenna length approximately 9ft on 1.8, 3.5 and 7MHz, and approximately 6.5ft on 14, 21 and 28MHz.

**NOTE:** These figures have been determined from a series of comparisons and contain some degree of interpolation and extrapolation of observed data. Their purpose is to indicate the relative inefficiencies of short mobile antennas rather than to indicate a performance specification.

## Antenna design criteria

There are a number of different designs commonly found in commercial and homemade mobile antennas, and it is as well to understand the characteristics of each type before deciding upon a final design.

I will assume that in all cases the mobile antenna will be shorter than a quarterwave, although it is just feasible to operate a full quarter-wave on 28MHz. A short antenna will have capacitive reactance, and in order to achieve resonance, ie a purely resistive feed impedance, a certain amount of inductance must be added. The value of the inductance required will of course vary considerably with the frequency in use. By far the simplest method of achieving resonance is the system adopted by the "military", an inductive tuning unit mounted directly below the antenna. I am sure that most amateurs will have seen such devices fitted to the front wings of Army Land Rovers. The system is relatively "soldier proof" and easy to tune, but suffers from one serious drawback in terms of efficiency, which is low. The amateur equivalent is the base-loaded antenna in which the inductance is usually fixed and out in the open, but it still suffers in the same way from low efficiency. The cause of the problem is due to the relatively-high impedance of the antenna whip and the low current which flows through most of its length. The part of an antenna which is responsible for most of the radiation is generally accepted as that part which carries the maximum current.

\*9 Conegar Road, Quenington, Cirencester, Glos GL7 5BY.

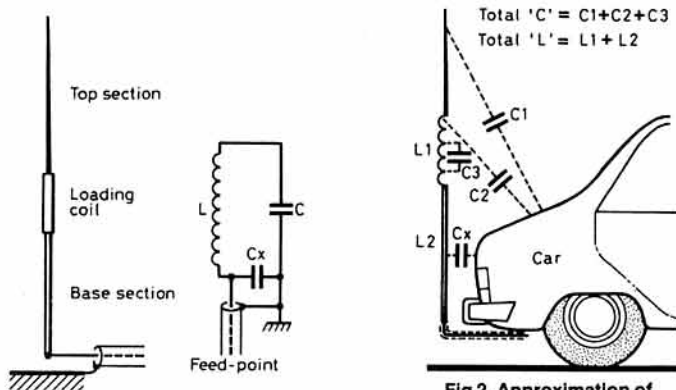


Mike Grierson was born in 1945 and built his first radio set in 1958. He passed the RAE in 1961 after a period of self-tuition and was licensed as G3TSO in 1964. His first introduction to mobile operation was on 1.8MHz in 1961, and since that date he has built numerous mobile antennas, transmitters and receivers and has operated all bands from 1.8MHz to 144MHz, 1.8MHz remaining the favourite band. Professionally involved in aviation, amateur radio remains purely a hobby with home construction being the major interest. He currently operates a home-constructed station both at home and from the car.

If we wish to achieve maximum current flow into a short antenna, all we have to do is to raise the inductor to the top of the antenna; however, unless we add a large capacity hat, a very much larger value of inductance is required at the top than at the bottom. The sheer mechanics of trying to mount a large coil on the end of a thin whip antenna makes this type of arrangement undesirable for mobile use, but it has applications for base station operation. A further disadvantage of top loading is caused by the increased LC ratio, the bandwidth is narrow and the whole antenna is subject to marked changes in resonant frequency due to antenna movement causing changes in the value of capacitance. A good compromise is to place the loading coil somewhere near the centre of the antenna so that we can achieve the maximum current flow in a high proportion of the antenna length while applying the mechanical constraints imposed by mobile operation. The loading coil can conveniently be placed in a position such that the base of the coil is roughly half-way up the antenna or slightly higher.

## The centre-loaded antenna

Now is the time to consider how a centre-loaded antenna operates, and it is convenient to divide the amateur bands into two groups, those below 10MHz (lower frequency) and those above 10MHz (higher frequency). In the case of the higher frequency bands, the mobile antenna can be considered to be a shortened quarter-wave vertical and normal antenna calculations may be applied. The lower frequency bands present a slightly different situation, as the mobile antenna is so short that it is only a small fraction of a quarter-wavelength and the antenna behaves more like a leaky parallel-tuned circuit. In this case we are attempting to make it as leaky as possible by utilising long lead lengths in the circuit, in the form of antenna elements and a large coil.



**Fig 1. Simplified equivalent circuit of a mobile antenna**

**Fig 2. Approximation of capacitance and inductance in a mobile antenna**



Fig 1 shows a simplified equivalent circuit of a centre-loaded antenna, while Fig 2 attempts to illustrate where the various components of L and C come from in a practical installation. The inductance L is very obviously represented by the loading coil L1, but not so obviously the antenna base mast can be regarded as part of the total inductance and is represented as L2. The base mast has capacitance to earth, Cx, but its effect is minimal. The top section of the antenna forms the top plate of the capacitor C and is represented by C1 which combines with the capacitance of the loading coil to ground (C2) and the internal capacity of the coil (C3). By changing the value of C it is possible to tune the antenna, and this can simply be done by varying the length of the top section. As the total value of C in a 9ft 1.8MHz antenna is typically only 15pF, any small changes of this value will cause a large change in resonant frequency. The high LC ratio results in a very narrow bandwidth, but as the frequency is raised so the value of inductance required decreases, reducing the LC ratio, which in turn makes tuning less critical. The bandwidth also increases as the frequency is raised.

Let us consider what happens if we increase the length of the base mast below the coil. As mentioned earlier, the base mast can be regarded as part of the total antenna inductance, on the lower frequencies any small changes in the value of inductance will have negligible effect, so that if we were to double the length of the base its effect on the total value of inductance would be almost nil, however, the top section is now significantly further away from the ground and the total capacitance in the system will have reduced and hence the antenna resonant frequency increases. Here is the first pitfall for the newcomer, we have increased antenna length and the frequency has also increased. If we now try the same experiment on the higher frequency bands, the effect is different, increasing the length of the base is proportionately greater in terms of the total value of inductance, and while the change in capacitance is the same as in the lower frequency case its effect is less due to the reduction in the LC ratio. Any excessive changes in base length on the higher frequency bands will usually render the antenna impossible to tune on the desired band. It should now be obvious that base extensions on the lower frequency bands are a practical way to increase performance without seriously detuning the antenna, whereas on the higher frequency bands this is not very practical as the antenna is more likely to be thrown out of band. A slight retune will usually be necessary on the lower frequency bands by increasing the length of the top section. Fig 3 illustrates a practical centre-loaded antenna.

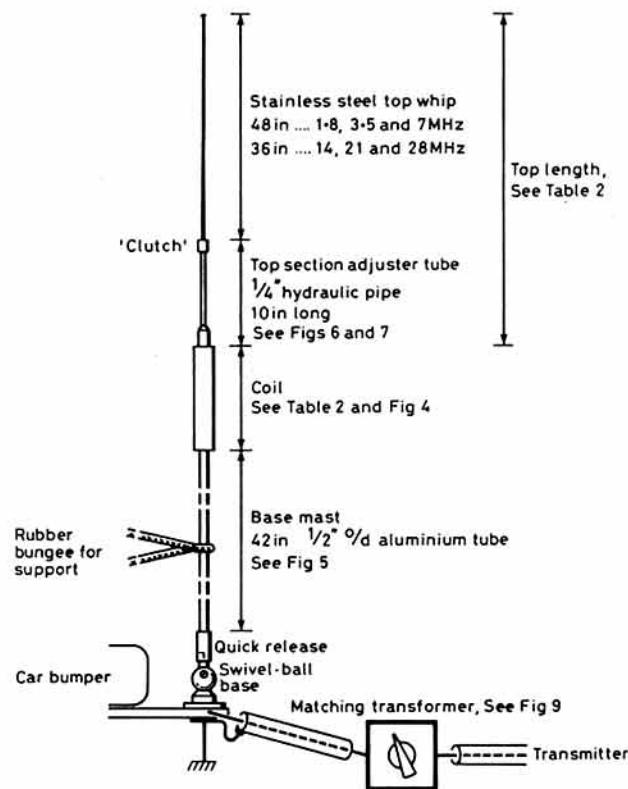


Fig 3. Constructional details

## The loading coil

The loading coil is an incredibly simple device yet remains the subject of much folk-law and a certain amount of nonsense. It is commonly believed that the current flowing through a loading coil somehow manages to reduce in value towards the top; in fact, some loading coil designs actually use thinner wire at the top than at the bottom.

Let us return to the parallel-tuned circuit. Physics tells us that the current entering the coil must be the same as current leaving it, this must also apply to the loading coil with the exception of small losses due to stray capacitance. It is these losses that will reduce antenna performance together with dielectric and resistive losses in the coil. If the stray capacitance in the coil is kept to a minimum, maximum current will flow up the base mast through the coil and into the top section where it charges up C1. Current flow in the top section of the antenna falls off rapidly above the coil. It would seem to be a natural conclusion that the loading coil must be mounted well away from surrounding objects and ideally above the vehicle roof line to minimise losses.

It would also seem fairly logical that if the current through the coil is high, it too will contribute to the radiating of the antenna. Why then should a short fat coil with is high Q be better than a long thin coil as so many of the older text books claim? Well, practice has proved the point quite conclusively that the long thin coil performs equally as well as, if not better than, its larger diameter counterpart which has no merit in terms of electrical performance and is aerodynamically disastrous. Large diameter coils were discarded at a very early stage of the development process.

Table 2. Actual loading coil dimensions used in G3TSO mobile antenna

Band	Coil length (inches)	Coil dia (inches)	Winding length (inches)	Wire gauge (SWG)	No of turns	Inductance (μH)	Approx top section length (inches)	Base (Ohms)
160	8-875	1-125	8	25	370	510	52 @ 1-93MHz	28
80	6-5	1-375	5	20	130	142	52 @ 3-7MHz	12-5
40	4-75	1-125	4	18	70	34	53 @ 7-05MHz	15
20	2-5	1-125	1-5	18	26	10	36 @ 14-2MHz	45
15	2-25	0-75	1-25	18	21	4	40 @ 21-2MHz	45
10	2-25	0-75	0-75	18	10	2	33 @ 28-5MHz	45

### NOTES

1. Coil dimensions may be changed provided the inductance figure is adhered to.
2. Top section length will depend up on diameter of top section.

### FORMULA

$$L(\mu H) = \frac{a^2 n^2}{9a + 10b}$$

a = Coil radius inches  
b = Coil winding length  
n = Number of turns

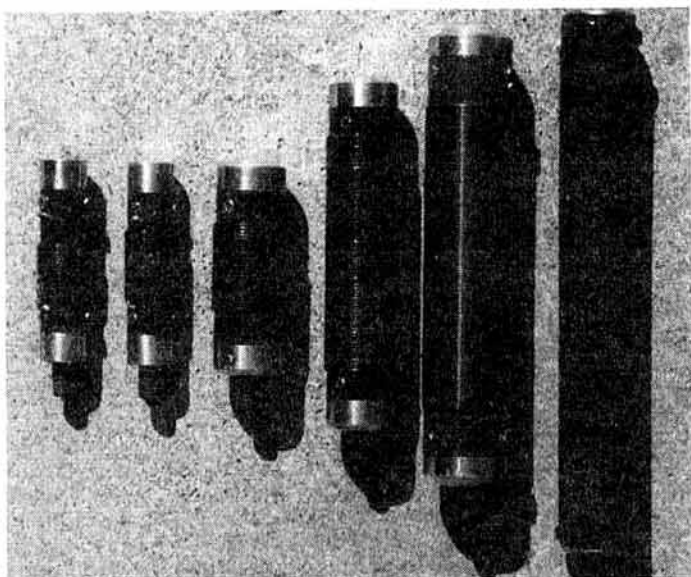
## Loading coil construction

There are no hard-and-fast rules regarding the construction of loading coils; however, there are a number of factors worthy of consideration when designing and constructing them.

Wire diameter is an important consideration, as too thin a wire will have a significant effect on dc resistance in the coil. In the case of the higher frequency bands, either 18 or 16swg will usually suffice, but on the lower frequency bands inductance requirements are such that enormously-long coil formers will be required to accommodate sufficient turns. In some cases the length of the former will dictate the gauge of wire to be used. In practice 24swg should be regarded as the thinnest wire usable on 1.8MHz, where a 500μH coil on a 1.25in. former will exhibit approximately 3Ω resistance. Higher values of resistance should not be considered acceptable.

Coil diameter has already been mentioned, and values of 1 to 1.37in are suitable, there is little point using 2.5 or 3in formers. Often formers will be limited to 10 or 12in length, and this has been found adequate, although on 1.8MHz a longer length would have been desirable.

Coil formers should be made of low-loss, lightweight material with a sufficient degree of strength and heat resistance so that it does not melt when soldering. Materials such as Paxolin, resin-bonded fabric and glass-fibre are ideal; plastic waterpipe is not ideal, although it is readily available in the right sort of sizes. Some teleprinter rolls are wound on a resin former which is also very good.



Loading coils for 1.8 to 28MHz

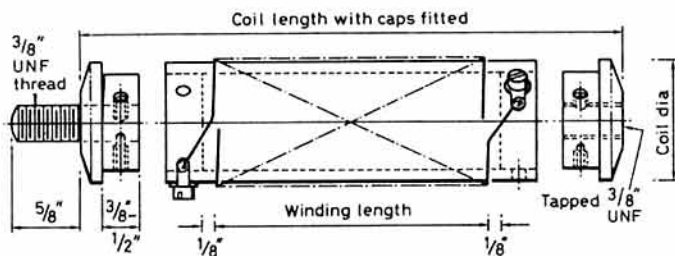


Fig 4. Loading coil

Construction of the coil, Fig 4, will depend to a large extent on the resources available. Ideally, machined aluminium end-caps should fit snugly into either end of the former and be secured with three or four screws drilled and tapped into the aluminium. It is possible to avoid the machining by obtaining aluminium bar with a similar diameter to the inside of the coil former. End caps should be drilled centrally to facilitate assembly of the antenna and tapped with a suitable thread, 3/8in UNF, 24 tpi being a fairly universal thread for commercial antenna parts.

Coil winding should not cover the inserted end caps, but start at least 0.12in down the former to minimise stray capacitance effects. There are possible advantages to be gained from spacing turns at least one turn apart to minimise stray capacitance, and the use of ribbed formers to facilitate airflow to remove moisture; however, there are likely to be aerodynamic penalties and so close winding has been adopted to minimise drag and turbulence. Several coats of polyurethane varnish are used to seal and protect the finished coils. The use of heat-shrink sleeving is possible for protection, but may attract moisture by capillary action if not properly sealed.

Both ends of the coil may be left with female 3/8in UNF thread, or a stud may be inserted into the uppermost end-cap and retained in position by arranging for one of the end-cap fixing screws to penetrate the stud and lock it. Studding both ends of the coil is not advisable as moisture may build up inside.

## Mounting the mobile antenna

After 21 years of mobile operating I think I tried every conceivable location in which a mobile antenna could possibly be placed, all have their advantages and disadvantages and an element of personal preference invariably creeps in.

The principal location points are: the roof, including roof racks and gutter mounts; wing mounting, either front or rear, and bumper-level mounting. One of the very important aspects of a mobile installation often overlooked is the need for a good earth at the base of the antenna. Roof mounting appears to offer the best location, but perhaps provides the worst earth-point unless one is prepared to remove paint from the vehicle.

The location of an hf antenna on a vehicle is not as critical as its vhf counterpart, and despite numerous claims to the contrary the location for

a mobile antenna makes little difference whether it is on the roof or the bumper. The screening effect of a vehicle is not likely to become significant until the dimensions of the vehicle start to approach a quarter of a wavelength, this is not likely to happen below 21MHz unless you own a double-decker bus.

Once the mounting position has been decided upon, the antenna design can commence. In my case bumper-level mounting, utilising a steel bracket made by the local blacksmith and secured to existing bolts underneath the vehicle chassis. The length of the base mast was chosen to lift the loading coil above the roof of the vehicle, and mechanical stability while on the move imposed a slight limitation on the original length. A total antenna length of 8ft was aimed at, but this was increased to 9ft on the lower frequency bands and was reduced to 6ft on the higher frequency bands. Bumper mounting has enabled a rubber bungee to be attached to the antenna some 20in from the base and attached to the boot handle to enhance high-speed performance.

## A choice of materials

A variety of different materials can be used in the construction of a mobile antenna, and those suggested here represent just one way of approaching the problem.

The choice of 3/8in UNF threads as a standard method of fixing components together has proved to be very worthwhile, as numerous commercial, cb and amateur antenna fitments use this thread. The purchase of a suitable set of taps and dies is a good investment.

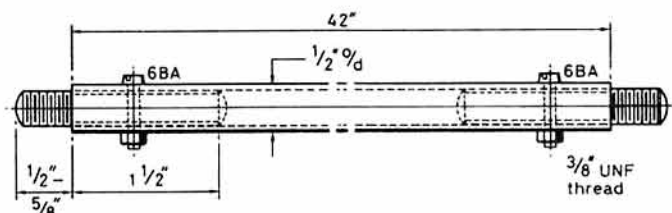


Fig 5. Base mast

The base mast (Fig 5) is comprised of a 42in length of 0.5in od by 0.375in id drawn aluminium or dural tubing which is both light and strong. The ends can be fitted with a length of 0.375in brass rod and threaded for 0.5in with 3/8in UNF thread. Alternatively, obtain two 3/8in UNF by 2in bolts, saw off the heads and insert them into either end of the tube. The studs can be secured by drilling through the tube and stud and inserting a small diameter screw (6BA). They should be removable to facilitate periodic cleaning to remove corrosion.

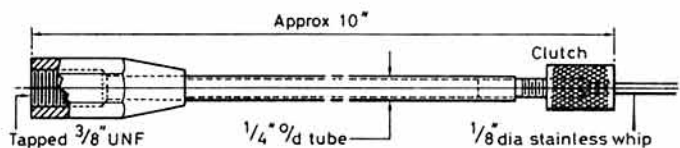


Fig 6. Top section adjuster

The antenna top section (Fig 6) ideally should be variable in length to facilitate initial adjustments to achieve resonance and subsequently to permit operation on more than one frequency in a band. Old domestic car antennas can be used, as they are telescopic, but they can be rather heavy when mounted on top of the loading coil. A suitable alternative is to use a stainless-steel vhf antenna which is readily available and mount it into a hollow tube with some form of collet or clutch assembly. The construction of this clutch can be the most complicated part of the antenna and its final design will depend upon the engineering resources available. The tube used was a short length of aircraft hydraulic pipe which is silver-soldered into a special turned 0.37in UNF nut, and the whole assembly screws into the loading coil. The clutch (Fig 7) was manufactured from a length of brass rod drilled to accommodate the 0.12in stainless whip and tapped to

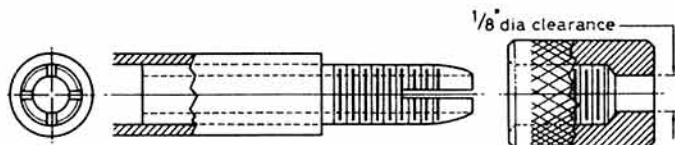


Fig 7. Clutch construction



take a knurled nut. The rod is then cross-cut with a hack saw vertically down from the end, and the end is filed to a taper so that the nut will compress it around the whip and clutch it. The clutch assembly can either be silver soldered to the hydraulic pipe or alternatively force fitted into the upper end. Other fixing arrangements are possible using grub screws.

All coils were wound on Paxolin, glass-fibre or resin-bonded fabric formers fitted with machined aluminium end-caps drilled centrally and tapped with a  $\frac{3}{8}$ in UNF thread. Coil dimensions are listed in Table 2, but the dimensions can vary to suit available formers as long as the procedure for initially resonating the antenna is followed.

The construction details are illustrated in Figs 4 to 7, and most dimensions can be adjusted to suit individual requirements.

## Mounting the antenna

In order to test and tune the antenna, a suitable mounting on the vehicle will be required and should preferably be the mounting that will be used when operating mobile. Drilling holes in new cars is not desirable, and with a little imagination existing holes or bolts can often be used to hold a suitable mounting bracket in position. Indeed, two suitable bolts to hold an optional tow bar were found under my Ford Sierra. A bracket was manufactured by the local blacksmith at minimal cost (£4) and a flat steel plate was arranged to emerge from under the rear bumper. There are a number of commercial antenna mounts available which will mount onto a flat surface and swivel to give a vertically aligned hole complete with the  $\frac{3}{8}$  UNF thread already tapped. Quick-release fittings are also available for cb use with the same thread and permit bayonet mounting of the antenna. A separate heavy earth braid from the antenna base to the vehicle chassis is advisable to guarantee a good earth connection.

## Resonating a mobile antenna

A loaded mobile antenna will radiate maximum power when the antenna is at resonance, but the power output and hence antenna efficiency drops quite rapidly as the frequency moves away from the resonant point; this effect is most critical on the lower frequency antennas. An easy way to determine resonance is to apply a signal generator to the antenna mounted on a vehicle and, using a sensitive field strength meter, observe the frequency that coincides with the maximum field strength. Important considerations are that the signal generator has a constant output level, the field strength meter should be a broadband device with a level response, and the proximity of the field strength meter to antenna should be great enough to avoid inductive coupling, 4 to 6ft should be suitable for a field strength meter with an 18in antenna.

A grid dip oscillator can also be used, and it should be link coupled directly to the antenna base without using coaxial cable. At resonance the antenna will draw power from the gdo and a dip will be observed. Occasionally more than one dip will be found and the deepest one is most likely to be the correct one. The gdo method is the simplest way of getting the antenna into the required band. Alterations can be made to antenna top-section length, or the turns on the coil can be physically changed. Once the antenna is "in band" according to the gdo, the transmitter may be used as a convenient low-power signal source. It is most important to keep the power as low as possible during the next operation as some high swr conditions will be encountered, 2 to 3W should be adequate. Using the transmitter as a signal source it is necessary to plot field strength readings over a range of spot frequencies across the desired amateur band. At or near resonance there should be a rise in the value of field strength.

So far no mention has been made of the swr bridge as it cannot measure resonance on its own, because the base impedance of a mobile antenna is most unlikely to be 50 $\Omega$ . However, an swr meter placed in circuit during resonating operations will indicate a rising swr away from the resonant point, and close to resonance a minimum value of swr will be indicated. The minimum value of swr is unlikely to coincide exactly with the maximum field strength reading, and the latter should be regarded as an indication of resonance and may well coincide with an swr as high as 3:1. Once the resonant point is found the antenna length may be adjusted by a small amount at a time, typically 0.5 to 1in, until the desired resonant frequency is obtained. Adjustment of the antenna to cover a range of frequency by adjustment of the top section may require some alterations to the turns on the loading coil, and it is often better to wind coils with a few more turns than necessary as it is easier to remove turns than add them at a later stage.

Resonating an antenna is a laborious process until you develop the "feel" which only comes with considerable experience, and it cannot be over-emphasised how critical small changes in top section length can be to

the resonant frequency. Once the antenna is resonant it will be necessary to transform the base impedance to match the antenna to the transmitter.

## Matching the antenna to the transmitter

There are a number of ways of matching the transmitter nominal 50 $\Omega$  output to the impedance likely to be encountered at the base of mobile antenna, typical methods being inductive shunt feeding, capacitive shunt feeding and transformer matching (Fig 8). An antenna tuning unit could be used, but is not advisable as it will inevitably lead to attempts to load a non-resonant antenna, a wonderful match can be achieved, but it will not radiate as effectively as a properly-resonated system.

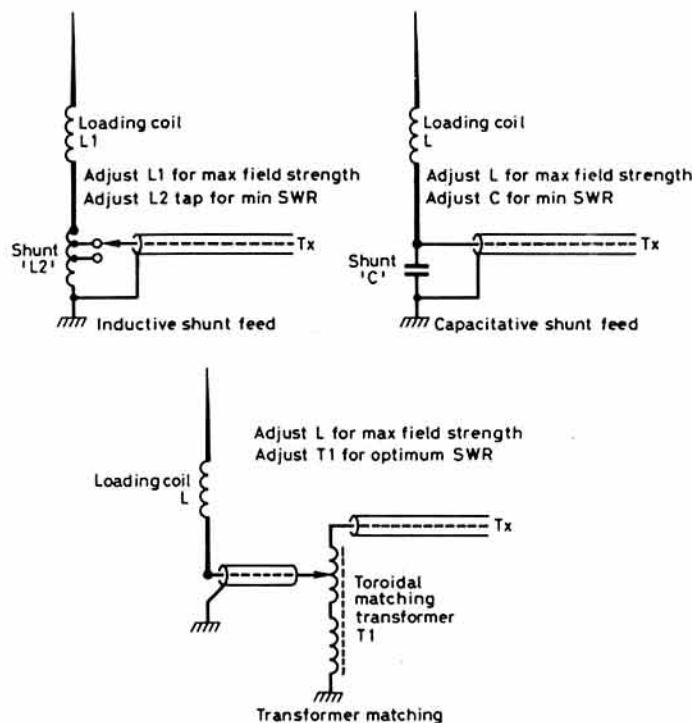
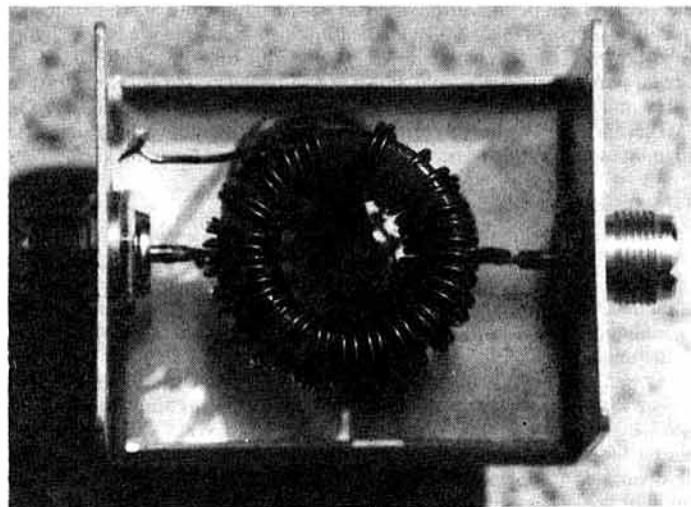


Fig 8. Recommended methods of antenna matching

Capacitive matching is simply the addition of a shunt capacitor directly across the antenna feedpoint. Values as high as several thousand picofarads may be required on 1.8MHz reducing to a few hundred picofarads on 28MHz. Exact values can be determined experimentally and will need to be switched for multiband operation.

Inductive shunt feeding requires the addition of a small inductance in the antenna base connected from the antenna to earth. The transmitter is tapped up this inductance in order to obtain a match. Unfortunately the addition of this extra inductance will in itself change the resonant frequency of the antenna and multiband switching becomes complicated.



Toroidal matching transformer

I have adopted the use of a toroidal matching transformer which can be home made or purchased from one of the well-known trade suppliers. The design, which has featured in *Technical Topics* at least twice, comprises a toroidal auto-transformer. Cores such as the Amidon T 157-2 are suitable and can be wound with 20 turns bifilar using 18swg wire. Both windings are connected in series, in phase, and the second winding is tapped every other turn. Fig 9 shows the winding arrangement. This convenient little transformer permits antenna impedances of 50Ω down to 12.5Ω to be matched. Some change in resonant frequency will occur when the transformer is placed in circuit. This type of matching device works best when it is looking at a purely resistive load, and should therefore be regarded as a matching transformer for use at antenna resonance and not as instant QSY matching unit. It does offer some flexibility, but in the interest of performance, resonance is the aim of the game.

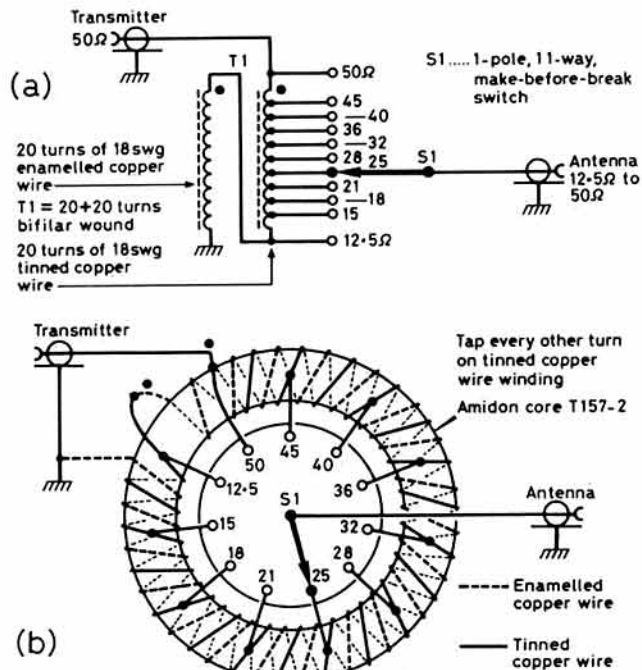


Fig 9. (a) Toroidal matching transformer (b) Winding layout

With the antenna at resonance and the appropriate matching network inserted between the transmitter and antenna, the minimum SWR indicated should be almost coincident with the maximum output indicated on a field strength meter. It is now adequate to use the SWR bridge as an indication of resonance. In order to facilitate quick tuning of the antenna when changing frequency or bands, a set of calibration charts or graphs indicating antenna length versus frequency is very helpful, as are switch positions of any matching networks employed.

By sweeping either side of the resonant frequency, the bandwidth of the antenna can be measured and can be the bandwidth at which the SWR rises to a specified level, ie 3:1, indicating the maximum SWR before many solidstate rigs start to shut down. Bandwidth on the lower frequency bands, particularly on 1.8 and 3.5MHz will be very narrow, typically 3 to 5kHz and will not be symmetrical about the resonant frequency. On 7MHz and the higher frequency bands, bandwidth will usually be adequate to permit one setting for the greater part of the band.

### The capacity hat

I have deliberately not mentioned the capacity hat as it has not featured in any of my designs. Its purpose, as its name implies is to add extra capacitance to the antenna and can be used to reduce the value of inductance required to resonate the antenna. In order to achieve the best possible performance, the capacity hat should be placed at the very top of the antenna to preserve the optimum current distribution, and this is not very practical in a mobile installation. There are some useful applications for horizontal elements in a mobile antenna when it comes to tuning; a small horizontal adjuster will tune the antenna over a wide range and permit a fixed length top section to be used. There is one major disadvantage in terms of safety; horizontal projections on an antenna could be regarded as potentially dangerous if they came into contact with, for example, a passing pedestrian.

### Equipment installation

Most manufacturers' handbooks supplied with amateur radio equipment give details of how to install the equipment in a vehicle and yet they are too often ignored. With an increase in the number of in-car electronic systems, so the chances of interference become greater.

Battery leads should be as short as possible and connected directly to the vehicle battery via fuses and not through cigar lighter sockets or in any way through the car wiring harness. The dc power leads supplied with most equipment are too nice to cut up and too expensive to replace if you need a new one, so why not buy a spare power connector and, using wire from your local motor factor, make up a permanent set of power leads for the vehicle.

Second, earthing at the transceiver is important. Most equipment is fitted with a heavy earth terminal, and this should be taken to a good earth using a short heavy braid. Finding a good earth inside a car is not so easy these days. Finally, the antenna feed cable must be earthed at the antenna base. If this is omitted, rf can travel back up the braid to the transceiver earth or, even worse, right back to the vehicle battery earth, causing havoc with car electronics as well as making antenna tuning difficult on the higher frequency bands. Fig 10 shows the recommended wiring for a mobile installation.

It is current practice by many mobile stations to use a boom microphone often fitted with some form of remote switch box and maybe a power source for an electret microphone. All earthing on such remote equipment should be wired to the transmitter microphone input earth point only, as earth loops caused by extra earths can cause rf pick-up loops which cause rf interference to the transmitter af stages.

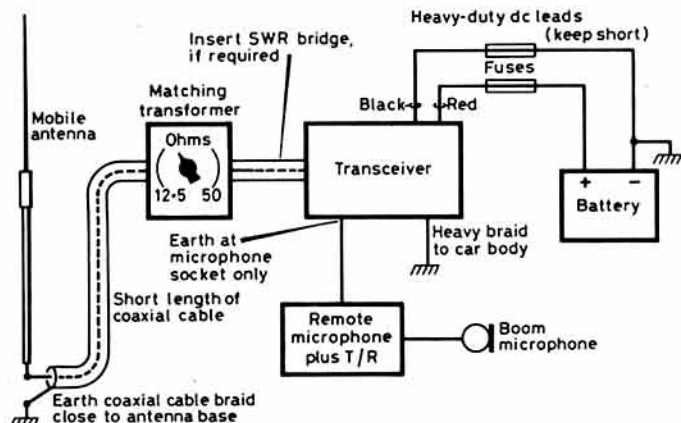


Fig 10. HF mobile installation

### Conclusion

Mobile operation can be a very interesting and rewarding aspect of amateur radio, often giving contacts not achievable from the base station as well as providing a means of taking the hobby away for the weekend or to another country. Many of the modern hf transceivers are highly mobile and designed to operate from a 12V supply and only require the addition of a suitable antenna. It is often the antenna that causes the major problems, and poor results are often attributable to poor installations, a non-resonant antenna and a general lack of understanding of what is really happening. It is hoped that this article will provide a non-technical insight into the operation and construction of a mobile antenna capable of good results subject to suitable band conditions. Several years ago I worked five continents in the space of 10 days while operating from the south of France using the design described in this article.

To summarise: a mobile antenna should be mechanically sound and firmly secured to the vehicle, preferably at more than one point. There should be a good earth for the coaxial feed to the antenna as close to the antenna base as possible. The loading coil should be clear of the vehicle and ideally above the roof line. The antenna should only be operated at its resonant frequency and matched to the transmitter using a suitable matching arrangement; an off-tune antenna and an atu will never perform well. The overall efficiency of the antenna will ultimately be determined by its physical length, and provided all losses are kept to a minimum the only way to improve the performance is to increase the length; on the lower frequency bands this can easily be done with a base mast extension. Commercial antennas vary from good to bad and in general will only work as well as a homemade antenna, the Hustler being a very good bench mark from which to judge other antennas. □



# KITE-BORNE ANTENNAS FOR HF PORTABLE OPERATION

*Dave Lunn, G3LSL\**

DURING THE SUMMER MONTHS I enjoy portable operation on the hf bands, using a Trio TS120V 10W transceiver. A variety of antennas has been tried on these outings, including dipoles and longwires strung between convenient trees, also base-loaded verticals using an 8m telescopic aluminium mast. The latter involves the erection and guying of the pole, which is not an easy single-handed task, while the tree-supported varieties entail considerable physical exertion, not to mention risk to life and limb! In searching for a more convenient method of supporting efficient radiators, the viability of kite-borne antennas was explored. The exercise proved as interesting as it was successful, and the following notes are offered as a practical introduction to the subject for those wishing to try "sky hooks" for themselves.

Although kites are dependent upon the vagaries of the weather, the British climate provides a frequent supply of windy days and there are several kite designs which are suitable for flying in a wide range of wind speeds. Kites generally fold into small, easily-carried packages, and the erection and recovery of a kite-borne antenna is a good deal quicker and easier than its mast- or tree-supported counterpart. In its simplest form a kite-borne antenna comprises a length of light but strong wire which doubles as the tethering line of the kite. However, this arrangement is fairly limiting since the wire assumes a sloping configuration whose angle and direction are fixed by the prevailing wind. More complex arrangements are possible, allowing greater freedom to determine radiation angle and direction.

If kite-borne antenna operation is to be successful, there is a logical sequence of steps which should be followed. The first of these is to choose the type of antenna to be supported, as this will determine the size of kite needed. Once the choice of antenna and kite has been made, it will be necessary to select an appropriate site for "flying operations" and to learn the techniques of kite flying. Finally, there are important issues concerning safety and the observance of Civil Aviation Authority regulations.

\*16 Kingsmead, Little Ann, Andover, Hants SP11 7PN.

## Antenna types

Reference has already been made to the limitations of using the wire as the tether for the kite. However, this simple approach is still capable of surprisingly good results and is certainly worth trying before graduating to more ambitious configurations. Fig 1(a) shows the recommended arrangement. No insulator is needed at the kite end, for obvious reasons, but the base-end insulator should be strong enough to easily withstand the mechanical pull of the kite. The length of the wire can be a half-wave at the operating frequency for voltage-feed, or a quarter-wave for low impedance current-feeding. The former is to be preferred, as it saves the need for a system of radials to provide the low impedance earthing arrangement needed for quarter-wave antennas.

An alternative to the end-fed arrangement is the sloping dipole, shown in Fig 1(b). This confers no advantage over the end-fed wire and, in light winds, will exhibit a marked sag in the middle due to the weight of the centre insulator and feeder. A more attractive variant is to support the centre of the dipole rather than one end, thus producing the popular inverted-V antenna (Fig 1(c)). Two ground anchoring points are needed for this arrangement, in addition to that for a tethering line; one immediate advantage being that a degree of directivity can be achieved by moving the two anchor points around so as to place the antenna broadside on to the required direction of fire.

Omni-directional, low-angle radiation on the higher frequency bands demands a relatively vertical radiator, and this is obtained by once again flying the kite on a separate, non-conductive line. The antenna wire is then dropped straight down from the kite to the operating position (Fig 1(d)). In practice this is best accomplished by first flying the kite to the desired height and then moving the lower end of the wire until it hangs vertically. It will be found that the wire will exhibit a distinct bowing shape, due to the sideways pressure of the wind, but this appears to have little effect on the radiation pattern. Once again, if a quarter-wave radiator is used, ground radials will need to be laid out from the base of the antenna. A much better option is to use a length which is an odd number of  $1/8$  wavelengths. This will result in an intermediate value of

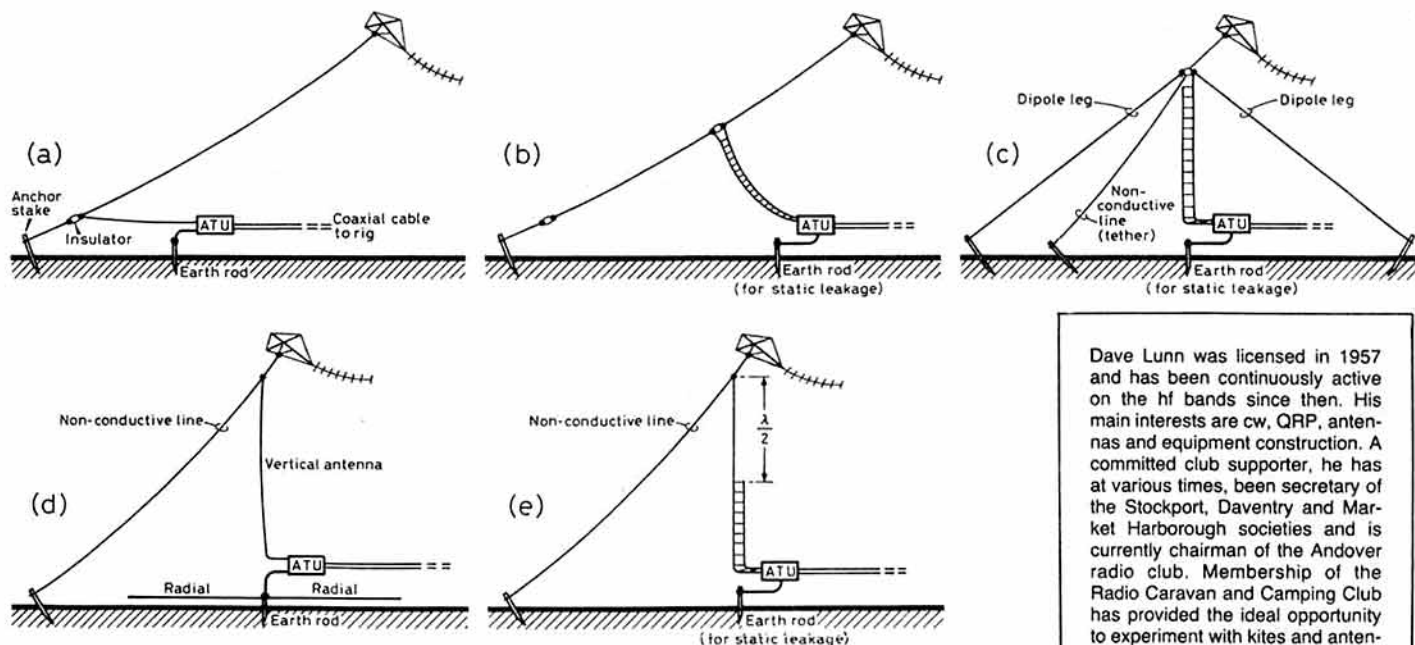


Fig 1. Some examples of kite antennas. (a) Simple wire tether antenna. (b) Sloping tether dipole. (c) Inverted-V. (d) Suspended vertical antenna. (e) Vertical Zepp

Dave Lunn was licensed in 1957 and has been continuously active on the hf bands since then. His main interests are cw, QRP, antennas and equipment construction. A committed club supporter, he has at various times, been secretary of the Stockport, Daventry and Market Harborough societies and is currently chairman of the Andover radio club. Membership of the Radio Caravan and Camping Club has provided the ideal opportunity to experiment with kites and antennas while operating "caravan portable".

feed impedance and avoid the need for a high-efficiency earth connection. For antennas with intermediate or high feed impedances, an earth rod driven into the ground will usually suffice, though ground conductivity obviously plays an important part.

One antenna type which avoids the need for an earth connection, (though a static leakage path should still be provided), is the Zepp (Fig 1(e)). This antenna has a mixed following among the amateur fraternity but can be very effective with the right feeder length and at type. The diagram shows that the radiating portion can be raised well above ground level, avoiding absorption by nearby objects and also enhancing low-angle radiation. Although the normal, horizontal Zepp can be used on multiples of the frequency at which it is a half-wavelength, this is to be avoided in its vertical form. The reason is that radiation for a half-wave Zepp is generally at 90° to the run of the wire, whereas at multiples of half-waves its lobes tend to lie much more in line with the wire, which would cause power to be radiated upwards and downward rather than horizontally.

Many other types of wire antennas may be kite-supported, and the various handbooks are a useful source of ideas and of data relating to radiation characteristics, feed impedance, dimensions etc. The range of antenna types described will require different forms of matching to obtain maximum efficiency. If resonant dipoles are used, lightweight coaxial feeder would enable direct coupling to the transmitter output. Voltage-fed antennas and those of random length, which may present "awkward" impedances, are best fed via a tapped tuned-circuit at. This enables working Q to be controlled and also provides a dc path to ground for any static charges. Non-resonant dipoles and Zepps, fed with open-wire line, require a balanced feed which is usually achieved by means of a coupling coil in the at. In such cases it is essential to provide a dc leakage path between the feeder and ground, which can be arranged by connecting a 50kΩ 1W resistor from one leg of the feeder to the earth point. Failure to do so could result in unpleasant shocks from accumulated static build-up.

Needless to say, all materials used in the construction of kite-borne antennas should be as light as possible, consistent with adequate strength. An ideal wire type is that made from thin copper tinsel, braided over a stranded nylon core. An alternative is the thin, stranded (7/0-2), plastic-covered wire of the type used for equipment inter-board connections [1]. The feeder shown in the diagrams can be domestic quality 300Ω ribbon, since high power is unlikely to be used for portable operation. Generally speaking, the total weight of an assembled antenna, even for the lower frequency bands, should be no more than 150 – 200g. This weight will easily be supported by a kite whose surface area is around 0.5m<sup>2</sup> which leads us to the choice of kite.

## Kite types

There are three main types of kite: the flat, or plane-surface kite; cellular kites (such as box kites), and the parafoil which has no rigid members and closely relates to the steerable parachute. All three types are equally suitable as supports for antennas, though their flying characteristics can be quite different. The most popular kite shape, and probably one of the easiest to construct, is the classic flat diamond with tail. Although simple to design, it can provide a very stable antenna support when correctly trimmed. It also has the merit of being relatively inexpensive to either buy or build. The diamond will fly in light to moderate winds and is easy to assemble and to fold. The more complex box kite will cope with stronger wind speeds and is an extremely stable flyer. It does not need a tail and, like the diamond, has a simple two-point bridle for attachment to its tether. Parafoil kites have air pockets which need to be inflated by the wind before they assume the aerofoil shape necessary to promote flight. For this reason they are more suited to moderate to strong winds, in which they exhibit an extremely high lift-to-weight ratio.

In selecting a kite, the main aim is to choose a stable design which will easily support the weight (and drag) of the chosen antenna and fly virtually motionless in a steady wind. The newcomer to kite flying is recommended to try a diamond for his first attempt. A relatively small one, with a surface area of only 0.5m<sup>2</sup> will easily lift 50m of thin antenna wire, and many toy shops stock such models which are usually made from plastic sheet. The "stunt" kites, with twin lines, should be avoided as they are not suitable for stable, anchored flight. Over-large kites should also be avoided. In a strong wind, a 2m<sup>2</sup> kite will exert a dramatically strong pull, with the attendant risks of a broken line or friction-burns to the hands! The more practically-minded reader may wish to build one of the excellent designs shown in books on the subject [2]. These give detailed information on the materials and construction methods to be used. Fortunately commercially-made kites are available and some sources are listed at the end of the article [3]. These kites are generally well made and

require only a little "fine tuning" to the bridle to enable them to perform well. Whatever the source of a kite, it is a good idea to mark it with the owner's name and telephone number. A broken line can result in a kite travelling a considerable distance before grounding and it may be very difficult to find.

Clearly, broken lines are to be avoided, since a runaway kite with trailing line or antenna wire is potentially dangerous. It is therefore advisable to use a line which will not break, even in strong winds. Opinion varies as to the best type of line, but I favour monofilament nylon fishing line. This can be bought at modest cost from any fishing tackle shop and has the overriding advantage that it does not twist under strain. Various strengths are available, but 55lb breaking-strain sea fishing line is particularly suitable. It is usually sold on 100m plastic reels, but these are of no use for letting-out or reeling-in kite line in the field. Instead a purpose-built reel should be made, preferably with ball-race bearings and a winding handle, which is large enough to permit winding-in against a strong wind. Again, most books about kites also include diagrams of line reels, while an alternative approach might be to use a converted sea-fishing reel. If line other than monofilament nylon is used, there is a strong likelihood that it will twist in use. This can lead to tangles and knots which may be impossible to unravel. The solution is to use swivel-links of the appropriate strength at the kite end of the line. These are also available from fishing tackle shops. Before leaving the subject of fishing tackle, there is a definite art to tying knots in monofilament line, which will not slip apart or cause the line to be weakened. Any fisherman will be more than pleased to teach this skill, which is well worth acquiring!

## Choice of site

The correct choice of site will contribute both to the success and to the safety of kite-borne antenna operation. The first, mandatory, requirement (see "Regulations" section) is that the site must be at least 5km (approximately three miles) from any operational airfield. It should also be well away from any area known to be used for low-level military flying, (see "Safety" section). It should be an open location, such as moorland or a hill or cliff top, although height for its own sake is not of course necessary at hf. The area should be as flat as possible and free from roads, buildings, trees and other objects, so as to allow easy retrieval of the kite if the wind should fail. It is also imperative that there should be no power lines of any sort anywhere near the chosen position (see "Safety" section). In this context, there should also be no folds or dips in the ground, or hedges, which might conceal power lines. Nor should the site be anywhere near a railway line (which might be electrified). In short, the ideal spot is large, flat and devoid of any features other than short grass! An Ordnance Survey map of the locality is often a useful source of ideas for potential sites, such as disused airfields, common ground, etc.

If there is uncertainty about the right to fly kites on a given site, it is wise to establish who owns the land and whether or not permission is needed. Care should also be taken to ensure that livestock is neither harmed nor frightened by the activity and that all equipment and stray bits of wire and rubbish are removed from site upon departure. Having listed several "negatives" it is worth pointing out at this stage the delights of operating far from the nearest source of man-made electrical noise. The improvement in signal-to-noise ratio is startling! If the chosen site allows vehicle access to the point where operation is to take place, so much the better. A car provides shelter, a power source and an equipment platform, all in one. It can also be used as the anchoring point for the simple antenna shown in Fig 1(a). If the vehicle battery is used as the equipment power source it is advisable to park on a downward slope if possible, to avoid the consequences of a "flat" battery!

## Kite-flying technique

Having chosen an antenna, a kite and a suitable location, it is best to wait for the right wind conditions for the maiden flight. Ideally the wind should be steady, rather than gusting, and of moderate strength. Wind speeds in the range 30 to 60km/h (approximately 20 to 40mph) would be suitable. The BBC TV weather forecasts provide excellent predictions of local wind speed and direction, subject to the normal uncertainties of any forecast of course. It should also be remembered when deciding whether to set out on a portable expedition that the wind will usually be stronger and steadier on a hill-top or open common than it appears to be at the home QTH. It may be preferable to take along an assistant on the first few outings, as single-handed kite launching can be a little tricky for the inexperienced flyer. "Junior ops" have a major advantage over one's spouse in this regard, in that they provide a plausible excuse if passers-by should wonder at the sight of an adult "playing with kites"! Until experience has been gained, kite flying in very strong winds should be



avoided. It is also a good idea, whatever the wind strength, to wear strong leather gloves while launching and recovering, as friction burns and even cuts to the fingers can be sustained when handling monofilament nylon under tension.

On arrival at site, the first task should be to prepare the antenna by laying it out on the ground ready for lifting as the kite rises. The anchoring point(s) should next be prepared, as it is difficult if not impossible to hammer stakes into the ground with one hand while fighting to hold a kite line in the other! Suitable anchoring points include a car roof-rack, bumper bar or towing-bracket, a convenient fence or post, or a purpose-made metal stake which can also be used as the earth connection. The kite should then be assembled and attached to its line. A metal ring should be inserted or tied in the kite line, some distance along from the kite itself, to which the antenna can be fastened. This ensures that the antenna hangs well below the kite, so it does not interfere with its launching or flying characteristics. The distance to the ring is not critical and will depend upon the total length of the line and of the antenna, but a minimum separation of 8 to 10m is suggested. This separation will also allow the kite to climb to a stable height before it has to start lifting the weight of the antenna. In cases (for higher frequency antennas perhaps) where the total antenna length/height is small, it is recommended that the antenna support ring is positioned tens of metres below the kite, allowing it to rise into steady wind conditions, despite the short antenna length.

After the antenna has been tied on, the kite can be launched. The assistant should hold the kite into the wind and 3 or 4m of line should be let out. Once the kite has been thrown upwards and has started to climb, more line should be released in a controlled manner to encourage it to climb quickly above ground turbulences. When the kite has attained sufficient altitude and is flying steadily, the antenna guys and anchoring points can be attended to, and finally the rig connected and powered up. It is wise, once radio operation has begun, to keep an eye on both the kite and the weather. Slowly declining signals may indicate a sinking kite rather than deteriorating band conditions! Similarly, the wind direction can shift quite rapidly and affect the performance of a directional aerial. A literal "weather eye" should be kept open for developing storm conditions which might pose the risk of lightning (see "Safety" section). These warnings may appear self-evident and unnecessary, but attention can become totally concentrated on operation of the equipment, particularly when "head down" in a contest or when kite-borne operation leads to the station becoming the subject of a "pile up".

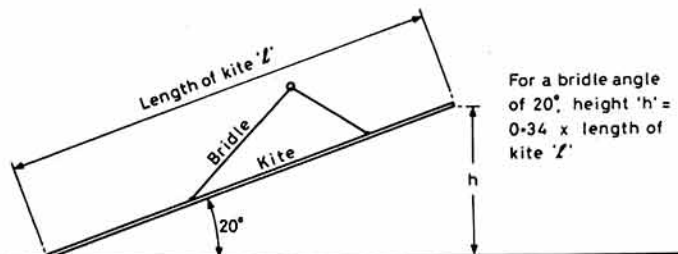


Fig 2. Method of adjusting bridle angle

Varying wind strengths may require adjustment to the bridle of the kite in order to achieve and maintain stable flight. Under moderate wind conditions a bridle angle of 20° makes a good starting point. In lighter winds this angle may need reducing, while stronger winds would require a larger angle. There are no hard-and-fast rules, and the optimum angle is dependent upon the flying characteristics of the individual kite, as well as upon wind strength. The method of adjusting the bridle angle, on a flat kite, to 20° is shown in Fig 2. The kite should be suspended by its bridle over a flat surface until its lowest point just touches. The angle between the kite and the flat surface should be adjusted to 20° by moving the support point along the bridle until the kite hangs correctly. If no convenient means exists to measure the angle directly, it can be calculated using the formula shown. An excellent idea is to fix a bridle ring (key rings are ideal) at the optimum point on the bridle to suit moderate winds, by a process of trial and error out in the field. Two other rings can then be positioned a few centimetres on either side of the first ring, for use in stronger and in weaker winds. The kite line is then terminated in a quick-release clip of the type used on dog-leads, enabling it to be easily changed from one ring to another.

## CAA regulations

The flying of kites, which are classified as "aircraft" under current legislation, is governed by a number of rules, and full details of these

regulations can be obtained by writing to the Civil Aviation Authority [4]. The main provisions of the legislation, affecting the use of kites for supporting antennas are as follows. First, kites should not weigh more than 2kg (4.5lb), but this is highly unlikely for the type and size of kite needed to lift light wire antennas. Second, kites must not be flown higher than 60m (197ft) above ground. This rule should not unduly handicap the erection of effective antennas, since a 5λ/8 vertical for 3.5MHz is only 50.5m (166ft) high. Third, kites should not be flown within 5km (3 miles) of an aerodrome or within 60m (197ft) of any vessel, vehicle or structure. Interestingly, permission may be granted by the CAA to operate outside the above restrictions provided that a written request is made to them specifying the purpose, precise location, proposed maximum height and period of time for which the kite is to be flown. Thus the height limitation (for those wishing to erect a half-wave vertical for 1.8MHz, for example) may not be totally binding. Unfortunately, the CAA requires that written application for an exception to the rules should be made about a month prior to the date of intended operation. The accurate prediction of wind conditions a month ahead of time is a skill which few radio amateurs possess, so this part of the regulations seems rather curious and of dubious value. However, operation entirely within the CAA regulations gives plenty of scope for worthwhile experimentation and should not prove to be any real hindrance.

## Safety

Certain references have already been made to the question of safety while flying kite-borne antennas. The safest bet is never to fly kites anywhere in sight of power lines or railways. Always use tethering lines which have a wide margin of strength for the kite size and prevailing wind conditions. A runaway kite, trailing a wire antenna beneath, could travel a considerable distance before coming to earth and the wire could drape across power lines in the meantime. This could literally be lethal to anyone approaching the hanging, energised wire, especially to children who would not recognise the danger. The strength of a kite line can be judged by hanging a weight from a short length of it and jerking the line up and down. The "55lb" sea-fishing line mentioned earlier is adequately strong, yet thin and light to handle and is therefore recommended.

Kite flying should not be undertaken in areas where low-level military flying occurs. Military aircraft are authorised to fly down to 250ft above ground, at speeds which may reach 500mph. At these speeds, over undulating ground, they may inadvertently fly even lower and contact with a kite-borne antenna system would obviously be catastrophic. If in doubt about the likelihood of low-level flying in a given area, one should make enquiries to the nearest military airfield.

The other danger is that of a lightning strike. Kites should never be flown in thundery weather conditions, and the first, distant roll of thunder should be the signal to immediately stop operating and reel-in the kite. Benjamin Franklin got away with it – you might not! A medium-wave broadcast receiver, such as a car radio, can be used to check for approaching thunderstorms, because the static "crashes" will be picked up when the storm is still many miles away. Even on days when there are no storms, large static charges can build up on a kite antenna unless there is a dc path for them to leak away to ground. Such charges can be extremely painful, if the only available leakage path is via a part of one's anatomy! So do fit a leak resistor to the atu, as described earlier.

## In conclusion

Kite-borne antennas add a new dimension to portable hf operation and can dramatically improve reception and transmission compared with more conventional portable antennas. For the QRP enthusiast they offer a means of optimising low-power operation in the field.

## Notes and references

- [1] Available from Maplin Electronic Supplies Ltd.
- [2] *Penguin Book of Kites*, David Pelham.  
"Kite Antennas for Top Band", P Painting, G3OUC, *Practical Wireless* January 1984.  
*How to Make and Fly Kites*, Eve Barwell and Conrad Bailey.
- [3] Brookite Ltd, Okehampton, Devon EX20 1RR.  
Ballons 'n' Things, 27 Essex Street, Birmingham 3.  
Cochranes of Oxford Ltd, Leafield, Oxford OX8 5NT.
- [4] Civil Aviation Authority, Room 621, Aviation House, 129 Kingsway, London WC2B.

## Acknowledgements

I would like to thank Jack, G3PVG, for introducing me to kite antennas, and also Pat, G3OUC, for providing much useful material used in the preparation of this article. □

# Technical Topics

Pat Hawker, G3VA

THE MULTIPLICATION of electronics products in homes is adding to the problems of operating transmitters, even of low power, in residential areas: at the same time, the CMOS microprocessors and other electronic systems fitted in so many vehicles underline the safety risks involved in EMC problems. At one time, the amateur needed to worry only about interfering with his neighbours' television and radio receivers, but today the list of vulnerable equipment has grown long, including such items as video cassette recorders, electronic telephones, smoke detectors, security alarms, domestic-appliance controls etc. At the same time, radiation from domestic appliances, personal computers, switched-mode television sets, electronic light dimmers etc. makes weak-signal reception increasingly difficult. Many of us feel that, for too long, the UK authorities have lagged behind other countries in legislating against excessive radiated interference and poor immunity of consumer products to strong RF fields — though one has to recognise that such legislation may not always be to the advantage of the amateur.

Recently, there have been signs that renewed efforts are being made to persuade the authorities and industry of the increasing range and importance of EMC problems. A number of UK universities where EMC research has been carried out in recent years — including the universities of Bradford, Bristol, Hull, Nottingham and York, plus City University, London, have joined together in a loose consortium in an attempt to increase the awareness of Government departments, research establishments, industry and broadcasters of the importance of EMC — and actively to seek more sponsored research into various little understood or unquantified aspects of EMC. In late-November about 70 people were given an outline of what has been done already and an opportunity to discuss how they viewed EMC topics. It was clear, for example, that there is considerable support in industry for the view that I have expressed in *TT* and elsewhere that it would be helpful if all training courses in electronic engineering included at least some grounding in the importance of good EMC design. I took the opportunity of contrasting the long delays in introducing UK legislation on levels of permitted radiation from personal computers with the position in the USA where the FCC imposed tight regulations several years ago. Mr A. Nieduszynski, the divisional head of the DTI's Radiocommunications Division, gave an assurance that he expected the draft EEC directive on EMC to be implemented within about 18 months. It is clear, however, that, in the past, many design engineers have felt that matters such as EMC and overall thermal regulation problems were of little concern to the designer and could be left to be put right later, if necessary.

It is much to be hoped that this group of academics, of whom the leading lights appear to be Dr Andy Marvin (York University) and Dr Peter Excell (Bradford University), is successful in creating more interest at the highest levels in this subject, though my feeling is that the inclusion of this topic in degree and HNC courses is every bit as important as the award of more sponsored research grants.

John Worsnip, G2BAQ, who wrote the article on reducing RF breakthrough from microcomputers in the December issue of *Rad Com*, is a senior lecturer at the Cambridgeshire College of Arts and Technology (CCAT). He has mentioned that they have a unit in the computer technology option of their HNC electronic engineering course which covers EMC topics, and intend to include similar units in their BEng degree course in the near future. A number of their student projects have also been concerned with aspects of EMC. There is hope yet!

## Rejuvenating Dryfit and nicad batteries

In *TT* October 1987, p750, G8APX drew attention to the range of sealed, maintenance-free rechargeable lead-acid (gel-electrolyte) batteries, sold under the brand name of "Dryfit", for the operation of hand-held transceivers. Compact units with a capacity of, for example, 12V 1.1Ah or 6V, 2.6Ah, are widely available. Treated well, these units provide many charge-discharge cycles while retaining their normal ampere-hour capacity.

Although they are "sealed" units, eliminating acid spillage, and with a "solid" electrolyte, for safety reasons they include pressure vents to deal with any excessive build-up of pressure due to over-loading or over-

charging. Reading G8APX's notes, Tim Harrowell, G3IMI, was reminded of an article he had filed away, from a German magazine, on the rejuvenation of Dryfit batteries that have lost their capability of holding a full charge due to excessive loss of moisture from the gel electrolyte through the vents. He points out that substandard batteries are often available cheaply at rallies, having served their working lives in operating burglar alarms.

My dictionary-aided translation of the article ("Regenerierung von Dryfit-Akkus") may be a little crude but the gist of the procedure is as follows: First carefully drill into the top cover of the battery (just clear of the cell vents) with a 2-3mm-diameter drill. There will be three cells and thus three pressure vents in 6V batteries, six in 12V batteries. Then, with the aid of a syringe, inject into each cell some distilled water, approximately 1.5ml/Ah of normal capacity. Leave the battery for some hours and then re-seal the holes with an adhesive such as Uhu-plus. After a couple of charge/discharge cycles the capacity of the battery should then be restored to nearly its original value, though one cannot guarantee success.

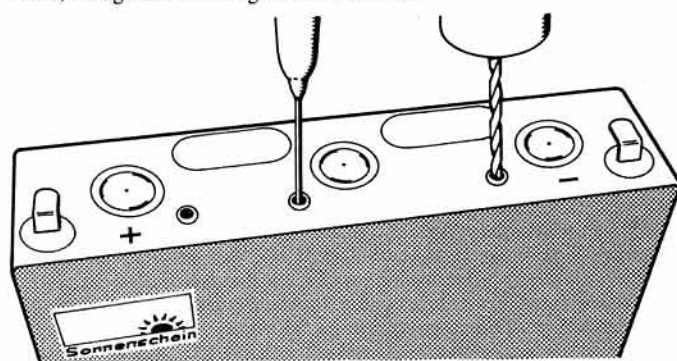


Fig 1. Rejuvenating the three cells of a 6V Dryfit rechargeable accumulator by drilling a hole into each cell and injecting a little distilled water by means of a syringe and later sealing the holes with Uhu-plus adhesive

The German author seems well satisfied with the results he achieves with defective batteries which he claims are often restored to 90-95 per cent of their original capacity.

The article reminded me of an item on "rejuvenation of nicads" contributed to *TT* (combined June/July 1980 issue, p636) by David Foster, G3KQR, in which he used a hypodermic needle and syringe to inject distilled water into nicad cells that had lost weight. As there must be many readers not having access to 1980 issues of *Rad Com* it seems worth repeating this item:

G3KQR wrote: "The most important finding (of my experiments) was that old nicad cells had lost weight. For the HP11 size, 45 by 25mm, in some cases the weight loss was as much as 40g. This appeared to be due to gassing and loss of fluid. It was reasoned that the weight loss was most probably due to loss of water, and not so much due to loss of hydroxide. These 'sealed' cells are provided with a pressure-gassing vent, which seems to allow blow-off at a pressure of about two atmospheres.

"The gassing vent in these cells is under the positive terminal, sometimes obscured by a brass soldering terminal which can be drilled by shallow penetration with, say, a No 55 drill. Pressurised venting is made possible by the synthetic rubber plug that is trapped during the manufacturing process between the 'Top Hat' of the positive terminal and the top disc; the two metal portions are spot-welded together.

"Access to the cell can be gained with a hypodermic needle and syringe thrust vertically through the top, through the rubber into the cell (the needle 'track' will 'self-heal' on withdrawal of the needle).

"Alternate suction and pressure will allow topping up to be done, using distilled water. Old cells were found to need about 3ml of water. The procedure is simple and safe and there is no contact with the hydroxide. Hundreds of cells seem successfully to have been given a new lease of life... in view of their condition they were acquired very cheaply." No attempt should be made to replace hydroxide as the handling of potassium hydroxide is extremely dangerous."



Previous *TT* items have shown that it is sometimes possible to remove short-circuiting "whiskers" in nicad cells and also to overcome sulphation in lead-acid batteries.

Also as noted before in *TT*, some dry cells (carbon-zinc etc), if not left fully discharged for too long, can often be given a new lease of life when "charged" at a very low rate (a few milliamps) preferably using "dirty dc" (ie rectified ac without filtering out any of the ripple). Care must be taken to avoid the risk of overheating and so causing an explosion that can occur from attempting to "charge" sealed dry cells too rapidly. A less effective, but sometimes worthwhile, trick is to gently heat a dry battery for a couple of hours when it is nearly discharged. This can tone up the depolarizer and tends to be most effective on batteries that have been discharged continuously into a load for long periods.

B D Tipper, G3WWL, has discovered a useful (and often free) source of flat (just a few millimetres thick) 6V batteries suitable for use with small transistor devices. He writes:

"I have occasion at my place of work to use a large quantity of Polaroid Image film. Each film pack when exhausted still contains a quite respectable 6V (nominal) dry battery, and it takes but a second to remove the battery from the plastic pack. These batteries are thus free, robust and, being flat, can be fitted into equipment where it may be difficult to install a conventional battery. I have found various uses for these batteries, eg powering the p.e.p. circuitry in a power meter where one has now lasted at least six months. Contact to the battery can be made conveniently via fanned out multistrand wire held with Sellotape. Maybe others will also be in a position to make use of this tip."

### More on the tune-up protection device

The tune-up protection device for use with hf transceivers described by Fred Piese, VK3BYW, in *Amateur Radio (VK)* May 1987, and reproduced in *TT* (October 1987, p782) has rightly attracted considerable interest. André Saunders, GM3VLB (ex-5Z4KL), after completing one the night before the CQWW contest, found it invaluable in loading his 135ft end-fed antenna through a single-L, single-C homebrew atu. He comments: "I was able to do this quickly and in complete confidence and without fear of damaging my FT707. Definitely one of the most useful and simple 'gadgets' in a long time."

Unfortunately, as constructors soon found out, VK3BYW's circuit diagram (Fig 9 of the October *TT*) contained errors in respect of the bridge-type swr indicator section. As shown, it will not work properly and may give a false impression. Fortunately, most constructors were able to make the necessary corrections by comparing this part of the circuit with those published in the standard handbooks. Corrections have also been published in *Amateur Radio (VK)* September issue, and by Steve Hart, VK5HA, in the Australian South Coast Amateur Radio Club newsletter *Scorchat* (brought to my notice by John Gill, VK5AJG) although it would appear that VK5HA's diagram still contains an error. Spenny, G6NA, points out that this type of device is not a true swr meter, only a bridge. When the null is zero, then 1:1 swr. At readings other than zero one can assume swr from the table given by VK3BYW (October *TT*). The actual indications are (R) the voltage across the bridge in the classic Wheatstone method, and (F) voltage across a standard resistor. Actual swr can only be measured by reflectometer-type devices which are usually derived from Maxwell's bridge.

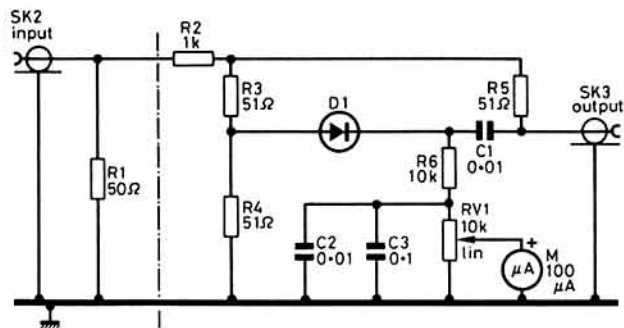


Fig 2. The tune-up gimmick for a low-power (FT7) transceiver as described by G4HHB in 1981

Both G6NA and GM3VLB have provided notes on the modifications they made to produce effective working models, and I feel it is worth showing both versions. More information on this type of swr indicator can be found, for example, in *The ARRL Antenna Handbook*, 14th edition, page 15-4, as "Resistance bridge for swr measurement".

Spenny, G6NA, writes: "I was very interested in VK3BYW's tune-up unit. I have been using a resistive bridge similar to the one described by Les Mays, G4HAS, in *Rad Com* (August 1981, p715) in his article "Safe tune-up with the FT7": Fig 2. This is perfectly ok but does not give any indication of swr, so I find the ability of the new device to read a ratio most attractive."

"I first made up the VK3BYW version as shown on a piece of Veroboard, and it appeared to work reasonably well, albeit insensitively, just about ok on a 50μA meter. This is easily remedied by changing the core of the broadband transformer for a ferrite of about 100μ."

"I then tidied it up by making a small pcb to mount on the tune-send switch. Putting this unit between my atu (with its resistive bridge) and the transmitter I found quite a discrepancy between the tuning demanded by the two bridges. I puzzled over this for a time after I had done all the clever things like matching the diodes at rf and checking to see if stray capacitances were affecting the readings. Then I thought of a drawing error, could not think of a simple one, so rigged it all up again with a 500Ω carbon pot in the antenna position. Sure enough it balanced all right—at minimum ohms, actually 8.29! Another look at the VK3BYW circuit and it became obvious. So back to square one, a couple of circuit changes (see Fig 3) and it works like a charm."

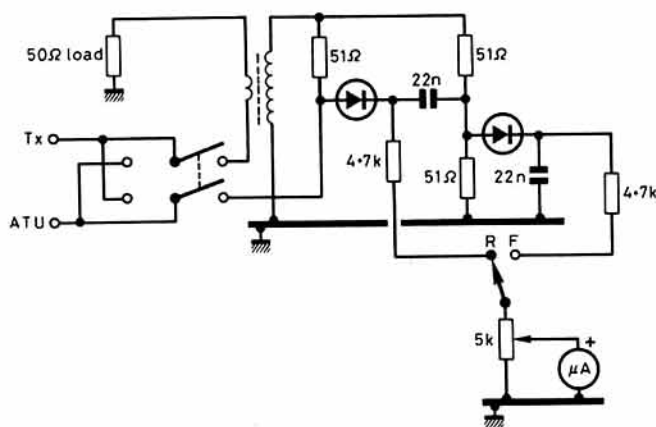


Fig 3. G6NA's modified quiet and safe tune-up device as described by VK3BYW in the October *TT*. Transformer primary two turns, secondary 10 turns on ferrite (μ about 100) core. All resistors two per cent

G6NA adds the comment that he would like to see this and similar devices widely used, not only from the viewpoint of protecting solidstate transmitters but also because of the reduction of on-air tuning squawks. He adds: "Dave Tong can take the squawk out of an in-band tuner, but nothing can reduce desensitising when agc is in use. With the 50μA meter at full sensitivity the antenna should receive only 8mW which ought not to affect wanted signals. Even with a 500μA meter it is 60mW, again a reasonable value. With this little unit no 'final adjustments' will effect any improvement and must be discouraged."

GM3VLB's modifications led to instant success after repeated failures with the circuit as published in October. He writes:

"A search through the literature produced the circuit of a resistance bridge for swr measurements (*ARRL Antenna Handbook* as above) almost, but not quite identical to VK3BYW's circuit. In Fig 4 the circuit to the left of and including the toroidal transformer works flawlessly, and is omitted for the sake of clarity."

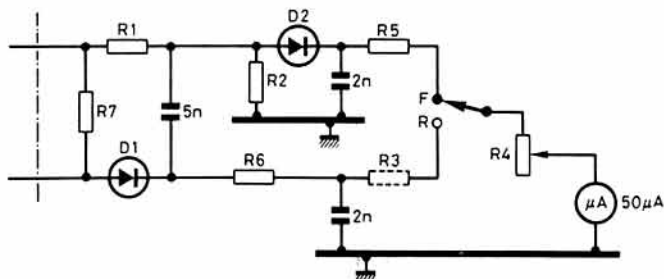


Fig 4. GM3VLB's modification to the resistance-bridge section of VK3BYW's tune-up device. R1, R2 47Ω (0.5W) should be equal in value but the exact value is not critical. R3 approximately 1kΩ but select (see text). R4 47kΩ variable. R5, R6 47kΩ, R7 50Ω (1W), D1, D2 OA90 or OA95

"Some additional notes may be helpful. R5 should be selected to be as close a match to the line impedance as possible. R1 and R2 should be equal but their exact value is not critical. R3 is needed to compensate for slight differences in the arms of the bridge. I found a 1k $\Omega$  resistor suitable but a small preset might be convenient. R3 is selected by applying some rf to the transmitter input terminal with no dummy load connected, and then adjusting R3 to give equal meter deflections in the forward and reverse positions."

The Australian tune-up protection gimmick is, in effect, a form of implementation of a silent-tuning principle developed initially at Philips Research Laboratories for military and professional communications systems by Professor Mike Underhill, G3LHZ: see, for example, his article "Simple quiet tuning and matching of antennas", in *Rad Com* May 1981, pp420-2. This system was based on the use of a crystal calibrator/receiver to provide the means of tuning for match. It was developed to permit tuning/matching of Service transmitters under strict "radio silence" conditions. The less rigorous VK3BYW technique seems more suited to the less-demanding amateur radio situation. If widely adopted it would allow amateurs to experiment with antennas without risk of blowing their power amplifier modules and at the same time bring a welcome relief from those loud tuning squawks.

## Stable oscillators and pll phase-noise

It has been said that "what we call progress is the exchange of one nuisance for another nuisance". Or, as Oscar Wilde put it: "We are all learning new ways of making old mistakes... success is not having the same problem as last year... experience is the name we give our mistakes." This seems apposite to the low-cost form of pll (phase-locked-loop) frequency synthesisers found in most current hf transceivers and general-coverage receivers. The synthesiser is undoubtedly a convenient and effective form of stable oscillator, and excellent for some applications such as handheld vhf transceivers and general-purpose hf broadcast receivers in permitting users to press-button tune to a desired channel or frequency. High-grade, high-cost professional synthesisers are capable of very high performance. Problems arise, however, when a low-cost pll vfo is used in what would otherwise be high-performance equipment with a good dynamic range.

I recall at the dawn of the professional synthesiser era in the early sixties a heated debate between Marconi engineers who favoured the (very high cost) mixer-type synthesiser and Racal engineers who considered pll-type synthesisers more cost-effective in spite of their inherently greater phase-noise and jitter. Since then enormous research and development effort has been expended on improving the characteristics of professional pll synthesisers, and the synthesisers fitted in some of the currently available amateur equipment have improved significantly, but most still severely limit the near-in dynamic range of receivers, as a study of Peter Hart's equipment reviews will indicate.

For really high performance, as G4DTC put it in the December *TT*: "synthesised oscillators with all their problems should be avoided like the plague. And who needs them (with high-stability vfos)?" To add to the information already given on his Kalitron tunable local oscillator and applicable to all oscillators tuned with variable capacitors: "One of the major sources of drift in LC oscillators is caused by convection currents changing the permittivity of the air between the plates of the variable capacitor. Considerable improvement is effected by placing the capacitor in a draught-proof enclosure." Another technique that was occasionally used for transmitter vfos in the days before the one-unit transceiver was to locate the vfo LC circuit in a separate enclosure well away from any heat-generating devices and then to connect the tuned circuit to the active oscillator device via coaxial cables which formed part of the fixed capacitance.

G4DTC has also queried whether "Kalitron" is the correct spelling for the form of push-pull oscillator used in his "ultimate" receiver. I have never come across the origin of this oscillator which first started to be used in amateur vhf equipment in the 'fifties. It is not mentioned in the comprehensive *Theory and design of valve oscillators* by Dr H A Thomas (first published in 1939) although this includes a push-pull vhf (50MHz) oscillator stabilised by resonant "long lines" (which could take the form of a resonant length of miniature coaxial cable): Fig 6. It is mentioned that "such schemes have been in operation at commercial transmitters and it has been found that the degree of frequency stability attainable is sufficient for most practical purposes. The greatest single factor causing frequency variation is change of temperature: the temperature coefficient of frequency is of the order of 40 parts in 1-million/ $^{\circ}$ C at frequencies in the neighbourhood of 50MHz."

In the "Technical Correspondence" column of *QST* (September 1987, p43), David Newkirk, AK7M, of ARRL, complains that poor choice of terminology can lead to misunderstanding of circuit function and design. His example of this is the phrase "dual digital vfos" applied to synthesised-tuned

amateur transceivers and receivers. He comments: "... nearly every new amateur transceiver these days sports these characteristics: (1) micro-processor frequency control; (2) phase-locked-loop (pll) frequency synthesis; and (3) digital (that is, direct numeric) frequency readout. But this does *not* make such a vfo 'digital'! Far from it, in fact. The non-digital nature of pll vfos is the main reason for the spectre we're coming to know all too well as phase noise. High receiver dynamic range is more or less accepted as important by amateur equipment manufacturers. Now, we must increase their understanding of the fact that noisy oscillators can and do offset improvements in dynamic range. If you've noticed in some receiver/transceiver reviews that a given dynamic-range measurement was said to be 'noise limited' you've seen the result of phase-noisy pll vfos.

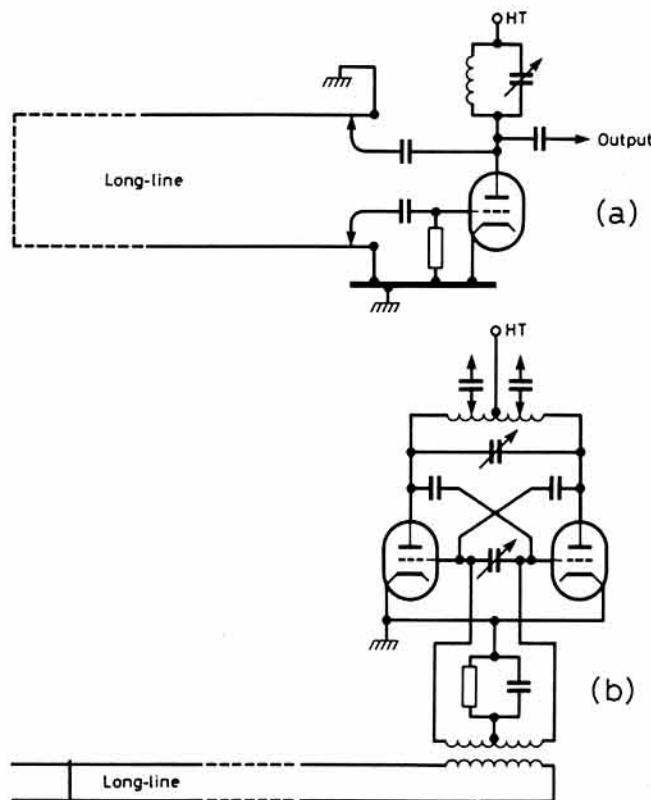


Fig 5. Stabilisation of vhf valve oscillators by means of transmission-line (Lecher lines) section or by coaxial cable section. A solidstate multiband transmission-line oscillator, using quarter-wave sections of miniature coaxial cable and covering 14 to 36MHz in 32 bands was briefly described by Dave Parnell in *TT* June 1987, p408

"What does this have to do with whether or not a vfo is pll or digital? If it's commanded and displayed digitally, it's digital, right? Not necessarily. At the heart of almost all of our pll vfos are phase-locked LC (inductor/capacitor) or vxo (variable crystal oscillator) circuits. Phase locking is simply a method of forcing a vfo or vxo to a desired frequency and holding it there by negative feedback. (Oscillators tuned in this way are almost always controlled by varying the tuning voltage of one or more varactor diodes; such a vfo is thus called a vco; a voltage-controlled crystal oscillator is a vxco). Because it's possible to use microprocessors to monitor and control pll circuitry, and because microprocessors 'speak digital', many of us feel safe in referring to such microprocessor-controlled pll vcocs and vxocs as 'digital'... Yes, there are truly digital vfos, vfos in which the output signal is fabricated piece by piece in digital circuitry. Because such circuits do not use phase-locked loops to achieve good frequency stability, they can, in theory, provide an output very low in phase noise. But the vfos in most of our 'digital vfo' rigs aren't digital at all... Here's my vote for better terminology where microprocessor-controlled vfos are neither dual nor digital: 'dual vfo command registers'. It almost sounds like something new."

The 1939 book on oscillators by Dr Thomas, referred to above, includes many ingenious compensation techniques to improve the stability of oscillators against voltage changes, including resistance (reactance) stabilisation, phase-compensation and the German Dow electron-coupled tetrode/pentode oscillator (the origin of the once extremely popular "eco") as well as amplitude-limited techniques by Arguimbau and Groszkowski. Two-valve



oscillators include the classic two-valve Franklin master oscillator and the Ross-Gunn oscillator which is basically similar to the Kalitron except that it used two tuned circuits, one in each anode circuit.

Although all these oscillator circuits were originally developed for use with valves, most of them can and have been successfully implemented in solidstate form. Walter Glazar, W3WI, in *QST* revives, in modern guise, F Llewellyn's 1931 reactance-compensated oscillator which can be implemented by the simple expedient of adjusting the reactance of a strategically-located bypass or coupling capacitor to minimise frequency variations due to changes in supply voltage which cannot be entirely eliminated by the use of conventional ic regulators.

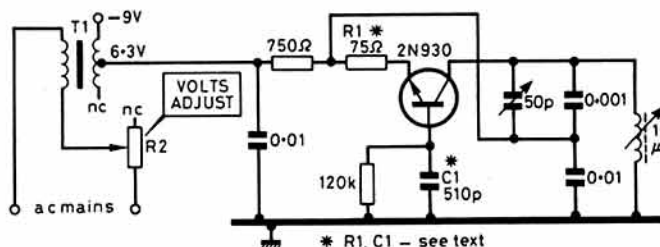


Fig 6. W3WI's experimental oscillator circuit used to demonstrate reactance compensation

W3WI shows how this type of circuit can be adjusted by temporarily adding a small amount of ac to the supply (Fig 7) until a detectable fm wobble is on the note, then alternately adjusting the value of C1 and R1 to improve the tone. Once the adjustment for minimum fm is established, fixed-valve components are installed (C1, R1) and T1 removed. The oscillator shown in Fig 6 was for use at about 1,500kHz and C1 (510pF) presents a relatively high reactance (230Ω). R1 provides a degree of negative feedback and further improves stability.

Reactance compensation can even be used to improve the stability of crystal oscillators in demanding situations.

## Star hf resonance indicator

TT June 1985, p455, included a short note from Ian White, G3SEK, showing how he uses an swr meter to trim coaxial cable to length so as to form, for example, a half-wave vhf phasing line. This, in turn, resulted in a letter from Bill McLeod, VK3MI, reporting further experiments leading to improvements in this technique. He has also written this up in detail in *Amateur Radio (VK)* July 1987, pp26-7. His experiences have shown that this modified method is more suitable for low or high-impedance sections using the appropriate load resistor for the comparison. Also, the accuracy is improved with the meter indicating a "dip" in the current to the resistive leg rather than maximum current to the reactive leg of the two parallel paths.

In his *Amateur Radio* article he points to some shortcomings in using gdos or hf noise bridges when an accurate resonance indication is required. On the other hand, he suggests that a toroid transformer-type swr meter can be used very effectively as an indicator for a variety of antenna adjustments:

"These instruments compare the phase and amplitude of the voltage and current indication sections. Like the noise bridge, they are calibrated and compensated for 50Ω or 75Ω transmission lines. Below 10Ω, the current meter section still indicates but the voltmeter is starved; over 250Ω the opposite effect occurs, with voltage indicated but insufficient current. These characteristics can be used as an indicator for transmission line tests using suitable comparison terminations and a buffer pad for a power signal generator which can be the station vfo, a low-power driver stage or a QRP transmitter (Or possibly the VK3BYW transformer plus dummy load technique? - G3VA).

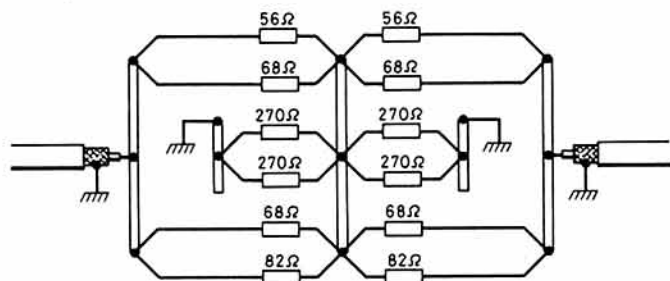


Fig 7. 6dB, 50Ω attenuator pad for VK3MI's Star hf resonance indicator. Series resistors 2W metal oxide: 1 by 56Ω, 2 by 68Ω, 1 by 82Ω. Shunt resistors (2W metal oxide) 4 by 270Ω (or 1 by 66-9Ω). Common bars: multiblock inserts each drilled three ways transversely

"A 6dB attenuation pad is normally used to reduce the voltage and current each to half the input value for a 50Ω termination, ie it reduces the power by a quarter. When terminated by a non-reactive 50Ω resistor it can become a dummy load. More importantly it also has the property of only changing from 30Ω to 84Ω at the input port when the output is either shorted or left open. These are values well within the 2:1 capability of most solidstate equipment designed for 50Ω.

"It is essential to buffer equipment during initial tune-up or for antenna and transmission line testing. Also it is ideal to allow the use of 5Ω and 330Ω terminations in tests using the swr meter for a dip indicator, as it tends towards a current limited source when the load approaches zero and as a constant voltage device for high impedance loads.

"Power handling capacity of available non-reactive resistors is a difficulty but metal oxide types are obtainable in 2W rating. A pad capable of absorbing 10W of rf power with the output port open-circuit can be built using the T-configuration as in Fig 7.

"Then, for testing series tank circuits and quarter-wave stubs (inverting sections) to an open circuit at the remote end, and also half-wave lines (repeating sections) to a short-circuit, the output port of the 6dB pad can feed via a T-connector to both a 5Ω termination (two 10Ω resistors in parallel) and the test section in parallel, as in Fig 8(a). The swr meter in the resistive leg does not indicate swr, as insufficient voltage is developed across the load for that section materially to affect the reading. However, in-phase current to the resistive termination shows a dip when it is 'robbed' by the line section, falling to minimum value at resonance. As a check, disconnect the line section to permit the dip to rise to maximum reading, showing that the dip is not due to any other circuitry. Then substitute a non-reactive resistor, usually 1 to 10Ω, for the same dip reading. This value is the equivalent series loss of the test section; for example, RG58 cable will be about 2.5Ω for a quarter-wave section at 3.6MHz, increasing for poor quality or damaged cable; this measurement can be converted into a cable specification figure for loss per 100ft or per 100m.

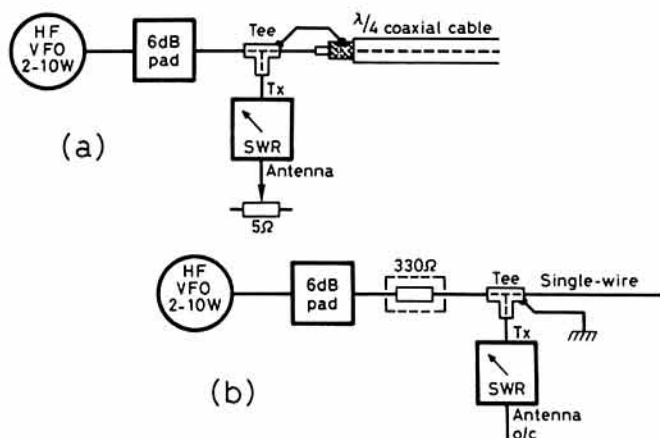


Fig 8. (a) Set-up for hf resonance indicator 1 to 20Ω; (b) for 200 to 1,000Ω

"The arrangement in Fig 9(b) can be used for higher impedances from 200Ω to 1,000Ω where a bridge with a suitable range is not available (the 'ant' port of the swr is left open). However, this is of less practical value and accuracy than the low impedance case, as the test sample is usually subject to other influences: for example, a half-wave wire must include the distance to effective earth from the T-coupler and the capacitance to earth (the same restrictions apply to other methods of measurement).

"The frequency accuracy of this dip method can be better than one per cent with a reasonable frequency-readout from the vfo... A complete instrument could be constructed. However, for occasional use, the station swr meter provides a readily-available indicator, while the 6dB pad limits and protects the source as well as its other uses."

## Antenna installation tips

Peter Delaney, G8KZG, still overhears much discussion among amateurs on such antenna installation topics as the effective weatherproofing of cable joints, plugs/sockets etc.

Other aspects, such as the strains imposed on coaxial cable during and after installation, are often disregarded entirely. He considers that a publication, issued several years ago by Pye Telecommunications Ltd *HF, VHF and UHF Communication Antennas* (TSP220/5), contains practical tips that are worthy of wider distribution.

The introductory general section covers topics relating to the use of coaxial cable feeders, weatherproofing, baluns, wind velocity, pressure and wind/ice loading etc. I trust that I am not infringing any Pye Telecommunications copyright by paraphrasing some brief extracts from this useful section, interposed with some additional comments by G8KZG and myself.

**Coaxial cable.** Pye point out that a major source of losses in conventional braided cable, compared with the more expensive cables with solid copper sheathing, is the effects of moisture on the braid. Water can quickly oxidise copper braid and increase resistive losses without changing the nominal impedance of the cable. It is emphasised that any damage to the outer sheath, even a pin-hole, will allow in time a considerable amount of rain-water to reach the braid, yet will be almost impossible to detect. (Note: the test procedure outlined by VK3MI on page 109 should detect a change in cable resistance — G3VA.) It is believed that pvc-sheathed cables are more vulnerable in this respect than polythene-sheathed cables, and polythene sheathing is to be preferred. Cable with a solid outer rather than braiding is potentially the more reliable, and Pye suggest that this could repay in time the extra initial cost in some (exposed) installations.

**Handling coaxial cable.** Pye note that many antenna faults are brought about by the mishandling of the feeder cable during installation. Tension can cause either open- or short-circuits. Should the braid be pulled free of the clamping ring in the plug, one or more of the fine wires can short to the inner conductor. Alternatively, the inner conductor and polythene insulation can be caused to move inside the braid, causing the centre pin to lose contact with the socket and result in an open-circuit fault. During and after installation, cable should be treated with care and never subjected to tension. Cable runs should always be supported by the mast or a carrier wire. (Unfortunately, this is often a counsel of excellence rather than practical policy for hf wire dipoles other than the inverted-V types, but can usually be followed for beam arrays and most vhf/uhf antennas — G3VA.)

With 10mm (0.405in) cable, it is not advisable even to take a length up a mast and drop one end to the ground; nor to leave the coil on the ground and feed one end up the mast. Preferably, the coil of cable should be taken up the mast, the top secured and the feeder fastened to the mast (without undue tension on the cable) progressively as the coil is lowered. Pye stress that coaxial cable is not a homogeneous conductor: the outer covering, braid, polythene and inner conductor can all, under stress, move relative to one another; furthermore under stress any one of these layers could take the whole load. Note that, for example, 45m (150ft) of URM67 cable weighs a substantial 7kg, while the inner conductor comprises only seven strands of 0.77mm diameter copper wire. G8KZG feels that few amateurs ever pay much attention to the tensions resulting from the weight of coaxial cables when installing an antenna, or the possibility that the core could have to carry the full weight of the load.

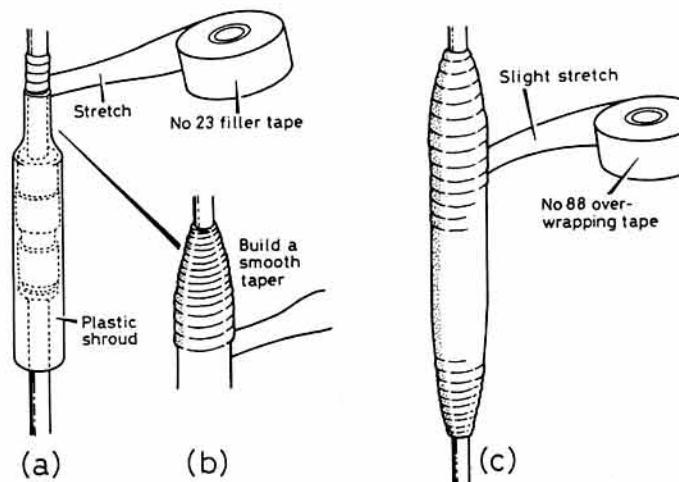


Fig 9. Waterproofing an external coaxial-cable socket and plug connection as recommended by Pye Telecommunications

**Waterproofing connectors.** Plug and socket connectors exposed to the elements always need additional protection; without it there will sooner or later be moisture ingress, possibly ruining the cable over a considerable length due to hygroscopic effects in foam or semi-air-spaced cable as well as braid corrosion. Pye warn that permanently-joined connectors for

fixed installations, even inside a plastic shroud such as those supplied for pmr base stations, should be further protected by winding with suitable tapes: Fig 9. After extensive tests, Pye recommend the use of a combination of two 3M "Scotch" wrapping tapes, Nos 23 and 88.

Both are elastic filler tapes of the type described in 1985 (TT January, March and June) as "self-amalgamating" tape when a debate arose on the degree that such tapes are vulnerable to ultraviolet rays in sunlight. Pye recommend 3M No 23 to provide the basic weatherproofing and to build up the steps between the cable and the connectors. The No 88 tape then provides a tough over-wrapping which gives mechanical protection to the join. Pye state: "These self-bonding tapes, when applied correctly together, provide a sound waterproof covering suitable for all climates".

The recommended method of wrapping, shown in Fig 9, is described as follows: "Remove the paper backing from a length of No 23 tape and commence wrapping on the coaxial cable about 38mm (1.5in) from the connector. Fig 9 (a). The tape should be stretched to two/three times its natural length as the wrap is carried out, and each turn should overlap the previous one by about 50 per cent (ie half-lapping). When wrapping over a step, several turns are necessary in order to build up a comparatively even taper (Fig 9 (b)). The wrap should be finished on the coaxial cable at about 38mm (1.5in) beyond the second connector, and for the final turn the tape should be slightly stretched. Applied in this manner the tape will easily fuse into an inseparable void-free mass. The over-wrapping with No 88 tape (Fig 9 (c)) should completely cover the previous wrap, starting slightly before the beginning of the filler tape. A full turn with 100 per cent overlap is recommended before winding on with a 50 per cent overlapping. The tape should be stretched slightly during winding but relaxed on the final turn which, like the first, should have a 100 per cent overlap and completely cover the end of the filler tape."

G8KZG uses a variation of the Pye technique. After applying the self-amalgamating tape as described, he adds a generous layer of "Hammerite" paint to cover the entire joint with a margin at either end as a protection against uv. He comments: "This appears to provide an effective and lasting seal, although, of course, I cannot enter into the type of testing that companies such as Pye can undertake." On the 3M "Scotch" tapes he adds: "No 88 is described as a 'flame retardant cold and weather resistant ... for applications where superior cold-weather resistance is judged important'. It is basically a pvc insulating tape of superior grade. Tape No 33 would also seem suitable, it is also pvc and can be used down to -17.8°C and is specifically claimed to be 'highly resistant to physical abuse, chemical attack, and ultraviolet light'. It also seems rather easier to obtain (eg Farnell in Leeds)."

## Checking antenna installations

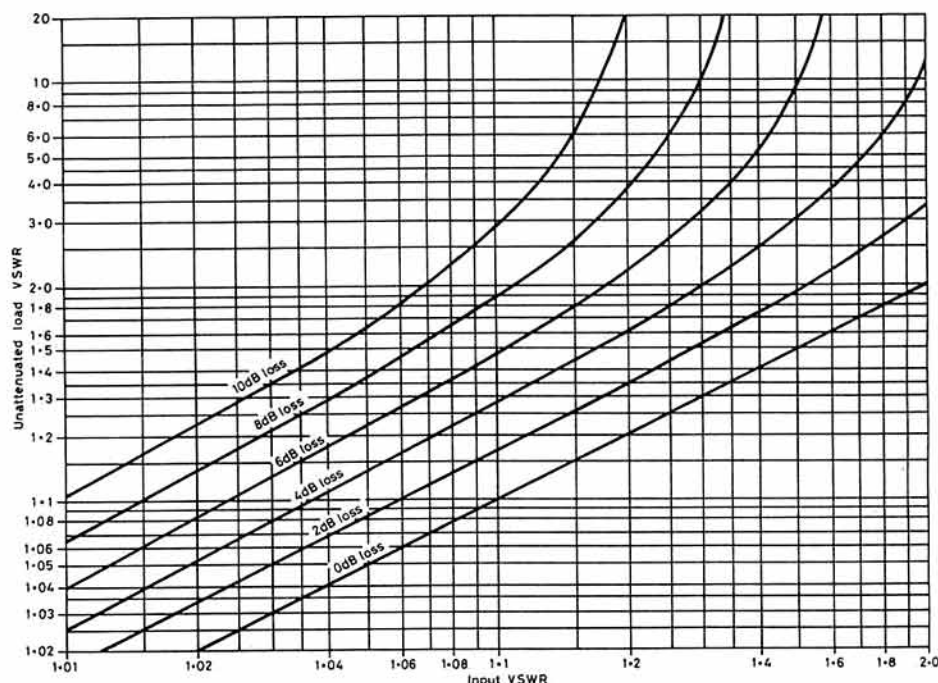
The Pye Telecommunications publication TSP220/5 also provides a useful reminder on some aspects of antenna checking with particular reference to the effect of feeder losses on vswr readings. As G8KZG comments, this is a hardy annual topic but, judging by comments overhead on the bands, is still frequently misunderstood.

Pye point out that a dc continuity check on an antenna installation can often reveal open-circuits or poor connections. (This is always true of folded dipole driven elements; with non-folded elements open-circuits in the feeder can be detected from the shack if a high-value, eg 100kΩ, resistor is wired across the centre-gap (feedpoint) of the element for this purpose — G3VA.) It is more difficult to recognise a short-circuit feeder or a moisture-ridden element even with the aid of a vswr check. Broadcasters often use a vswr "trip" to close down automatically a high-power transmitter in the event of an antenna/feeder fault, yet at least one four-channel uhf television antenna at a main station (Dorris, near Aberdeen) caught fire and was damaged beyond repair when a trip re-set correctly because a fault had carbonized a short-circuited cable up the mast forming a matched dummy load. This deprived some millions of viewers in Scotland of all four programme channels for some days — and several thousands of viewers of acceptable signals for many months while a replacement antenna providing the same coverage as the original antenna was being built.

Pye point out that the accuracy of the match between the antenna and the transmission line when measured by a reflectometer depends on where the vswr meter is inserted in the system. If the point of measurement is remote from the discontinuity or change of impedance, then the vswr reading needs to be corrected to allow for the cable loss which has the effect of reducing the reflected power. Fig 10 shows this effect quantitatively. For example, a vswr of 1.5:1 at the antenna junction will appear as 1.3:1 at the end of a cable having a loss of 2dB, as would be the case with 100ft (30m) of URM67 cable at 100MHz. It should be noted



**Fig 10.** The effect of feeder attenuation on measured vswr. For example, an antenna with an unattenuated vswr of 10:1 and a feeder loss of 6dB would appear to have a vswr when measured at the transmitter end of only 1.5:1



that any termination, including an open circuit, will produce a vswr not exceeding 1.25:1 at the end of a cable having a loss equal to or greater than 10dB as might well be the case for a cable ruined by moisture ingress.

Faulty, high loss, feeders will thus always show a low vswr, for example a feeder with badly-oxidised braiding. It is important always to investigate any change in the vswr of an antenna because, under certain conditions, an increase in feeder loss is likely to result in an improvement in the vswr measured at the equipment end of the feeder. Because comparison is the best guide to deterioration in the antenna system, it is thus essential that initial readings be made and recorded.

Pye recommended the following procedure:

- (1) Before erecting an antenna, check and record: (a) the dc resistance of the feeder (centre conductor and outer connected together at one end); (b) insulation of feeder (between centre conductor and outer); and (c) vswr of antenna.
- (2) When the antenna has been installed, check and record: (a) vswr of system; and (b) dc resistance of system read between centre conductor and outer.

Incidentally, for those who still set great store in achieving an extremely low vswr, just add a long length of lossy cable to your feeder. You, but not your contacts if any, will be delighted at the difference it makes to your vswr!

## G6XN's end-fed Windom

Almost 60 years ago (*QST* September 1929), L Windom, W8GZ, described the use of a single-wire feeder for a half-wave dipole antenna. This soon became known worldwide as a "Windom antenna" although (as John D Kraus, W8JK, has pointed out) the principle of the single-wire feeder was originally conceived and developed by Bill Everitt and John Byrne at Ohio State University.

In effect, the single-wire feeder, when matched correctly to the correct point along the dipole element, is itself a transmission-line antenna so that some energy must always be radiated from such a feeder, unlike a twin-wire or coaxial transmission line. The traditional method of adjusting the tapping point is to aim at there being no standing waves on the feeder wire (in the early days by running a neon along the line). Nevertheless, even when correctly adjusted, a single-wire feeder always radiates some energy and is to some extent a lossy feeder and a source of moderate rf fields when brought into the shack.

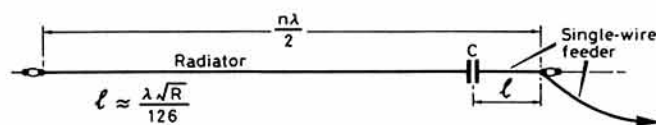
Les Moxon, G6XN, in a recent letter, admits that in his book, *HF antennas for all locations* (RSGB), he gives the Windom antenna a rough time, including it in the section "feeder systems to be avoided" and emphasising its losses. However, this assumed a long feeder line, and he points out that for a feeder length of around  $\lambda/2$  it can be shown that the power radiated from it is the same as from a dipole carrying, at its centre, the same relatively low current. It is thus equivalent to a loss of only

0.6dB; this would rise to a much more significant 3dB loss by radiation only for a very long straight single-wire feeder.

"In addition there is the earth loss which comes to 0.18dB for a quarter-wave 'artificial earth' which has the advantage of being easy to calculate, but could probably be eliminated (at least at the lower frequencies where it can be long enough to be out in the clear) by using a shorter wire or counterpoise with inductive loading.

"I have applied the idea to a full-wave inverted-V for 7MHz, erected as a temporary substitute for a beam lost in the October hurricane. This has yet to be evaluated for 7MHz dx but works as well as can be expected of a long-wire antenna on 14MHz where the swr is about 3.0, though on 7MHz it is less than 1.2! Perhaps more to the point, I set up a 'scale model' at 29MHz, comparing a half-wave dipole centre-fed (75Ω twin feeder) with the same dipole end-fed with about 1.5λ of single wire. Assuming a loss of 0.35dB in the twin feeder, the total loss for the single-wire feeder plus artificial earth came to 2dB (ie 1.65dB down) which seems reasonable but emphasises the need to keep the single-wire feeder lengths as short as possible (for 3.5MHz even a half-wavelength would represent a very long feeder!).

"Replacement of the centre feed by end-feeding, Zepp-fashion but with a G6CJ balancing stub, gave identical results but only after going to some length to reduce stub losses (heavy gauge and wide-spacing). Removal of the balancing stub then caused a loss of only 1dB, in line with experience that the conventional Zepp feed sometimes seem to work well enough."



**Fig 11.** G6XN's end-fed Windom antenna with single-wire feeder.  $\lambda$  is wavelength in feet.  $R$  is radiation resistance (referred to a current loop). A value of 500Ω is assumed for the impedance of the single-wire feeder.

Reactance of capacitor  $C$  is  $1/\omega C$  approximately equal to  $70/\omega$ .

Values found in practice:

At 7MHz,  $l = 12\text{ft}$  for  $n = 2$  ( $C = 27\text{pF}$ )

At 29MHz,  $l = 2\text{ft}$  for  $n = 1$  ( $C$  variable and not measured but estimated to be about 5pF).

**Principle of operation:** From a point of maximum rf voltage on the antenna one moves a short distance outwards to find an impedance (from a Smith Chart) equal to  $R + jX$ , where  $R$  matches the single wire feeder,  $X$  being tuned by the capacitor. Since  $l$  is short and current in it small, its virtual removal from the radiator has negligible effect on field strength

G6XN has developed further thoughts on Zepp antennas and or radials but these must be held over. So back to the end-fed Windom: Fig 11. G6XN writes: "The important thing is that it provides a much simpler method of end feeding, without the complication of the G6CJ balancing

stub, the unpredictable losses of the conventional Zepp arrangement, or the mechanical and weatherproofing problems of remote tuners for voltage-fed antennas. Were it not for these problems, end-feeding would tend to be more attractive than centre feeding for non-rotatable antennas, since the ends are more likely to be within reach of or close to the shack. In addition the centre of the element no longer has to support the weight of the feeder.

"The matching principle used for the single-wire feed had previously been used in a two-wire version for matching the 'Claw' antenna at ground level (near the mast) on 10MHz, and for matching each of a pair of inverted-V elements at 7MHz. I have never come across it elsewhere and find it extremely useful; however, since it is more or less what the Smith Chart tells one to do, I can hardly claim it to be original.

"The single-wire feeder should be particularly useful for inverted groundplanes (see for example *TT* November 1987, Fig 3(f), p836). It may also be of interest to note that if  $R$  increases as  $f^2$  and is small enough, one would have an ideal multiband system with nearly the same value of capacitance needed, in the same place, on the fundamental and all harmonics until  $l$  approaches one-eighth-wave. There is a tendency for this and, though it does not quite happen in practice, the fact that capacitors for different bands are nearly co-located and in many cases accessible does lead to interesting possibilities for multiband operation, without the loss of efficiency and the 'rf in the shack' problems sometimes associated with random-length wire antennas; but one is restricted by the need to keep the feeder short in terms of wavelength."

### Passive frequency multipliers

Modern practice, stemming primarily from ssb requirements and the use of pll frequency synthesisers, has reduced the use of the one-popular Class C frequency doubler/multipliers of the valve era. Oscillator chains for uhf operation often use diode frequency multipliers, including varactor diode multipliers that are "passive" in the sense of not requiring to be powered other than by the rf input.

Chris Randall, G4RBR, and David Skinner, G3PVH, have both drawn attention to an item in the publication *News from Rohde & Schwarz* (No 118, 1987/3) on passive frequency multipliers. The article is based on a recent R&S patent (DE 3524 112C1) due to the work of Bernd Fritze. As mentioned several times *TT*, it is perfectly in order to use patent disclosures for experimental (ie home construction) purposes, but not for commercial products except under licence from the patentees.

R&S point out that frequency multipliers made up solely of passive components are simple in their design and afford reduced interference, but on the other hand they present the disadvantage that the forward voltage across the diodes, corresponding to the difference between input and output voltages, is reduced by the generated output voltage just when the diodes should pass the maximum current for the purpose of obtaining high efficiency especially for generating higher harmonics. Furthermore this output voltage increases the reverse voltage across the diodes just when minimal current should flow, ie the diodes should be cut off.

The article continues: "The invention based on replacing the diodes by common-base transistors makes the current, being an exponential value of the input voltage, virtually independent of the output voltage. A frequency multiplier of this type generates sufficient current even in the case of output circuits designed for higher harmonics, and the output

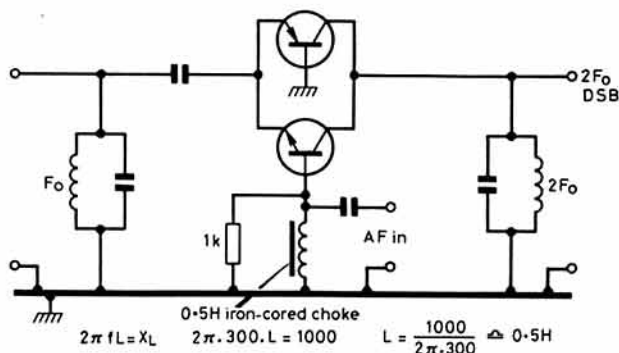


Fig 13. G3PVH's suggested balanced modulator with single-ended input and output tuned circuits based on the R&S passive frequency multiplier concept

circuit can therefore be excited to yield higher multiplication factors at greater efficiency. In addition, the minimum forward voltage of transistors is smaller than that of diodes, so efficiency is improved even more. The transistors work as purely passive components without an extra operating voltage."

R&S show four examples of passive frequency multipliers based on the use of common-base transistors (Fig 12), including the use of a single transistor, and complementary pairs (ie one npn and one pnp device of similar characteristics). In (a) the input circuit presents a low impedance at the desired harmonic frequency and the output tuned circuit filters the desired even or odd harmonics out of the generated spectrum; (b), with the transistors in parallel, is for the generation of odd harmonics, while (c) produces even harmonics, the odd-numbered harmonics being suppressed with the input circuit configured as an unbalance-to-balance transformer; (d) has the output circuit in the form of a balance-to-unbalance transformer and is for the production of even-numbered harmonics. It is noted that the suppression of unwanted harmonics is particularly effective with circuits using complementary transistors if the emitter currents are made symmetrical by C1.

G3PVH believes that this approach could also be used as a balanced modulator producing suppressed carrier double-sideband output at twice the input frequency. Fig 13 shows his suggested arrangement with single-ended input and output, though I do not think he had actually tried this idea at the time of writing. □

## TECHNICAL UPDATE

Alternative limiting stages for "A Droitwich-locked frequency reference for carrier frequencies of 200 and 198kHz", N D N Belham, G2BKO. *Rad Com* June 1984, p487.

DIFFICULTIES have been experienced in obtaining the rather "ancient" TBA120, and even when obtained some samples have not operated as expected. An alternative arrangement is shown in Fig 1. The first new limiting stage "squares off" the top and the second stage "squares off" the bottom of the pulse before it is used to trigger the 40106 Schmitt trigger ic.

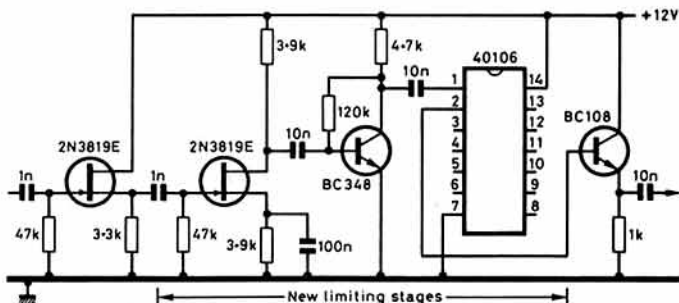


Fig 1. Alternative arrangements

The limiting starts in the rf stages, provided that enough stages are used, and this shows in no increase in amplitude of the signal and, if tuning is accurate, in a reduction of any trace of the amplitude modulation.

G2BKO

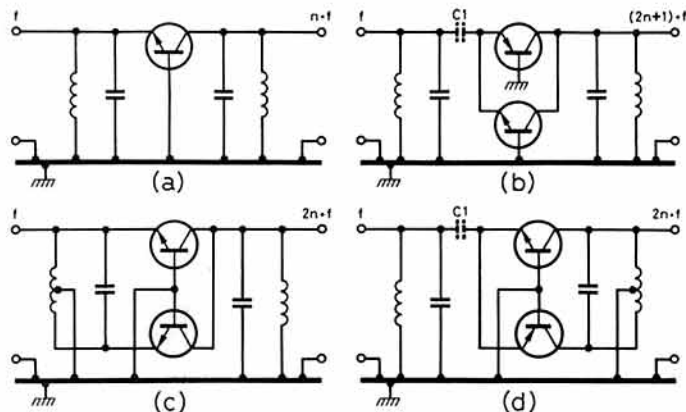


Fig 12. Passive frequency multipliers as described in the R&S patent using common-base transistors and complementary-pair transistors in various configurations



# NEWS

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## BULLETIN

### Calling all young radio amateurs "Young Amateur of the Year" Award

As you saw in last month's Bulletin, it's the Society's 75th anniversary this year and all sorts of wonderful things are taking place in 1988 in connection with it. One of them is the "Young Amateur of the Year" award, which is sponsored by the Department of Trade and Industry - we mentioned this last time, but between then and now the official Press Release arrived and we make no apology for bringing it up again. First of all, here's the text of the press notice;

"Anybody under the age of 18 who has made waves in the world of amateur radio should enter the Young Amateur of the Year Award now.

"The award, sponsored by the Department of Trade and Industry as part of the 75th anniversary celebrations of the Radio Society of Great Britain, is designed to increase awareness of amateur radio amongst young people and highlight the skills and benefits that participation in this unique activity can bring.

"The £250 prize will be awarded to the person judged to have made an individual contribution of outstanding merit between 1 April 1987 and 31 March 1988 in any area of amateur radio. This might include technical innovation, exceptional operating skills, success in promoting amateur radio to a wider audience, the fostering of international goodwill, social work for the handicapped or emergency communications. It is hoped that the prizewinning will take place at the RSGB's national convention in July 1988.

"The winner will also spend a day with the Department's Radiocommunications Division learning at first-hand about the varied work of the Department in the radio field.

"Applications or nominations must be sent to The Secretary, RSGB, Lambda House, Cranborne Road, Potters Bar, Herts EN6 3JE. The closing date is March 1988."

So - there it is. We ought just to mention that the award is open to any resident of the UK, the Channel Islands or the Isle of Man who has not reached his or her 18th birthday by the closing date. Also, applicants don't have to hold a current amateur radio licence. ■

#### "RADIO HAM HELPS SAVE SHIP'S CREW":

So ran a story in the Western Morning News for Monday 28 December 1987. Seems that Robert Watters, RS90281, of St Austell, Cornwall, heard a Mayday call from the Panamanian-registered "Island Queen" on Boxing Night. The vessel's cargo of timber shifted as a result of high winds, and her engines then failed; she was on passage from New York to Liverpool and at the time of the emergency was some 700 miles off the west coast of Ireland. Mr Watters heard the distress call and alerted Falmouth coastguards, who after the event praised his "...public-spirited action in making sure we knew of the emergency at the earliest possible moment".

After an air-sea rescue operation co-ordinated by Falmouth, all 14 crew members were taken off the ship. An RAF Nimrod later established that the "Island Queen" had sunk. ■



#### COVER STORY:

During this 75th Anniversary year, we'll be devoting the front covers of Radio Communication to historic photographs. There will be one from each decade of our existence, one looking into the future and the other three reserved as follows: an open invitation to the 75th anniversary celebrations (July issue), the traditional "Christmas" cover (December issue - remember, there's only 265 more shopping days to Christmas...!) and one other which we haven't decided on yet.

The January issue showed the founders of the Radio Society of Great Britain in 1913. This month's cover shows Gerald Marcuse, G2NM, the founder of the Empire Broadcasting Service, forerunner of the BBC's External Services - more on that in a moment.

There are many historic photographs in the Society's library which cover major events throughout its history but we don't seem to have anything from the 1940s. If you can help out with a good photo from that decade which shows the state of play in amateur radio at that time, please send it to us as soon as possible. We'd prefer a portrait format if possible, but in any event do let us see what you've got hidden away in the attic or the shack and we'll

(over) ▶

see if it's suitable. As an added incentive, if we do use your photo for the cover we'll pay you the usual fee or send the money off to the charity of your choice.

Incidentally, if you've any good colour photos (again, in portrait format please) from the 1950s onwards we may be able to use one or two of those. Most of the photos in our library are in black and white.

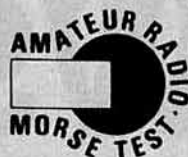
#### EMPIRE BROADCASTING:

Nowadays the BBC External Services broadcast all over the world in 37 languages (at the last count) with a network of relay stations and satellite links from Bush House in London. But it was the enterprise of Gerald Marcuse, G2NM, which ultimately led to the introduction of a broadcasting service to the Empire and later to the establishment of the then "Overseas Service" of the BBC.

Gerald Marcuse was one of the pioneers of the development of the short waves for communication, and between 1923 and 1927 he had become known to the general public as a result of his work. As a result of contacts with an amateur in Bermuda he became interested in the possibilities of providing a broadcasting service to the Empire, and after a great deal of correspondence with the Post Office he was granted a permit "to transmit speech and music for a period not exceeding six months from 1 September 1927 by means of wireless telephony with power for transmission not exceeding 1 kW and wave of 23 and 33 metres". On September 11 1927 he transmitted a special concert to Australia, enlisting the services of several well-known artistes of the day. The broadcast was only partially successful because of a breakdown in the transmitter, but enough of it was received in various parts of the Empire for it to be hailed as a great achievement. Several more broadcasts took place, featuring the sounds of Big Ben, birds singing in his garden and the voices of the local church choir!

Transmissions from G2NM continued almost daily until the end of August 1928, and in the same year the BBC commenced transmissions to the British Empire from Daventry. The Corporation used a wavelength of 20 metres and their transmissions were less well received than those from G2NM! ■

Our front cover photograph shows Gerald Marcuse with the equipment in use at his station in January 1924. From this station he made the first two-way contact on short waves with the west coast of the United States.



## MORSE TESTS

The following list shows the dates and locations of all the available test centres from mid-February to late April as we went to press. Because of space limitations, we cannot print a complete list of all the test centres notified to us, but these can be found on the application form itself.

Morse tests will be carried out in groups of three and will be of half an hour's duration. Details of the test, the venue and how to get there will be sent to you as soon as your application has been processed and your place confirmed.

COUNTY	TOWN OR LOCATION	DATE
Dyfed	Haverfordwest	03/03/88
Tayside	Kirriemuir	05/03/88
Tyne & Wear	Blue Star Rally	05/03/88
North Yorkshire	Scarborough	05/03/88
South Glamorgan	Barry Rally	06/03/88
Co.Tyrone	Dungannon	07/03/88
Greater London	Wanstead	11/03/88
Lancashire	Fleetwood	12/03/88
Isle of Wight	Binstead, nr Ryde	12/03/88
Lothian	Edinburgh	12/03/88
Mid Glamorgan	Rhydyfelin, Pontypridd	13/03/88
West Sussex	Horsham	13/03/88
Hereford & Worcester	Wythall Rally	13/03/88
Merseyside	Sandown Technical College	15/03/88
Berkshire	Reading	16/03/88
Bedfordshire	Luton	17/03/88
South Yorkshire	Sheffield	17/03/88
Jersey	St.Clement	17/03/88
Lincolnshire	Grimsby	18/03/88
Powys	Montgomery	18/03/88
Dorset	Dorchester	19/03/88
Norfolk	Norwich	19/03/88
Buckinghamshire	Bletchley, Milton Keynes	20/03/88
Shropshire	Telford	22/03/88
Gloucestershire	Gloucester	22/03/88
Grampian	Aberdeen	23/03/88
West Midlands	Coventry	26/03/88
Surrey	Guildford	26/03/88
Greater London	Croydon	28/03/88
Gwent	Newport	04/04/88
Guernsey	Guernsey ARS, St.Martins	07/04/88
Cambridgeshire	Cambridge	08/04/88
Hampshire	Winchester	09/04/88
Staffordshire	Stafford	10/04/88
Fife	Leslie	12/04/88
Derbyshire	Clay Cross	13/04/88
Suffolk	Ipswich	14/04/88
East Sussex	Hailsham	16/04/88
Cheshire	Macclesfield	16/04/88
Cornwall	Liskeard	16/04/88
Humberside	Goole	17/04/88
Strathclyde	Glasgow	17/04/88
Lincolnshire	Lincoln	20/04/88
Greater London	Wood Green, London N22	20/04/88
Northamptonshire	Tiffeld, Northampton	21/04/88
Nottinghamshire	Mapperley, Nottingham	23/04/88
Greater London	Dartford	23/04/88
Greater London	Croydon	25/04/88
Greater Manchester	Cliofton	25/04/88

We receive notification of new centres almost daily and the application form gives a full list of those currently taking advance bookings for Morse tests.



# Helplines

## RMG VACANCIES:

### 1) Minutes Secretary -

The Repeater Management Group is in urgent need of a Minutes Secretary. Essential requirements for this position are a good command of English, the use of a word processor and a willingness to attend all RMG meetings, which are held six times a year in London. It would be useful, though not vital, for applicants to have a knowledge of repeaters. Travelling and other out-of-pocket expenses will be reimbursed.

### 2) Repeater Regional Rep -

The RMG is seeking a person living in Lincolnshire, Norfolk or north Cambridgeshire to liaise between the RMG and repeater groups in that area. The successful applicant will become a Corresponding Member of RMG and will be expected to provide verbal reports every two months and to attend an annual meeting held at the RSGB's national convention. A telephone is essential and it would be an advantage to be listed in the current callbook.

If you would like to apply for either of these posts, please write as soon as possible, giving details of relevant qualifications and experience to the Chairman:-

Mike Dennison, G3XDV  
5 Lambs Walk  
Whitstable  
Kent CT5 4PJ

## T & P VACANCIES:

The Society's Technical & Publications Committee is in need of additional volunteer full members.

The work of the committee involves the reviewing of articles for Radio Communication and manuscripts for possible future books, technical correspondence, building constructional projects, and making contributions to the Society's publication programme.

Members of the committee are expected to attend meetings which are held in central London on Monday evenings from about 6.30pm to 9.30pm. Meetings are held at approximately every five weeks.

The successful applicant will have a good general knowledge of amateur radio and a sound technical understanding. Expertise in a particular field can be useful. If you are interested in becoming a

member of the committee or you would like further details, please contact the Chairman:-

Peter Hart, G3SUX  
42 Gravel Hill  
Addington  
Croydon  
Surrey CR0 5BD

## SLOW MORSE CO-ORDINATOR WANTED:

In last month's Bulletin (p46), we ran an item on the problems faced when trying to co-ordinate the RSGB slow Morse broadcasts and the problems in fitting them into the agreed international bandplans.

The slow Morse broadcast service is handled by a band of dedicated volunteers for the benefit of those preparing for the Morse test. Following the problem with the slow Morse broadcasts in the London area, the lack of a volunteer co-ordinator was highlighted and Council has agreed that co-ordinator should be sought as soon as possible. One of his or her responsibilities would be to make sure that all slow Morse broadcasts authorised by the Society are co-ordinated in such a way that there is no interference to broadcasts in adjacent areas. Anyone interested is asked to write to the Chairman of the Membership Liaison Committee, c/o RSGB Headquarters, and any views on the subject will be appreciated.

## HOME FOR OLD JOURNALS:

Don Brown, G4OYB wants some more space in his shack now that he's retired, so he'd like someone to take a number of journals off his hands and give them a good home.

These are:-

"The Journal of the British Institution of Radio Engineers" (later known as "The Radio & Electronic Engineer"), all copies from 1949 to 1985.

"The Journal of the Institution of Electrical Engineers Part III (later called "The Proceedings of the IEE Part B"), both of which deal with radio and electronics, all copies from 1942 to 1962.

If you'd like any of the above they're yours for the asking but you'll have to arrange to pick them up yourself by telephoning Don on Cheltenham 513561.

## RADIO SOCIETY OF GREAT BRITAIN

### LIAISON OFFICERS

The following list is of those areas for which no nominations for Liaison Officer has been received (as mentioned in last month's Bulletin).

### ENGLAND

Berkshire  
Cumbria  
Derbyshire  
Dorset  
Durham/Cleveland  
East Sussex  
Gloucestershire  
Hertfordshire  
Lancashire (North)  
Lancashire (South)  
Norfolk/Suffolk  
Northumberland  
North London  
North Yorkshire (SW of Ouse)  
Nottinghamshire  
Oxfordshire  
Somerset  
South Yorkshire  
Tyne & Wear  
West Sussex  
Wiltshire

### WALES

Clwyd  
Gwent  
Gwynedd  
Powys

### SCOTLAND

Dumfries & Galloway  
Highlands/Western Isles  
Lothian  
Orkney  
Strathclyde

### NORTHERN IRELAND

Co. Antrim  
Co. Londonderry/Co. Tyrone

### BAILIWICK OF JERSEY

Jersey

Clubs in any of the counties listed above who wish to nominate a Liaison Officer should send either the original or a photocopy of the nomination form printed overleaf to RSGB Headquarters by 5pm Friday 25 March marking the envelope "RLO" in the top left hand corner.

## RSGB AGM 1988

Please read page 919 in  
December's Radio Communication

NOMINATION FORM FOR THE POSITION OF  
RSGB LIAISON OFFICER

1. TO BE COMPLETED BY THE NOMINATING ORGANISATION:

(Figures in brackets refer to the notes below)

The ..... (1)

wishes to nominate..... (2)

for the post of RSGB Liaison Officer for the area of

..... (3)

We confirm that this nomination represents the wishes of the RSGB members of the above-named club and that the club regularly meets within the aforementioned area.

Signed on behalf of the above club/society/group:

Chairman .....callsign.....

Secretary.....callsign.....

Committee member.....callsign.....

2. TO BE COMPLETED BY CANDIDATE:

I, ....., am willing to stand as RSGB Liaison Officer for the area of

.....

and confirm that I am currently a member of RSGB and am resident in the aforementioned area.

Signed.....callsign.....

Date.....

Notes: (1) Name of local society, club or registered RSGB group  
(2) Name and callsign/BRS number of candidate  
(3) Name of area for which the candidate is standing

NB: As the main organisations existing at a local level, clubs, societies and groups should be well qualified to put forward candidates for these posts. We hope that this process will also improve members' awareness of the work of those officers. Please look carefully at the job description in Sept 1987 RadCom and choose a candidate who will actively encourage amateur radio in your area - the effectiveness of RSGB at local level lies in your hands!

\*COMPLETED FORM TO BE AT RSGB HQ NO LATER THAN 25 MARCH 1988\*



We thought we'd introduce a new feature in this month's Bulletin - essentially the idea is to have an occasional page or so which picks up a technical idea that's currently floating around the amateur world (or perhaps one that's had a brief mention in "Technical Topics" elsewhere in the magazine) and amplify it or discuss it a bit. If we receive howls of protest from the members we'll forget the whole idea; if, on the other hand, you like it, let us know the sort of things you'd like to see and we'll do what we can about writing them up. We thought we'd start with something nice and simple this month, and as a matter of fact we got the idea from listening to a contact on 144 MHz between two relatively new amateurs a couple of evenings ago.

The essence of it was that one of them was thinking of building something featured in an American magazine; as a matter of fact it was an RF speech processor of a rather nice design. The gist of the conversation was that our man had never heard of most of the transistor types shown on the circuit diagram and he was wondering whether this or that alternative would do. So in the first "Practical" we thought we'd mutter a few words of (hopefully) wisdom about transistor substitution. They're really intended for the beginner, although maybe even the older hands might find something useful.

If you're a newcomer to the world of electronics and you pick up a semiconductor data book - such as one of the well-known "Towers" ones like "Towers' International Transistor Selector", for instance - you could be forgiven for wondering how anyone ever manages to design anything; there are literally thousands of different transistor types and you might think that knowing which one of them to use in a particular circuit must call for great skill and knowledge and a memory like an elephant.

It's true that more than 100,000 different type numbers for transistors have been issued over the years by manufacturers and standards associations. However, you'll be relieved to know that the vast majority of the said devices were never widely used and probably aren't used now by professional circuit designers.

The next thing to know is that there are basically three separate serial numbering systems used in the industry. One is the American system, which uses the familiar "2N" series - the much-loved 2N3055 as found in a million audio amplifiers and power supplies is an example. Another is the European "Pro-Electron" series, in which transistors either get a code consisting of two letters and three numbers (for a so-called "consumer" device) or three letters and two numbers (for a so-called "industrial/professional" device).

The BF 981 used in nice 144 MHz front-ends is an example of the first and the BFY 50 - a very common switching transistor - is an example of the second.

Finally there's the Japanese system in which all transistor numbers start with "2S" and continue with a letter and several numbers. An example of this might be the 2SC2094, used as the PA stage of an Icom IC251E and pretty well indestructible in our experience....

So it's a reasonable bet that an American design will use transistors whose type numbers begin with 2N, whereas one designed by a British amateur and published in a British magazine will probably contain devices numbered in the "Pro-Electron" manner (see above).

Having said that, several European manufacturers produce their own versions of 2N devices which are particularly popular - the 2N2905A switching transistor is made by Mullard and others as well as several USA manufacturers. In contrast, if you're trying to fix a Japanese rig you'll probably find it's full of 2SC's and 2SD's, and unfortunately we don't know of any European semiconductor maker who manufactures parallel versions.

Finally, a few manufacturers insist on using their own numbering schemes for transistors. For our purposes the most common ones you'll come across in this category are the MJE series made by Motorola and the TIP series made by Texas Instruments.

The important point to remember is that for the vast majority of jobs - certainly those which don't involve high-power RF stages, high-voltage operation or anything that's a little unusual - most designers will use the same device for related jobs in a wide range of different circuits. This means that

you can do the same, whether you're designing from scratch or fixing something. Also, for this type of non-critical use there are probably hundreds of different devices you could use in the circuit, all of which would work perfectly well.

Let's take an example.

In the speech processor design our man was talking about, one bit of the circuit used a "2N1893". Now we'd be willing to bet that very few radio amateurs in the UK (or very few professional designers, come to that) could tell you what a 2N1893 is or what it's intended for. We'd also put money on the fact that it would be fairly difficult to obtain in the UK, even if it was a common device in the USA. So the next question is, what's it being used for? The answer is that it's an NPN transistor used to turn on a small relay.

In electronic design terms, designing a transistor stage to switch a relay on and off isn't difficult and even if you're Chief Designer of Racal or Marconi or wherever there's no way you could possibly spend more than about five minutes thinking about what was involved. Given that the circuit is running on a 24V supply and the relay is an ordinary one, there must be a vast number of transistors which could do this job. We would immediately think of the BFY 50, basically because we've used many of them over the years to handle simple switching, and almost without looking up its characteristics we'd reckon it would work straight away when placed in the circuit. If it didn't the 2N1893-driving-a-relay stage must be highly unusual!

The questions to ask yourself if you're looking at a design full of weird-sounding transistors go something like these;

- are they silicon or germanium?
- are they PNP or NPN?
- what frequencies must they amplify, if they must?
- what current must they switch, if they're switches?
- what sort of power must they dissipate?

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f) are there any special requirements for mounting them? In other words, is the case style critical or can you rearrange things so that it doesn't matter?

g) is there anything unusual about the circuit they're in - i.e. is a high collector-emitter voltage rating necessary, does it need to operate at UHF, does it need phenomenally high gain? If none of these things, you'll be home and dry quite quickly.

So what do we use for non-critical jobs? Assuming that the equipment isn't using voltage rails higher than 24V, which most small amateur-type projects don't, here's a table of devices easily obtainable in the UK which between them will do most things. We'd guarantee to find all of them at virtually any UK rally in five minutes flat and for pennies each;

Small-signal switching, turning on a LED, low-power audio oscillator or amplifier;

NPN - BC 107, BC 548; PNP - BCY 70, BC 557.

Operating small relays, sounders, lamps, anything one size up from the above;

NPN - BFY 50, BFX 85; PNP - 2N2905, BSV 17.

Small-signal RF oscillator;

NPN - 2N 2222, BF 183; PNP - BF 324, BF 450.

Other RF applications - it very much depends on the circuit and we wouldn't like to make general recommendations.

Medium-power audio or PSU regulator;

NPN - MJE 340 (plastic-encapsulated, made by Motorola) or one of the Texas Instruments TIP series; PNP - MJE 350, TIP series, BD 132.

High-power audio or PSU regulator;

NPN - 2N3055, 2N3771, -2 or -3; PNP - we like the BDX 96.

High-power high-voltage - they're almost all NPN. TV line output transistors like the BU 208, BU 500, etc, seem to work well in all sorts of unlikely-looking circuits.

Higher-power higher-voltage - try the BUS 13 or -14.

Medium-power Darlington - if you need one, try the BSS 62.

Those are some of the devices we've used over the years, and once again we stress that for the vast majority of projects which don't involve either high-frequency operation or require tricky combinations like high voltage and high power dissipation, a device in that list ought to work just fine.

The moral of the story is just that if you're considering making something from a published design don't be put off by the fact that the transistors in it don't sound familiar and aren't in any catalogues on your bookshelf. The odds are that you can find a device that will work perfectly well in the circuit if you just have a think about what the transistor is doing: if the write-up of the article is any good it ought to be obvious in a few moments. In fact, whether the devices are mechanically interchangeable often matters as much as whether they are electrically similar in the sort of applications discussed above, and any of the usual data books will soon tell you more than you ever wanted to know about transistor case styles.

In other words, that's one less excuse for not home-brewing!

#### PUNS EXPEDITION UPDATE:

In December's Bulletin we mentioned the Polar Universal Natural Science expedition which is due to start this month and said that we'd give more details later. Laurence Howell, GM4DMA, the base commander for the expedition, has now sent us an update.

The members of the expedition are due to depart from Heathrow by British Airways to Montreal on 18 February, from where they will fly north to Resolute Bay in the North West Territory. They will train there for about two weeks before flying to Ward Hunt Island (83° 05' N, 74° 06' W, locator FR 23 WB) on or around 4 March. The team cannot fly in before that date because there is not enough light for the ski aircraft to land on the floating Arctic ice shelf which surrounds the small island.

Following the completion of a number of scientific programmes, the three-man "ice team", led by Sir Ranulph Fiennes, Bt, DSC, will leave the base camp pulling their British Aerospace-designed sledges in an attempt to complete the first non-supported pull to the North Pole. The distance, "as the crow flies", is 450 nautical miles though the actual distance covered is likely to be twice that taking the terrain into consideration. On

a good day the team should make about 5 miles (if our calculations are correct, they should take about six months to reach the pole!) Once the group has left the base camp, Laurence and Morag (GM1ILL) Howell will maintain a 24-hour radio watch contacting the ice team on the hour every hour. Apart from holding amateur radio licences, both Laurence and Morag are qualified marine operators. They will establish radio links for commercial traffic as well as enjoying some amateur radio activity to the UK. Laurence will be active mainly in the 14 MHz band SSB/CW and 10 MHz band CW using the callsign GM4DMA/P/VE8, though there will be some activity in the lower and higher bands - conditions permitting. It is hoped that some 144 MHz operation will be possible via the 144 MHz/28 MHz RS satellite transponders. Antennas for the lower bands will be verticals with wire "vees" for the HF bands. The power output will be 100W from Racal Communications equipment powered by sealed lead-acid batteries. Recharging will be by two wind-generators.

Operating times will vary, but since the station will be active for 24 hours a day it could pop up at any time on the amateur bands. From the DX point of view, the station will be the most northern

land-based radio station in the world, being at least 50 nautical miles further north than VE8RCS at Alert. The station should be operational until mid-May.

In 1986, when Laurence was last operating from Ward Hunt Island, mobiles operating on the WAB 80 metre nets were often audible from early evening onwards as a result of the the relative quietness of the location. Capital Radio, Radio London and Radio 1 were also added to the log quite a few times.

On the propagation side, the operators will be using computer predictions for optimum working frequencies for various paths and will be comparing these with the actual values following contacts made.

Aircraft overflying the area keep an eye on the weather around Ward Hunt Is, often using the unprepared ice runway as a refuelling or rest stop. In 1986, the celebrated Australian explorer Dick Smith, VK2DIK, dropped into Ward Hunt Is for fuel and to try to heat up the avionics equipment in his helicopter, which had failed because of extreme cold, by using a Kerosene stove in the cabin! He was attempting to reach the North Pole but had to turn back south. However, he finally reached the Pole a year later.

More news as we have it.



# Square Bashing in the Isle of Man



Take half-a dozen VHF DX fanatics, offer them a week's holiday on a good site on the Isle of Man with one and a half tons of equipment and what have you got? Sounds like a question for the Christmas Quiz ("total and utter chaos"; "large-scale disruption of the radio-frequency spectrum"). The correct answer is "a Square Basher DXpedition", and if you're at all active on any of the VHF or UHF bands you probably heard us hard at it from GB4GD during the second week of August last year. So many people asked us what we were up to that the Bulletin editor twisted my arm (well, wrapped it halfway round my back, more like) to write an article about it - much more difficult than doing the DXpedition in the first place.....

As always, the aim of the Square Basher - apart from having a lot of fun - was to give as many European amateurs as possible the chance to knock another "wanted" country or locator square off their hit lists. Early in the planning stage we enlisted the help of the Isle of Man Radio Club and John, G8JHL, in finding a site; this was duly done and we were able to set up shop in a combination of a hired van and four tents. With a proper sense of priorities, one tent was "dedicated" to culinary purposes! It certainly was an excellent take-off, and on a clear day we could see the Mull of Galloway, Cumbria and Morecambe.

144 MHz meteor scatter was the main *modus operandi*, and indeed the expedition was timed to coincide with the peak of the Perseids shower. It's been remarked that in recent years the peak of this shower seemed less intense than in the past, and we thought that was the case in 1987 as well. However, in spite of this there were some good reflections. One of the most interesting 144 MHz contacts was

with HG2NP/0, and the reason we say "interesting" was that Robert initially started to call us on 25 wpm CW and we heard him! It certainly didn't seem to us that MS was the predominant mode, given that the signal was audible, or at least just about audible, for a good 3 or 4 minutes. We wondered whether some sort of troposcatter or ionospheric scatter was taking place; it's certainly possible if the rumour that certain Hungarian VHF DX-chasers have acquired ex-Soviet military QRO amplifiers is true! What was that comment in Ken Willis' column last year about "....two GU43s with ventilators"? We also seemed to have exceptionally good propagation to Czechoslovakia: at one point we worked OK2PZW and immediately afterwards worked his father OK2VMD, operating the same station. This led to some amusement whilst we imagined the family disharmony and chaos that could occur in a sporadic E opening!

We also, of course, worked many stations on 144 MHz tropo and we could probably have worked more; unfortunately there are only 24 hours in a day and human endurance is limited. Even the renowned Square Basher team can't handle more than about six QSOs a minute for more than about 48 hours. Incidentally, while we're on the subject of operating, beware the dreaded Square Basher Black List. Membership of this select and (so far) small band is reserved for those who transgress the unwritten laws; for example, those who consider that running QRP automatically allows them to respond to a "QRZ DX Eastern Europe?" call even though they're only 50 miles away and S9+. Warning; vengeance is swift.....

Just prior to the DXpedition it was announced that Class B licensees would henceforth be permitted to (over) ▶

by  
Tim Kirby  
G4VXE



The Square Bashers' site on the Isle of Man, looking westward. The HF station was set up in the van with the VHF/UHF/Microwave station in the rear tent, just below the main mast (centre). The large tent in the foreground was the kitchen.

operate on 50 and 70 MHz, and we looked forward with interest to seeing what effect this would have on activity. Certainly 50 MHz was busier, and indeed our expectations as to what could be worked on 50 MHz tropo were handsomely exceeded - both in terms of numbers of contacts and distances achieved. No doubt the elevated site and rare-ish country helped, but it was by no means unusual for us to make contacts into London or the south-east and the best tropo DX was with GJ4ICD at 577 km. Activity on 70 MHz didn't seem significantly higher; one or two new callsigns were noted but we rather suspected that the lack of commercial gear was inhibiting activity. However, there's no doubt that 50 and 70 MHz are bands which should be included on the itinerary of every VHF DXpedition to a remote spot.

Considering that Square Bashers personnel are dyed-in-the-wool VHF addicts, we didn't expect to do an enormous amount on HF. However, HF (which was known throughout the expedition as "DC") proved extremely interesting. We operated two HF stations, one of which was exclusively for the 14 and 28 MHz VHF nets. The antenna for these bands was a half-wave 14 MHz dipole with an average height of about 12 feet; one end of it was supported by nothing more spectacular than a bit of gorse. This primitive set-up

gave good results all over Europe, which ought to give some hope to the "can't get a proper antenna up" fraternity. The other HF station was there to get on with the serious business of DXing. We set up shop inside the back of the long-suffering hired van, with feeders winding their way out of the window to various dipoles stretched between the 430 MHz antenna mast and another mast strategically placed in a corner of the field. We concentrated on 7 and 14 MHz CW and hoped to give a new country for the Golden Jubilee DXCC award. Judging from the pile-ups which occurred we were fairly popular. Mind you, hardly a day went by without the HF station suffering from some disaster or other; several major conflagrations took place inside the ATU, for example. We obviously have a few trifling things to attend to before tackling the likes of Peter I Island....!

Activity on the microwave bands is rather less than that on 144 and 430 MHz and the microwave team of G8TFI and G4FRE (who incidentally rejoice in the respective nicknames of Baldrick and Mr Noisy, for reasons which I am not at liberty to disclose) were able to sample the scenic delights of the island rather more than the rest of the crew. Mind you, given some of the famous GD weather the rest of us

were glad to be snug in our nice dry tents by our nice hot amplifiers!

You'd be mistaken, by the way, if you assumed that radio was the main activity of the DXpedition. Au contraire, as they say; eating curry was what we were really there for! The local Indian restaurant is probably still wondering where those lunatics came from and why. No, there was no dancing on the tables but a policewoman did wave through the window at us and we did find a fly in the lager....

Most regrettably the time came to strike camp and go home. The trip from Douglas to Heysham (courtesy of the Isle of Man Steam Packet Company, which has nothing to do with AX25 incidentally) was interesting; someone happened to say to a member of the ship's crew that we were radio amateurs, and before you could say "tetrode" we were whisked off and given a tour of the bridge and radio room. The ship's gear was virtually all Marconi, and we learned that on a short voyage such as Douglas-Heysham the only activity was maintenance of the listening watch on 500 KHz and a bit of VHF marine band operation for local working. We were surprised to note that there was very little nautical language on the bridge - no-one was threatened with keel-hauling or flogging with a cat-o'-nine-tails, and we didn't hear the word "bilges" once!

We recommend DXpeditioning to anyone - it's a great way to spend a holiday. No TVI, no neighbours demanding to know "what's that aerial for?" Just good old British weather and a lot of fun. If all goes according to plan you'll be hearing us again in 1988, from somewhere nice and rare....

#### Total GB4GD QSOs

1.8 MHz	- 1 (!)
3.5 MHz	- 64
7 MHz	- 351
14 MHz	- 449
21 MHz	- 54
50 MHz	- 202
Best E DX CT1LN, 1930km	
Best tropo DX GJ4ICD, 577km	
70 MHz	- 51
Best DX GU2FRO, 550km	
144 MHz	- 1054
Best MS DX OH2TI, 2000km+	
Best tropo DX FC1DDA/P, 1335 km	
430 MHz	- 251
Best DX EA1BLA at 1224 km	
1296 MHz	- 42
Best DX PE1GHG at 644 km	
2320 MHz	- 12
Best DX G4FUF at 441 km	



# Around the Groups

Starting with the March issue, this section of the Bulletin will be expanded to include more items of interesting news from clubs, groups and societies. If you have any interesting items of news, with good black & white photographs if possible, please send them direct to HQ marked "Around the Groups - Bulletin". We may not be able to use all items sent in because of space limitations but we'll try and fit in as many as possible.

The deadline for the April issue is Tuesday 1 March but if you can send items in earlier it would be much appreciated.

## BARTG NEWS:

The editing of news items for the GB2ATG news broadcasts has now been taken over by G6URP and G1JZJ. Items for inclusion in those broadcasts should be sent to Mr R Andrews, G1JZJ, who is QTHR.

BARTG's quarterly publication, DataCom, is now available to blind amateurs on three C90 cassettes. The cost is £5.00 per year, which includes the cassettes and postal wallets, and, if you'd like to receive DataCom on tape, please send your subscription to Roy, G3LAZ who is QTHR in the latest callbook.

## RAIBC NEWS:

Since many RAIBC supporters and representatives already pay the subscriptions for some of the Full Members who would be hard pressed to find the money themselves, RAIBC has decided to operate a "Sponsor A Member" scheme. It appears that there may well be a large number of members who do not have the benefit of such good friends who are willing to help them out financially and to whom the recent increase in subscription rates will be a hardship. There will also be those who, as a matter of pride, would not wish to admit this but it is a sad fact of life that some of those who are disabled, blind or both find even £4.00 per year a struggle.

The "SAM" scheme will run like this: the treasurer and auditor of RAIBC will, if both parties wish, be the only people who will know the names of those concerned. If the sponsor wishes to remain anonymous to the members and vice-versa, their wishes will be

adhered to. If you would like to apply for sponsorship or to be a sponsor, please write to the Treasurer, Shelagh Chambers, (whose address is below) stating clearly whether or not you wish to have your identity known.

Shelagh Chambers  
78 Durlay Avenue  
Pinner  
Middlesex HA5 1JH

## QSL BUREAU NEWS:

After 40 years of sterling service, Mr J Reid, GW3ANU, has been forced to retire as QSL sub-manager for the GWO, GW2, GW3 and GW4 callsign groups because of ill health.

The new Sub-manager for those series is:-

Mr C Jones, GW1JCB  
7 Dawan Close  
Barry  
South Glamorgan CF6 8PZ

Also, the new QSL Sub-manager for the G4PAA-PZZ series is:-

Mr D Hollingworth, GOAMH  
182 Hythe Crescent  
Seaford  
Sussex BN25 3UA

## WAB NEWS:

December tends to be a quiet time on the awards front but, even so, there are still some new "firsts" to report.

The first 80m CW Basic Islands Awards (for working 25 islands off the British Coast) went to G4OGB.

G5LP/M received the first Gold WABEMA Award for activating 600 areas on 80m CW. This award is issued free of charge in recognition of the great service provided by mobiles and portables in "activating" rare or sparsely populated WAB squares or areas. The Basic WABEMA Award is issued for activating 100 areas.

GRUYD has been awarded the first 1987/88 144 MHz Winter Activity Award. The award runs until the end of February so there's still time to get your claim in.

WAB activity and interest is not just confined to the LF and VHF bands. Malik, 4X4JU, who has been a very strong signal recently on the 20m band, is the first non-European station on the Honour Roll with well over 1000 areas to his credit as well as 1000 bookholders. Please remember that even if you don't take part in WAB

yourself, there are many others who do and they'd dearly love to know your WAB area. It's very easy to work this out as it's simply your 10km National Grid Square. For example, if your NGR is SK 123 456, the 10km square (WAB area) is the first two letters followed by the first and fourth figures (SK14) and that's all there is to it.

WAB contests are held throughout the year and cater for all bands and modes. They tend to be a little less frantic than your average contest with participants actually giving their names and spending some time having a chat. If you'd like to have a go, the first WAB contest this year - the 160m mixed mode - takes place on Saturday 6 February from 1800-2300 GMT.

For those diehards who have not yet been bitten by the WAB bug, we hope to be running a short introductory item next month. In the meantime, further details can be obtained from:-

Brian Morris, G4SKQ  
22 Burdell Avenue  
Sandhills Estate  
Headington  
Oxford OX3 8ED

## AMSAT NEWS:

AMSAT-UK has donated £13,500 to AMSAT-DL for the express purpose of transporting the Phase 3C satellite (to be designated "OSCAR 13"), two metric tonnes of equipment (including an amateur radio station), and two technicians from Marburg in West Germany to Devil's Island, Kourou, French Guiana for the intended launch of Arienne V22 during the first week of May. We understand that AMSAT-DL's funding for the project has been considerably reduced and, were it not for the timely intervention of AMSAT-UK in providing the financial assistance, the Phase 3C satellite, equipment and support team would not have been able to reach Kourou in time for the launch window. AMSAT-UK hopes that the UK amateur radio fraternity, especially those not already donating to AMSAT UK, will now respond positively to its suggestion that they also donate some of their spare cash. All donations will be gratefully received by the AMSAT-UK Hon.Sec. Ron Broadbent, G3AAJ.

AMSAT-UK has also donated \$1,000 towards the launch insurance policy (\$10,000 premium - a bit more than your average third party, fire and (over) ▶

theft!) which gives \$1,300,000 cover against the failure of the satellite to attain the planned orbit, within certain constraints.

Some months ago, we mentioned the HAART project and AMSAT's possible involvement. As we went to press, it seemed likely the the first attempt would take place on 17 February. This is conditional on the necessary licence being obtained from the DTI. AMSAT-UK has applied for the special callsign GB5AUK.

#### PORT SUNLIGHT CENTENARY:

Thursday 3 March marks the 100th year since W.H.Lever started work on the construction of what was to become a world-famous factory for the manufacture and packaging of soap. Together with its associated village, built to house Lever employees, Port Sunlight is a remarkable example of 19th century industry and philanthropy.

A special event station, using the callsign GBOLBL, will operate from Gladstone Hall, Port Sunlight village from 18-20 March. It will be just one item in an extensive programme of events planned to take place throughout the year. The station will be active in the 80m, 40m, 20m, 2m and 70cm bands using as many modes as possible and including packet radio on 2m. Various charities will benefit from private sponsorship based on the number of QSL cards received within one month of the event. As an incentive to get your cards to them as quick as possible, all cards received within one month will be entered into a grand draw and the winner will receive a bumper pack of Lever products.

#### GOTA '88:

This year's Guides (Thinking Day) On The Air takes place over the weekend of 20-21 February and some of the special event stations set up for the event are listed in the 'Events Diary'. Almost 50 Guide groups were involved in last year's event and many more seem set to take part this year.

Both GOTA and JOTA provide an ideal opportunity for introducing young people to this fascinating hobby. With the encouragement of those amateurs who put on these special stations, many of the scouts and guides go on to become amateurs in their own right. Both the Scout and Guide movements in the UK do a great deal of work in this area, thanks to the dedication of a hard-core of organisers and it's up to all of us to do our bit - not only with these groups but with other youth groups such as the Boy's Brigade, YMCA/YWCA and youth



The photograph above shows an enamel sign which dates from the 1920s. At that time the RSGB was approached by the 'Wireless League' - which looked after the interests of broadcast short wave listeners - following a number of complaints from its members about poor service of radio equipment. The League asked for the Society's assistance in setting up a network of approved traders and repairers. The sign, which dates from 1922, was first seen on the side of a photographic shop in Chatteris, Cambridgeshire by Ian Waters, G3KKD/GBADE, who took the photograph about 5 or 6 years ago. More recently the shop was demolished and the sign was 'rescued' by one of the members of the March & District Radio Amateur Society, who have kindly agreed to loan it to us for display during the RSGB's 75th Anniversary Celebrations. It will form part of a planned display of historic amateur radio equipment at the National Convention in Birmingham during July.

clubs. Remember that if every UK amateur makes the effort to introduce just one youngster to amateur radio - and even if only 10% of these remain interested - we will have about 5,000 new recruits; a whole new generation of amateurs who will safeguard the future of our hobby and reverse the downward trend in active licensees.

#### RAYNET NEWS:

Ron Ray, G3NCL, has recently resigned his position as Raynet Zone 6 Representative. He is replaced by:-

John A Witts, G6BBW  
35 Mansfield Road  
Basingstoke  
Hants RG22 6DX

This will be a one year "caretaker" appointment.

In the November issue of Radio Communication, a call for nominations in Raynet Zones 4, 7, 10 and 12 was made. The following valid nominations were received by the closing date:-

Zone 10 (Cheshire, Cumbria, Gtr Manchester, Isle of Man, Lancs and Merseyside):

Mr Paul Gaskill, G4MWO

Zone 7 (Avon, Cornwall & Isles of Scilly, Devon, Dorset, Gloucs, Guernsey & Dependencies, Jersey, Somerset and Wilts):

Mr Brian Smith, G4ETN

There being only one nomination for each zone, Messrs Smith and Gaskill are elected unopposed for Zones 7 and 10 respectively.

In the other two zones, two nomination for each were received and so an election will be necessary.

Zone 4 (Beds, Cambs, Essex, Herts, Norfolk and Suffolk) -  
Mr Derek Gardiner, G4UJQ.  
(nominated by G3HQS, G4OGI, G4AUV, G4TWS and G4TWT)

Mr John Slater, G6EUO.  
(nominated by G4ZGY, G6HPY, G1VTR, G6MGN and G3YAC)

Zone 12 (all Scottish regions) -  
Mr Eric Garrington, GM3RFA.  
(nominated by GM4XKG, GM4PWR, GM4TJL, GM6YQA and GM1IKQ)  
Mr Malcolm McCreery, GMOETC.  
(nominated by GMOAAJ, GM4COX, GM4ZAN, GM6OQN and GM4SRL)

(cont on page 126)



# Events Diary

## CLUB NEWS:

Starting with the March issue, the "Events Diary" will be expanded to include Club News. However, in an attempt to reduce the number of pages presently used for Club News, we will be using a more abbreviated format, listing clubs alphabetically under counties and giving the date and subject of the meeting. As in GB2RS, latter nights and committee meetings will not be listed. The full details of when and where clubs meet, the contact person and telephone number will be published twice yearly in the UK Callbook and twice yearly (90° out of phase) in the Bulletin. The typical entry will look something like this:-

## AVON:

Avon ARS - 9th lecture "Propagation"; 16th DF hunt; 23rd lecture "TVI"; 30th demonstration "Satellite TV".  
E.Bristol ARS - 4th lecture "Contests"; 18th video "Aerial Circus".

Items for inclusion in the APRIL issue must be sent to HQ marked "Club News - Bulletin", and be received by Monday 22 February latest.

## Mobile Rallies

This is a list of all rallies, exhibitions and conventions notified to HQ (as at press date). Items are given in detail for the next three months inclusive and in brief thereafter. Please send detailed information, including contact call sign and telephone numbers direct to HQ and marked 'Bulletin'.

## 27 FEBRUARY

\*Rainham Radio Rally - Parkwood Community Centre, Deanwood Drive, Rainham, Gillingham, Kent. (5 mins from M2 junc 4). Opens 10am, many traders, bring & buy stall. Talk-in on S22, SU22 and 29.500 MHz FM by GB4RRR. Details Bob GILKE, tel: Medway 362154.

## 28 FEBRUARY

\*1st Taw and Torridge Rally - BAAC, The Pill, Bideford, North Devon. Opens at 10.30am, trade stalls, bring & buy stall, refreshments and bar. Ample parking and talk-in on S22. Details GOAYM, tel: 02375-488.

## 5 MARCH

\*Blue Star Rally - High Gosforth Park (Newcastle Racecourse). Usual traders, refreshments. Details Terry G6VEG, tel: Tyneside 2866908.

## 6 MARCH

\*Welsh Mobile Rally - The Barry Leisure Centre, off Holton Road, Barry. Details Mike GW8CMU, tel: 0446-711426.

## 13 MARCH

\*South Essex ARS Mobile Rally - The Paddocks Community Centre, Canvey Is, Essex. Rally opens 10am. Talk-in on S22. Details G0BBN, tel: 0268-755350.

\*3rd Annual Wythall RC Rally - Wythall Park, Silver Street, Wythall (south of Birmingham) on A435, 2 miles from M42 junc 3. Opens 12 noon, 3 large halls, usual traders, junk and flea market, bar & snacks. Talk-in on S22. Details Chris GOEYO, tel: 021-430 7267.

\*Bury HamFeast - New venue, The Castle Sports Centre, Bolton Street, Bury, one mile from M66. 12,500 sq ft, all on ground floor, usual traders, bar and catering facilities. Details G4JAC, QTHR. 20 MARCH

\*8th Annual Pontefract Components Fair - Carleton Community Centre, Pontefract. Opens 11am, trade stands, bookstall, prize draw, car-boot sale, bar and refreshments. Talk-in on S22. Details Colin GOA00, tel: 0977-43101.

\*Mid-Devon Rally - Pannier Market, Tiverton (8 mins from M5 junc.27). Opens 10am, 2 halls of trade stands, bring & buy stall, displays, snack bar and full refreshment facilities. Talk-in on S22, well signposted. Details G4TSM, Mid Devon Rally, PO Box 3, Tiverton, Devon.

\*Cambridgeshire Repeater Group Junk Sale Rally Extravaganza - Phillips RCS (Pye Telecom) Canteen, St Andrews Road, Chesterton, Cambridge. Opens at 10.30am (auction items accepted from 10am). Junk sale auction, bring & buy stall, trade stands, refreshments. Talk-in on S22 and via GB3PY by CSPI. Details G8XMS, tel: 0220 23-3362.

## 27 MARCH

\*White Rose Rally - The Refectory, University of Leeds. Details G0EGM, tel: 0532-676368.

## 10 APRIL

\*North Cornwall Radio Rally - Launceston Town Hall. Opens 10.30am, talk-in on S22 by Launceston ARC. Details Maggie, RS90696 tel: Launceston 5632.

\*Lough Erne ARC Rally - Killihevlin Hotel, Enniskillen. Details Billy, tel: 0365-24905.

## 17 APRIL

\*Trafford Rally & Components Fair - Lancashire County Cricket Ground (Old Trafford), Talbot Road, Old Trafford, Manchester. Opens 11am (10.30am for disabled visitors). Usual traders and attractions, bring & buy stall, refreshments, cash draw, talk-in on S22. Details Graham GIIJK, tel: 061-748 9804.

## 24 APRIL

\*BATC Rally - Rugby Post House Hotel, Crick, Northants, (M1 junc 18). Details Trevor G8CJS, tel: 0532-670115.

\*Swansea ARS Rally - CHANGE OF VENUE, Swansea Leisure Centre. Opens 10.30am. Trade stands, bring & buy, bookstall, refreshments, raffles, talk-in on S22 and via RB6. Details Roger GWAHSH, tel: 0792-404422 evenings.

\*Marske-by-the-Sea Rally - Marske Community Centre, High Street, Marske, nr Saltburn, E.Cleveland. Details Jimmy GIVLC, tel: 0642-219586.

IN BRIEF - More details later.

## 1 MAY

\*RSGB VHF CONVENTION - Sandown Park Racecourse, Esher, Surrey. Usual traders, comprehensive lecture programme, large RSGB bookstall, RSGB Committee stands. Details G3FZL. Trade - Les, G5HD tel: 040 928-342.

\*5th Anglo-Scottish Rally - Taft Hall, Kelso. Details Andre G43VLB, tel: 0573-24664 (evenings).

## 2 MAY

\*Mid Cheshire ARS Rally - Civic Hall, Winsford, Cheshire. Details tel: 0606-553401.

\*Doncaster Radio Rally - Bircotes Sports Centre, nr Bawtry, Doncaster. Details Audrey Wilson, tel: 0302-721259.

## 8 MAY

\*Swindon & DARC Radio, Electronics & Model Engineering Fair - Science Museum, Wroughton, nr Swindon, Wilts. Details Ken G8SFM, tel: 066689-307.

\*Drayton Manor Rally - Drayton Manor Park, nr Tamworth, Staffs. Details Norman, tel: 021-422 9787.

\*Yeovil RRP Convention - Preston Centre, Monks Dale, Yeovil. Details Dave G1MNM, tel: Yeovil 79804.

\*Drayton Manor Rally - Drayton Manor Park, nr Tamworth, Staffs. Details Norman, tel: 021-422 9707.

## 15 MAY

\*31st Northern Mobile Rally - Great Yorkshire Showground, Harrogate. Details Harry G3CQO, tel: 0943-602118.

\*Cambridge & DARC Rally & Car-boot Sale - Coleridge Community College, Radeburg Road, Cambridge. Details Brian G4TRO, tel: 0223-353664.

## 29 MAY

\*12th East Suffolk Wireless Revival - Civil Service Sportsground, Bucklesham, nr Ipswich. Details Jack G4IFF, tel: 0473-464047.

\*Plymouth RC Mobile Rally - Plymouth School, Plymouth, Plymouth. Details Joe G1RXR, tel: 0752-662511.

## 5 JUNE

\*Southend Mobile Rally - Rochway Centre, Rochford, Essex. Details G8EFC, tel: 0268-755331.

\*Bolton ARC Mobile Rally - Venue to be announced. Details Kenneth G6ZJL, tel: 0204-696906.

## 12 JUNE

\*Elvaston Castle Mobile Radio Rally - Elvaston Castle Country Park, nr Derby. Details John G4PZY, tel: 0332-767994. Trade enquiries, Peter, G3WFL tel: 0332-700265 (evenings).

\*RNARS Annual Mobile Rally - HMS Mercury, nr Petersfield, Hants. Details G4UJR, tel: 0703-557469.

## 18 JUNE

\*RAFARS Golden Jubilee Radio Rally - RAF Halton Air Show, Wendover, nr Aylesbury, Bucks. Details Terry G4PSH, tel: 0296-85760.

## 19 JUNE

\*Denby Dale Mobile Rally - Shelley High School, 5 miles SE of Huddersfield, W.Yorks. Details G3SDY tel: 0484-602905.

## 26 JUNE

\*31st Longleat Mobile Rally - Longleat House, Warminster, Wilts. Brian G4FRG, tel: Portishead 848140.

## 10 JULY

\*Worcester & DARC Strawberry Rally - Droitwich High School. Details Steve, tel: 0905-424151.

\*Sussex Mobile Rally - Brighton Racecourse. Details Bob G1IOS, tel: 0798-43841.

## 24 JULY

\*McMichael 88 Rally - Haymills Centre, Burnham, nr Slough. Details Bob G0BTY.

\*Anglian Mobile Rally - High Woods Sports & Leisure Centre, Severalls Lane, Colchester. Details G6HQI, tel: 0206-862403.

## \*RSGB 75 CELEBRATIONS\*

### 15/16/17 JULY

RSGB 75 - NATIONAL CONVENTION: National Exhibition Centre, Birmingham. Details RSGB HQ. Trade - Norman, G3HVV tel: 0277-225563

### 18 JULY

RSGB HEADQUARTERS CLOSED FOR ONE DAY

### 19/20/21 JULY

RSGB 75 - HQ OPEN DAYS: Visitors welcome from 10am to 4pm each day. Details RSGB HQ

### 22/23 JULY

RSGB 75 - DATA SYMPOSIUM: Harrow School, Harrow-on-the-Hill. 2-day symposium covering all aspects of data communication.

### 24 JULY

RSGB 75 - FAMILIES' DAY: (More details later)

### 28 JULY

RSGB 75 - INTERNATIONAL SATELLITE SEMINAR: Guildford. By invitation only. Details RSGB HQ.

### 29/30/31 JULY

RSGB 75 - AMSAT UK COLLOQUIUM: University of Surrey, Guildford. First day special technical meeting by invitation only. Last two days full lecture programme and social events for all delegates. Details Ron G3AAJ tel: 01-989 6741 (social hours please)

## 31 JULY

\*Scarborough ARS Rally - The Spa, Scarborough. Details Ian G4UQP, tel: 0723-376847.

## 7 AUGUST

\*RSGB MOBILE RALLY - Woburn Abbey, Bedfordshire. Details RSGB HQ. Trade - Norman, G3HVV tel: 0277-225563.

\*Flight Refuelling Hamfest '88 & Craft Fair - Herley, near Wimborne, Dorset. Details John GOAPL, tel: 0202-691649.

## 14 AUGUST

\*Derby Rally - Lower Bemrose School, Derby. Details Jack G3KQF, tel: 0332-772361.

## 21 AUGUST

\*Red Rose Rally - Bolton Sports & Leisure centre, Silverwell Street, Bolton. Details David G1100, tel: 0204-24104, evenings.

## 28 AUGUST

\*Torbay ARS Rally - STC Social Club, Brixham Road, Paignton, Devon. Details G3KZJ.

## 4 SEPTEMBER

\*21st Preston ARS Rally - University of Lancaster. Details Godfrey G3DWQ.

\*Telford Radio Rally & Exhibition - Details Martyn G3UKV tel: 0952-55416.

\*5th National Amateur Radio Car Boot Sale - The Shuttleworth Collection, Old Warden Aerodrome, nr Biggleswade, Beds. Details Tony G0CQO.

## 11 SEPTEMBER

\*Lincoln Hamfest '88 - Lincolnshire Showground, 4 miles N of Lincoln on A15. Details John GBVGF, tel: 0522-25760.

\*Vange ARS Rally - Nicholas School, Leinster Road, Basildon. Details Alan G4OJN, tel: 0277-624386.

## 17 SEPTEMBER

\*Scottish Amateur Radio Convention - Aberdeen. Details G4ZUK.

## 18 SEPTEMBER

\*Bristol Radio Rally - Brunel's Great Train Shed, Temple Meads Station, Bristol. Details Dave G4WUB, tel: 0272-839855.

\*Peterborough E&RS Rally - Wirrina Sports Stadium, Bishops Road, Peterborough. Details Fred G4NOC, tel: 0733-77032.

## 25 SEPTEMBER

\*RSGB HF CONVENTION - Belfry Hotel, nr Oxford. Details RSGB.

\*Harlow Mobile Rally - Harlow Sports Centre. Details G4KVR tel: 0279-22365 (daytime) or G4MIS tel: 0279-722622 (evenings).

## 2 OCTOBER

\*Great Lumley AR & ES Rally - Community Centre, Great Lumley, Chester-le-Street, Co.Durham.

\*Wakefield Mobile Rally - Details Steve G4RCH, QTHR.

## 8 OCTOBER (Provisional)

\*Midlands VHF Convention - Details Peter G3UBX.

## 9 OCTOBER

\*Armagh Rally - Drumhill House Hotel, Armagh. Details G18RXN.

## 28/29 OCTOBER

\*Leicester Amateur Radio Show - Granby Halls, Leicester. Details Frank tel: 0533-553293 daytime.

## 13 NOVEMBER

\*Bishop Auckland Radio Rally - Venue to be advised. Details Morris, tel: 0525-314638.

# Events Diary

## GB Calls

The list below shows ALL the special event stations licensed for operation during February (as at press date)

It is taken direct from the GB Calls file on the HQ computer. These call signs are valid for use from the date given but the period of operation may vary from 1 to 28 days. There's now no need to send details direct to the editorial office.

NOTE: This list is taken from the Headquarters' database during the first week of the month prior to publication. If you have an event which is taking place during the latter part of the month of issue, you must send your form in to Headquarters at least 10 weeks in advance to ensure that it can be processed ready for the listing, otherwise it will miss the copy date.

**1 FEBRUARY:**  
GB0CDE - COASTAL DEFENCE "E": Fort Purbrook. Locator: 10 90 LU. Details G0DHZ.  
GB0QHE - GLASCOTE HOBBIES EVENING: Glascote Comprehensive School, Silverlink Road, Glascote, Tamworth. Details G0EVJ.  
GB0MWS - MACCLESFIELD WIRELESS SOCIETY: Details G0CSX.  
GB2EC - EISTEDDFOD CASNEWYDD: Newport, Gwent. Details G4SUE.  
GB2SCB - SCOUT COMMUNICATORS BADGE: Penketh, Warrington. Details G3ZHE.  
GB2SEC - ST EDMUND CAMPION (SCHOOL): Bradford. Details G3SDY.  
GB2WTC - WERN TAW GUIDES: Pencoed. Details G4ADY.  
GB4CR - CONIC RELIEF: Wallace Hae Community Centre, Evesham. Details G4UXC.  
GB4MMS - MANNINGHAM MIDDLE SCHOOL: Bradford. Details G3SDY.  
GB4RG - RUABON GUIDES: Scout Hut, Johnstown, Wrexham. Details G4WUR.  
GB4WGC - WELLINGBOROUGH GIRL GUIDES: Redwell Primary School. Details G4MOP.

GB8DP - DENBY DALE PIE: near Huddersfield. Details GALLZ.  
**2 FEBRUARY:**  
GB2HZ - HERTZ: The Langham Hotel, Portland Place, London. Details G2FQS.  
**4 FEBRUARY:**  
GB0CDX - COASTAL DEFENCE "X": Golden Hill Fort, Freshwater, IOW. Details G3RJK.  
**6 FEBRUARY:**  
GB0CDT - COASTAL DEFENCE "T": Gosport, Hants. Details G0GIA.  
GB0LFG - LOW FELL GUIDES: Miller Centre, Low Fell, Tyne & Wear. Details G4PDO.  
**8 FEBRUARY:**  
GB4GOS - GUIDES OF SHEFFIELD: Guide HQ, Trippet Lane, Sheffield. Details G4MRU.  
GB4GOS - GUIDES OF SHEFFIELD: Guide HQ, Trippet Lane. Details G4MRU.  
**9 FEBRUARY:**  
GBARRS - RED ROSE SILVER: Bolton. Details G0FRL.  
**10 FEBRUARY:**  
GB2PGC - PAISLEY GIRL GUIDES: Scout & Guide Assoc., Lapwing Lodge, Paisley. Details G0BLX.  
GB4MGG - MINETY GIRL GUIDES: Braydon, Swindon. Details G4FNC.  
**12 FEBRUARY:**  
GB1CDY - COASTAL DEFENCE "Y": St. George Bks, Gosport, Hants. Details G1WSL.  
GB2RBG - ROYTON BROWNIES & GUIDES: Royton, Oldham. Details G4ZEP.  
GB8WGG - WOLLASTON GIRL GUIDES: Wellingborough. Details G6JUF.  
**13 FEBRUARY:**  
GB0RAC - RAG (WEEK): Bishop Grosseteste College, Newport, Lincoln. Details G4STO.  
GB4CDG - CHANCTONBURY DISTRICT GUIDES: Chalk Pits Museum, Amberley, W. Sussex. Details G3WU.  
GB4GC - GIRL GUIDES: Brighton, E. Sussex. Details G0EXS.  
**14 FEBRUARY:**  
GB1CDB - COASTAL DEFENCE "B": Fort Brockhurst, Gosport. Grid: SU 597 020. Details G1TOS.  
GB2ASG - ASTLEY SCOUTS & GUIDES: Scout HQ, Ellesmere Street, Astley, Tyldesley, nr Manchester. Details G4GWF.  
**15 FEBRUARY:**  
GB2SK - 2ND SKELLINGTHORPE (BROWNIES): Saxilby, nr Lincoln. Details G3UPI.

**16 FEBRUARY:**  
GB0CDF - COASTAL DEFENCE "F": Fort Fareham. Locator: 10 90 JU. Details G0DHZ.  
GB0CDS - COASTAL DEFENCE "S": Fort Southwick. Locator: 10 90 KU. Details G0DHZ.  
GB0HSC - HAMPDEN PARK SCOUTS & GUIDES: Eastbourne, E. Sussex. Details G4YJW.  
**19 FEBRUARY:**  
GB0FDG - FALKIRK DISTRICT GUIDES & SCOUTS: Falkirk Guide Hall, The Pleasance, Falkirk. Details G0HJS.  
GB0FSG - FIRST SCHOLES GUIDES: Scholes, West Yorks. Details G4MLW.  
GB0WGG - WIRRAL GIRL GUIDES: District Scout HQ, Royden Pk., Frankby. Details G4UDR.  
GB1CDO - COASTAL DEFENCE "O": Southsea Castle, Portsmouth. Grid: SZ 643 980. Details G1UWB.  
GB2CFG - CHESHIRE FOREST GUIDES: Northwich, Cheshire. Details G3CVW.  
GB2PLC - PATROL LEADERS COURSE: Burwood Park, Cobham. Details G0HYT.  
GB2WGB - WICKERLEY GUIDES & BROWNIES: St. Albans Church Barn, Wickersley. Details G4ENC.  
**20 FEBRUARY:**  
GB0BSR - BLUE STAR RALLY: High Gosforth Pk., (Newcastle Racecourse). Details G4ILW.  
GB0CNG - CARLTON NOTTINGHAMSHIRE GUIDES: Bakersfields, Nottingham. Details G4UNF.  
GB1CPG - COED POETH GUIDES: Minera, Wrexham. Details G1LHV.  
GB1CDT/GB6CDW - COASTAL DEFENCE "T" & "W": Fareham, Hants. Details G8POQ.  
GB6MGB - MALTBY GUIDES AND BROWNIES: Maltby, nr Rotherham. Details G6PMP.  
**21 FEBRUARY:**  
GB4GGS - GIRL GUIDES SANDY: Sandy, Beds. Details G0AVZ.  
**22 FEBRUARY:**  
GB2GOW - GUIDES OF WARRINGTON: The Scout Hut, Appleton. Details G4XQA.  
**24 FEBRUARY:**  
GB8MC - MAYFIELD CENTRE: Macclesfield, Cheshire. Details G0AMU.  
**26 FEBRUARY:**  
GB2CDW - COASTAL DEFENCE "W": Bridgemary, Gosport, Hants. Details G0GIA.  
**27 FEBRUARY:**  
GB2SD - SAINT DAVIDS DAY: British Steel Corp. Social Club, Port Talbot. Details G4HQQ.

(cont from page 124)

Any Raynet member currently registered in either Zones 4 or 12 may record his or her vote for one of the above candidates for their zone, eg members in Zone 4 may vote only for one of the Zone 4 candidates. No special ballot paper is required. The text of your vote should clearly indicate which candidate you prefer. Please do not include any correspondence in the same envelope. On the back of the envelope, which must be sealed, you must write in block capitals your name and call-sign. The envelope must be addressed to "The Secretary (Raynet Zone Election)" at RSGB HQ by 5.00pm on Thursday 31st March 1988.

### SRAL PRESIDENT RETIRES:

Axel Tigerstedt, CH5NW, recently retired as President of SRAL - the Finnish national amateur radio society - after 14 years in office. Under his leadership, SRAL saw a significant increase in its membership and considerable development of amateur radio in Finland. Good relationships with other societies also developed in a positive manner. In the past, CH5NW served as Treasurer for IARU Region 1 and SRAL still enjoys the benefit of Axel's advice and expertise in his capacity as a Board member.

The new President of SRAL is Seppo Sisatto, OH2BA. He has been licensed since the 1960s and is interested in communications at every level. He is frequently active on the bands and may often be found on Top Band during the small hours of the morning.

The Finnish PTT, as licensing authority, has published new amateur radio regulations in close co-operation with SRAL. The 10 MHz band has been made available with immediate effect to all OH amateurs. The 18 and 24 MHz bands will also be released, but not until July 1989. The 1.8 MHz band, which was available only on special permission, has now been reorganised. The portion of the band between 1830 kHz and 1850 kHz is now available to all General Class licensees, whilst the portions from 1810-1830 kHz and 1915-1995 kHz still require special permission.

(TNX - IRTS News Bulletin)

### CHRISTMAS QUIZ:

Well, you certainly went in for the December R.A.E. with a vengeance! You'll recall that in the December 1987 edition of the Bulletin we ran a Christmas Quiz, which we called the RadCom Annual Extravaganza, and when we returned to work after the Christmas break the postbag was already bulging with entries. The

closing date was 20 January, and we'll publish the results in the next edition. Incidentally, the Bulletin staff greatly appreciated the humorous comments, alternative suggestions and attempted bribes.....

### NEW RECIPROCAL LICENCE:

Late last year the DTI announced that a reciprocal licensing agreement has now been reached with Gibraltar. The Gibraltar A and B licences are now compatible with the UK A & B licences.

### 75th ANNIVERSARY STATIONS:

The Society has just received permission to issue "GB75" prefix call signs to any group wishing to run a special event station during the RSGB 75th anniversary year. All the normal rules apply except that stations MUST have public access in order to promote amateur radio. Call signs will be either A or B class depending on holder's class of licence and will be issued during 1988 only. If you intend to run such an event, please apply to RSGB HQ in the normal way.

GB75RS & GB75HQ - the RSGB HQ stations - are on the air during some lunchtimes on 20m and early evenings on 80m. Activity will increase as we approach July.



# NEWS AND VIEWS

## HF

John Allaway, G3FKM\*

AT THE TIME of writing, the December issue of *Rad Com* still has to arrive on members' doormats due to printing delays, and this has created severe problems for those of us who try to write columns like this one which involve input from readers. Because of the delay they did not know the closing date for this issue, and therefore the majority are likely to write when it is too late and when the column has gone for setting – almost two months before the February issue will appear, after making allowances for pre-Christmas postal delays and the Christmas-New Year holiday. I sincerely hope that things will be better for the March issue. Unfortunately several regular items will have to be omitted, including the band reports and various tables.

Howard Reeve, G2HFD, has written to say that Bill Lucas, ZS1J, died at the end of October. He was very well known and often heard on 21MHz ssb. Bill also held the callsign ZS6CV and gave many Gs their first QSO with South Africa.

### Marion Island

The latest update on possible activity from this rare location arrived recently from ZS6BBV, SARL dx and awards manager. It reads as follows: "It is definite, there will be no dpxpedition to Marion Is. This is the final ruling from the S African Minister of Environmental Affairs. S Africa is a signatory to the International Antarctic Treaty which discourages visitors to the area, unless it is of a research or environmental nature. Johannesburg amateurs were planning a dpxpedition for August 1988.

"DX clubs are encouraged to protest by writing to the Minister of Environment Affairs, Private Bag X9039, Capetown 8000, Republic of South Africa, with a copy please to SARL, PO Box 2327, Johannesburg, Republic of South Africa".

### The NCDXF 14MHz beacon network

**The sponsors:** The Northern California DX Foundation began in the San Francisco area of northern California. The aim of the NCDXF is to help that aspect of amateur radio concerned with long-distance communication, known colloquially as dxing. It is understood that the initial group consisted of wealthy amateur operators at a time when income tax was very high and contributions to various causes such as those with a scientific content could be tax-exempt. It now functions as a worldwide club funded by membership subscriptions but is still based and run from San Francisco.

**The beacon network:** One of the ways which the NCDXF has used to meet its aim is the establishment of a network of beacon transmitters around the world on the 14MHz amateur service allocation, in a similar manner to the 28MHz International Beacon Project described in *Rad Com* November 1987. The difference between the two systems is that whereas the IBP grew up somewhat haphazardly over a number of years from a number of very low power stations usually established and run by individual operators or small groups with little or no financial assistance, the NCDXF effort was centrally organised and well funded with the additional advantage of coming later when technical improvements, such as ics, had arrived to allow better timing and control.

**The stations:** Each of the stations uses similar equipment which was assembled as a "package deal", comprising a commercial Japanese amateur radio transmitter, the Kenwood TS130S, its companion power supply, a control unit, and an antenna assembly. They were distributed by the NCDXF from Stanford, California. The antenna despatched was a turnstile "quad", but it is believed that the only station to use this type is the one in Stanford. The others are understood to use groundplane or multiband verticals.

**The transmission schedule:** At the present time there are nine stations operating around the world on a frequency of 14.1MHz (equipment for the tenth went missing during transit from the USA). Each transmits in turn for about 58s in a sequence around the clock. The order is arranged to run from east to west beginning with New York on the hour. The timing is based on a quartz clock in the control unit, which has been found to be adequate and only occasionally has an equipment required manual resetting.

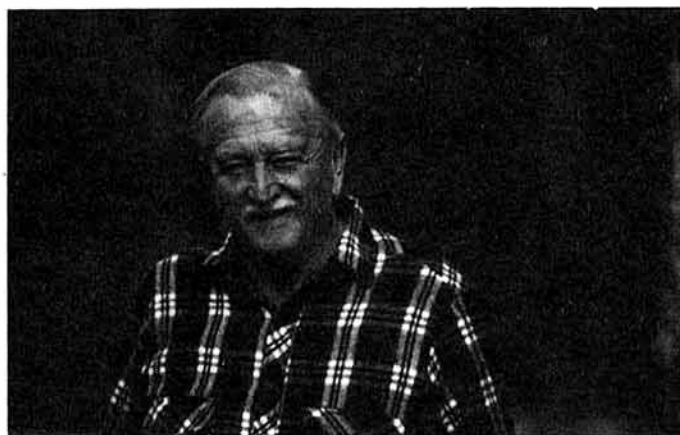
**The transmission format:** Each station transmits a similar message in the A1A mode, only differing in its identification callsign, with four power levels, as follows:

QST de (callsign)		100W
Do.	(Nine seconds)	100W
Do.	(Nine seconds)	10W
Do.	(Nine seconds)	1W
Do.	(Nine seconds)	0.1W
SK (callsign)		100W

### The locations and sequence:

Time	Callsign	Location
0000	4U1UN/B	United Nations, NY
0001	W6WX/B	Stanford University, Cal
0002	KH6O/B	Hawaii
0003	JA2IGY	Tokyo
0004	4X6TU/B	Tel Aviv University
0005	OH2B	Helsinki University
0006	CT3B	Maderia
0007	ZS6DN/B	Pretoria
0008	LU4AA	Buenos Aires

The sequence is repeated at 0010, 0020 *et seq.* As other stations are added to the network, the sequence and interval will be changed accordingly.



Bill Lucas, ZS1J (see text)

### DX news

F6CZB was due to arrive on Amsterdam Is in mid-November. He was accompanied by FC1HJO and should have been on the air by early December. F6CZB will be FT5ZB, and FC1HJO/FT3ZC, and activity will be on nine bands with special attention being given to 1.8 and 3.5MHz. Proposed favourite operating frequencies are 3,502kHz  $\pm$  2kHz, 3,797kHz  $\pm$  3kHz, 7,007kHz  $\pm$  2kHz, 7,070kHz  $\pm$  5kHz, 10,101kHz  $\pm$  2kHz, 10,145kHz  $\pm$  2kHz, 14,004, 14,014, 14,024, 14,214 and 14,274kHz, 18,070–18,100MHz, 21,021  $\pm$  2kHz, 21,221, 21,271  $\pm$  2kHz, 24,892–24,900kHz, and 28,028, 28,528 and 28,600kHz. QSLs may be sent direct until 30 July, and they will be answered using local envelopes and stamps. After 30 July cards will be dealt by F6EYS.

FB1MSR, F6GJK and another licensed amateur will be with the relief crew which goes to Kerguelen Is. Likely callsigns are not known at the time of writing.

ZD7JD is reported to be very active around 21.228kHz from 1830, according to the *Long Island DX Bulletin*, and ZD8MAC is often near 28.490kHz from 1600.

VK9ZB, on Willis Is, may have left by now, but his replacement is also a licensed amateur will a full VK call and will most likely be able to use cw.

Warwick Latham, ZK1WL, is now on Penryn Is in the North Cooks, and he will be there for two years.

\*10 Knightlow Road, Birmingham B17 8QB.



G4FDA and G4PAY met members of the J.A.M. Club at the home of JG3LJH in Kyoto. L to r: JA3HXV, JI3WEG (the president) JJ3RGP, JJ3UJN, JJ3EYJ, JL3LJH, JM31NH, JJ3CPE, JN3FVB, JJ3NXN, JN3DBE, JK3KSC, JG3EYX, JG3LKG and JG3PGX

Ron Wright, ZLIAMO, appeared to be on course for his visit to Auckland and Campbell Is, which is due to take place this month. He will be on cw and ssb and should be there for two weeks. Two scientists will also accompany the group, and in early December Ron was trying to raise US \$8,000 to cover transportation fuel and food costs.

Nigel Cleaver has written to say that he now has the callsign ZC4NC, and that initially he will be active on 14, 21 and 28MHz on cw, ssb, rtty and possibly Amtor. QSL to the address in "QTH Corner".

## Contests

### Israel 40th Anniversary International Contest

0001 to 2400 9 April

SSB and cw. Single-operator only 1-8 to 28MHz (recommended frequencies for cw are 30kHz above lower band edges, and ssb contestants are requested to stay clear of nets and not interfere with other traffic.) The object is to work Israeli stations. Send RS/T plus serial QSO number (from 001). Israeli stations will give report plus a three-letter zone code. The same station may be worked on each mode on each band for credit — thus making it possible to work a station at total of 12 times for credit. Each valid QSO counts five points, and there is a multiplier of one for each Israeli prefix worked on each band (4Z9 is the novice prefix and may be found on cw only between 7 and 7.05MHz, and between 21-1 and 21.150MHz). There is also a multiplier of one for each of the 18 Israeli zones worked (these are ARV, ASD, ASA, BSV, DSC, ELT, GOL GOL, HIF, JLM, JOR, JUD, LGL, MKZ, NAT, NGV, SAM, TVL and UGL). Zones count as a multiplier once only. Use separate log sheets for each mode on each band and show time, station worked, serial number sent, zone received and if new prefix. Post no later than 9 May 1988 to: 40th Anniversary Contest, Israel Amateur Radio Club, PO Box 4099, Tel Aviv 61040, Israel. (I have photocopies of rules and log forms for anyone who sends me an sase).

### PACC Contest

1200 13 February to 1200 14 February

1-8 to 29.7MHz, cw and ssb (no cross-mode). Please confine operations to the following segments (which include the IARU contest-preferred segments): (CW) 1.825-1.835, 3.510-3.570, 7.010-7.040, 14.025-14.070, 21.025-21.070, 28.025-28.070MHz, and (ssb) 3.6-3.650, 3.7-3.750, 7.05-7.1, 14.15-14.25, 21.2-21.3 and 28.5-28.7MHz). Single and multi-operator and listener sections. Exchange RS/T plus serial QSO number (from 001). Dutch stations will give province (GR, FR, DR, OV, GD, UT, NH, ZH, FL, ZL, NB and LB). Each QSO with the Netherlands counts

one point, and stations may be worked once per band only. The multiplier is one for each province worked on each band, and the final score the total of QSO points times total of multipliers from all bands added together. The usual signed declaration should accompany the log, which must be posted by 31 March to F Th Oosthoek, PA0INA, PO Box 499, 4600 AL Bergen op Zoom, Netherlands. Listeners score as above but should log code group given by both ends of the contact.

### ARRL International DX Contest

0000 20 February – 2400 21 February (CW)

0000 5 March – 2400 6 March (Phone)

Single-operator single- and multi-band, multi-operator multi-band – single, two, and unlimited transmitter sections. There is also a QRP section for those with a maximum of 5W output (this is all-band). Exchange RS/T plus output power. USA/VE stations will send signal report and state/province. Each QSO counts three points, and the multiplier is the sum of USA states/provinces (excluding KL7, KH6) Washington DC, VE1-VE8, VO and VY, worked per band (maximum of 59 on each band). A station may only be worked once on each band and cross-mode QSOs are not allowed. All entrants are encouraged to use official ARRL stationery (send three 10c to the address below). Logs must show date, time and callsigns, and complete exchanges and multipliers must be marked clearly. The usual signed declaration concerning the rules should also be included. Entries with more than 500 QSOs must include a "dupe sheet". They must be posted by 6 April to ARRL International DX Contest, 225 Main St, Newington, Conn 06111, USA. (Copies of the rules only are available from G3FKM).

## Awards

### Golden City Award

Issued to applicants who have made the specified number of contacts with stations in the greater Johannesburg area. DX applicants require five. Endorsements are available for mode, and certified log extracts should be sent to Awards Manager, SARL, Johannesburg Branch, PO Box 2327, Johannesburg 2000, Rep of South Africa. The cost is US \$5 or 10ircs.

### PACC Award

For confirmation of contact with at least 100 Netherlands stations. Entrants in the PACC contest who submit a log may use this as their application if the QSLs for the stations worked are included with the log. The relevant PA stations must also have sent in a log, and contest QSOs may be added to make up to 100 any QSLs already held. If necessary, contest QSO credit can be claimed for up to five years after a contest. Stickers are issued at 200,300 etc.

### Listeners Century Club

Available to listeners as in the PACC Award.



GM4CHX recently visited Norfolk Is and met John, VK9JA. A particular interest for him is the transmission and reception of weather reports for yachts in the Pacific



Amir, 4X6TT, in G4LJF's a shack at the start of his round-the world expedition

RADIO COMMUNICATION February 1988





Another one for G3GIQ's "dxce" of visitors. L to r (rear): SP5HHV and SP5OXU; (front) xyl SP5HHV, SP5EWY and SP5IFV

#### QSL Region Certificate

For QSOs on or since 30 September 1980 with at least 50 different VERON QSL Regions. Send QSLs with application — they must have the region number printed or rubber stamped on them.

Apply for the above to: Traffic Bureau, VERON, A Sandser, PA0MOD, Obdammerdijk 2, 1713 RA Obdam, Netherlands. (No mention of fee appears in the latest information on these three awards but the last received indicated that it was seven ircs.)

#### WAZ

CQ Magazine has recently revised and updated the rules of its awards programme. One of the more important points concerns the clarification of the zones in the PR of China. Stations in the prefix blocks BY3G-BY3L, BY9A-BY9F, BY9G-BY9L, BY9T-BY9Z and BY0 are located in Zone 23 (as well as JT and UA0Y), and the rest in Zone 24 for WAZ purposes. Other things to be noted include the facts that:

**QTH CORNER**

**BY4WNG** Box 1827, Nanjing, Peoples Rep of China  
**C9MKT** via SM5KDM, L Hognert, Olandsresan 21, S-75255 Uppsala, Sweden.  
**CR9BZ** via OH2BH, Nuottaniementie 10 0 20, SF-02230 Espoo 23, Finland.  
**E88XS** via OH5XT, Paaskysentie 2 A 38, SF-48220 Kotka 22, Finland.  
**FT5ZB** D Prevostat, Martin de Vivies, District de St Paul et Amsterdam, Terres Austr et Antarctiques, France.  
**HS0A** RAST, GPO, Box 2000, Bangkok 10501, Thailand.  
**KC6CS** JE1JKL, S. Nakamura, 3-16-6 Shibakubo, Tanashi City, Tokyo 188, Japan.  
**LX9BV** DL7MAE, am Rosegarten 3, D-88059 Neuching, FR Germany.  
**T28MG** D Goedraad, PO Box 2095, 8203 AB Leyland, Netherlands.  
**V5UO** F Bliss, G3IFB, Coppalex, North Rd, The Reddings, Cheltenham, Glos GL51 6RE  
**ZC4NC** N J Cleaver, c/o CWAQ, 8th Signal Regiment, BFPO 58.  
**ZK1WL** W Latham, PO Box 127, Rarotonga, S Cook Is.  
**ZS21RSA** PO Box 2327, Johannesburg 2000, Rep of South Africa.  
**6W7OG** D Borowiec, RCFS Box 175-A, Thies, Senegal.  
**9N1MC** via G4UCB, D L Miller, 6 Kinson Rd, Bournemouth BH10 4AJ.  
**9N5DY** via JA8RUZ.  
**ex-9V1TL** P Carbutt, 44B Gawber Rd, Barnsley, S Yorks S75 2AP.

- (1) For five-band WAZ, contacts may only have been made on the "regular" hf bands (3-5, 7, 14, 21 or 28MHz).
- (2) QSOs with mobile stations are not valid.
- (3) XZ9A and XZ5A QSLs are accepted for Zone 26.
- (4) Abu Ali is in Zone 21.
- (5) Transkei, Walvis Bay and Bophuthatswana count for Zone 38.
- (6) Spratley Is is in Zone 26.
- (7) KC4AAA can be counted either for Zone 12, 13, 28, 39, 29, 30 or 32.

#### 160m Worked All Zones

This would have been considered impossible until fairly recently but is now issued on the presentation of proof of contact with each of the 40 CQ zones on or since 1 January 1975. Any legal mode counts as this is a mixed-mode award. Applicants should fill in the standard WAZ application form CQ 1479 and send it with their QSLs for at least 30 confirmed zones and US\$5, or ircs (each counted as equivalent of US\$0.37) — for the certificate plus US\$2.50 for the return of QSLs by air mail to Leo Hajisman, W4KA, 1044 SE 43rd St, Cape Coral, Fla, 33904, USA. After the basic award, further endorsements may be added at 35, 36, 37, 38, 39 and

## HF F-layer propagation predictions for February 1988

The time is presented vertically at two-hour intervals 00(00)gmt for each band, ie 00=0000, 02=0200, 04=0400 etc.

The probability of signals being heard is given on a 0 (indicated by a dot) to a 9 scale; the higher the number the greater the probability with 1 meaning 10 to 19 per cent of days, and so on. Additionally 50MHz F-layer and 1-8MHz openings are indicated by a plus (+) sign in the 28 and 3-5MHz columns respectively.

HF f-layer propagation predictions for February 1988				HF f-layer propagation predictions for February 1988				
Time / GMT	28MHz	24MHz	21MHz	18MHz	14MHz	10MHz	7MHz	3.5MHz
	000001111122 024680246802	000001111122 024680246802	000001111122 024680246802	000001111122 024680246802	000001111122 024680246802	000001111122 024680246802	000001111122 024680246802	000001111122 024680246802
** EUROPE								
MOSCOW	.....2222....	.....24541....	.....57873....	.....78886....	.....2887883....	32.665557833	875533235788	++42....24++
MALTA	.....12221....	.....25442....	.....67776....	.....88888....	.....2877897....	552748567975	99832235799	+++3....25++
GIBRALTAR	.....11....	.....2222....	.....15651....	.....488773....	.....8888882....	231176667883	898753334799	+++2....4++
ICELAND	.....11....	.....11....	.....1342....	.....36751....	.....178885....	.....6766785....	672264345786	+++3....24+
** ASIA								
OSAKA	.....12....	.....341....	.....21....	.....54....	.....751.1....	.....15322441....	.....21.12563	.....25....
HONGKONG	.....12....	.....341....	.....673....	.....17751....	.....156541....	.....1.23234512	.....1.1.2.2666	.....353
BANGKOK	.....3441....	.....5662....	.....168851....	.....168774....	.....1365661....	.....2....3235623	.....3....2677	.....355
SINGAPORE	.....3443....	.....5765....	.....168872....	.....268775....	.....1365672....	.....2....3235624	.....2....2677	.....354
NEW DELHI	.....3441....	.....5762....	.....17885....	.....36777....	.....334563....	.....411.1235334	.....73....2578	.....4....35+
TEHERAN	.....4543....	.....67661....	.....277883....	.....566786....	.....1.5335672....	.....632311235745	.....873....2678	.....4....35+
COLOMBO	.....4543....	.....67661....	.....267884....	.....356786....	.....1235673....	.....12....235746	.....61....2678	.....4....35+
BAHRAIN	.....5544....	.....167761....	.....377883....	.....555785....	.....2.522567311	.....7422....235766	.....872....2688	.....4....35+
CYPRUS	.....56552....	.....78774....	.....2888871....	.....5888883....	.....32.766678832	.....885533346888	.....97631.113688	.....+3....4++
ADEN	.....56551....	.....177773....	.....366786....	.....4556882....	.....3.422357732	.....8331....35887	.....872....2588	.....+5....255
** OCEANIA								
SUVA/S	.....1....	.....2....	.....631....	.....1.7531.241	.....11175432651	.....43333551....	.....121.123....	.....
WELLINGTON/S	.....1....	.....11....	.....343....	.....15651....	.....56565....	.....145322452....	.....22....13....	.....
WELLINGTON/L	.....1....	.....1....	.....1....	.....41....21	.....112.741.452	.....1533353....	.....121.123....	.....
SYDNEY/S	.....12....	.....3422....	.....77451....	.....187663....	.....3765661....	.....1253212531	.....12....12....	.....
SYDNEY/L	.....4531....	.....67521....	.....278754....	.....368776....	.....2365673....	.....14323551....	.....21....262....	.....3....
PERTH	.....4531....	.....67521....	.....278754....	.....368776....	.....2365673....	.....53222552	.....21....142....	.....2....
HONOLULU	.....4531....	.....67521....	.....278754....	.....368776....	.....2365673....	.....2....13235744	.....2673....	.....35....
** AFRICA								
SEYCHELLES	.....22551....	.....134773....	.....255786....	.....4446882....	.....3.211357732	.....841....25888	.....851....2578	.....+2....25+
MAURITIUS	.....46552....	.....67774....	.....2667871....	.....3556883....	.....32.222357842	.....851....125888	.....84....2588	.....+....25+
NAIROBI	.....55563....	.....66775....	.....2666882....	.....4547851....	.....43.421257853	.....9832....25798	.....883....2588	.....+5....255
HARARE	.....24664....	.....467861....	.....1566884....	.....25447862....	.....44.422147874	.....9842....14799	.....883....2588	.....+5....25+
CAPETOWN	.....13675....	.....347872....	.....5677851....	.....155568841	.....531332236886	.....8953....2699	.....8851....478	.....+2....5+
LAGOS	.....47761....	.....688783....	.....877861....	.....1.55568841	.....561352225886	.....8922....2586	.....7883....478	.....+5....2+
ASCENSION Is	.....254362....	.....475574....	.....7766772....	.....1.86445751	.....464173222686	.....99954....389	.....88861....168	.....+3....3+
DAKAR	.....67662....	.....288775....	.....5877772....	.....1.77556851	.....354.75223785	.....889452....1489	.....87962....168	.....+4+3....3+
LAS PALMAS	.....55451....	.....177673....	.....5888871....	.....7888884....	.....233.87667884	.....888574334699	.....989742111479	.....+5....4+
** S. AMERICA								
StH SHETLAND	.....1232....	.....13454....	.....366762....	.....1.25776641	.....344.65543454	.....577453211124	.....35552....1....	.....222....
FALKLAND Is	.....14562....	.....36774....	.....1687762....	.....37765641	.....244.66532354	.....7884532....24	.....57862....2	.....253....
R DE JANEIRO	.....22123....	.....44234....	.....764562....	.....754454....	.....244.36322364	.....889353....37	.....88962....15	.....++3....2
BUENOS AIRES	.....3243....	.....26365....	.....575662....	.....1675554....	.....134.56522243	.....7893532....25	.....68962....2	.....4++4....
LIMA	.....4442....	.....6664....	.....87651....	.....76443....	.....11.1.532222	.....4671422....33	.....588621....1	.....2++4....
BOGOTA	.....4342....	.....6554....	.....87651....	.....76543....	.....1.12532232	.....46614321....4	.....888531....1	.....3+54....
** N. AMERICA								
BARBADOS	.....4442....	.....6664....	.....286662....	.....575554....	.....11.6522253	.....5671332....26	.....887631....4	.....++44....
JAMAICA	.....1332....	.....3553....	.....67651....	.....77553....	.....1.1542232	.....355.3221.14	.....888531....1	.....3+54....
BERMUDA	.....2332....	.....4453....	.....67661....	.....176663....	.....4543452	.....455.2321.135	.....888421....14	.....+5+4....
NEW YORK	.....221....	.....1442....	.....37651....	.....57662....	.....1554451	.....343.13221134	.....788421....3	.....4++4....
MEXICO	.....221....	.....1442....	.....37651....	.....764....	.....254221	.....243.22221.1	.....278431....	.....5+4....
MONTREAL	.....221....	.....1442....	.....37651....	.....57762....	.....1555551	.....343.13222234	.....788321....13	.....4++4....
DENVER	.....221....	.....1442....	.....37651....	.....2651....	.....4642....	.....231.1.133112	.....377331....	.....4+4....
LOS ANGELES	.....221....	.....1442....	.....37651....	.....64....	.....2642....	.....131.11.231.1	.....157231....1	.....2+4....
VANCOUVER	.....221....	.....1442....	.....37651....	.....13....	.....552....	.....12.1.14321	.....245221....21	.....253....
FAIRBANKS	.....221....	.....1442....	.....37651....	.....13....	.....13....	.....11.21124531	.....232221....2321	.....23....

The provisional mean sunspot number for November 1987, issued by the Sunspot Index Data Centre, Brussels, was 40.9. The maximum daily sunspot number was 89 on 23 November and the minimum was 15 on 13 November. The predicted smoothed sunspot numbers for February, March, April and May are respectively: (classical method) 34, 35, 36 and 37, (SIDC adjusted values) 41, 42, 43 and 45.



## The WARC bands

Absence of the challenge of dxcc from 10, 18 and 24MHz bands seems to have caused some unfortunate lack of interest in using them. We have restrictions on each — voluntary on 10MHz but mandatory on 18 and 24MHz. However, I was amazed to hear that GW3AHN has now worked over 100 countries on each and I asked him to give me a list — which he has done. It is worth mentioning some of the really interesting dx worked, and I am going to list some of the better prefixes.

On 18MHz these include: A2, C6, VP8 (Ant), CX, EA9, EL, FB8X, FB8Z, FH, FK, FM, FY, HK, HP, HZ, J2, J3, J7, J8, JW, OY, PJ, PY, PZ, S7, TL, TR, TT, TU, VK9Y, V2, V4, VP2M, VU, XT, YB, ZD8, ZL, ZS3, 3B8, 3V, 3X, 5H, 5N, 5T, 6W, 6Y, 9J, 9K, 9L, 9M, 9Q, 9V and 9Y.

On 24MHz, countries included were: A2, C6, VP8 (Ant), CX, EA9, EL, FB8Z, FH, FK, FM, FR, FY, HC, HH, HP, HZ, J2, J3, J6, J7, J8, JW, JX, KH2, KV4, KP4, PZ, S7, TI, TL, TR, TU, VK9Y, V2, V4, VP2M, VP9, VU, YB, Z2, ZL, ZS, ZS3, 3V8, 3B9, 3V, 3X, 5H, 5N, 5T, 6W, 6Y, 8P, 9J, 9K, 9M, 9Q and 9Y.

On 10MHz: A4, C6, VP8 (Ant), CX, DU, EA9, FB8Z, FG, FS, FK8, FM, FO, FY, HI, HK, HZ, J2, J3, J6, J8, KL7, KP2, P29, PJ, PJ2M, PZ, TR, TZ, VE (St Paul Is), VK9, VP2E, VP2M, VP2V, VP8, VP9, V4, XT, YC, YN, YV0, ZD8, ZK2, ZL, ZM7, 3B8, 3B9, 3V, 3X, 5N, 5T, 5Z, 6O, 6W, 7X, 8P, 9J, 9M and 9Y.

Not quite the "dead" bands that many talk about — and just for amusement's sake I am going to run 1988 tables for all three. Scores please direct to me by the normal closing dates.

## Finale

Thanks to the valiant few who guessed the closing date! These included G3GVV, G3PJT, G3URA, GM4CHX, G4NXG/M, G4UZN, GD4XTT and GD0ELY.

The following are thanked for news items extracted: *DX'press* (PA3CXC), *CQ Magazine* (W1WY), *DXNL* (DL3RK), *Long Island DX Bulletin* (W2IYX), *DX News Sheet* (G4DYO), *The Ex-G Radio Club Bulletin* (G13OEN/W6), *Long Skip* (VE3IPR), *Lynx DX Group Bulletin* (EA2JGO), and the *DX Family Newsletter* (JH1KRC).

Closing date for receipt of material for April issue is 19 February. □

## VHF/UHF

Ken Willis, G8VR\*

### VHF news from overseas

Much of this news is related to 50MHz, so I apologise to readers who think that I devote too much space to it these days. The 50MHz band is, of course, a sort of "half-way house" between hf and vhf, at times exhibiting the characteristics of both parts of the spectrum, so we should be glad of this extension of our horizons. Even if you don't agree with that, there can be little doubt that vhf operation has gained a new dimension through 50MHz operation, and the following correspondence might have come straight out of G3FKM's HF column, so exotic are some of the calligns mentioned.

First, from Ascension Island, David Butler, G4ASR, showed me a copy of a most interesting letter received by Mike Barry, ZD8MB (G4MAB), and signed by the Governor of Ascension Island. The letter authorised operation on 28, 50, 144 and 432MHz by all ZD8 amateurs, and granted permission to establish beacons ZD8HF (28MHz) and ZD8VHF (50MHz). In his closing paragraph, the Governor commented: "I would like to wish you luck in what appears to be an extremely interesting hobby" — a most pleasant way of conducting official business. Perhaps Mike can persuade the Governor to become licensed in time for some F2 propagation in a couple of years. Both beacons were authorised to use 25-50W. Mike had some early success on 50MHz. During his first days on the band starting on 19 November, he received beacon FY7THF between 2300 and 0030gmt. Then on 26 November he heard beacon

HC2FG, and the following day copied PY2AA (beacon) on cw and PY1VO (ssb). Finally, 30 November brought a two-way contact with HC1BI on ssb between 0012 and 0032gmt, on 50-110 MHz.

Jan, OH1ZAA, telephoned me from Colorado to say that he was activating his Cayman Island call ZF2KZ on 28 and 50MHz between 10 and 16 December, but this was too late to do more than notify some of the regulars on the 50MHz net. In later correspondence, Jan made a plea for operators to give all six characters when sending their locator since this would provide more accurate data for later scientific analysis of the propagation mechanisms.

For the first time that I can recall since I commenced writing this feature, news arrived directly from Japan in the form of a letter from Hat (Hatsuo Yoshida), JA1VOK, of Chiba, a very respected 50MHz operator. Writing at the end of November, Hat said that he reads about our vhf activities in the UK, especially on 50MHz. Japanese operators enjoyed some excellent tep conditions in October and November last year and made 50MHz contacts with FK, VK and ZL. In October beacons VK6RTT (52-32MHz) and VK8VF (52-20MHz) were copied, though nothing was heard of them in November. From 26 October, openings to FK and VK occurred, with FK1TK, FK1TS and JG3MRT/FK being worked by JA1VOK. It is so long since I operated on the hf bands that I needed to look at a globe to see just where FK is located. The prefix is assigned to the Loyalty Islands, Chesterfield Island and New Caledonia, all in the South Pacific to the northeast of Queensland, and apparently ideally situated for a tep path to Japan. During the tep "season", Hat reported openings to VK2,3,4,6 and 8. Using what he called "afternoon-type tep", he worked VK4ZWH (0446gmt) and VK4BZL (0455gmt) on 31 October, VK8ZMA (0836gmt) on 2 November, and VK4ZJB (0432gmt) on 14 November. He also had contacts with C21INI (Nauru), the first time since 1980 that this station has been heard in Japan. Another Japanese operator, Kazu, JG1TSG, worked into the Melbourne area on 52MHz, a QRB of about 8,200km, and to Alice Springs. In November, Hat worked ZL2TPY on 51-11MHz at strength 55 to 59, as well as hearing New Zealand channel 1 tv on 50-74MHz. ZL2 is some 9,000km from Chiba. Note the frequencies. The band 52 to 54MHz is used by VK, ZL and J etc.

On a bleak winter's day here in England it is nice to dream of living on a Pacific island, with native girls in attendance, and a very large 50MHz antenna dark against the sky as the pile-up of rare calligns builds! Talk of Englishmen on remote Pacific islands leads me to wonder what has happened to Peter Taylor, H44PT (G8BCG), last heard of operating from Guadalcanal in the Solomons. He was equipped for 50MHz when he wrote (4-2-70 May 1983), so maybe he was able to catch those tep conditions last October and November.

Ted, G4UPS, sent me a copy of a letter which he received from Alfredo, LU3EX, in Argentina, another dedicated 50MHz operator. Alfredo reported tep propagation on 50MHz with, at times, "much flutter QSB", from 17 to 22 and again between 26 and 31 October. Nothing was heard during daylight hours "except cordless telephones" (so we are not the only sufferers!). Calls copied via tep were YS1ECB (Salvador), HK1BAU (Colombia), KP4EOR (Puerto Rico), PY6BN and PY2FAL (Brazil), FM3AG and FM3BY (Martinique), NE8KZ/KP2, WZ6Z/KP2 and KP2A (Virgin Islands) plus several OA (Peru) and other Brazilian stations. Beacons copied were FY7THF, PY2AA and HC2FG. Alfredo has received QSL cards for the reception of his 50MHz signals by DK1PZ and PA0ERW (April 1980) and EA3LL (April 1982), but this related to F2 propagation, not tep, so don't get too excited just yet. He said that he had "many contacts with ZB2BL, sorry that his beacon is not on". In an encouraging finale to his letter to G4UPS, Alfredo says: "Best regards from here, will work you on six soon". Let's hope he is right.

### Modes for abodes

What you can work on the vhf/uhf bands may depend on where you live. If you are located in the extreme west of the UK, there will not be much to your west except wet squares. At my QTH, French, Belgium and Dutch stations are so close that I have to penetrate layers of them to reach the choicer dx spots.

Wearing my hat as the European manager for the ARRL VHF/UHF Century Club Award (VUCC), I see lots of QSL cards from all over Europe, some of them so rare that I wonder why the recipients didn't write to tell us about the contact. A recent submission from Ron Adams, GM4ILS (Elgin), aroused my interest because it illustrated very clearly his use of the aurora, a mode which favours the more northern stations of course. Ron submitted cards for 100 squares worked on 144MHz in a total of 16 countries. Most of the contacts had been made on cw, which is another object lesson for square chasers, but no fewer than 56 of Ron's 100 squares had been worked by auroral propagation. It was also a

\* 6 Lerryn Gardens, Broadstairs, Kent CT10 3BH.

surprise to find that there were no cards in the submission from GW, GD, GU, GJ or F, countries which a southern station would expect to work more or less routinely. Among Ron's contacts, however, were some with OH, HG, IK and OE, showing that although his location may be badly screened for tropo contacts to the south, opportunities for much better dx exist through aurora and sporadic-E.

We all like to receive awards, but it is a pity there cannot be some sort of handicap system which recognises that a station working 100 miles using 2W to an indoor dipole can feel that he has achieved as much as someone who works the USSR with full legal power into  $2 \times 17$  elements from a remote site with clear take-off.

By the way, if you still don't know about the VUCC Award, send me a largish sae for details.

## Repeater news

Trevor, G3ZYY, of the West Devon Repeater Group, felt that it was about time his group's activities received a mention. They have been operating GB3WD for more than four years, and soon the antennas, two full-wave dipoles phased together, will need to be replaced. This is no mean task, since the repeater is located at the North Hessary Tor, Princetown, BBC site, 1,695ft asl, with the antennas a further 350ft up. Despite the ageing aluminium on the mast, the repeater still provides excellent coverage over a "vast area of the southwest", to quote Trevor. A battery pack is available to run the system at reduced power in the event of a power cut. Future plans are to replace the present cavities with commercial units and to build up a stock of spares. Financing the maintenance and operation of the facility is by no means easy in an area which is not high in population density, so new members of the group will be made very welcome. Write to Trevor, G3ZYY, QTHR. The group issues an excellent newsletter and a very handsome certificate of membership. Trevor makes a point which echoes my own thoughts on the use of repeaters: if you live at a superb vhf location and can put up a mast carrying high-gain antenna systems, you may not want to use repeaters. If so, then count your lucky stars. Flat dwellers and folk in areas where restrictions of various sorts or the terrain make this impossible, are often limited to the use of repeaters to maintain any sort of vhf activity. Trevor commented that in his "hilly and mountainous area, 144MHz communication would be very difficult without the local repeaters". Wallies whose only recreation is to spoil things for others, please note.

Martin, G0BQK, of the Ridgeway RG, also wrote for the first time. This group was formed early in 1987 by an amalgamation of the Vale of White Horse and the Thamesdown groups. The reason for these groups joining forces was to ensure the efficient running of the repeaters in the area covered by the individual groups and to avoid duplication of spares, insurance premiums and even committee members. Another advantage was that the new group required a single membership fee while providing service from all the existing repeaters. Decisions like these are surely a credit to the many amateurs who spend so much of their free time initiating and running repeater operations in such a businesslike way. There are not only some good administrators around but some excellent writers, too, judging by the quality of the newsletters published these days. The Ridgeway Group currently operates four repeaters, GB3WH (R2) and GB3TD (RB13), both at Swindon, GB3OX (RB15) Oxford, and GB3TA, a vhf digital repeater (AX.25 packet) on 144-650MHz. Martin asks Raynet controllers to note that GB3TA and GB3TD are powered by a float-charged battery supply and therefore capable of continued operation during power failures. GB3WH has a battery back-up, the battery taking over if the mains supply fails. A new logic system is being developed for WH, so it may change at times as on-the-air tests take place. To join this group write to Ray, G4XYA, QTHR, who will be pleased to welcome you.

The Kent Repeater Group Newsletter No 50 described the effect of the October hurricane on its flock. GB3NK was one of the few in the affected area to remain on the air, thanks to the BBC auto-start diesel generators on site, and it carried essential traffic for a time. GB3CK went off the air, but when a visit to the site was possible two days after the storm, damage was found to be slight and only the lack of a mains power supply was keeping the repeater inoperative. GB3EK was another which came back when power was restored, and GB3SK suffered a bent antenna pole, but the worst affected was GB3RE which lost its 80ft mast and antennas were so badly damaged that they needed replacement. Kent RG complain, like so many other groups, that some of their repeaters are virtually dominated by operators who make no contribution towards costs. I don't know what can be done about people who seem to have no conscience in these matters, except perhaps to announce to continual offenders over

the air that they should sign up, but as the Kent newsletter points out, the groups do not want to discourage visitors to the area using the repeaters freely.

The Leicestershire group's publication *LENS* is a magazine in its own right, containing a varied selection of items, one of which caught my eye. Jack Hum, G5UM, who is an honorary life-president of the Leicester group celebrated his sixtieth year as a radio amateur in 1987. Jack is, of course, our vhf awards manager and a Vice-President of the RSGB. Congratulations, Jack.

## Sunspots

Solar activity waxes and wanes on a daily basis, and although there is a general upwards trend as Cycle 22 progresses, it will, of course, be some time before we can expect much in the way of high mufs. Correspondence indicates that several readers are keeping track of the various indices which indicate solar and geomagnetic activity, probably because the release of the 50MHz band in the UK has brought about a renewed interest in Old Sol. One parameter which seems to cause a certain amount of confusion is the so-called sunspot number. During November-December 1987, this was being quoted in the thirties range: however, this does not mean that if you had observed the sun at that time you could expect to count 30 spots on its disc. An astronomer, Rudolf Wolf, started recording sunspot data as far back as 1749 at the Zurich Observatory. He devised a system by which all astronomers, wherever they were located and whatever equipment they possessed, could describe sunspot activity on a common basis, and Wolf defined a Sunspot or Wolf Number, calculated from the formula:  $W = K(10G + N)$  where W is the Wolf or Sunspot number, G the number of groups of spots observed on the sun's disc, N the total number of spots observed and K a constant for the particular observatory (or backyard telescope) which is calculated from statistical information. The situation becomes slightly more confused, since results over a period are "smoothed" to give monthly and 12-monthly mean sunspot numbers. To give an indication of what we must hope for, Charlie Newton, G2FKZ, gave me some figures for the peak of Cycle 19, when the sunspot number reached 200. Any old-timers who were on the air in those days (the latter part of the 'fifties) will recall that conditions on 28MHz were quite exceptional, and operators in countries where the 50MHz band was authorised worked some phenomenal dx. In *VHF/UHF* last month, you will note that Ron Livesey of the BAA reported that for the current cycle, no 22, we might expect a sunspot number between 118 and 185 at the peak; on the face of it, not an exceptional figure.

Since the sun pours out radio-frequency energy, measuring this solar "flux" is one way of determining the level of solar activity, and this is done at several observatories around the world. One wavelength chosen for such measurements is in the microwave region, 2.9GHz, and readings obtained at that frequency have become one of the standards for referring to the sun's activity.

Geoff, G3ENY, has provided figures which show that the relationship between sunspot number and solar flux is approximately linear, for example:

Flux	Wolf Number	Flux	Wolf Number	Flux	Wolf Number
80	21	140	95	200	156
100	48	160	116	220	176
120	72	180	137	240	196

From a practical point of view, Radio Australia and other daily announcements provide figures for both flux and sunspot number, and it is obvious that they will need to be much higher than those currently being measured before we can hope for much F2 propagation at frequencies at or above 50MHz.

## Johnny Haydon, G3BLP

Anyone who was around the vhf bands during the late 'forties and 'fifties, or who likes to read about the early days of vhf in back numbers of *T & R Bulletin* and *RSGB Bulletin*, will know that in those days Johnny Haydon, G3BLP, was one of our top operators. The big signal and crisp, fast cw from his Surrey location were part of the vhf scene, and before moving to Dunstable in the 'sixties, he achieved a number of "firsts" and was winner of several contests. He was also an early 60MHz operator, and with Ron Glaisher, G6LX, organised and ran the popular five-band dinners, which later became the vhf dinners.

Ron Glaisher, G6LX, wrote to say that Johnny was *en route* to New Zealand to visit members of his family when he was taken ill and forced to return to the UK, where sadly, he died early in December. He had not been very active since he moved from Surrey, but there will be many like myself who will always associate Johnny with the excitement of vhf in



those pioneer days, when virtually everything we used was home-brew, and G2JF could nightly be heard working seemingly incredible things from his vantage point in Kent. In those days, the vhf part of the spectrum was largely unknown territory, and in setting out to explore it, Johnny set standards which many of us had to try very hard to emulate. He made a small bit of vhf history and thus won't quickly be forgotten, even in this much-changed environment of vhf operation as we know it today.

## Meteor scatter

With the Geminids just two days away as this is being written, reports on this shower must be held over until next month. Unfortunately, the late printing of the December issue resulted in readers being unable to take advantage of the predicted best times and directions for this event which were tabulated.

You probably know my views on 50MHz meteor scatter. We need more people to use the mode on a band ideally suited to it. A QSL card received from Alan, G18YDZ, contained information that during the August Perseids he worked three stations on a single burst, using ssb, so this is surely proof enough of the long reflections which can occur at this lower frequency.

The latest 2 *Metre News Sheet* published by SM6EOC/SM6AFH, gives a listing of some stations now active on meteor scatter from rare squares. Among these are: EA5HM (IM89), YU3UBC and YU3XY (JN 65), YU5CEF (KN01), LZ1DX (KN22) and OH8UV (KP34). Also listed are two vhf stations active in Turkey, both said to be QRV on meteor scatter, they are TA1E (KN40) and KC3RE/TA3 (KM38). The 14MHz vhf net is the best bet for arranging skeds with these stations.

George, G3NOH (Ealing), wishing to try cw meteor scatter for the first time, found that his TS830S would not key faster than about 30wpm. After much experiment, he found that in the af unit in this transceiver, there is a 27kΩ resistor, R84, in the collector of keying transistor Q18. If this resistor is reduced to half this value, simply by soldering a second 27kΩ across it, the rig will then key in excess of 1,200lpm, and, George assures us, with no clicks. One small problem associated with this solution is that a low residual output is present when the key is up but, on the air, stations have said that it is not noticeable. When he went on to the 14MHz vhf net to make skeds for the Quadrantids, George was called by a German station who earlier had heard him talking about it. The German had already met and solved the problem, presumably in a similar way. For those who have yet to try cw meteor scatter, for best results the keying waveform needs to be sharper than is normally required so that when a burst of high speed cw is slowed down, the resulting morse is crisp and clear. This often means that the keying filter or associated circuits have to be modified slightly to the point where the rig is on the verge of being "clicky", a small step from being downright anti-social if taken too far. While this may not be too much of a problem when operating in the wee small hours on an otherwise dead band, during major showers when activity is high, a badly adjusted cw rig can wreak havoc among neighbouring operators, and not just in the cw part of the band. Perhaps someone could write an authoritative article for *Rad Com* on this topic.

*Dubus* issue 4/87 contains details of a modification of the LA8AK meteor scatter timer to provide 1, 2.5 and 5min period timing. It also gives the results of an expedition to Iceland in June/July 1987 by SM6AHF and others during which 144MHz meteor scatter was worked. UK stations listed as being worked on ms from Iceland were G4KUX, G0DAZ, G4RNL, GM4YXI, G0CUZ, G4DHF and G3UTS. Numerous G stations were worked from wet squares during the voyage.

Several readers wanting to build the very simple G4IJE memory keyer are finding the 2102 chips hard to locate as they are somewhat dated and no longer in production. If anyone can help, please write to me and I will publicise the information here.

## From here and there

So many amateurs lost their antennas in the October hurricane which hit the south that at least one supplier ran out of the most popular models. One who suffered was Fleming, G4MJC (Eastbourne), who had earlier survived the buffeting of gale-force winds at sea during his "wet-squares" expedition. Another was Tim, G0GTF (Hastings), whose array of dx tv and amateur band antennas was lost, most damage being caused when two aluminium poles supporting the antennas became entwined, making it difficult to get them down. Tim is now in no doubt that there is a certain minimum wall-thickness for tubing used as masts! Here at G8VR a mast designed by Tony, G4NRV, can be reduced in height by 50 per cent and lowered to a horizontal position all in a matter of minutes, using small boat-winch. The only problem was trying to stay upright at 4am and at the same time avoiding pieces of falling tiles and airborne garden fences.

The antennas emerged unscathed. I heard at second hand that Paul, G4DVC (Deal), got up to see what was happening, and returned upstairs to find his chimney stack lying on the bed he had just vacated.

Remember that PA0 stations will be authorised to operate between 50.000 and 50.450MHz from 0000gmt 1 March 1988, using cw only with a power of 30W to the antenna, and no antenna gain restrictions. Operation will be permitted throughout the 24 hours. This follows a most enlightened decision by the Netherlands authorities, and perhaps it will prompt other European countries at least to grant some experimental 50MHz licences to identify any interference problems which might be caused by operating in a part of the spectrum still used for domestic television. The authorisation is initially for one year.

Bill Tynan, W3XO's vhf feature in *QST* December 1987, describes a digital signal processing technique (dsp) which is said to offer much promise for weak signal reception on the vhf bands. The technique involves microcomputers more directly in the communication process than they have tended to be used so far (eg for cw sending, contest logging, satellite and moon positioning etc), so one can see that this might be something which the computer buffs will relish along with packet radio and the like. That term "weak signal" has me worried, though, because my micro puts out almost as strong a signal on 144MHz as the main rig, and produces hash and pulses right across the band despite many attempts to suppress it. W3IWI and N4HY are two stations in the USA pioneering this technique.

The callign G6NB, issued before the second world war to "Bill" Biltcliffe, is one which older vhf operators will certainly recognise. The dx worked by Bill over the years on the 144MHz band, is well documented in the vhf literature. Bill would be the first to agree that much of his success was due to the fact that he lived for many years at a site in Buckinghamshire which not only had a superb vhf take-off but where he was able to erect antennas without incurring the wrath of the local authority. However, none of this detracts from the fact that Bill is a dedicated vhf operator who knows how to wrinkle out the weak signals, as I know to my cost having heard him working prefixes inaudible at my QTH. Unfortunately Bill has now moved from that location to another near Bicester, and it may take a little time for him to get back on the vhf bands in any serious way. I wonder if the estate agent handling the sale of Bill's house extolled the virtues of its vhf potential? Let's hope it won't be wasted on someone who prefers gardening!

Paul Thompson, G6MEN (Shrewsbury), caught some Es to Spain on 24 and 25 October and worked crossband 50/28MHz. He says: "It pays to monitor 28,885kHz", and this is obviously good advice since it was the reason Botswana was worked via tep in October. At least one xyl known to me is "trained" to listen on this frequency when the old man is not within earshot, and to call for him when things are heard!

Radio Australia on 9,655kHz gives a short but informative report on solar conditions every day at 0825gmt, and is a very strong signal here in the UK. See *Rad Com* August 1987, p589, for a list of other frequencies used by this station. □

## SWL

**Bob Treacher, BRS32525\***

## New swl book

I am delighted to start this column with the news that there is a new book on the market which has been written by an swl, exclusively for the swl. Arthur Miller, BRS88969, who has been an swl for around 30 years, has written the *Short Wave Radio Listeners' Handbook*. Until now there has been a scarcity of adequate reliable information about swling, and Arthur's book certainly redresses the balance. It is intended for newcomers to short wave radio, and covers both the amateur bands and the broadcast bands.

I have a copy, and even as an experienced swl myself, there is much in it of interest and makes compulsive reading. It is written in non-technical language, and is primarily designed to encourage the newcomer to our hobby. The book has over 200 pages and 12 chapters which deal with receivers and antennas, propagation conditions, frequency ranges of transmissions, how to identify stations, the peculiarities of the hf and vhf bands, how to report to stations, amateur radio operating procedures,

\*93 Elibank Road, Eltham, London SE9 1QJ.

contests and awards, and much more. There are a number of appendices which cover countries, prefixes and zones, together with a list of all the commonly-used amateur abbreviations.

I would commend the book to all short wave listeners as an invaluable work which should be in every shack. It costs only £6.99, and is available from Patrick Stephens Ltd, Denington Estate, Wellingborough, Northants NN8 2QD.

### UBA swl events 1988

Following the success of the UBA's initial contest last year, it is to be run as an annual event. As in 1987, this year's event has been timed to coincide with both the ssb and cw legs of the CQ WPX Contest. The ssb leg will be held over the weekend of 26/27 March, while the cw leg is later in the year, on 28/29 May.

The rules are the same as for 1987, when 48 entries were received. Send an a/c to the address below and you will receive a copy of the full rules. Readers might recall that the contest marks a departure from normal contest rules in that listeners can choose their own 2-3h listening periods. Hopefully, the event will receive wide support from the British Isles.

The UBA also sponsors an annual competition to find the swl who can log the most DXCC countries on all six bands during the year. Although a month has been lost, there is still time to enter. Again, the full rules are available by sending me an a/c.

### Derby society contest

G1DHQ sent details of the contest which the Derby & D ARS is running on 144MHz from 1300 to 1700 on Sunday 13 March. It has an swl section and the winner will receive a commemorative certificate. Full rules are available from G1DHQ, 119 Green Lane, Derby, DE1 1RZ.

### VHF news

Several readers have provided details of what they heard and worked during the big tropo event in early November which I mentioned briefly in last month's column. I will concentrate on the report from David Whitaker, BRS25429, who heard some very good dx on both 144 and 432MHz. On 144MHz, he logged no less than 30 OK stations, with the best dx being OK3KGP/P (JN99BB) at over 1,450km. Also heard were four OEs, nine Y2s, including Y24LA in JO64, and five SPs. In all, 52 squares were heard in 20 countries; four were new – GJ, HM, JJ and JL squares. Annoying gotaways included an OK in JN98 and SP9HRP in KO00 (KK square) which David heard local stations working but which he could not copy.

On 432MHz, many OK1s were copied, the best being in HK square at 1,228km. Best dx was SP6MLK/6 in IK square (1,313km). New squares on that band were DH, HJ, HM and HI. In view of the long haul dx which David hears on 432MHz during lift conditions, I find it hard to believe that he will actually give up the band in favour of 50MHz in the summer!

### Other news

Brad Bradbury, BRS1066, wrote to provide a few more details of the trophy he picked up at the HF Convention at Oxford (not the NEC as previously reported!). He was delighted with the trophy, which took the form of an engraved pewter mug and he also received a special certificate to commemorate his 40 years as a QSL Bureau sub-manager. Brad updated his yearly totals for the tables which will be included next month.

The piece about vhf awards prompted some activity. Both David Whitaker and Mick Toms sent claims to G5UM and now have 80/15 (432MHz) and 125/20 (144MHz) stickers respectively. By the time this is read I will have a 175 sticker for 144MHz, and Joan, my xyl, BRS62088, will have a certificate for 40 squares for 144MHz. Mick had carried out some changes to his receiving set-up on uhf/vhf, and was in the process of looking for a dual-band antenna for 50/70MHz in readiness for the summer season.

Good to hear again from Graeme Caselton (ex RS44984). He took a non-serious part in the Society's 21/28MHz Contest and my HF Challenge, but some of the countries logged will have gone some way to a further sticker on his DXLCA certificate. His table score will also be included next month.

Maurice Wilcox, BRS0930, wrote from his QTH in Hartlepool, and provided details of his receiving set-up and of the QSL cards he is awaiting to claim a French award for hearing all continents. Maurice, who is 72, was also looking forward to a relaxing three months holiday in 9H1 away from the British winter.

Once again I seem to have left Robert Small's contribution until last! He thought that November had produced "fantastic conditions", with dx

available from 7 to 28MHz. On 7MHz, he heard OH1RY from 3D2 and ZK1, and managed to hear the S0 expedition on cw. K4YT/DU8 was a consistently strong signal during CQWW. On some evenings 14MHz had been staying open very late. His best dx included FK8FS, KX6DC, G3CWI/CE8 (via G3ZAY), H44GP, FT8ZA and FR/G/FH4EC. This last station has F6FNU as his manager. He is not a member of the REF and therefore QSL cards have to be sent direct. The 21MHz band provided JPICKY/JD1, but Robert is unaware of his QTH or QSL information (if anyone has the gen, please let me know and I will pass it on to him); while 28MHz gave his first new countries on the band in over three years. They were FT8XD and VU4GDG/DQP on ssb, and 5R8VT and PA0GAM/ST2 on cw. Other good dx had been copied, and the signs appear good for the future.

This month Robert has something of interest to report on 24MHz. He had heard a few more European countries on ssb, including several Gs who are not allowed by their licence to transmit on ssb on the band – so don't send any QSLs. DX heard included 9Y4RT, FY5AU, J37AJ and K6STI on ssb, and VK6AKG, VU2LO and S79WS on cw.

### Finale

Many thanks to G4UDR, GM4PVC, BRS1066 and BRS8841 for the QSL information for FM5WS and TG9NX. David Whitaker will let me know if the details had the desired results. Indeed, it took G4UDR three attempts to secure a card from TG9NX, so it appears not to be an easy task; he eventually received one after sending a "tearjerking" letter, together with two ircs, about needing the card for an award, and the card came back very quickly!

Please remember to submit your LF Challenge logs by 26 February.

News, views and your first scores for the 1988 tables should be with me no later than 9 February, with late copy by 17 February. □

## MICROWAVES

Mike Dixon, G3PFR\*

### More on beacons

In view of the fact that last month I recommended G4FRE's beacon keyer for use in personal and other beacons, it is fortunate that building two of these devices reminded me that the boards available carry a couple of modifications (improvements) which were featured in the *Microwave Newsletter* earlier this year. For those who have seen only the original write-up, the modifications are quite simple.

The original clock oscillator circuit is not the optimum configuration, and Dave has indicated that better performance is given by strapping pins 3, 5, and 6 of IC1 together, disconnecting the timing capacitor, C1, from pin 3 of IC1 and reconnecting it to pin 4 of IC1. In the revised circuit, R1 is 220kΩ and R2 is changed to 100kΩ. To make the l.e.d display more comprehensible, the 3.9kΩ resistor feeding the base of TR1 should be connected to pin 11 of IC5. A further acceptable modification is to replace the BFY51 transistors with BC107s, the original transistors being somewhat beefy for the task assigned to them! Since writing the January column, I have built two of the keyers to the revised circuit, using Dave's boards, and both work extremely well. There were no problems, either, in programming the eeproms. As a matter of interest, this keyer is being used in two beacons — one on 28MHz and the other on 50MHz — planned for Ascension Island, subject to the authorities there allowing them to go on air.

South-coast microwave operators will be pleased to know that the Isle of Wight beacons, GB3IOW, on 1.3 and 10.1GHz have at long last been approved by the DTI, and should, hopefully, have been back on air by the end of 1987 from their new site at Chillerton Down.

The 1.3 and 2.3GHz beacons GB3NWK went off-air following the severe storms in the south. After the "big blow" the antennas and feeders were found to be missing, presumed stolen, while the mast was down! However, it transpired that the antenna riggers for the pmr station, with which the beacons share a mast, had mistakenly removed the antennas and feeders while servicing the pmr antennas following the gales. Fortunately the missing equipment has been located and the group hoped to have the beacons back on air by Christmas, weather and new mast brackets permitting.

\*"Woodstock", Gaze Bank, Norley, Warrington, Cheshire WA6 8LL.



The old 2.3GHz Andover beacon, GB3AND, which has been inoperative for some time now, may be moving to a new site on the edge of Salisbury Plain under the call sign GB3WWH (Westbury White Horse). The original equipment is on "long term loan" to G3RHI, who is proposing the move and who would like to hear from anyone in the immediate area interested in the project, particularly with regard to providing possible technical assistance. Bert confesses to having no particular attraction to microwaves, but he is prepared to have a go at restoring the beacon to service without the need to amass expensive test equipment: all he may need is some access to test equipment for the band. He is already contemplating how to build a cheap and cheerful receive converter to monitor the beacon from his home, less than a mile from the beacon site. The answer to this one appears to be the well-tryed, reliable and simple interdigital design described in the *VHF/UHF Manual*. This could be criticised for being "old-hat" — so it is, but nevertheless is a simple and reliable first converter for the less experienced.

There can be no definite timetable for this move since, in effect, it is a new application which will have to go through the full DTI approval routine, although the new site does appear to have been cleared by at least one of the departments concerned. More news when available!

### A new user group for 3.4GHz

Martyn, G0CZD, and Derek, G3KFD, have launched a new Midlands-based user group to try to encourage more use of the 3.4GHz band, and they are also prepared to support the 5.7GHz band. Their initial action is to launch a free news-sheet called *3456* in which they intend to publish (or republish) designs specifically for the band. The first issue, recently received, is openly a canvassing issue asking for both material input (text, designs and operating news) and stamps to cover the postage for the first three issues proper. While not in direct competition with the *Microwave Newsletter*, there are areas of potential overlap and I would hope that relevant material from both sources will be regarded as freely interchangeable. I would remind readers that both this new private newsletter and the established *Microwave Newsletter* are dependant on what the users supply in the way of information to the respective editors. Neither can be reasonably expected to supply all the technical information needed — nor should they! Please keep the information coming! Meanwhile, details of this new news-sheet can be obtained from either of the operators mentioned above, both QTHR.

### Components service

Over the coming months, users of this service can expect changes to the list of components stocked, for the reason that the supply situation is changing. Right at the outset it was decided on a limited budget that only "key" or very difficult components would be stocked, and now many of the original components are accessible from other sources. Several suppliers are prepared to handle small-quantity orders, and furthermore, improved and often less-expensive devices are becoming available. Users can therefore expect, for instance, that GaAsfet types might change and the current MMICs may be replaced by newer types. Some may disappear altogether if they have outlived their usefulness.

Users' suggestions are always welcomed and considered for inclusion in the service (if feasible, or funds permitting) and it is our intention, before an item is deleted, to publish details of alternative sources in the *Newsletter* and, space permitting, in this column.

### Winchester round table

A comprehensive account of the last Winchester round table, held at the IBA establishment at Crawley Court on 15 November, was recently received from Ted, G4ELM. Some 37 amateurs (including two xyls) attended. Like the earlier event at Martlesham, the calibrate and align service using professional test equipment was reported as under-used. Where have all the constructors gone?

Out of the discussions came a plan to hold a form of round table in northern France some time in 1988, in order to stir up French enthusiasm and portable activity. The final tally of those interested was 13, so we wish them luck with this novel idea! G4ELM gave a talk on using pocket computers for microwave distance and bearing calculations in the field, while G8KQW and G4FUF reviewed their year's portable activities, and other, unnamed operators reported on the October IARU contest as seen from Margate. These included 130 QSOs on 1.3GHz, 35 on 2.3, nine on 3.4 (including four to PA0) and five on 10GHz. It was reported that no less than 400 Piper/SSB 10GHz systems were in use in Germany!

Other discussion revolved around the need for more beacons: planning is going ahead for 10GHz beacons in mid-Hampshire, near Basingstoke,

Reigate/Guildford and mid-Essex. It seems that the surge in narrowband activity brought about by the commercial transverter is happening and has highlighted the need for more beacons — one of the reasons for my ramblings on beacons last month!

The next event at Winchester is scheduled for Sunday 13 March, 1988. Details from Don, G3JHM, or Ted, G4ELM, both QTHR. □

## DATA COMMS

Ian Wade, G3NRW\*

### Read all about it

Many people have asked me where they can read about data comms, so here is a list of magazine articles and books which I have found particularly useful and interesting. They are graded roughly in order of depth and complexity, ranging from beginners introductions to advanced level. Because the amount of material available is so vast, it's impossible to include every reference on the subject, but if you know of any publication which I haven't mentioned and which you think will be of interest to other readers, please let me know.

### For beginners

Starting with rtty, one of the best (and cheapest) introductions is the excellent booklet *Introducing RTTY*, published by *Practical Wireless* at £1.15. It contains reprints of a number of articles by Jeff Maynard, G4EJA, covering the basic principles of rtty, characteristics of rtty signals, block diagrams of rtty stations, and practical circuits for terminal units and tone generators. He then goes on to review some commercial items of rtty equipment, and finishes with a brief description on how a computer can be programmed for rtty. Dick Ganderton, G8VFN (and, incidentally, now the editor of the new-look *Short Wave Magazine*), then takes over with full circuit details on how to build a complete rtty station based on a ZX81 micro. Highly recommended for beginners.

Up-to-date Amtor references are a little thin on the ground. The original articles on Amtor by Peter Martinez, G3PLX, appeared in *Rad Com* August 1979 and June/July 1980, and the full specification (CCIR 476-3) is included in the *Proceedings of the Third ARRL Amateur Radio Computer Networking Conference*, published by ARRL in April 1984.

For beginners to packet, the best reference I have seen is the August 1986 issue of 73 magazine. This is a special packet issue, with a whole range of articles for the beginner and experienced hand alike. Included are an excellent packet primer by W1BEL, an article on how to operate packet by W2JUP, circuit details for building a precision tuning indicator and a connect alarm, a review of packet in space, a round-table question and answer session, a summary of networking, and a packet buying guide. And for budding sysops planning to set up a mailbox, there is a detailed account by WB2MNF of the technical and operational problems to be expected; food for thought before jumping in at the deep end! All very readable stuff, and worth the effort to get hold of.

Closer to home, *Practical Wireless* ran a four-part introduction to packet last year (May to August 1987) by Roger Cooke, G3LDI. Roger was one of the very first packeteers active in this country, and has a wealth of operational experience, particularly on the hf bands. His down-to-earth approach and ability to translate the jargon into comprehensible English make this series required reading for the beginner.

### Data comms in general

If you want to expand your basic knowledge of data comms in general, several books come to mind. The first of these is the *ARRL Handbook*, that mighty tome which each year contains long chapters on digital communications and digital equipment. Here you will find everything from morse code (in English, Japanese, Korean, Arabic, Hebrew, Russian and Greek!) to rtty, Amtor, ascii, packet, Open Systems Interconnection (OSI), RS232/449, modems, terminal node controllers, and a useful glossary of comms terminology. On the practical side, the equipment chapter contains full practical details for building a whole

\* 7 Daubeney Close, Harlington, Dunstable, Bedfordshire LU5 6NF.

range of digital devices, including modems, an RS232 break-out box and an Amtor controller. Well worth buying for these chapters alone.

If you are interested in the codes used by different services, the book to consider is the *Radioteletype Code Manual* by Klingenfuss. This contains full details of different versions of rty codes (including Arabic, Cyrillic, Greek, Korean, Amharic, Thai and Japanese!), plus the TOR/SITOR code as used in Amtor. Also included is a full description of the TOR protocol, with examples of how stations communicate with each other.

Widening the perspective still further into the world of commercial data comms, two gems come to mind. The first is *Understanding Data Communications*, published by Tandy (book reference 62-1389). This covers the nuts and bolts of asynchronous and synchronous data transmission, and then moves on to introduce higher-level protocols and the seven-layer ISO reference model. Each chapter finishes with a quiz to test your understanding, and there are even answers at the back (no cheating!). Lots of pictures and easy-to-read style make this a worthwhile investment.

The second general introduction which I have found useful is *Practical Data Communications* by Fred Jennings, published by Blackwell Scientific Publications. This is angled more towards the UK telecomms marketplace, and covers comms interfaces, modems, analog and digital links, half-duplex and full-duplex protocols, packet switched networks and local area networks. The appendices are particularly useful, including lists of the more important V-, X-, G- and I-series recommendations which you will need if you want to dig deeper.

### Intermediate/advanced level

Returning to the amateur packet scene, the *Proceedings of the ARRL Computer Networking Conferences* held annually in the USA are essential reading to keep up-to-date with current thinking. A little on the expensive side for an individual purchase perhaps, but a club or group may find it worthwhile to buy a copy for each of the last two years (covering the fifth and sixth conferences), to share among the membership.

The definitive work on AX.25 is, of course, the full specification *AX.25 Amateur Packet Radio Link Layer Protocol, Version 2.0*, published by the ARRL and available from the RSGB at around £5. This is of real interest to anyone contemplating writing their own AX.25 software, and includes full details of data formats, state tables and implementation notes.

If you want to progress further into the murky depths of protocols, the book to read is *Communication Network Protocols*, (2nd edition) by Brian W Marsden, and published by Chartwell-Bratt in Bromley, Kent. Originally prepared as a set of undergraduate texts, this book on data comms has the rare distinction of being readable! It starts with a discussion of the basic principles, then goes on critically to examine the traditional message switching approach, highlighting its weaknesses. This leads to the development of better packet switching protocols, such as HDLC, X.25, and X.3/X.28/X.29. The seven-layer ISO reference model is explained in some depth, and there is detailed coverage of local area network architectures. However, what makes the book particularly readable are Dr Marsden's explanations of "why" things do or don't work, rather than just the basic mechanics of "how", giving the reader a valuable insight into the development of protocols over the years. And yet another feature of the book: it is priced at just £9.95, well under the average for this kind of material. A bargain.

### Magazines and newsletters

All of this theory can become a bit heavy, so it makes a nice change occasionally to catch up with the gossip as well as the technicalities. There are many magazines and newsletters produced by organisations covering amateur data comms, some of them very good (MAXPAK's *Digicom* and SARUG's *Sinclair/Amstrad Newsletter* come to mind).

Here is a list of some groups in the UK. More to follow in the April *Data Comms*.

"AMRAC" (Amateur Radio and Computer Club). Trevor Tugwell, G6TJT, 6 Kestrel Drive, Mudeford, Christchurch, Dorset BH23 4DE. Tel 0703 847754.

"AMRAC" (Essex). Dave Hill, G4ODK, 42 Kennedy Avenue, Laindon West, Basildon, Essex SS15 6LE. Tel 0268 418058.

"AMRAC" (Thames Valley). John Linford, G3WGV, 7 Tickenor Drive, Wokingham, Berks RG11 4UD. Tel 0734 733745.

"AMSAT-UK". Ron Broadbent, G3AAJ, 94 Herongate Road, Wanstead Park, London E12 5EQ. Tel 01-989 6741.

"BARTG". Mrs Pat Beedie, GW6MOJ, Ffynnonlas, Salem, Llandeilo, Dyfed SA19 7NP. Tel 0558 822286.

"Cambridge Packet Group". James Miller, G3RUH, 3 Benny's Way, Coton, Cambridge CB3 7PS.

"Dublin Area Packet Group". Gerry Lawlor, E19FV, 137 Gaybrook Lawns, Malahide, Co Dublin.

"MAXPAK" (Midlands AX.25 Packet Radio Group). Bill Hartshorne, G4TEC, 11 Pentland Gardens, Wolverhampton WV3 9JY. Tel 0902 27310.

"PACK-AGE" (Scottish Packet Group). David Anderson, GM4JJJ, Westhouse, Cowstrandburn, Saline, Dunfermline KY12 9HP.

"RSGB Repeater Management Group" (Data Repeater Co-ordinator). Martin Stubbs, G8IMB, Crofters, Harry Stoke Road, Stoke Gifford, Bristol, Avon BS12 6QH. Tel 0272 699352.

"RSGB" (*Connect International*). Mr Tim Charles, RSGB HQ.

"SARUG" (Sinclair/Amstrad Radio Users Group). Paul Newman, G4INP, 3 Red House Lane, Leiston, Suffolk IP16 4JZ.

"SWAX25" (South-West AX.25 Packet Radio Group). Edward Harland, G3VPF, 3 Randall Close, Chickerell, Weymouth, Dorset DT3 4AS. □

## SATELLITES

Bob Phillips, G4IQQ\*

### Oscar 10

After about one month of operating, Oscar 10 is still providing a useful service. In view of the present circumstances I have decided to reinstate the monthly visibility chart, as a number of readers have indicated that this is useful for a quick check when the satellite is likely to be in range. It's a long time since we have been able to make use of such extended periods of access in the northern hemisphere, with particularly high elevation angles for much of the time. The highest angles of around 60° are achieved on the 9th, 10th and 11th of the month and then again for the last two days.

Fig 1 shows the visibility of the satellite from my own QTH in northwest Kent, and should be suitable for most of the time in other locations. I should stress that the chart indicates when the satellite is in range, but this does not necessarily mean that the Mode B transponder is available for operation. At the time of writing, the schedule for February has not been published, so if you want to use the satellite please check with the usual information providers. To improve readability of the chart,

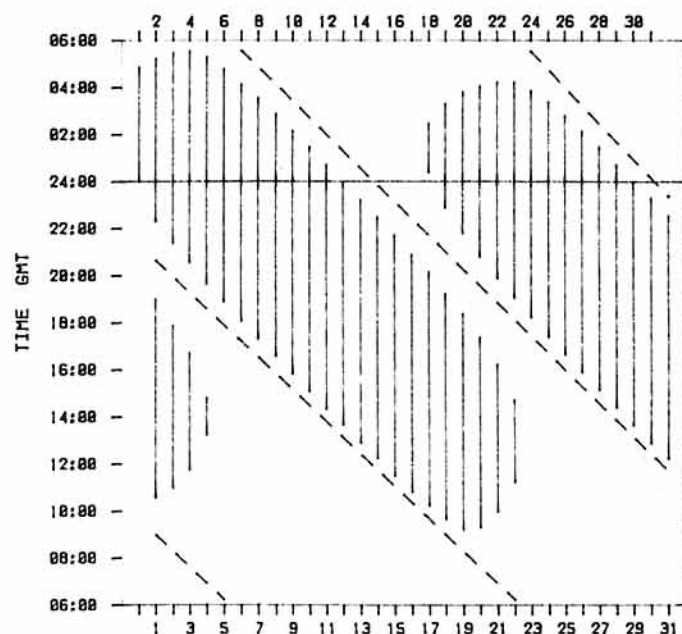


Fig 1 OSCAR 10 VISIBILITY (London area) - FEBRUARY 1988

— satellite in view — — — — — perigee (MA=0)

\*Transvaal Cottage, New Barn Road, Swanley, Kent BR8 7PW.





# Contest News

## 1.8MHz CONTESTS – IMPORTANT ANNOUNCEMENT 2nd 1.8MHz Contest 1987 and Town and County Contest 1988

Following the contest held on 14/15 November 1987, the HF Contests Committee received an unprecedented number of letters complaining of flagrant contravention of the rules and spirit of the contest by a disturbing number of participants. These complaints are largely corroborated by those committee members who were active or were monitoring during the event.

This is not the first top band event that has invoked similar complaints, and there was a spate of comment after the last Town and County event. There can be little doubt that the offending operators are fully aware of who they are, and know precisely what action must be taken to remedy the situation.

It is the decision of the committee that the UK Transmitting Section of the 2nd 1.8MHz CW Contest 1987 be declared void. There will be no publication of lists of

entrants or scores, and there will be no awards. The Overseas Transmitting Section and the SWL Sections will stand as usual, and details of awards together with the listing of results for these sections will be published later.

In addition, the committee has decided to cancel the forthcoming 1988 Town and County Contest, and to closely monitor other scheduled 1.8MHz events. It will also give serious consideration to the future of all 1.8MHz events in their current format. While such actions are much regretted, the committee is unable to condone the abuse of its general rules.

S V Knowles, G3UFY, adjudicator, 2nd 1.8MHz Contest 1987.

P Glaisher, G4RWW, adjudicator, Town and County Contest 1988.

R L Glaisher, G6LX, chairman, HF Contests Committee.

### IARU Region 1 SSB Field Day 1987 results

The 1987 event produced three less logs than last year, also the scores were well down; this was due mainly to very poor conditions on 28MHz. All entrants in both the Open and Restricted sections struggled to accumulate any sort of score on this band.

The winner of the Open section was once again Lichfield ARS, G3WAS, which had a comfortable lead over West of Scotland, GM4AGG, which was placed second. In third place was Pontefract and District ARS, G3FYQ. Both GM4AGG and G3FYQ moved up the results table two places on last year's table, so could it be that next year's winner will come from one of these clubs. It can be seen from the points/multipliers table that entrants must take time out from working the pile-up and go and search for multipliers.

In the Restricted section this year's winner was once again the Three As Contest Group which won this year from South Manchester RC, with Central Lancs G0FDX in third place. As in the Open section, this year's second and third placed in the Restricted section have shown movement up the table over last year.

The standard of log keeping this year was generally good, but it seems that year after year it is the same entrants whose logs do not comply completely with the rules; maybe the committee will publish a list of all entrants whose logs are not correct in the hope that it will shame them into action. I would like to congratulate West of Scotland ARS on a superbly laid out and presented entry; it was a pleasure to receive it – also to thank those entrants who sent notes of encouragement and thanks to the committee, and to G3HCT for the help in checking.

G3KDB

#### OPEN SECTION

			POINTS/MULTIPLIERS PER BAND				QSOs	Score		
			3.5MHz	7MHz	14MHz	21MHz			28MHz	Total
1	G3WAS/P	Lichfield ARS	756/27	976/29	2,074/69	196/27	57/4	4,059/156	1154	633,204
2	GM4AGG/P	West of Scotland ARS	724/15	1,133/29	1,990/62	170/15	2/1	4,019/122	1140	490,318
3	G3FYQ/P	Pontefract & District ARS	670/18	602/15	2,184/62	305/26	41/5	3,802/126	1068	479,052
4	GM5VG/P	The Windy Yett Contest Group	850/18	800/17	2,268/60	61/12	10/1	3,989/108	1152	430,812
5	GW4CC/P	Swansea ARS	655/16	607/11	2,123/53	64/12	10/2	3,459/94	966	325,146
6	G3XEP/P	White Rose ARS	1,046/17	865/19	1,013/36	62/13	27/1	3,013/86	830	259,118
7	GU3HFN/P	Guernsey ARS	517/11	583/21	1,798/33	50/13	—	2,948/78	872	229,944
8	GD3AHD/P	Liverpool & District ARS	726/16	664/22	1,295/40	14/4	—	2,699/82	739	221,318
9	G4HRS/P	Horsham ARS	1,025/23	672/21	1,433/39	75/32	16/1	2,443/90	676	219,960
10	GW4NZ/P	Port Talbot ARC	999/17	380/15	1,433/39	8/4	—	2,820/75	827	211,500
11	G4NOK/P	North Wakefield RC	123/5	292/11	1,872/39	358/19	29/4	2,674/78	833	208,572
12	G8JC/P	Worcester & District ARC	805/19	841/20	517/37	58/10	25/2	2,246/88	586	197,648
13	G3SFG/P	Southgate ARC	1,090/12	745/14	718/34	49/11	36/2	2,638/73	674	192,574
14	G3NWR/P	Wirral ARS	726/16	537/12	848/36	58/11	7/1	2,176/76	573	165,376
15	G3BRS/P	Bury RS	903/14	473/14	908/32	30/6	4/2	2,318/68	635	157,624
16	G4IRC/P	Ipswich RC	835/16	693/17	453/31	33/11	9/2	2,023/77	553	155,771
17	G3GHN/P	Clifton ARS	764/12	731/17	495/35	16/3	2/1	2,008/68	492	136,544
18	G4CRC/P	Cornish RC	635/13	523/19	718/26	30/9	—	1,906/67	488	127,702
19	G3GIZ/P	Chester & District RS	1,091/15	116/7	1,130/31	—	—	2,337/53	713	123,861
20	G3MDG/P	Chesham & District ARS	569/14	632/16	355/23	29/4	64/2	1,649/59	428	97,291
21	GM4TMS/P	Stirling & District ARS	479/13	335/9	820/28	11/4	—	1,645/54	397	88,830
22	G4FPQ/P	Stamford & District ARS	563/11	371/15	324/33	35/6	12/1	1,305/66	345	86,130
23	G3XRO/P	Bangor & District ARS	268/12	277/14	682/28	19/5	2/1	1,248/60	324	74,880
24	G4ECT/P	Cheshunt & District ARC	490/14	373/7	262/31	20/4	20/1	1,165/57	284	66,405
25	G4GCT/P	North Bristol ARC	659/12	523/9	207/15	16/5	31/2	1,436/43	363	61,748
26	G3NFC/P	Burton-on-Trent & District ARS	736/13	334/11	288/15	7/2	39/2	1,404/43	364	60,372
27	G4BOX/P	Sutton & Cheam RS	789/13	—	96/15	23/3	54/1	962/32	235	30,784

#### RESTRICTED SECTION

			POINTS/MULTIPLIERS PER BAND						QSOs	Score
			3.5MHz	7MHz	14MHz	21MHz	28MHz	Total		
1	G0AAA/P	Three As Contest Group	698/18	929/26	489/38	125/24	105/5	2,346/111	583	260,406
2	GD3FVA/P	South Manchester RC	526/15	540/23	849/40	117/18	29/6	2,061/102	542	210,222
3	G0FDX/P	Central Lancs ARC	753/18	645/15	609/31	26/7	7/2	2,040/73	524	148,920
4	GD3RFH/P	Western Group Isle of Man	602/13	658/19	720/32	33/7	5/1	2,018/72	541	145,296
5	GM0ADX/P	Kilmarnock & Loudoun ARC	749/14	542/13	667/34	7/2	—	1,965/63	472	123,795
6	G3RCV/P	Cray Valley RS	724/14	840/17	313/22	39/4	2/1	1,918/58	473	111,244
7	G4ADD/P	FSF Contest Group	350/11	625/19	647/31	20/5	—	1,642/66	392	108,372
8	GM4SUF/P	Dukes of Sutherland	398/12	415/12	667/30	45/9	—	1,525/63	378	96,075
9	G4RFR/P	Flight Refuelling ARS	922/16	607/16	311/14	10/3	6/1	1,856/50	483	92,800
10	G3ZME/P	Telford & District ARS	793/10	333/11	445/27	7/3	—	1,578/51	415	80,478
11	GJ3DVCC/P	Jersey ARS	353/14	476/24	360/17	38/8	4/1	1,231/64	351	78,784
12	GM3STU/P	Unst RC	341/11	176/10	809/35	5/1	—	1,331/57	348	75,867
13	G3ULT/P	Reading & District ARC	425/11	234/9	533/24	57/7	45/2	1,294/53	322	68,582
14	G4FOX/P	Melton Mowbray ARS	623/10	566/10	375/21	7/2	—	1,571/43	371	67,553
15	G3BPK/P	Wigan-Douglas Valley ARS	570/10	253/10	337/26	27/4	—	1,187/50	332	59,350
16	G3HOX/P	Manchester & District RS	686/10	331/10	379/21	2/1	—	1,398/42	404	58,716
17	G4SJM/P	Ripon & District ARS	532/10	344/13	371/20	14/2	—	1,261/45	332	56,745
18	G6UQU/P	Stockport RS	664/15	427/9	278/15	12/2	—	1,381/41	376	56,621
19	G3PGU/P	Stratford-on-Avon ARC	575/12	369/7	306/14	56/7	38/2	1,344/42	341	56,448
20	G4PVO/P	Droitwich ARC	680/13	347/11	221/15	18/4	—	1,266/43	288	54,438
21	G4JXG/P	Braintree & District ARC	757/14	616/10	143/11	—	—	1,516/35	369	53,060
22	G3SRC/P	Surrey Radio Contact Club	234/7	443/16	221/21	62/8	39/1	999/53	247	52,947
23	G6HH/P	Hastings Electronics & Radio Club	867/15	334/9	73/12	2/1	22/2	1,298/39	354	50,622
24	G4AYM/P	Gloucester ARS	678/13	210/7	195/16	39/5	5/1	1,127/42	371	47,334
25	G5LKP/P	Reigate Amateur Transmitting Society	487/12	397/10	261/19	—	—	1,145/41	291	46,945
26	G3FJE/P	Sheffield & District ARS	607/14	525/12	19/4	—	2/1	1,153/31	267	35,743
27	G6HC/P	Coulsdon Amateur Transmitting Society	270/8	224/9	204/20	36/2	68/2	802/41	195	32,882
28	G3YRC/P	Yarmouth RC	456/9	333/8	143/15	7/2	—	939/34	219	31,926
29	GM4URZ/P	Loch Lomond ARC	57/6	238/8	355/19	28/4	2/1	680/38	157	25,840
30	GM4HEL/P	Helensburgh Amateur Club	85/5	73/6	511/23	26/3	—	695/37	164	25,715
31	G4CW/P	North Kent RS	614/14	45/3	114/11	—	—	773/28	169	21,644
32	GW4LZP/P	Meirion ARS	299/9	204/7	103/4	—	—	606/20	127	12,120

Check logs gratefully received from the following: EI2Q, GM3ZRC, J87CD, LZ1OT, OK1KVK, OK1KZ, OK3YK.



## Comments received with the logs

"How disappointing conditions were compared to last year. This year was our 13th SSB Field Day and we've never before failed to work even a single JA. Congenial company, a good station and a large bottle of G3LNS's best malt whisky all combined to make the weekend an enjoyable experience" - G3WAS.

"We changed site for this year, it seemed to have paid off, each year we get nearer winning. Poor weather meant we could not erect our 40 and 80m top-secret dx antenna so we had to settle for dipoles and slopers" - G3FYQ.

"Our new TS930 was very helpful to the operators who understood the controls, an in-depth teach-in is now top priority. Instead of starting the contest at a precise time, why not check to see if we are ready, 70min late starting" - GW4CC.

"Reasonable opening to the west coast of the States during the night, but no VK or JA in the morning" - GU3HFN.

"Despite wet and windy weather and poor band conditions we all had an enjoyable weekend and we will be back next year - with a better score" - GD3AHD.

"Weird conditions, 10m just did not seem to happen this year" - G3SFG.

"We see both the field day events as social occasions and we have a large marquee for catering and socialising" - G3NWR.

"Severe QRN from the rain; one operator was quite happy to continue operating during a severe thunderstorm" - G4IRC.

"Suppose the HBs, ONs and PAs were all talking to each other on vhf. Seemed odd without them though we did get portables from OH, OK and F" - G3GHN.

"Lack of support, damage, rain, storms, wind and fire. Despite all these minor irritations we managed to maintain our sense of humour and still speaking to each other - just" - G4BOX.

"Our contest team is becoming more organised now development work has followed a plan, and our small dedicated team works well together" - GD3FVA.

"Band conditions this year on 10 and 15m were nothing short of atrocious. Clean petrol ensured the generator ran faultlessly this year" - G0FDX.

"This was the first SSB Field Day in seven years that it rained on us" - G3RCV.

"This was our first entry in SSB Field Day and was used to let some of our less-experienced operators get their feet wet on hf phone. Despite the poor conditions and awful weather everyone enjoyed themselves and we expect to be back next year" - G5LK.

## Operators of the leading stations

G3WAS: G3KDB, G3LNS, G3NAS, G3NKC, G3NLY  
 G4HRS: GM3RAO, GM4CXM, GM4TOQ, GM4VSA, GM4XGY, GM0DZE  
 G3FYQ: G4OSY, G4TLZ, G4ZVB  
 G0AAA: G3SXW, G3TXF, GW3WVG  
 GD3FVA: G3SVW, G4SVR, G0AOU, G0CAR  
 G0FDX: G1AHM, G4OBK, G4YSN, G4YWG, G4ZYN, G0GPI

## Multipliers worked on each band

3-5MHz			OPEN SECTION 7MHz			14MHz		
G3WAS	27		G3WAS	29		G3WAS	69	
G4HRS	23		GM4AGG			GM4AGG		
G8JC	19		GD3AHD	22		G3FYQ	62	
G3FYQ			GU3HFN			GM5VG	60	
GM5VG	18		G4HRS	21		GW4CC	53	
G3XEP			G8JC	19		GD3AHD	40	
GW4NZ	17		G4CRC					
21MHz			28MHz			Total all bands		
G3WAS	27		G3FYQ	5		G3WAS	156	
G3FYQ	26		G3WAS			G3FYQ	126	
G4NOK	19		G4NOK	4		GM4AGG	122	
GM4AGG	15					GM5VG	108	
G3XEP						GW4CC	94	
G4HRS								
GU3HFN	13							
3-5MHz			RESTRICTED SECTION 7MHz			14MHz		
G0AAA	18		G0AAA	26		GD3FVA	40	
G0FDX			GU3DVC	24		G0AAA	38	
G4RFR	16		GD3FVA	23		GM3STU	35	
GD3FVA			GD3RFH	12		GM0ADX	34	
GU6U	15		G4ADD	17		GD3RFH	32	
G6HH			G3RCV					
21MHz			28MHz			Total all bands		
G0AAA	24		GD3FVA	6		G0AAA	111	
GD3FVA	18		G0AAA	5		GD3FVA	102	
GM4SUF	9					G0FDX	73	
GU3DVC						GD3RFH	72	
G3SRC	8					G4ADD	66	

## 28MHz Cumulative Contest September/October 1987 results

Only 16 logs and three checklogs were received for this contest. This was rather disappointing as there were 159 calls from 35 different counties recorded.

G3YDV was a clear winner using an Icom IC735 and a TH3 Mk3 at 70ft.

The logs were generally good. G3BXS and G0CPE are to be congratulated on error-free entries, and G4ODV for working the only overseas station, PY2JH.

Although most of the entries came from the south, the highest number of counties worked in one night was 17 by G4WQN in Nottingham. GW3SB listened for at least half an hour on each evening but only heard a small part of one transmission. No one claimed to have had good conditions on any night.

There was only one unmarked duplicate; most points lost were due to minor receiving errors. Two entrants gained points due to a misunderstanding of the rules, own county counts for bonus and the same counties count for a bonus on every night, not just the first night.

Most comments from operators concerned the lack of activity, particularly from G0s or the inexperienced, the very people for whom these contests have been arranged. It was suggested at an HFCC meeting that high-speed morse might put

off would-be entrants. A newcomer need not worry, regular operators recognise each other's calls and do not need to slow down. There is ample time, particularly on 28MHz, to spend as long as it takes to make a slow contact, and any experienced operator would gladly slow down to any speed immediately. Thanks to all who made the effort to send logs in. I hope there will be many more next time.

G3MCC

Posn	Callsign	County	28 Sept	6 Oct	14 Oct	22 Oct	30 Oct	Total
1	G3YDV	SRV	142	167	166	CK	CK	475
2	G4WVX	BKS	125	140	159	CK	CK	424
3	G4WQN	NOT	158	155	159	89	89	402
4	G0BON	BRK	124	128	142	CK	CK	394
5	G3BXS	BRK	124	128	123	118	CK	365
6	G4OBK	LNH	134	132	87	CK	CK	353
7	G3MCC	LDN	CK	119	120	CK	108	347
8	G2HLU	BRK	CK	109	80	CK	109	298
9	G3VYI	SRV	84	109	83	CK	CK	276
10	G4WYG	KNT	81	98	96	CK	CK	275
11	G3CWL	SRV	70	78	99	CK	CK	247
12	G3GLL	ESX	87	CK	74	CK	86	247
13	G0CPE	LDN	74	84	75	CK	CK	233
14	G0BXC	LDN	63	77	83	CK	CK	223
15	G4ODV	CNL	66	45	CK	40	CK	151
16	G3EPO	DVN	33	29	33	CK	CK	95

\*ORP (5W)

Many thanks for checklogs from G6LX, G3BPM and G4OGB.

## 1.3 / 2.3GHz Contest, August 1987 results

Conditions during the contest were described in various ways but, of the few printable comments, "YUK:" would seem to be the only one that truly sums up the situation. The weather was also causing some problems and, although it was described as good by a few, other entrants must agree with the comment from GW4MGR where the group is still having trouble perfecting the latest mandatory requirement for contests - that of having "webbed feet".

Activity patterns varied but generally are summarised by the two comments: "Where were all the London stations" and "Many of the usual groups were missing". Despite all the adverse comments, many entrants also commented that they enjoyed the contest.

The leading fixed stations were GI4OPH on 1,296MHz and G8JHL on 2,320MHz. In the open section, the Addiscombe ARC plus Tatsfield ARTS Group, G4ALE/P (2,320MHz) and G0ALE/P (1,296MHz), the field on both bands. Congratulations and certificates go to these stations.

G3LCH

2,320MHz FIXED STATION SECTION			Pwr			Ant		
Posn	Callsign	Points	QSOs	Loc	Best dx	Pwr	Ant	
1	G8JHL	2,672	16	IO83	G3AUS	70W	1-8md	
2	G8IFT	899	11	IO82	G4ALE/P	20W	44eqly	
3	G8ZQB	762	7	IO92	G4ALE/P	3W	1-5md	
4	G6PHJ	609	6	IO92	GW0EMG/P	12W	1-4md	
5	G4PMK	307	4	IO93	GW0EMG/P	20W	0-6md	
2,320MHz ALL OTHER STATIONS SECTION			Pwr			Ant		
Posn	Callsign	Points	QSOs	Loc	Best dx	Pwr	Ant	
1	G4ALE/P	3,388	20	JO01	G8JHL	35W	1-6md	
2	GW0FRE/P	2,265	14	IO81	G4DDK	40W	1-2md	
3	GW0EMG/P	1,028	10	IO83	G6PHJ	50W	2-0md	
4	G6AWP/P	343	3	IO94	G4CBW	5W	1-2md	
Check log on this band G6DER								
1,296MHz FIXED STATION SECTION			Pwr			Ant		
Posn	Callsign	Points	QSOs	Loc	Best dx	Pwr	Ant	
1	GI4OPH	6,536	21	IO74	G0ALE/P	130W	4x23ey	
2	G8JHL	6,131	34	IO83	G4PRJ/P	350W	1-8md	
3	G4NBS	4,290	26	JO02	GI4OPH	4W	4x23ey	
4	G8IFT	3,898	32	IO82	GI4OPH	150W	4x23ey	
5	G8ZQB	2,539	19	IO92	GI4OPH	50W	27eqly	
6	G4PMK	2,508	17	IO93	G8VOI/P	30W	23ey	
7	G6PHJ	1,811	17	IO92	GW3JXN/A	70W	27eqly	
8	G6AJE	589	8	IO92	G0ALE/P	10W	27eqly	
9	G3KZR	508	8	IO91	G3GIM	10W	23ey	
1,296MHz ALL OTHER STATIONS SECTION			Pwr			Ant		
Posn	Callsign	Points	QSOs	Loc	Best dx	Pwr	Ant	
1	G0ALE/P	9,752	54	JO01	GI4OPH	400W	2md	
2	GW4FRE/P	7,018	42	IO81	PA0WWM	300W	2md	
3	GW3JXN/A	4,283	17	IO72	G0ALE/P	50W	2x23ey	
4	GW4MGR/P	3,865	25	IO83	G3GIM	100W	1-2md	
5	G0AWP/P	3,844	19	IO94	G8VOI/P	30W	23ey	
6	G4PRJ/P	2,430	14	JO00	G8JHL	2W	2x23ey	
Check log on this band: G6DER.								

## HF NFD 1988 rules

- 1. The general rules** for RSGB hf contests, published in "Contest News" Rad Com January 1988, will apply.
- 2. Site notification.** Each group intending to compete must send details of the site to be used to: RSGB HF Contests Committee, c/o J C Burbanks, G3SJJ, Southlands 16 Cotgrave Road, Plumtree, Nottingham NG12 5NX, to arrive not later than Saturday 23 April 1988. Details must include the name of the person responsible for the entry; the address to which contest stationery should be sent; section to be entered; name of group; call sign(s) to be used; national grid reference and sufficient access information for an inspector to be able to locate the site.
- 3. Date and time.** From 1500gmt Saturday 4 June to 1500gmt Sunday 5 June 1988.
- 4. Sections.**
  - (a) Open Section.** One transmitter and one receiver (or one transceiver). There is no restriction on the number or type of antennas, but the maximum height must not exceed 65ft (20m).

(b) **Restricted Section.** One transmitter and one receiver (or one transceiver) with one antenna which must be a single element such as a dipole, vertical, long wire etc, having not more than two elevated support points and not exceeding 35ft (10.7m) above ground at its highest point.

#### Notes.

(i) Stand-by equipment is allowed, but it may not be connected to the power source when the main equipment is in use.

(ii) It is not permitted to use permanent buildings or structures as support points for antennas.

(iii) Each portable station must operate from the same site for the duration of the contest and may not be located in permanent buildings or use the public mains supply.

(iv) Power for all equipment may only be derived from a portable generator on the site, or from solar cells, accumulators or batteries. Float charging must only be from a portable generator.

(v) No equipment or antennas may be installed or erected on the site prior to 24 hours before the start of the contest. This does not apply to storage of equipment.

(vi) All stations are subject to inspection by representatives of the HF Contests Committee. The inspector's brief will be to ensure that the rules and spirit of the contest are being observed. Should the inspector be unable to locate the site due to inadequate or incorrect information, the entry will be disallowed. In the event of a last-minute change of site, it is the responsibility of the members of the group to make suitable arrangements for the inspector to find the new site. The inspector must be given immediate access to all parts of the site with the right to stay as long as desired, and the ability to return at any time during the contest. The inspector may also visit in the 24 hours before the start of the contest. The presence on site of any amplifier or modified commercial equipment capable of excess power will result in the entry being disallowed, and in the event of such an infringement being proven, all operators listed as being associated with the group in operation of the station will be barred from entering any RSGB contest organised by the HF Contests Committee for five years.

**5. Frequencies and mode.** CW (A1A) only in the 1.8, 3.5, 7, 14, 21 and 28MHz bands. Contest preferred segments as recommended by the IARU must be used ie 3.510-3.560 and 14.010-14.070kHz.

**6. Exchange.** RST and serial number starting from 001.

**7. Scoring.** Each station may be worked once on each band, but points must not be claimed for contacts made by a competing station with members of its own group. Points will be scored as follows:

Fixed stations in Europe (including the British Isles) ..... 2 points.  
Fixed stations outside Europe ..... 3 points.  
Portable and mobile stations in Europe (including the British Isles) ..... 4 points.  
Portable and mobile stations outside Europe ..... 6 points.

The contacts on 1.8 and 28MHz should be scored as above and the totals multiplied by two to obtain the band score for the RSGB listing. An IARU Region 1 listing will be collated by the Region 1 contest manager, and the totals in this list will not include the above factor.

**8. Documentation.** Packs of contest stationery will be sent in May to the person making the notification under rule 2. Entries are to be in accordance with general rules 7 and 8 with the following additions:

(i) Separate logs must be used for each band, each with a band cover sheet.  
(ii) A cover sheet, form HFC2, summarising the overall entry, must be included.  
(iii) Callsign list for each band per Rule 7(a) in the general rules (see 1 above).

**Note:** Duplicate contacts must be marked as such without any claim for points. Unmarked duplicates for which points have been claimed will be penalised at the rate of 10 times the number of points claimed plus the claimed score; logs containing in excess of five, regardless of band, may be disqualified.

**9. Name and address for entries.** Address logs to "HF Contests Committee" as follows: British Isles entrants to J C Burbanks, G3SJJ, "Southlands", 16 Cotgrave Road, Plumtree, Nottingham NG12 5NX. Overseas check logs should be sent to PO Box 73, Lichfield, Staffs WS13 6UJ, England.

**10. Closing date for entries.** Logs must be post-marked no later than Monday 20 June 1988.

#### 11. Trophies

(a) The National Field Day Trophy to the station having the highest checked score, regardless of section.

(b) The Bristol Trophy to the station having the highest checked score in the other section.

(c) The Gravesend Trophy to the runner-up in the section having the highest number of entries.

(d) The G6ZR Memorial Trophy to the runner-up in the other section.

(e) Certificates of merit to the stations having the three highest checked scores in each section.

(f) The Scottish NFD Trophy to the Scottish station having the highest checked score.

(g) The Frank Hoosen G3YF Trophy to the station having the highest checked score on the 14MHz band.

(h) Certificates of merit to the groups in each section with the highest checked scores on each band.

**12. Check logs.** While overseas stations are not eligible to enter NFD, check logs are very welcome. A certificate will be awarded to the overseas station in each continent whose check log shows the most points contributed to competitors.

#### SWL SECTION

**1. The general rules** for RSGB hf receiving contests, published in "Contest News" *Rad Com* January 1988, will apply

**2. Holders of UK Class B transmitting licences** may enter the receiving section.

**3. Rules 1,3,5,9,10** from the transmitting section will apply.

**4. Logging.** Only portable or mobile stations may be logged, and such stations may only appear once in the column headed "station heard" on each band. The callsign of the stations being worked may only be repeated once in every five contacts logged. Entrants should log the callsign of the station heard, RST and serial number given by that station, and the callsign of the station being worked. Points should be claimed as in the transmitting section.

**5. Awards.** Subject to a minimum of 10 entries, certificates of merit will be awarded to the leading three entries. If less than 10 entries are received, awards will be at the discretion of the HFCC Contests Committee.

## Listener Championship 1988 rules

- The number of events counting towards the table has been kept at 10.
- RSGB hf contest general rules do not apply.
- No entries for the championship are required.
- The championship will be decided on the basis of listener contests listed below and starting in February.
- Points will be awarded to the leading eight UK receiving stations in the results published in *Radio Communication* as follows:

Contest	1	2	3	4	5	6	7	8
7MHz Phone	70	55	50	45	35	25	15	5
7MHz CW	70	55	50	45	35	25	15	5
1-8MHz Town & County	50	35	30	25	20	15	10	5
Region Round-up	50	35	30	25	20	15	10	5
HF SSB (July)	80	65	55	45	35	25	15	5
HF CW (July)	80	65	55	45	35	25	15	5
21/28MHz Phone	80	65	55	45	35	25	15	5
21MHz CW	80	65	55	45	35	25	15	5
28MHz Cumulative Phone	40	35	30	25	20	15	10	5
28MHz Cumulative CW	40	35	30	25	20	15	10	5

## CONTESTS CALENDAR

### RSGB HF CONTESTS

6, 7 Feb	7MHz Phone (Rules in October issue)
13, 14 Feb	First 1-8MHz (Rules in December issue)
27, 28 Feb	7MHz CW (Rules in October issue) (NOTE NEW DATES)
12, 13 Mar	Commonwealth (Rules in November issue)
3 April	Ropoco 1 (Rules in January issue)
17 Apr	Low Power Fixed
15 May	Region Round-up
4, 5 Jun	NFD (IARU CW) (Rules in February issue)
25, 26 Jun	Summer 1-8MHz
9, 10 Jul	SWL
17 Jul	Low Power FD
17 Aug	Hopscotch
28 Aug	Ropoco 2
3, 4 Sep	SSB FD
Sep-Oct	28MHz Cumulative CW
9 Oct	21/28MHz SSB
16 Oct	21MHz CW
12, 13 Nov	Second 1-8MHz
Nov-Dec	28MHz Cumulative Phone

### RSGB VHF CONTESTS

7 Feb	144MHz CW (Rules in January issue)
14 Feb	70MHz Cumulative (Rules in January issue)
21 Feb	432MHz Fixed and AFS and SWL (Rules in January issue)
28 Feb	70MHz Cumulative (Rules in January issue)
5, 6 Mar	144/432MHz and SWL (Rules in January issue)
13 Mar	70MHz Cumulative (Rules in January issue)
27 Mar	70MHz Cumulative (Rules in January issue)
2 Apr	50MHz Fixed (Rules in January issue)
3 Apr	70MHz Fixed (Rules in January issue)
9, 10 Apr	144MHz and SWL (Rules in January issue)
17 Apr	10GHz Cumulative (Rules in January issue)
7, 8 May	432MHz-24GHz
15 May	10GHz Cumulative (Rules in January issue)
29 May	432MHz Trophy and SWL
12 Jun	432MHz FM
19 Jun	10GHz Cumulative (Rules in January issue)
2, 3 Jul	Jubilee VHF NFD
10 Jul	10GHz Cumulative (Rules in January issue)
30 Jul	144MHz Low Power and SWL
31 Jul	432MHz Low Power and SWL
7 Aug	10GHz Cumulative (Rules in January issue)
14 Aug	1.296MHz Trophy and 2320MHz Trophy
3, 4 Sep	144MHz Trophy/IARU VHF and SWL
11 Sept	10GHz Cumulative (Rules in January issue)
18 Sept	70MHz Trophy and SWL
1, 2 Oct	432MHz-24GHz/IARU UHF/SHF
6 Oct	432MHz Cumulative
14 Oct	1.3/2.3GHz Cumulative
22 Oct	432MHz Cumulative
23 Oct	50MHz Trophy
30 Oct	1.3/2.3GHz Cumulative
5, 6 Nov	144MHz CW
7 Nov	432MHz Cumulative
15 Nov	1.3/2.3GHz Cumulative
23 Nov	432MHz Cumulative
1 Dec	1.3/2.3GHz Cumulative
4 Dec	144MHz Fixed and AFS and SWL
9 Dec	432MHz Cumulative
17 Dec	1.3/2.3GHz Cumulative

### OTHER CONTESTS

Jan-Dec	UBA SWL (Rules in December HF)
6 Feb	AGCW-DL HTP80 Straight Key party (Rules from G3FKM)
26, 27 Feb	CQ WW 160m SSB (Rules in January HF)
27, 28 Feb	UBA SSB (Rules in January HF)
13, 14 Feb	PACC (Rules in February HF)
20, 21 Feb	ARRL International DX (CW) (Rules in February HF)
5, 6 March	ARRL International DX (Phone) (Rules in February HF)
9 April	Israel 40th Anniversary International (Rules in February HF)



# Club News

## CHESHIRE, CUMBRIA, G MANCHESTER, I of MAN, LANCs, MERSEYSIDE

**Carlisle (C&DARS)** - 8 Feb ("Valve regen receivers", G3MNL). 7.15pm. The Scout Hut, Trinity School, Strand Rd, Carlisle. Sec G3XWA, tel 0228 27463.  
**Fylde (FARS)** - 2 Feb (Visit to Blackpool HQ). 16 (Informal). 7.45pm. The Kite Club, Blackpool Airport. Sec G8GG, tel St Annes 725717.  
**Liverpool (L&DARS, G3AHD)** - 2 Feb ("Construction report", G6XBK). 9 (Open night), 16 (Junk sale), 23 ("Mast construction", G4IYT). 8pm. Churchill Conservative Club, Church Rd, Liverpool 15. Info G4CVZ, tel 220 5470.  
**Manchester (SMRC)** - 5 Feb ("Geophysics", G8LQO). 12 (Winter DF Contest - First transmission 8.15pm), 19 ("The Cornish Pumping Engine", G2HW). 26 (TBA). 8pm. Sale Moor Community Centre, Norris Rd, Sale. Sec David, tel 061 973 1837.  
**Penrith (EVRS)** - 18 Feb (Visit by Microwave Modules). 7.30pm. Ullswater Centre, Penrith. Sec G4FUI, tel Penrith 66728.

As this is the last "Club News" that I shall compile, I would like to thank all clubs for their co-operation over the last three-and-a-half years. In my place you will have six county liaison officers to do the job and I would like to wish them all the best.

G3XSN

## HEREFORD & WORCS, SALOP, STAFFS, WARCS, W MIDLANDS

**Atherstone (ARC)** - 9 Feb (RSGB film night), 22 (Night on the air). Upper School, Long St, Atherstone. Sec G4IWA, tel 0827 713670.  
**Coventry (CARS)** - 5 Feb (Indoor df contest), 12 (Night on the air), 19 ("The big computers", G0AJB), 26 (Night on the air).  
**Halesowen (Midlands ES & SC)** - 23 Feb (Natter night).  
**Hereford (HARS)** - 5 Feb (AGM). 8pm. Civil Defence HQ, Gao St, Hereford. Sec G3WRQ, tel 0432 54064.  
**Rugby (ATS)** - 2 Feb (Night on the air). 7.30pm. Cricket Pavilion, "B" entrance, Rugby Radio Station. Sec G8TWH.  
**Shrewsbury (Salop ARS)** - 4 Feb ("Model steam engines", G0EBD), 11 (Natter night), 18 ("Lead mines", G4ZZP), 25 (HF night on the air). 8pm. Old Bucks Head, Frankwell, Shrewsbury. Sec G0EIJ, tel 0743 67799.  
**Stratford Upon Avon (SuAARC)** - 8 Feb (Technical topics), 22 (Video evening). 7.30pm. Baptist Church, Payton St, Stratford on Avon. Sec G8OVC, tel S on A 750584.  
**Telford (TARS)** - 3 Feb (Night on the air), 10 (Amsat films), 17 ("Mysteries of swr", G6PZZ), 24 ("Preparing for NFD", G6ZHV). 8pm. Dawley Bank Community Centre, Dawley, Telford. Sec G1JNZ, tel 592317.  
**Willenhall (WARS)** - 10 Feb (Junk sale). 8.15pm. Cross Keys, Willenhall. Sec G0EGG, tel 0902 734475.

## DERBYS, HUMBERSIDE S OF HUMBER, LEICS, LINC, NOTTS

**Mansfield (DARS)** - 5 Feb (G1TYU video night), 16 ("Mains and installation Test Gear", G4GYU).  
**Melton Mowbray (MMARS)** - 19 Feb ("Data communications", G4AMK).  
**Workshop (WARS)** - 2 Feb (Video night), 9 (Natter night), 16 ("The History of Amateur Radio", Bill Parry), 23 (Natter night).

## BEDS, CAMBS, NORTHANTS

No club reports received this month due to no doubt to the industrial dispute at the Luton sorting office.  
 My thanks for the support given to me by the clubs in the former Region 5 during my stint as regional representative over the last six years. Please support your new county liaison officers.

G3D0T

## BERKS, BUCKS, OXON

**Chesham (C&DARS)** - 3 Feb (General meeting), 10 (Technical topic), 17 (natter night), 24 (tba). 8pm. Stable Loft, The Bury Farm, Pednor Road, Chesham. Sec G0ETU, tel 09278 3911.  
**Harwell (HARS)** - 16 Feb (Constructional contest), 7.30pm. Harwell Lab, Social Club. Sec G6LNU, tel Wantage 68453.

**Oxford (O&DARS)** - 10 Feb (natter night), 24 (tba). 7.45pm. Civil Service Club, Govt Buildings, Marston Rd, Oxford. Sec G4PUU, tel Oxford 52859.

## KENT, E SUSSEX, W SUSSEX

**Dover (SE Kent YMCA) ARC** - 3 Feb (Natter night), 10 (Talk by Ken Smith, G3JIX), 17 (Natter night), 24 ("Weather satellite reception", G4RVB). Dover YMCA, Godwynhurst, leyburne Road, Dover. Details: John H Dobson, 145 Snargate Street, Dover, Kent CT17 9BZ.  
**Eastbourne (Southdown ARS)** - 1 Feb ("The British Engineerium"), 7 (Visit to The British Engineerium), 7 Mar (Junk sale). 7.30pm. Chaseley Home, Southcliff, Bolsover Road, Eastbourne. Details GIUTH, tel Crowborough 63061.  
**Gillingham (Bredhurst R&TS)** - 4 Feb ("How to use the oscilloscope", G0ENN), 11 (Construction/natter night), 18 ("Sunspots", G3ZAY), 25 (Rally briefing by GB4ARR on air), 27 (Rainham Radio Rally, 10am, Parkwood Community Centre, Parkwood Green, Deanwood Drive, Rainham, Gillingham, Kent. Details G0AMZ, tel Medway 376991.  
**Hastings (HERC)** - 18 Feb ("Club quiz"). 7.30pm. West Hill Community Centre, Croft Road, Hastings. Details G4NVQ, tel Hastings 420608.  
**Herne Bay (East Kent RS)** - 4 Feb ("Kanga Products", G0BPS and G3ROO), 18 (Natter night). 7.30pm. Parkside Lodge, Kings Road, Herne Bay. Details G4RIS, tel 0277 262042.  
**Maidstone (MYMCAARS)** - 5 Feb (Natter night with cw and RAE), 12 ("Electronics at work"), 19 (Natter night with RAE and cw), 26 (TBA). 8pm. YMCA Sportscentre, Melrose Close, Maidstone, Kent. Details G0BUW, tel 0622 30544.  
**Meopham (MPRC)** - 14 Feb ("Television technology", Adrian Addison). 7.30pm. Vigo Rugby Club, Vigo Village, Meopham, Kent. Details G4XNU, tel 0732 823371.  
**Worthing (W&DARC)** - 3 Feb ("Real time image", Colin Hewlett), 10 (Discussion Evening), 17 (Clubs activity video by G8VEH), 24 (Junk sale). 7.30pm. Lancing Parish Hall, South Street, Lancing, West Sussex. Details G4GPX, tel Lancing 753893.

## DYFED, GWENT, POWYS, MIDS & W GLAM

**Blackwood (B&DARS)** - ("Home security", Blackwood Police Crime Prevention Officer). 7.30pm Sec GW6YYR, tel 0495 243858.  
**British Telecom (BTSW Dist ARC)** - 10 Feb ("Television by satellite", Jim Baker of BT - An insight into the existing and proposed use of satellites for domestic and commercial tv). 7.30pm. Sec RS91086, tel 0222 28320 weekdays 8am-4pm.  
**Cardiff (CRSGBG)** - 8 Feb (Sea watch), a Coastguard video). 7.30pm. Sec GW0CUM, tel 04463 3212.  
**Llanelli (Colleshill ARS)** - 8 Feb ("QRP transmitter building", GW0GEM). Sec GW1MGW.

## GRAMPIAN, HIGHLAND, ISLAND AUTHORITIES, TAYSIDE

**Inverness (ARC)** - 4 Feb ("First aid", the Red Cross). 7.30pm. Cameron Youth Club, Planefield Road, Inverness. New sec GM0CJT, tel 0349 61783.

This "Club News" marks another milestone in the Society's history, the last to be written for Region 12. Little did I realise when I took over from Frank Hall some 62 months ago that I would be the last RR12. Over the last five years I have visited many clubs, conventions, special event stations, contests etc, all of which have made me very welcome and have extended that famous highland hospitality for which I express my sincere thanks. Thanks are also due to our area reps, without whose considerable assistance, representing you would have been impossible.

GM8KPH

## AVON, GLOUCESTER, SOMERSET

**Bath (B&DARC)** - 20 Feb (Club night), 3 Mar (Lecture). 8pm. Englishcombe Inn, Englishcombe Lane, Bath. Details G4GEV, tel Bath 832156.  
**Bristol (North Bristol ARC)** - 5 Feb (New committee meeting), 12 (Bring & buy), 19 (Karate display, G4UGO, 26 (CW activity night), 7pm. Self Help Enterprise, 7 Braemar Crescent, Northville, Bristol. Details G4YQQ, tel 0272 690404.

**Bristol (South Bristol ARC)** - 3 Feb ("Ambulance equipment", G4OPO), 10 (28MHz activity evening, G0DRX), 17 VHF activity evening, G1XVK), 24 (Bristol Rally planning evening, G4WUB). 7PM. Whitchurch Folk House, East Dundry Road, Whitchurch, Bristol. Details G4RXY, tel 0272 834282.  
**Yeovil (Y&DARC)** - 11 Feb ("Moonbounce", G3MYM), 18 ("The World of Amateur Radio" - RSGB video), 25 (Natter night), 3 March ("Antenna matching", G3GC). 7.30pm. The Recreation Centre, Chilton Grove, Yeovil, Somerset. Details G1MNM, tel 0935 79804.

**Io WIGHT, CHANNEL IS, DORSET, HANTS, WILTS**  
**Blackmore Vale (BVARs)** - 9 Feb (Two mini-lectures: "Power supply units", G2GRC, and "Data communications", G0GGG), 23 (Project night), 7.45pm. The Bell & Crown, Zeals, (on the A303). Sec G4YXX, tel 0963 32389.

**Eastleigh (Itchen Valley ARC)** - 12 Feb ("Manual telegraphy or morse code", G3JZV), 26 (Voyager satellite", G6GLJ). 7.30pm. The Scout Hut, Brickfield Lane, Chandlers Ford, Eastleigh. Sec G1IPQ, tel 0703 736784.

**Fareham (F&CARC)** - 3 Feb ("The RSGB", G3KWU). 7.30pm. Porchester, Hants. Sec G3CCB, tel Fareham 2888139.

**Farnborough (F&DARS)** - 10 Feb ("Packet radio", G3RRA), 24 ("Instrumentation", G3HEJ). 8pm. Railway Enthusiasts Club, Access Road, off Hawley Lane, Farnborough. PRO M C Graffius, The Paddock, Diamond Ridge, Camberley, Surrey GU15 4LB.

**Isle of Wight (IoWARS)** - 5 Feb ("ATU problems"), 12 (Members talk/demonstration), 19 (Open forum), ("The anatomy of a transceiver"). 7.30pm. Unity Hall, Wootton Bridge. Sec G4RGE.

**Liphook (Three Counties ARC)** - 3 Feb ("Independent television", G3OGP), 17 ("Aircraft radio and radar", David Cotterell, Dan Air). 8 pm. The Railway Hotel, Liphook. Contact G4VKC, tel Liphook 723415.  
**Lymington (L&DARS)** - 20 Feb ("Practical aspects of antenna design", G2HCG). 11am at QTH of G1JAF. Sec G2AIV, tel 0590 72844.

**Southampton (Waterside SWC)** - 23 Feb (Junk sale). 7.30pm Community Centre, Blackfield, Southampton. Sec G0BPA, tel 0703 893937.

**Weymouth & Portland (SDRS)** - 2 Feb ("Safety systems for nuclear reactors"), 1 Mar (Junk sale). 7.30pm. The Pennsylvania Castle, Portland, Dorset. Sec G0FIT, tel 0305 67596.

## G LONDON NO OF THAMES, HERTS

**Cheshunt (CDARC)** - 3 Feb (Natter evening), 10 (Antenna planning), 17 (Natter night), 20 (Marine radio comms), 27 (Natter night). 8pm. Church Room, Church Lane, Wormley, Cheshunt, Herts. Info Jim, Ware 4316.

**Chiswick (ABCARC)** - 16 Feb (Youth in Amateur Radio - a discussion). 7.30pm. Chiswick Town Hall, High Road, Chiswick, London W4. Sec G3GEH, tel 01-992 3778.

**Ealing (EDARS)** - 2 Feb (Morse), 9 (Open evening), 16 (TV dxing), 23 (Computers and radio).

**Harrow (RSH)** - 5 Feb (Activity night), 12 (Talk by David Evans, G3OUF), 19 (Activity night), 26 (Construction night), 8pm. Arts Centre, High Road, Harrow Weald. Sec G0GXM.

**Stevenage (SDARS)** - 2 Feb (HF operations, Forum and demo), 16 ("Planning Permission", Mr Tamkin of the Borough Council). SITEC Ltd, Ridgmond Park, Telford Ave, Stevenage. Details G0GTE, tel Stevenage 724991.

**Southgate (SARC)** - 11th Feb (Talk on energy by the CEGB), 25 (Informal). 7.45pm. Holy Trinity Church Hall, Green Lanes, Winchmore Hill, N21. Info G4YLL, tel 0992 30051.

**St Albans (Verulam ARC)** - 9 Feb (Informal), 23 ("EMC matters" G3OSS). 7.45pm. RAFA HQ, New Kent Road, St Albans. Details G4JKS, tel St A 59318.

I wish all members of the old Region 19 a Happy New Year on this my last "Club Notes" to be written. Also thanks to those secretaries who have helped in the past nine years in sending in their notes on time. It is also apparent that many clubs do not know that there is a new representation scheme in operation now, and that club notes are no longer to be sent to G3AAJ. All the best of luck es gd dxing.

Ron Broadbent.

# Members' Ads

The Conditions of Acceptance are published below the Member's Ad form circulated with every issue of *Radio Communication*.

The current rate is £2.30 for 40 words or less: advertisements containing more than 40 words will cost an additional £2.30 for every additional 40 or less words. Each advertisement must be accompanied by the correct remittance, either as a cheque or postal order made payable to Radio Society of Great Britain.

## FOR SALE . . .

LINEAR AMP. HF 80-10. Running 2x811A's ex. condx. £145. Kenwood MC50 base mic, £28. Both items carr. paid. GW4UJL. 1987 QTHR. Tel: 034-882346.

FT290R/2 PLUS MM 100W linear, £410. G4DSC. QTHR. Tel: 0765-2230.

MICROWAVE Modules 70cm 100W linear amplifier £150, ono. BNOS 40A power supply, £250 ono. G8WJU. QTHR. Tel: 0277-623019 (after 6 pm).

TR10 TH201A 2m FM mobile tcvr. 25W, boxed, £195. Kenwood separates, TX599 (unused), RX599 (+ 2m convtr), boxed £350. DAIWA 9-15V/50A power supply, model PSR1250, £220. KWE-ZEE match atu £45. New CV2799 (QVQ03/20A) valve gold plated, £15. G4DAI. QTHR. Tel: 0602-393404.

TR10 TL922 Linear amplifier. Ex. condx. One year old, £1100. Buyer collects. G4WXX. Not QTHR. Tel: St Helens 38165.

FT107M TRANSCEIVER with FTV107R transverter, 430MHz, 144MHz, 50MHz boards, £800. G3KFT. Tel: 0242-820883.

YAESU FT1012D Mk3 FM, fan, manual, original packaging, used receive only, £500 ovno. MMT432/144R tvtr, £90. G6YDA. QTHR. Tel: 070-681-7572.

KENPRO KP200 electronic keyer, 8 memories, 6 months' old, £110 ono. Bremi 13.8v 3A power supply £15. Murphy AM/FM 80 channel converted CB £30. Pye Westminster and Cambridge OK for spares, both for £10. Tel: Mike, 01-660-8692 (evenings).

TR10 TS711E 2m base. 14 months' old. Mint condx. Little used on transmit. Current price, £940 no offers. Buyer must inspect and collect. G1TMD. QTHR. Tel: 01-650-6596 (evenings only).

SWLER GOING TX. R200 gen cvge rx with conv to 118-172MHz. Boxed BGN £450. Buyer to collect. Will demonstrate. Woolley, 202 Faversham Road, Kennington, Ashford, Kent. Tel: 0233-28393.

COMPLETE STATION in new unmarked condition: Trio TS520, VF0520, KWEZE match, Shure 444 base mic. Best offer around £400. WANTED: MMT70/144 tvtr, old mic suspension ring mount, old mics for collection. GW6AYM. Tel: 044-128-2782.

TR10 R600 RX boxed as new, £220. AR8BLF, £50. EHCO mariner BC RX, £25. WANTED: Redifon R408 RX. Tel: 0834-3057.

FULL SPECIFICATION teletext decoder module, inc. interface module and keypad. Offers. Codemaster model CWR610E cw/rtty decoder cw/trainer. Still under guar. Offers around £100. Geiger counter complete ex MOD. Offers around £50. Tel: Bob, (Nantwich) 0270-624248.

IC27E 25W mobile 2m, £300. IC47E 70cm mobile, £380. IC02E h/h, £260. Tono linear 2m-80s 90W o/p plus GASFET preamp, £130. All as new in original boxes. G3WQU. QTHR. Tel: 0253-53126.

FL200B SOMMERKAMP TX 3.5-30MHz exchange for 12v 25a psu, or atu, or sell £75. MM432/144R tsvtr £90. Tonna 21 ele 70cm YAGI unused, £15. Buyer collects or pays carriage. G3WQM. QTHR. Tel: 0904-793672.

FT290 WITH MUTEK preamp nicads and case, vgc, £230. Heatherlite mobile mic with earphone and scan buttons to suit FT290, £12. Datong D70 Morse tutor with books, £35. G0HWA/CBANU. QTHR. Tel: 0785-52693 (evenings/weekend).

MMT432/285 TRANSVERTER, £100. Excellent condx.

Mutek 1.3GHz LNA NEC645/35, £25. Brand new ITT 4CX250B's, £20 each. Amperex 4CX250F, £20. G32VC PCB all ICs MD108 etc. (no filter) working, £20. 2X8FR94 DC0DA 1.3GHz, 3W PA working, £15. G4MAW. QTHR. Tel: 0803-555488.

TWO ELEMENT tri-band beam DX32, £65 ono. Aluminium lattice tower 19', with parts to extend to 32', £70 ono. Danish marine tx 'sailor' 760. Offers or exchange for general coverage rx. G3WPP. QTHR. Tel: 0905-354942.

FT290R MKII MOBILE mount bracket, £395. Charge for FT290R, £5. FT208R c/w 2 nicads pack, spr/mic, charger PA30C/DC adaptor, £180. 10m FM 40-channel £40. Transmatch SEM 80-10m £50. All items vgc; p & p extra. G8WJN. QTHR. Tel: 0437-781265.

YAESU FT102 TCVR. FM/AM board fitted. Never used on transmit, complete with SP102 speaker and 5-band vertical aerial. All in mint condition, £680. No offers. DAIWA 2KW automatic atu, £140. G6RLH. Tel: 0322-523668.

AEA MOSCOW muffler woodpecker blanket, 10-16Hz tcvr. relay RF amplifier 100% wkg. order. Accept £35 ono. Tel: 0903-784584, or write, Peter Craw, 117 Sea Lane, Rustington, W Sussex, BN16 2RU.

IC2E 2M FM Hand/held. 10MHz coverage. Comes with helical aerial, charger, case, full lcom service manual, £120. Tel: Ask for Simon Baker, 01-676-0941 ext. 2278 (office hours), or Dartford 76256 (evenings/weekends).

KW2000A WITH AC & DC psu's. Crystals for WARC bands, spare valves, handbook, HRT mods, £185. 2m FM 30W HCL400 with handbook, £120. Centronics 306 printer, £25. 77-68 processor system, suitable spares, £25. Offers. G3NWL. QTHR. Tel: Tony, 0962-53593 (evenings).

DRAKETRY, RV7 remote VFO, MS7 speaker, MN75 matching network, PS7 power supply, TR7 fitted fan, 1.8KC SSB filter and aux board, £980. May split sensibly. Tel: Launceston 3010 (evenings), or Okehampton 3131 (daytime - not Mon).

LINEAR AMPLIFIER, Heathkit HL2000, ex. condx. Little used. Pair of 3-5002 giving 1KW out, £900. Tel: 0837-3131 (daytime), or 0566-3010 (evenings).

DX200 REALISTIC 5-band HF communications rcvr, 150-400KHz, 520KHz-30MHz, £65, or part ex. for VHF (including air) rcvr. G0HVZ. Tel: 0785-664796.

YAESU FT757GX + FP757GX + MD-18B. Boxed, vgc, £775. 2-ele cubicle quad + M/D rotator + 2 section 27'-50' tower, £300. May split. G0DUS. QTHR. Tel: 0284-705123.

FT290R, NICADS, charger, mic, £250. Datong FL2 as new, £60. 18AVT/WB, £50. All with handbooks. G4AFU. Not QTHR. Tel: Paul, (Cumbria) 09312-514.

WORKSHOP MANUAL, FT107M, FTONE, FT1012D, FT208R, FT726R, FT221, FRG7700, FT757GX, FRG9600, SX200N, TS700A/G, FRG8800, FT708R, FT4610, FT1610, FT725A. Instruction manual with circuit, FT708R, FT290/790R, IC3200, IC490, IC745, IC271, ICR71, FC757AT, FT480R, FT707, FT720, FRG7000, FTV901R, R600, FTV707. Tel: 0270-761978 (after 6 pm).

PHILIPS CD304 CD player (infrared remote control), £175 ono. Olympus OM2N 50mm/f1.8, £130 ono. Vivitar(om) 75-205mm zoom, £45 ono. Weiz SP300 swr/pwr meter, 1.8-500MHz 1KW, PEP board fitted, £75 ono. G4WVX, Bruce, QTHR. Tel: 06286-64415.

PROFESSIONAL 40' lattice sectional tower c/w new base, 6 months' old, cost £560, asking £280. Buyer dismantles. Sony editing umatic recorder, £300. Non editing umatic recorder, £100. Both £375, some tapes. BBC model B micro with Panasonic printer disk drive + modem, £450. As new 6 x 2/3" C mount vidicon cameras, £50 each. Shibaden colour camera c/w CCU, needs attn. £50. As new 2 x Siemens 12" high resolution monitors B+W, cost new £200, asking £100 each. Tektronix 529 TV waveform monitor well used but OK, £45. Mobira transportable car phone, 5 months' old, new £1200, asking

£600. OR will swap the lot for a Suzuki 410, hard top, in good condx. G4KCU, new QTHR. Tel: 0246-414510.

ICOM IC27E 2M mobile, mint condx. c/w mobile bracket, manual, boxed £250 ono. Heatherlite mobile mic to suit IC27E etc. £15. TR10 CW XTAL filter YK88C, 600Hz, £25. G4NOV. Tel: (Rugby) 0788-521214.

TR9000 2M MULTIMODE, mint condx. no mods, boxed, with mobile mount, mic, instruction manual and service manual, £300 or, exchange FT707 with cash adjustment. Will consider FT101E/2/2D. G6LKF. Tel: (South Benfleet), 0268-753734.

KW107 SUPERMATCH ATU, including SWR bridge and dummy load, vgc. G3JEP, QTHR. Tel: 0395-264863.

YAESU FT901DE with DC-DC convertor FC902 ATU SP901 speaker MD1 desk mic. All ex. condx. £700. No splits. Will travel halfway. Tel: 051-678-6052. Not QTHR. G0DNQ Wirral.

SX200 SCANNING receiver, perfect order psu, £125. Trio TR2400 with soft case, charger, 3 batts, and speaker/mic £125. J beam 4EL4M YAGI, £15. G3KTL, QTHR. Tel: 061-436-1381.

FT290R MUTEK front-end c/w soft case, nicads, chgr, handbook. 5/10/12.5/25 FM channel steps. Iemac condx, £265 ono. G4DWV. Tel: Guy (Luton) 0582-598254.

HEATHKIT TRANSCEIVER SB102, 220W PEP 2 x 6146B in final with matching psu speaker and shure mike. Also manuals and some spares. Owner needing space must change for internal powered rig. £150 ono. G3KRT, QTHR. Tel: Ruislip 638287.

G4MH MINI beam, good condx. £40. G4OAB, QTHR.

YAESU FT726R with 6m, 2m, 70cm, and satellite modules fitted. With mic, manual and box, £750. Would exchange for FT221R with mutek front end plus cash adjustment. Tel: 0453-811454 (Glos) after 6 pm.

TR10 TR2300 one owner, mint condx, two sets nicads, all accs, boxed, £110. YAESU FT1012D with FC902 atu. both mint condx, £650. Fluke 73 digital multimeter, cased, new unused, £75. FP707 psu, £125. Allan, G3CXR. Tel: 0257-422766 (Standish, Wigan).

TR10 TH211E 2M FM mobile, 5-25W digital code squelch external speaker, tiltable front panel, frequency control from mic. Very little use. c/w box and service manual. One year old, £230. G4PGX, QTHR. Tel: 0283-46367.

TR10 9130 2M multimode, good condx. c/w mobile brkt, manual, boxed, £375 ono. SMC-RD3 rotator and control unit VHF type, £30. 8E1 ZL 2m beam £10. Slim Jim 2m vert, £2. Datong D70 Morse tutor, £35. Ray, G0GJ. Tel: Sheffield 848310.

RADCOM 1979-86 complete, £15 ono. Admiralty h/b of Wireless Telegraphy, 1938, 2 vols £5. Slow scan television h/b, £2. G8MY, QTHR. Tel: 0252-511086.

ICOM IC4E, 70cm h/h with spare battery pack and charger, £160. Kenpro KP202 6-channel 2m h/h with nicad batteries. Fully crystallised, £69. G0ABF, QTHR. Tel: 091-5844673, Houghton-le-Spring, Tyne & Wear.

ROBOT 1200c SSTV unit. With G3NOX prog/interface for BBC B computer, and G3000 Eprom for Wragge compatible, £1200. Can deliver. Exchange for TS440s (+ psu) or TS940s. G3GRX, QTHR. Tel: 0768-64890.

ICS/AEA CP1 with SWL-text 64 cartridge, £180. J-beam 2m/5 ele yagi, £8. Dressler ARA30 active antenna, £50. All above mint, boxed. Long list approx 100 radio/rty/computer books, many of professional interest and mostly new. G3SEV. Tel: 09278-3625 (evenings).



12V REG PSU 1A, meter, c/w audio amp and speaker, in metal case 125x85x150mm, E23. QRP atu, air spaced caps, switch tapped coils, in matching case, £25. Both new. C4GRM, QTHR. Tel: 01-878-0069

YAESU FT301D TX/RX. Solid state, CW/SSB/FSK/AM, 160-10m. All filters, with FP301D, FV301, Y0301, FC301, will split, £750. Yaesu FT107R Tvt with 2m module, £85. Wanted: Japanese, German WWII copies HRO for £150. Tel: St Albans 39333.

SHACK CLEARANCE of 2M equipment etc. FT209R with many accessories, FT290 nicads, case, SB2, head-set, Rotator AR40, 9 ele Tonna aerial, All working condx. most excellent. Going HF, need cash. Offers? Tel: (Yateley) 0252-876277 (evenings/weekends).

VALVE TX/RX, Swan 350 in near mint condx. SSB/CW 80-10m 400W. Sensible offers only. Valve transmitter, "Sphinx", mint condx, 160/80/20M, SSB/CW/AM. Offers or exchange 2m portable or WHY? G3HCH, QTHR. Tel: 0759-318408.

YAESU FT757GX, FP757GX, £675 ono. Wrasse SC1 show scan TV converter, £900 ono. FT208, £140 ono. Tel: 0534-24119/0534-24018.

YAESU FT290 with mutek, nicads, charger, case, mobile mount and 25W W4D linear, boxed, manual etc, £290 - inc. HB9CV if collected. Wanted: FC301 atu or other FT301 accessories to complete HF line up. G0HAS, QTHR. Tel: (Wiltshire) 0793-874614 (evenings/weekends).

REALISTIC scanner PRO2020, good condx, £145. Icom HF IC745 + mains psu and FM option. Little use, £780. Modem 300 baud, £15. Tel: Andrew, RS48317 (Loughborough) 844239.

GRUNDIG TK40 reel to reel tape recorder with mic and spare reels. Superb condx, rarely used, £70. Buyer collects or pays carriage. G1IAJ. Tel: East Kirby (Lincs) 428.

REGENCY MX7000 scanner for sale, in good condx. range: 25-550MHz and 800-1300MHz. Only £275 ono. G1BNE, not QTHR. Tel: Andrew, (Luton) 0582-455455, Ext 235.

CWR880 RTTY/CW/TOR decoder, integral LCD display, mint, boxed, cost £289, accept £180; Amstrad green monitor, £40. Sorno CQM712 suitable 2M, £35; Marconi TF801D signal generator 10-480MHz, ex-Gov. £45. Duncan Hawkins, G8KNF. Tel: (Milton Keynes) 0836-618668.

UHF EX-PMR equipment, Pye Multichannel Olympic, £70. Pye Multichannel Europa, £65. Pye multichannel Westminster, working, £58. £60. Motorola CD100 dash mount, £75. Pye F460T talkthrough 6-channel base station in cabinet with duplexer, £65. Hawkins, G8KNF. Tel: (Milton Keynes) 0836-618668.

R1475 WITH PSU, works, £20. 52 set, less xtal calibrator, works, £10. 6' x 2" aluminium mast sections, £5 each. 2 x KEF B200 + celestion HF1300 + cabinets, £60. Wanted: EC10 Mk11. Alwyn, G8DOH. Tel: 01-373-1001.

TR2400 FM HANDHELD 143-148MHz, with huge load access. inc. St1 base stand, speaker mic. three nicad packs, £165. MML144 1005 144MHz 100W amplifier, £100. Pye Coaxial relays 951 type cable entry, new, £6.50. G8KBQ, QTHR. Tel: 0458-34105.

DRAGON 32 with BMK amtor/rtty on ROM. ST5 TU with three shifts, beautifully constructed, £175. Toni-tuna with three shifts, £35. Trio R600 rx with FM, as new, £200. 70cm 8/8 J-beam with 15W UR67, £15. G0GSA, Rugby. Tel: 0788-832887.

FTV144 MODULE, £100. F790 tcvr, 70cm + charger, case, nicads, £275. Tokyo HL45V 11n 70cm, £95. Zetagi B300 11n, £95. Hygain 3 ele 10-11mtr beam, vgc, £25. Rama freq. counter, 1kHz-5MHz, £40. Bryan, G1NWU. Tel: Market Harborough 880625.

SPECTRUM 48k comp. cassettes, rtty and transceive £60. TS120V/SP120/DFC230; £400. Datong morse tutor plus morse course 6 cassettes, £45. FRG7 rx narrow filters, FM, £130. Goodman PLL dig. pocket rx, LW/MW/SW/FM (stereo), scanning with 25 mms £70. Katsumi EK9X elec. keyer plus CW osc. £15. Air band h/h rx 12 xtal, nicads, charger, £20. Olympus micro cass. recorder, £25. 2M preamp filter B108 OK on rx, needs IC for transmit, £20. Casio LCD 24 hr dig. clock, £7. RAE course + books, £15. Var. books: Wires & Waves, AM Radio software, QRP circuit handbook, wire antennas, confid. freq. list, £12. Heathkit SB104A tx handbooks, £8. G1UGA, not QTHR. Tel: 0733-230088.

CDE AR40 ROTATOR 70' control cable, £45. AV07, in leather case, £20. Kenpro 1 to 1 Balun, £12. Two new 813s, £25. QTHR. Tel: 0494-30018.

COMPLETE 2MTR Mobile station, KDX FM2030, 25W, FM tcvr, Heatherlite mobile mic c/w scan buttons, 5/8 revco magmount, m/m preamp switched, £200 ono. Roger, C4VAA, QTHR. Tel: (Fakenham, Norfolk)

0328-4323.

EPSON MX80 III printer, inc. tractor feeder, vgc, £100. Video boards for IBM or compatible PC CGA+ printer port, £20. IBM mono+ printer port, £20. Hercules graphics mono+ printer port, £30. Trans- tel printer, vgc, £20. Tandon 14" green mono monitor for PC, as new, £60. C4GLP, QTHR. Tel: 0276-24706.

ICOM IC2E, inc. helical, case, nicad pack, BP4 pack, ICDC1 pack, ext. mic, instr. man., £150 ono. Photographic equipment, Pentax ME 50mm lens, auto winder, flashgun, 2X converter, equipment case, plus other small access. £200 ono. G08TGP, QTHR. Tel: 0481-47918.

G WHIP MONOBAND whips 80/20/15mtrs, PL259 mount, £10 each. G0EJK. Tel: (Blackburn) 0254-673184, (9-4).

ICOM ICR70, 0-30MHz rcvr £400. Yaesu FT707+FP707 psu, £375. Homebrew Bartg ST5C terminal, £30. Electronic keyer with paddles, £35. BBC Model B computer (issue 7) with disk drive, monitor and amateur software, £400. Printer, £75. G0EVH, QTHR. Tel: 021-329-2305.

TR10 TS940S, AT940, mint condx. £1575 ovno. Sommerkamp TS788DX 10mtr multimode tcvr, offers? 2M, 8XY Yagi, £10. 37' portable telescopic mast, £45. ZX81 16K RAM, £10. 70cm ATV tcvr 0.5W tx, £50. Oric 1 48K computer, £30. G5RV, £5. G0DDA, QTHR. Tel: 0705-470531.

HW101 TXCVR, HP21 psu, ex. condx. updated by Heath k-tone fitted, spare valves, £175. ERA micro-reader, reads CW/RTTY completely automatically, £80. Datong ASP automatic RF speech processor, £45. G-whip mobile HF antenna, 80-40m coils, £25. Buyers pay carriage. C4AGTU. Tel: 0224-743039.

YAESU FRG7700, all mode receiver + ant tuner + 2 FRV7700 "A" and "B" converters. As new, boxed with manuals, £300 ono. London. Tel: 01-697-4306.

70CM SSB/FM. MHT432/28 transverter. Recent factory overhaul. Pye U108 FM tcvr c/w mic & spkr. All c/w plugs, leads, manuals. 10A psu to suit above. £100 the lot. C4EZG. Tel: 0963-51133.

YAESU FT208R fully synthesised h/h tcvr 3W output, spkr-mike, leather case, charger, DC-DC mobile converter, rubber duck, 7/8 mobile whip and gutter mount, £195 the lot, no splits. Tel: 038482-5449 (evenings & weekends only).

HEATHERLITE 2M AMP. (4CX350A), £425. Or exchange HF transceiver, FT77, FT707, FT101, etc. WHY? or 2M 70cm multimode. Cash adjustment either way. G6NSC, QTHR Grimsby. Tel: 0472-822648.

YAESU FT707 TCVR. Mint condx with mic, boxed, £385. YAESU FTV107R tcvr 2M and 6M fitted with relay box, also mint, £300. 3 ele met for 6M £20. G1UJZ, QTHR. Tel: (Chris) 0474-82-3797.

HAVING GONE Black box I can offer many home built VHF items at knockout prices, most with spare set valves. Several psu's and HT's. SAE for list. G5UM, QTHR. Leicester, LE7 9JJ.

FT290R, £250. R2000, £395. C7900 10W 70cms, £180. Sony 2001D mint, £295. MC55 Trio mobile mic, £35. Ambit 20W linear, £45. WANTED: TS930S or TS440 PX or cash. G0CVZ. Tel: 0733-222588. 2 Chancery Lane, Eye, Peterborough, or packet via G83PX.

EX RAF R4187 aircraft HF receiver. Valve double super-het with fine IF strip (2.1MHz & 100kHz). Complete with all valves and circuit. Some modification notes. Offers from callers only. G2ARU, QTHR. Tel: Eastergate 3488.

TR10 TS780 2M/70CM multimode base station, £695. Atlas 210X with digital dial, £295. Robot 800 rtty, morse, s/scan, keyboard, TV display, £450. Timestep satellite interface with ROM for weather picture colour display on BBC B computer. G2HCG, QTHR. Tel: 0425-617090.

R600, little used, excellent condx. Ideal receiver for listener, or shack, £200. G4JQ1, QTHR Lancs. Tel: 025482-3366.

YAESU FT290R 2M multimode with nicads, case, fully serviced, £220. Contact Richard, G1WRR. Tel: (near Bath) Radstock 32857.

STRUMECH VERSATOWER 3-section BP30, c/w head unit and top bearing, £350. KR400 rotator OK but needs new direction indicator pot, £75. 3 ELT 10M monobander, £40. 12 ELT ZL special 2M beam £12. All ovno. Buyer collects. G3DPR, QTHR. Tel: 028577-514.

DYMAR LYNX 2000 AMLB. 68-88MHz, 20W. New condx. £45. G1NOL, QTHR. Tel: (Bishops Stortford) 0279-506996 (after 6 pm).

BELCOM LS202E HANDHELD 2m multimode, little used. Extras, £180. Also 40/80m vertical, exc. condx.

E40. Tel: 0302-782616. C4NQL.

DIGITAL ELECTRONICS info-tech M600A receive only. Baudot, ASCII, Sitor ARQ/FEC, morse. Variable shift, VDU and scope outputs, RS232 printer port. Centronics conversion kit included. 230V, 50HZ, £240 including shipping. Karagianis, 20 Lea Road, Sonning Common, Reading RG4 9LJ. Tel: 0734-722085.

RECEIVER R210 2-16MHz. Mint condx. Mains psu for R210/C11 SUR30 Mk111 new. Swap for other Larkspur or WW2 radio gear. Xerox professional disk drive word processor. Swap for radio gear WHY? or British motorcycle. C4XWD. Tel: Kidderminster 823674 (evenings).

SILENT KEY SALE. Heathkit SB200 linear, £350. Radcomms and shortwave magazines from 1947-86, prefer not to split if possible. Offers. G3NFV. Tel: 0372-372587.

30' LATTICE TOWER, £225. Daiwa h/duty DC7011 rotator, £80. 3-ele tribander, £130. Buyer collects. G0G11, QTHR. Tel: Barry (Essex), 0787-475929.

YAESU 726R 2m 77cms SAT speaker SP102 MD1 desk-mike, £730 ovno. ZX Spectrum 128 tape recorder, power pack, leads, £70. FT980 speaker, filters, £40. 4-ele 2m J-beam, £10. All plus postage. G0CAM, QTHR. Tel: 0761-415746.

KENPRO KR600RC rotator. Trio 2200GX 2m tcvr, R1-R0, S20-S23, charger, car mount, mike. Datong RFC speech clipper. Ten-tec 215 mike with stand. Offers to Chris Page, GABUE, QTHR. Tel: 0903-814594.

TR10 TS711E 2M multi base station, 40 memories, 25W with micr. manual and orig. pkg. £635. Trio TS811E, 70cm multi base station, 40M/25W, micr. manual, orig. pkg. Best satel combo £750. See A McKenzie's Buyers Guide - best buy. Sommerkamp FT2772D Mk111 tcvr. 9 bands, fitted fan, FM plus AM board and filters, mic, manual £465. Prices include data post UK. GJ602B. Not QTHR. Tel: 0538-83722.

G0ING HF. YAESU FT290R, gwo. c/w nicads, mike, shoulder strap, soft carry case, instruction manual and orig. box. Plus 30W Daiwa linear and HB9CV antenna. £245. G1WPN, Not QTHR. Tel: 0469-61068 (Grimsby area).

MARCONI DIGITAL HF rx, 1.6-30MHz, type EC1838/1 cased with manual, £275. AMT2 terminal unit, new £125. Dressler D70 500W 70cm linear, new, £575. Prism modem 2000 for prestel and microne, with software for BBC B, new £75. QTHR. G8MYT. Tel: 0448-450265 (Sussex).

LOOK! CDC/SHUGART 8" drives, as new, £45. Set of S100 boards to build complete system c/w back plane and CP/M disk, new £225. Tatung TP100 f/t centronics printer (Epson comp) as new, £100. Philips 100MHz stereo signal generator and milli-voltmeter, transmit stereo music to yourself! £60. Rodime 20MB hard disc new, £150. S100 Western digital hard disc controller board, new £70. 3-phase fully controlled AC variable speed drives, 3KW output suit workshop lathe for speed control, £350 each. Simon, G8POO. Tel: 0661-842389.

SUPERBRAIN Z80 micro 2 x 360k, drives RS232, lots of software, £150. OKI 132 column printer, £85. Dolphin 80 column printer, £60. G3POG. Tel: (Merseyside) 07048-72124.

ORIC 1 COMPUTER, plus games, tapes and manuals, £75. Cossor CDU150 scope, £150. G3M3LO, QTHR.

SILENT KEY SALE: complete station. Desk, TS930S + AF filter, AT230, DK210 keyer, Vibraplex key, MX60A mic, HS5 phones, TET MV3BM ant. All vgc, approx 2 yrs old. £1400 ono. Prefer not to split. TH21E handheld, £140. G1TPS, QTHR. Tel: 05827-61394

SILENT KEY SALE: Late CAVAZ. FT102 tcvr, £500. FC102 atu, £100. Walz 300W dummy load 1kW peak, £25. FRG7700 rx, £200. Coleson. Tel: 01-602-9407.

HW101 TXCVR, HP21 PSU, exc. condx. Updated by Heath, K-tone fitted, spare valves, £175. ERA micro-reader, reads CW/RTTY completely automatically, £80. Datong ASP automatic RF speech processor, £45. G-whip mobile, HF antenna, 80/40m coils, £25. Buyers pay carriage. C4AGTU. Tel: 0224-743039.

ICOM 251E MUTEK fitted, orig. packing and manuals £400. Icom SMC desk/mic £25. 5/8 colinear 144-146MHz. 4 months old, £30. Phil1, G1GXS, QTHR. Tel: 01-672-1833 (after 7 pm only).

PACKET RADIO monitor program and interface, for CBM64, £18. Creed 7E printer including cover and base, £3. G8PZT. Tel: (Kidderminster), 0562-68734.

VIDEO RECORDERS. Video 2000 (not VHS), Grundig 2 x 4, full tech. manual plus Philips 2020 with 11 tapes, £90. RCA AVQ50 9.3 GHz airborne weather

radar tx/rx, display, dish, tech. manual, no cables hence only £30. G30CK, QTHR. Tel: Andover 781752.

88D SHORT WAVE RECEIVER. Mint condx. in orig. box, with service manual and brand new spare set of valves, £120, ono. G Scanlin, 1 Cadbury Road, Portishead, Avon, BS20 9QF. GWGLGD.

YAESU FT767GX with synthesiser modification. Ex-condx. in original packing. Buyer to inspect £1199 ono. Balun 50 ohm rated at 1kW, £14, never used. Kenpro stay bearing K5065, never used, £15. Paul, G4DXG, QTHR. Tel: 0892-35830 (after 7 pm).

FT101E outstanding condx., 600Hz filter fitted plus 30m, complete with matching SP100 loudspeaker Datong FL1 audio filter, spare new driver/PA valves, £375. R600 receiver, 150kHz-30MHz pristine condx., £220. MFJ optimizer CW/SSB notch filter, MFJ722 2.5kHz-80Hz. Really dig out the dx from the qrm, £40. Brand new Yaesu YM35 scanning microphone, £10. David, G4WOS, QTHR. Tel: 0304-611627.

YAESU FT101ZD Mk3 WARC FM narrow CW, fan, mic, manual, £550. Yaesu FC102 atu, mint, £150. FDK multi 750XX 2m all mode, £300. Eddystone 730/4 communications rcvr plus orig. Eddystone round speaker manual, £150. G3XSN, QTHR. Tel: 051-722-3644.

FT767GX new, boxed with 2m, 6m, 70cm fitted, including synthesiser mods £1750 ono. FC102 tuning unit, £195. SP102 speaker, £45. MML144/100/10 100w linear, £95. Tel: 048-65-3110 (after 8 pm).

SPECTRUM COMMS TRX6-21 6m tvtr and 25W linear kit £115. Welz SP400 SWR/power meter, £45. MMT432/144R tvtr, £125. Tonna 70cm 19-ele, £5. (Buyer collect aerial). G8ATA, QTHR. Tel: 04484-4671.

ICOM FM HANDHELDS: IC2E (2m) £125. IC4E (70cm), £150, or take the pair for £260. In good condx with soft cases, chargers, spare nicad pack and DC pack. G4OHB, QTHR. Tel: 021-449-3530.

ICOM IC735 TRANSCEIVER with spare power cord, 10 months' old. Unmarked, £750 ono. G4CCN, QTHR. Tel: Woodbridge 6529 (evenings).

MUTEK GLNA32S masthead preamp, £110. G0EJK. Tel: (Blackburn) 0254-673184 (9-4).

HQ1 MINI BEAM 6-10-15-20. Good working order, £70. Spectrum 48K in DKtronics keyboard, plus modem, £75. GANFL, QTHR. Tel: Stoke-on-Trent 680763, (after 6 pm).

YAESU FT208 HANDHELD. Many extras, £165. Meteor 600 frequency counter as new, £120. Morse tutor, Datong, £35. 2m collinear new, £35. 70cm collinear, £35. J-beam 10xy, £20. 5A power supply, £15. G6HFW. Tel: (Manchester) 0942-876796.

FT1, THE ULTIMATE RIG, all options fitted, £1100 ono. Kenwood TH20SE inc. extras, full year's guarantee, £165. New PK232/6 with CBMG4 software, £300. ATV tcvr with monitor, £75. Commodore 64 + printer, disk drive, extras, £250. G4NMP, QTHR. Tel: 0709-554665.

FT7 10M-80M COMPLETE WITH PSU. Ideal mobile or base station, £175. No offers. G0AIIH, QTHR. Tel: Dick 0287-36766.

TELEQUIPMENT D67A SCOPE 25MHz dual trace, twin sweep generators, £170. AVO precision meter, £100 ono. Eddystone 898 dial, £10. 5B254M and 5B255M valves, £4 each. All good condx. and plus carr. G3ATF, QTHR. Tel: (Devon) 0805-22561.

DX300 RX. 10KHz-30MHz AM/SSB service manual, £130. Sony 2001, £100. WANTED - FT101ZD; 16mm cine cameras WWII-present day; 'Stroboscope' calibrated instrument 'Dawe' or similar; circuit diagram for Bendix RA18 rx. WHY? G1YST. Tel: (Melksham) 0225-706795 (evenings).

23CM SSB ELECTRONICS MV1296S Gaasfet preamp and controller, perfect £150. 13cm G3VVB cavity, unused, £40. LHM Electronics 1W-5W solidstate amp (23cm), £15. 1.4m dish with dipole feed, 23cm, £25. 2m dish, dual band feed, 23/13cm, £45. G6OYL. Tel: Dave 0709-816700 (after 5 pm).

TONO 9100E CONSOLE with 12" Zenith VDU, psu, tonfuna, transceiver CW, RTTY, KC5, Amtor, 8 ASC11 (9600 BPS). Display 1920 chrs with 14K memory and 3120 buffer. Nearly new, £800 ono. G4DIO, QTHR. Tel: 0902-733185.

EDDYSTONE 730/4 receiver valve, ex condx, buyer collects, £130. Tel: 01-657-0430.

YAESU FT902DM. Datong FL3 filter. Shore 444 frequency counter HF & VHF with probes. CAP CO atu 1kW model. SWR & power bridge RMS & POP, 1kW (Welz). Tel: Scarisbrick 880345.

ICOM SM8 DESK MIC, mint, boxed, £50. Buyer to

inspect, collect, pay cash. G6ADL, QTHR. Tel: Kettering 710004.

COMEX TVRO SYSTEM - Comex rcvr with tunable sound, 'S' meter, UHF + video o/p.s. STS low noise, LNB with scalar horn + polarizer. 1.6m GRP dish on polar stand. 50m H100 coax. Documentation and circuit diagrams, £525 ono. G8PRF, QTHR. Tel: 0484-651374.

COMPLETE STATION: KW2000A tcvr, 150W, 10-160m, KW psu, KW atu, mic, key, phones. Unbelievable mint condx, little used. Found in careful storage ex-retired amateur. Also spare valves. A snip at £175. GWOAWN, QTHR. Tel: 0492-623602.

REALISTIC DX300 RECEIVER, synthesized 10KHz-30MHz, digital read out, modes AM/USB/LSB/CW, owner's manual, bargain £50. Marconi T19A table model 1947, owners leaflet, new valve one spare, vgc, £35. BRS90661. Tel: 01-397-2785.

CHANNELMASTER 9502 rotator and control unit with 20m control cable, £45. 9523 support bearing, £12. £50 together. As new, except used one field day. Carriage extra at cost or buyer collects. G6ZH, QTHR. Tel: 0491-651259.

KENWOOD LPF LF30A, £17.50. Mini-max 6-digit automatic frequency counter. 100Hz-50MHz, £25. ICS Practical Radio Servicing Course, 28 books. Ideal RAE candidates, £25. WPO Communications speech processor, mic socket, Electret mic insert, £14. Post extra. G4CIG, QTHR. Tel: 021-777-6086.

PYE WESSIE LB/FM, £25. HB, £30. UHF, £39. Olympic LB/AM, £39. Europa HB/FM, £39. Oscilloscope Solartron 1400, dual beam, £125. Audio gen. £20. Pye UHF Gen. £90. Plug ins for Tektronix 500 scopes, from £5. G4YVJ. Tel: 0507-85203.

TS520SE. EX CONDX. £360. G4KCO, QTHR. Tel: 091-5270660.

FT401DX NEW PA valves, vgc, £175. G4TZN, QTHR. Tel: (South Yorkshire) 0909-567561.

SONY 2001D MINT £295. ST5C, £50. MC55 mobile mic £35. Standard C7900 70cm, 10W, £180. Ambit 20W 2m linear, £40. WANTED: Trio 930S or 440S. Mike, GOCVZ. Tel: (Peterborough) 0733-22588.

PYE REPORTERS TX 172-350, rx 167-550, 3 for £50. Creed 75 pedestal/cabinet, £5. IEEE PCB for Epsom MX80, £15. Nashua copycat photocopier, £25. FAL 12-way stereo mixer chassis, inc. meters, psu, L.E.Ds, and cheques, etc. £20. G3TCF, QTHR. Tel: (Knockholt) 0959-33296.

PSU's (4 OFF), 50A, 13.8v, fully smoothed stabilised etc. all tested, £79. Variacs (4 off) 8x8x5, about 40A, £25. (2 off) Double units, 80A with motor drive, £45. Prices inc. post. WANTED: books, mags, on antiques, G4XOX. Tel: 0245-324555.

RACAL PROFESSIONAL RECEIVER. Type RA117, vgc, 1-30MHz in 1MHz bands, £200 ono. Delivery can be arranged. Tel: 0604-862803 (after 6 pm).

TRIO TS820S fitted 500Hz filter, also 6146B, £495. Matching R820 rx transceivers or separate with TS820S. Fitted extra 250/500Hz filters, notch filter, passband VBT. All boxed, mint, buyer collects. WANTED: Drake C-line. G4LW, QTHR. Tel: Trowbridge 3166 (anytime).

KW2000E WITH PSU, KW110Q multiplier, Trio LF30A filter, Electronic bug keyer, microphone, and 5-band vertical antenna, £230, or swap for a good 70cm portable. G4JCB. Tel: 01-851-0268 (after 7 pm) Buyer collects.

MTV435 20W ATV transmitter, ex condx, £90 ovo. B+W video camera, new tube, £50. 2-way video switcher, £15. Trio TR9500, B09, Sp120, £350. FT690 Mk1, nicads, etc., £275. Racal RA17 rcvr, clean, £145. All ono. Need space! G1EZJ, Chris, QTHR. Tel: 0782-46570.

TR9500 TRIO 70CM multi 10W o/p. B09 base plinth SP120 spk, vgc, £350 ono. Or phone me with an offer - I may say yes! Also Eddystone 770 UHF rec. £90 ono. Chris, G1EZJ, QTHR. Tel: 0782-46570.

ENCLOSED 6" STEEL cabinet (19") contains HVPSU plus meters, £40 ono. G5WC, QTHR. Tel: 01-504-5499.

ITEM 1. A 12 channel audio mixer with on each input channel, balanced (mic level) XLR input, unbalanced line level input, gain control, 3-band EQ, one pre-fade aux send, one post fade aux send, fader, pan and peak light. Two aux return inputs one with EQ and one without. Outputs are main left and right (metered), pre fade aux and post fade aux. Slave output and headphone output. This unit was designed to contain a power amplifier so has some room inside the case. The psu (for the mixer only) is fitted internally. ITEM 2. A 6-channel audio mixer with on each input channel, balanced (mic level) XLR input, unbalanced line level in-

put, gain control, 3-band EQ, one pre-fade aux send, one post fade aux send, fader, and pan. Both aux returns have EQ gain and pan. Outputs are main left and right (metered), pre-fade aux and post-fade aux. The psu is external. Offers on item 1 over £75, and on item 2 over £50. ITEM 3. A Pioneer audio amp (SA706) faulty. ITEM 4. A mains powered rcty terminal unit. On items 3 and 4 make an offer! Also for sale about 200 pc boards each with at least two TL072 opamps and assorted components on each board. Offers on the lot please. Anyone interested should phone Neil, G4RQN. Tel: 0553-675676 (evenings or weekends).

PSU (EX LAB) 0-60A, 0-20v, 240v AC-in. Full meters fused, etc. Large heavy unit. Ideal shack PS, £60. Buyer must collect. Tel: Peter, 0642-456327 (days).

AR245 SYNTHESIZED handheld, 144-148MHz, 800 channels, spk mic, charger, cigar holder to charge from psu, 5 or 1W. New condx. Any trial, can bring to Portsmouth area, £110 cash. Charles, GOCNX, QTHR. Tel: Isle of Wight 404702.

KENWOOD TS670 quadband multimode tcvr, 6/10/15/40m with separate antenna socket for HF. Good rig for crossband. Boxed and in immaculate condx. BNOS LPH50-10-100 6m linear and pre-amp. Offers invited for above. G4NFC. Tel: Ayr 531225 (evenings and weekends).

TRIO TS700S and external VFO, VFO700S 2m multimode digital readout base station, £420 complete boxes and manuals. Heathkit SB610 monitor scope £70. WANTED: TL922, L7E, L4B linear amplifier, Heil equaliser, 50MHz linear amp. G4FNI, QTHR. Tel: (Dorset) 0202-24848.

HEATHKIT HR1680 amateur bnds rx; Hygain 12AVQ; Beckman CM20 capacitance meter; SEM Ezitune; SEM QRM eliminator; Yaesu FP200 psu; Rotary ceramic switch (high pwr); All gd condx. Offers? £140Z, Noel Cameron, 16 St Mary's Crescent, Westport, Co. Mayo, Eire.

TRIO TM201A 25W 2m mobile. Scanning, memories, 2 VFOs, mint, £225. G4LWA, QTHR. Tel: (Bucks) 0494-31755.

YAESU FTV707 (2m, 10W) transverter. Suit FT757GX, FT77, FT707, etc., boxed, £95. Scanner, realistic PRO2009, boxed, £95. Yaesu FT227R 2m-FM mobile, synthesized, scanning, vgc, £125. Yaesu FT790R, nicads, chrg, boxed, £275. FT290R, nicads, chrg, boxed, £265. All ono. Tel: 0476-77708.

ICOM IC251E 2m multimode with Mutek front-end £425. Yaesu FT780R 70cm 10W multimode, £325. Home-made 2m single 4CX250B amplifier self contained with psu, £135. 2m pair 4CX250 amplifier parts chassis anode lines, bases, etc., £100. G3ILO. Tel: (Nailsworth, Glos.) 0453-83-3411.

TRIO 2500 2m handheld, good condx, £100. Tel: Ken, G4TMM on Rhyll 2859.

DRAKE TR7A HF tcvr, with NB7 noise blanker 500Hz and 9KHz filters, cooling fan PS7 HD psu with fan astatic noise cancel. Mic owners and service manuals, all in vgc, £725 ono. G4WRLP, QTHR. Tel: 0286-3567 (evenings only).

KW 2000B plus psu, mic, recently overhauled by KW. Ex. condx. MFJ versatuner, tunes anything, complete with SWR bridge and meter, bargain, £280. FT290R complete with mutek and many accessories. Immac. £299. Buyers collect. G3WRO, QTHR. Tel: Harlow 30609.

FT290R plus nicads, chrg, fist/mic, case, telescopic .25 wave, vgc, £240 ono. Prism 2000 direct connect Modem for BBC/Prestel, complete with cables etc, £40. MH144/30LS 30W linear amplifier, ex condx £45. Ron G4BVE, QTHR. Tel: 041-638-4814.

YAESU FT726R fitted 2m, 70cm, satellite board, manual Y448 mike. As new, original carton, £750. G4IOF, QTHR. Tel: 01-722-7040.

AMT2 TERMINAL Unit from ICS with BBC 'B' software, £130. G4OWE, Tel: 0243-864867.

ICOM R70 GEN/COV rx + FM board + DC kit. Mint, £450. Hallicrafters sky champion, £40. BC348 rx £45. Marconi rsc fky1370A incl. spare set, £25. Xtal calib N7, E8. Thermal noise generator, 15k-160m, £10. Philips 3WB 1937, 727A, gmo £45. Pye 4WB 1950, P76 gmo, £30. Regentone 2-spkr 1949, U353 gmo, £40. Dawe white noise generator 419C, £30. Armstrong stereo tuner amp. 226 £35. QST mags 1935-75 some bound. Offers. Complete or single years. RS43536. Tel: 061-962-7577.

SONY ICF7600D PORTABLE receiver, 153kHz-29.995MHz, am/ssh plus 76/108MHz fm. Perfect condx in orig. box, £130 ono. Oldham sealed rechargeable battery, 12v 24-amp hour capacity, good clean psu for 12v rig, £12. G0AQS. Tel: 061-339-9116. QTHR.

FT690R Mk11, six months old and used only 3/4 times for test purposes, hence as new and in orig.



packing c/w nicads, charger, carrying case, telescopic antenna and mic, £300. GOAQS, QTHR. Tel: 061-339-9116.

FT200 + FP200. Thoroughly overhauled. New PA/ driver. Full 10m. Excellent first transceiver, £200. Can deliver within sensible radius. G4CWH, not QTHR. Tel: 0279-51192 (about 9 pm). Also B40C rx, £40. Tanberg open reel tape recorder, offers.

ICOM IC735 HF tcvr, with FL32 CW narrow filter fitted, together with SM8 desk mic, and full service manual. New Nov. 87, mint boxed, only used for receiving, £780. Buyer to inspect/collect, pay cash. G6ADL, QTHR. Tel: Kettering 710004.

FT690 Mk2, with FL6020 linear and nicads. Hardly used, unmarked, as new, boxed, £395. G01IE. Northampton. Tel: 0604-881971.

COMPUTER RTTY-CW transceiver system. Consisting Dragon computer, mint, boxed. PNP Communications terminal unit with all leads (presently ready wired for FT757GX) and Crosvenor software Mk2, transceiver hard cartridge. Includes joysticks + psu, £75 the lot. Paul, G4XTA, QTHR. Tel: 09313-359.

COMPLETE PACKET amtor/rtty/ASC11/cw Commodore 64, Pakratt 64 vhf/hf/modem disk drive, data cassette, SPI80 NLQ printer, Doctor dx, 12v psu, cost £1000+ when new, super condx £475. G4OER, Dunstable. Tel: 0582-608152. Prestel 219998427.

FT102, £550. FC102, £150. Both recently serviced very good condx. KR400RC rotor, four months' old with cable, good condx. £100. All with original packing and manuals. Prefer buyer inspects/collect carriage extra. Jack, GW3CBA, QTHR. Tel: Barry 741520.

AOR AR2002 SCANNER 25-550, 800-1300MHz. Hardly used, mint condx, boxed. Also Icom AH7000 Discone antenna, similar condx. £380 the two items. G4WFT, QTHR. Tel: (Rushden) 0933-313150 (after 6 pm).

TR10 9R59D RX. Bit messed about but now back to original state. Not brilliant on amateur bands, but OK for broadcast. 550KHz to 30MHz, with manual and circuit, £40 ono. GW3YTL, QTHR. Tel: Ruthin 4010 (evenings only).

TR10 2200CX fully xtalld, £65. MM 144/28MHz cvtr £18. Advance LF sig/gen, £25. 300v stabilised psu £15. All plus carriage. WANTED: Trio TR7800 or similar, any condition considered. Keith, G0HRM, QTHR G6PZD. Tel: 0788-832115 (after 4.30 pm).

TR10 9500 70cm multimode c/w B09 base, PS20 power supply, SPI20 speaker, £450. FC707 atu, £50. Scarab rtty c/w Spectrum computer and MPU1, £75. 432 17-ele long and 17-ele crossed. Both met, £15, £20. G6KEY, QTHR (Steve). Tel: 0932-242536.

YAESU FT708R, 70cm handheld, YM 24A speaker mic, NC-9C battery charger, PA3 car adaptor-charger, £155. G4GFX, QTHR. Tel: Lancing 753893.

BNOS LPM 144-25-160 2M LINEAR. Mint condx. Practically unused. Bought new direct from BNOS. Boxed with instructions/guarantee. List £255, sale £200. Speaker SP520. New, boxed, £15. Met 3-ele 6m beam, new, unused, £25. G2FZU, QTHR, Notts. Tel: Southwell 813847.

RECEIVERS AR88 with manual, £55. Eddystone EB35 £35. TX KW Vespa 250W PEP 10-160m with mic, manual £75. 2m linear Tokyo HL30V 3W-30W, as new, £35. G4JXX. Tel: (Fareham) 0329-230737.

FT290R MUTEK, nicads, charger, psu, case, swr meter, MM144/30LS, 7/8 whip, gutter mount, car slide mount, £350. G6NWN, QTHR. Tel: 0623-512369.

TS530SP: Never used, £550. MRD515 with SP, £475. GDO FX1, mint, checked buy Lowes, £25. G4GCP, atu, fitted meters, £60, as new. GMSYD, QTHR. Tel: 041-649-4345.

DATONG MORSE tutor, £15. GW morse key, £20. Icom ICR70, good condx, £450 ono. Buyers collect. G8HNN, QTHR. Tel: Worcs 58306.

YAESU FT757 HF tcvr and FP757 psu, plus Daiwa atu CNW419, £900. Buffham, G3TMA. Tel: 0775-87464.

YAESU FV101 external VFO. For use with FT101 tcvr good order, £95 ono. G3BX1, QTHR, Trowbridge, Wils. Tel: 0373-830804.

FT290R, MOBILE MOUNT, nicads, case, mobil mic, headset mic, .25 flexiwhip listen on input, smart toneburst, £350 ono. Icom IC2E handheld 10MHz coverage listen on input, £130 ono. WANTED: 2m4CX 250B linear without psu. Julian, G6LOH. Tel: (Towcester) 0327-857766.

TR10 TR2400 2M FM handheld, case, charger, plus additional 5/8ths antenna, £110. Philips CD10 battery pack with high capacity nicads, little

used, £20. Jaybeam 11 element band 3 ant, £10. Triax BB grids, £15 each. G8YUE, Anthony. Tel: 01-568-0994.

COMPUTER SYSTEM: 6809 cpu, flex, 64k, 128k RAM disk, graphics, twin disk drives, 12" monitor, RS232 ports; s/w monitor, assembler, editor, 'c' compiler, £300. Brother EP22 typewriter/printer £90. Buyer collects. G4GOX, QTHR, West Yorks. Tel: 0924-401238.

KW1000 HF LINEAR amplifier, £225. G13VAV, QTHR. Tel: Limavady 62946.

NAG 2M LINEAR with preamp, £200. BNOS LP50-3-50 6m linear, £140. BNOS LPM432-1-50 70cm linear, £220. MM 70cm ATV transmitter 20W, £125. Kenpro 600 rotator complete, £150. All vgc. Eric, G4TBR, QTHR. Tel: Chesham 786510.

M MICROWAVE RTTY tcvr & RCA keyboard, little used, sell or exchange with TS1205 for a TS430S. 2M/FM tcvr 143/149 variable, 0-25W output. Dawe 610B o/p meter. 2m to 28 tcvr. Offers? WANTED: Howland West CIS1100 head phones. G4YUG. Tel: 0473-830147.

GET ON THE AIR for £55! 80m QRP CW rig made from Howes kits. In full working order and fitted into sturdy metal case. Also 3-button Triamnic keyer in neat plastic case. Good fun, £18. GMDLZ, QTHR. Tel: 0475-673271.

ICOM IC720A, gmo, £650. Angus, G0CHV. Tel: 0789-840464.

FT227R RELIABLE MOBILE synth, 2MT 10W FM tx/rx with freq. scan and full manual. Good condx. £115 ono. G4BUW, QTHR. Tel: 0344-420503.

CBM64, 1541 disk drive, cassette, amateur radio software, GP100 printer, complete £250. Vic 20 c/w MBA-TOR ROM RTTY morse, Amtor ASC11 rx/tx and AEA MP1 interface, complete £150. Also mags, books. G1P1B, QTHR, N/W Kent. Tel: 0474-872574 (evenings 7 pm).

YAESU FT101E, unmarked, mint condx. 300Hz c/w filter, manual, mic, all leads. Orig. packing £385. RTTY terminal unit with video display and keyboard. All solid state, G3PLX design. Can be used with BBC micro etc. Software and leads inc. Professionally built, £55. Teleguipment S54R scope. All solid state; B/width DC-10MHz. Times 1 and times 10 vert amp. Int/ext syncs etc. Little used; as new, £50. Prefer buyers collect. Tom, G3YHD, Manchester. Tel: 061-748-9152.

ICOM IC2025 CW/SSB tcvr c/w microphone, orig. box, 144.0-144.6MHz, vgc, £105. 4-ele 2m quad, £12. Two Goodmans Axiom 401 15-ohm 12" 40W spkrs in large cabinets £25 each. Buyer collects or pays p. & p. Rob, G0DUX, QTHR. Tel: 0703-253842.

TR10 TM201A 2M FM transceiver, 5/25W, boxed, £210. Also FC10 remote frequency display and control unit for TM201A, £25. P&P extra. G6MUK, not QTHR. Tel: 0637-860512.

TR10 2M. TR9000 Multimode bkts for mobile, £300. Tel: 0302-859451.

## WANTED . . .

ALTRON MT31 mini tower or strumech 9m mini tower, Altron 3 ele AQ620 HF mini beam or similar. G4WSN. QTHR. Tel: 0743-62393 (after 6pm).

MANUAL FOR FT208R. G4LWY. QTHR. Tel: 0925-76-2485.

HF TRANSCEIVER KW2000 FT200 type etc. for club project, hence equipment preferred in non-working order. Contact G3TVR. QTHR. Tel: 0746-765264.

ANTENNA BOOKS: H P Williams "Antenna theory & design", J D Kraus "Antennas". Rudge, Milne, Oliver & Knight, Eds., "The handbook of antenna design". E A Laporte "Radio Antenna Engineering". C A Balanis "Antenna theory..." Or, WHY? G4OXM. Tel: 0725-265653.

DIGITAL WORLD clock by Trio HC10. Also linear TL922, must be mint. G0HZZ. Tel: Howard, 0394-460-474.

GROUND POST FOR versatower P60. Must be in orig. conx, with or without winch. G4PZD. QTHR. Tel: 0524-414030.

KENWOOD TR751E 2M multimode. Must be in good condx. Reasonable price paid. Terry, G4OXD. Tel: 0462-35248 (after 6 pm).

DISC OPERATING SYSTEM and floppy disc controller for Acorn atom computer. Also any operations

system information for atom or jupiter ace. A J Smith, G4OEP. Tel: Bristol 45060. QTHR.

2M FM RIG required. Must be reasonable price. UNI2030, Q16, FT2, IC22 or similar. Non-working considered if cheap and complete. Tel: Chris, 05477-273. Also wanted, amateur radio books and RADCOMs.

EZITUNE for SEM transmatch atu: YAESU desk mic MD188: 3 x 6146B valves by GE. Norman G4RYS, QTHR. Tel: 0532-663846.

DRAKE T4XB MANUAL, photocopy or loan of to photocopy. Wanted to purchase: Drake R4C T4XC and accessories. Also Collins 5 line. 4CX1000 or 4-1000 with or without base. WHY? Gavin Williams, G3YCP, 7 Braemore Road, Hove, E Sussex, BN3 4HA.

NATIONAL RECEIVERS type 1-10, SW3, HR07, HR050, HR060, HR0500, HR0600, FB7, FBXA. All other national rx/tx's, working or not, wanted, plus manuals. Pay £150 for German, Japanese, WWII HR0's. Want 'command' BC342/8 racks, cables, receivers, transmitters, dynamotors. Tel: St Albans 39333.

ICOM IC402 must be in good condx. Cash waiting. Bird corp. 100W + dummy load or high power 30 db atten. WHY? Narda Coupler must be good for 2-3GHz. WHY? Tel: Keith, 0268-751417 (after 6 pm).

REQUIRED, operating details for National "thrill box" 1928, and for prewar SW3. Also needed, circuit for Trophy 5 and Trophy 7, and full photocopy of Eddystone SW manual No.1. All costs paid. G4IMT, QTHR. Tel: Bath 891-254.

COLLINS amplifier must be in good condx and 500-1KW. Howard, G0HZZ. Tel: 0394-460-474.

10M BELCOM LS102L OR TS788. Cash waiting, must be in gmo. PSE G4WAF, QTHR Pelsall, West Midlands. Tel: 0922-692517.

BOOKS BY Lenk, Carr, Middleton about radio or electronics sought by ancient (koff!) ham. Also any others you suggest. Advise price ptp. Artington, G0JOE, 9 North Hill Green, Romford. Tel: Ingrebourne 44641 (10-4 Mon, Wed, Thurs).

WANTED: AOR2002 must be mint. Exchange FT790 70cms multimode with FL7010 linear. Nicads, charger, soft case, mobile mount, boom headset, PTT box. All as new with original packing, etc. Not QTHR. Tel: (Reading) 0734-668532.

WANTED URGENTLY: copies of McDonald's Radio & Television servicing books. Years 1978-79, 1981-82 1983-84, 1985-86, 1986-87. One or all of the above needed by budding TV engineer. G4TKP, QTHR. Tel: Derby 383442.

TR10/KENWOOD YG885, 8830KHz. If 2.4KHz bandwidth (SSB) crystal filter unit. G3JMO, QTHR. Tel: 0642-486155.

DRAKE SP75 Speech processor MS7 speaker 7077 desk mike 1548 interface cable to connect TR7A and R7A. GIDES, QTHR. Tel: Ruislip 633118.

RACAL RA1217 technical handbooks; your price paid, also related items; LF, ISB adaptors, DC psu etc. ZX Spectrum 48K; Drakeline equipment; Bird thru-line equipment - working or otherwise. Tel: 03306-613 (after 7.30 pm or weekends).

EARLY WIRELESS and xtal sets wanted; particularly WWI equipment or parts, early valves, horn speakers, old radio books, magazines, catalogues, prewar television; keen collector pays well for anything associated with early wireless. James, G4ERU, 5 Luther Road, Winton, Bournemouth. Tel: 0202-510400.

CIRCUIT DIAGRAM or handbook for Marconi signal generator, type TF801B/1 and type 867. Please telephone 0903-775929 with offer. Thanks.

WANTED: YAESU FT73R, Trio TH41E or TH405E. Also HF general coverage receiver, R600, R1000, FRG-7700, etc. Tel: 0476-77708 (Lincs). FOR SALE: Realistic PRO2009 V/UHF scanner, mint, boxed, £110 inc p & p UK.

WW II EX-SERVICE equipment, German. Parts/ literature, only for display so w/c not required. British W565/66, WS No.1, No.11, T1190, AD67, S2 ERT, RC37, S6, YQ, H2S/SCR720 for museum in Norway. LASHE/OZBR0. RAG Otterstad, Vejdammen 5, DK-2840, Holte, Denmark. Tel: 010-452-801875.

FT290 MKII c/w nicads, charger, exchange for "K" reg ex-min series IIA landrover. Full engine, transmission chassis overhaul, but body scruffy, full tilt. MOT 14.4.88. Value £350. G8FYH, QTHR. Tel: Colchester 66331 (between 6-9pm)

WANTED: LT235 144MHz IF; Tonna 232 eles for 23cm; CUDEE 17 eles for 70cm; quality reel to reel tape deck with dolby, 4 speeds, 10" reel. G1EGC, QTHR.

RADIO COMMUNICATION February 1988

Tel: Great Missenden 2752 (6-7 pm).

BEG, BORROW OR BUY handbook or any gen on receivers HQ170A, S640, CR70A. G3NFV, QTHR. Tel: 0372-372587.

MANUAL AND ANY INFORMATION on Taylor valve tester 45C, also circuit diagram or manual for WS19. Must be Mk3 and include component values. Buy borrow or copy. David, G4LXH, QTHR. Tel: 01-594-6847.

DRAKE MN2700 or low power version, also VF0700S ext. VFO for Trio TS700S. Cash paid, will collect. G4JBH, QTHR. Tel: 0935-824225 (after 6 pm).

DRAKE L7 LINEAR amp and psu, Drake MN2700 atu. Top price paid. Urgently required. Tel: 0602-609345 (anytime).

TRIO JR599 TX in good condx. Can collect most areas. G4YSI, QTHR. Tel: (Surrey) 09323-42131.

FT77 OR SIMILAR small HF transceiver for mobile use in exchange for new FT727 dual band VHF/UHF handy, only 4 months' old. Receipts to be shown on exchange. GW4YNR, QTHR. Tel: 02912-5053 (after 6 pm).

HELP HELP HELP HELP York Radio Club G4YRC urgently require one reliable HF transv. for club members use. TS520? FT101? We can offer approx. £280. Please contact Bob, on 0904-425619, after work.

FAULTY OR DAMAGED racal rx, condition not important. Also labgear LG50 tx for sale. Tel: Vincent, 0254-381787.

G4CLF OR MLX SSB trx module. Consider part built project using above, may also consider basic Shimizu SS105S. Write or tel: (Cumbria) 09405-728, G4YWI, QTHR.

DIRECTION FINDING; wanted to borrow for research into contests and past activity. "I and R" bulletins to August 1938; RSCB bulletins to October 1957. Any photos or other information welcomed. All items returned and costs reimbursed. G4HKC, QTHR. Tel: 0206-860724.

TS120 OR TS130 V or S model and TS530S or FT102. Also BBC model B. G3XFB, QTHR. Tel: 0902-850033.

DATONG FL1 or FL2 filter in good working order. GD4EIP, QTHR. Tel: 0624-71353.

PYE A200 6-Metre amplifier, working and in good condx. Modified or in original state. Late model 2-metre h/h Yaesu/Kenwood also required. GW3KAJ, not QTHR. Tel: Llanidloes 3511.

"NIXIE" TUBES (two please) type B5870. Used in Yaesu frequency counter, YC305D. All replies answered. GW4AXS, QTHR (1988 book). Tel: (Oban) 0631-65147.

CW FILTER MF455-03AZ with transformers for my FRDX400. Also other filters and VHF converters for same. Alternatively, complete FRDX400 in gwo, with all options. Also need B9A plugs. G4AZO, QTHR. Tel: Woking 21649.

WARTIME SUITCASE RADIO (B2), also any spares for 123 set (ie) case, earth spike, valves, neon tester, antennas, etc. G4L10, QTHR. Tel: 0705-373320.

DURANGO COMPUTER. Software or manuals. Desperate for any information. G5WG, QTHR, or tel: 01-504-5499 (reverse charges).

YAESU FT230R 2M mobile transceiver. Would prefer to inspect and collect. Please ring 0245-468149, (after 7 pm) with price. G4UHM, not QTHR (Essex).

BUG KEYS, ANY semi-automatic mechanical speed keys by McElroy, Bunnell, Speed-X, Lionel, Vibroplex, etc. any age, any condx, scrap or mint. G3TSS, QTHR. Tel: 043-471-3125.

COMMODORE VIC20 service manual and xtal. freq. for UHF 625 lines TV type and one user manual to buy. All replies returned. Post cost, etc. BR535140. M E Lee, 26 Bromford Crescent, Erdington, Birmingham, B24 9RL.

2M AND 70CM HANDHELDS also 10FM. Have for exch. or sale 35mm Olympus OM10 Camera body, 28mm f2.8 Olympus lens ERC & flashgun in mint condx. with manuals. BC221 frequency meter. Tel: Frank, G3ZKS,

manuals. BC221 frequency meter. Tel: Frank, G3ZKS, (York) 0904-25798.

HF LINEAR. Fair price paid for good example. Home brew would also be considered. Jim, G4VMO, QTHR. Tel: 021-706-3570 (anytime).

EDDYSTONE 940. Must be nr-mint. Top price paid. G5HX, QTHR. Tel: 0203-412397.

1296MHz TRANSVERTER. Microwave modules preferred. To resume operation on this band after many years absence. G5GX, QTHR. Tel: 0482-43035.

NEWLY LICENSED AMATEUR with interest in early Morse apparatus, keys, sounders, etc. seeks to purchase original items of such, or photographs of same. Original or replica Baird scanning disc or drum telivisor, likewise. COHTR. Tel: (Tamworth) 0827-898024.

TEN-TEC TITAN 425 linear amplifier. Must be in mint condx. Consider other compatible linears. G3GAZ, QTHR. Tel: 0304-830691.

70CM EQUIPMENT BELCOM 430 or TVTR with 2m. IF and pwr/swr meter, Q-multiplier for 455KHz, codar PR30 pre-amp, 2m-10m cnvtr 4m rig, Pye fm mod/unmod 10-20m of H100 co-ax and N type plugs, etc. G8ATE, QTHR. Tel: Leics. 392842.

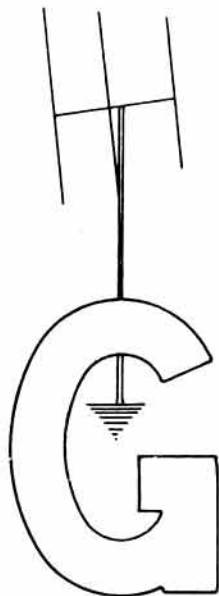
COLLECTORS OF BBC test card music seek contact with others with same interest. Particularly interested in recordings made before 1970. Tony Emery, G3YWG, QTHR.

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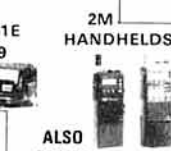
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PK232 IBM	IBM PC and Compatibles, Disk, handbook	39.00	(2.50)
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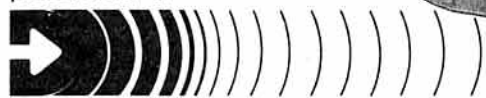


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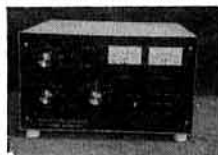
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### INDEX TO ADVERTISERS

AE/Holdings.....	153	Klingenfuss Publications.....	144
AJH Electronics.....	148	KW Ten-Tec Ltd.....	151
Amcomm of London.....	IFC		
AMDAT.....	150	Lowe Electronics.....	82/84
AMSAT UK.....	156		
ARE Communications Ltd.....	IBC	Mercury Communications.....	153
Allweld Engineering.....	151		
Billington Valves.....	80	Nevada (Telecomms).....	90
J. Birkett.....	144	Photo Acoustics.....	145
Bredhurst Electronics.....	145		
		QuartsLab Marketing Ltd.....	144
Cambridge Kits.....	148		
Circuit Distribution Ltd.....	150	Random Electronics.....	144
CR Supply.....	150	RN Electronics.....	148
Craven & Findlay.....	152		
Currys.....	95	South Midlands Communication.....	92/4
		Spectrum Communications.....	148
Datong Electronics Ltd.....	149	Stephens-James.....	149
		Strumec Versatow.....	147
G4TNY Amateur Radio.....	143		
Garex Electronics.....	90	Technical Software.....	147
Hately Antenna Technology.....	150	Tennamast.....	156
Heatherlite Products.....	151		
HRS Electronics Ltd.....	146	Tyneside Amateur Radio Soc.....	156
ICOM (UK) Ltd.....	86/89	Uppington Tele-Radio.....	150
ICS Electronics Ltd.....	91		
		Ward Electronics.....	144
J.E.P. Electronics.....	148	Waters & Stanton.....	85
J.P. Export Co.....	153	C. Wilson.....	150
Jaycee Electronics.....	153		
		Yaesu Musen Co Ltd.....	OBC
R.A. Kent.....	156		

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# MORE NEW TITLES

## PASSPORT TO WORLD BAND RADIO

If you are interested in listening to the shortwave spectrum outside the amateur bands then the 1988 edition of *Passport To World Band Radio* is for you. This book lists all the shortwave broadcast stations in the world by frequency from Korea on 2,300kHz to Norway on 25,730kHz. For each entry is given the transmitter site, time of transmissions, transmitter power, target area, language of broadcasts and much more useful information. All this is shown together in graphical form for easy reference. No more searching through pages of lists to find the information you need.

This book is not just a guide to broadcast stations, however. In addition there are brief reviews of no less than 60 different shortwave broadcast receivers, and full-length reviews of 14 recent models. Useful tips are also given on what to look for when purchasing a shortwave receiver. There are also 12 feature articles covering a wide range of shortwave broadcast listening and a useful glossary of terms used throughout the book.

*Four Sections:* How to tune in the world; 1988 Buyers Guide to World Band Radio; World Scan; Lexicons and Guides.

**400 pages; paperback; 1988; £16.25 to RSGB members by post**

## W1FB's ANTENNA NOTEBOOK

*W1FB's Antenna Notebook* is the latest antenna book from ARRL. As its title implies, this book is a collection of practical ideas, and features simple, general purpose antennas without going into extensive antenna theory. The book also dispels a number of common fallacies regarding swr and baluns.

*Chapter titles:* Some fundamental antenna data; Building and using dipole antennas; Single-wire antennas; Simple vertical antennas; High-performance wire antennas; Limited-space and invisible antennas; Matching techniques; Special receiving antennas; Simple antenna measurements.

**130 pages; paperback; 1987; £9.95 to RSGB members by post**

## ARRL HANDBOOK

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**1,188 pages; hardback; 1988; £24.75 to RSGB members by post**

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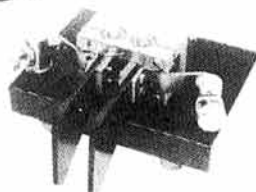
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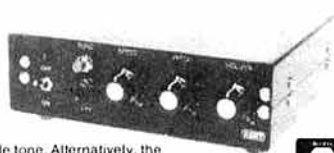
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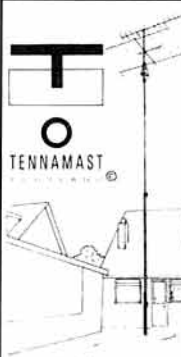
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# Yaesu's FT-736R. Because you never know who's listening.

Why just dream of talking beyond earth?

With Yaesu's new FT-736R VHF/UHF base station, you can discover some of the best DX happening in ham radio. Via moonbounce. Tropo. Aurora. Meteor scatter. Or satellites.

You see, the FT-736R is the most complete, feature-packed rig ever designed for the serious VHF/UHF operator. But you'd expect this of the successor to our legendary FT-726R.

For starters, the FT-736R comes factory-equipped for SSB, CW and FM operation on 2 meters and 70 cm, with two additional slots for optional 50-MHz or 1.2-GHz modules (220-MHz North America only).

Crossband full duplex capability is built into every FT-736R for satellite work. And the satel-



lite tracking function (normal and reverse modes) keeps you on target through a transponder.

The FT-736R delivers 25 watts RF output on 2 meters, 220-MHz, and 70 cm. And 10 watts on 6 meters and 1.2-GHz. Store frequency, mode and repeater shift in each of the 100 memories.

For serious VHF/UHF work, use the RF speech processor. IF shift. IF notch filter. \*CW Narrow Optional and FM wide/ narrow IF filters. VOX. Noise blanker. Three-position AGC selection. Preamp switch for activating

your tower-mount preamplifier. Even an offset display for measuring observed Doppler shift on DX links.

And to custom design your FT-736R station, choose from these popular optional accessories: Iambic keyer module. FTS-8 CTCSS encode/decode unit. FVS-1 voice synthesizer. FMP-1 AQS digital message display unit. 1.2-GHz ATV module. MD-1B8 desk microphone. E-736 DC cable. And CAT (Computer Aided Transceiver) system software.

Discover the FT-736R at your Yaesu dealer today. But first make plenty of room for exotic QSL cards. Because you *never* know who's listening.

## YAESU

\*CW narrow optional



**UK Sole Distributor South Midlands Communications S.M. House, School Close,  
Chandlers Ford Industrial Estate, Eastleigh, Hants SO5 3BY. Tel: (0703) 255111**

Prices and specifications subject to change without notice. FT-736R shown with 220-MHz option installed.