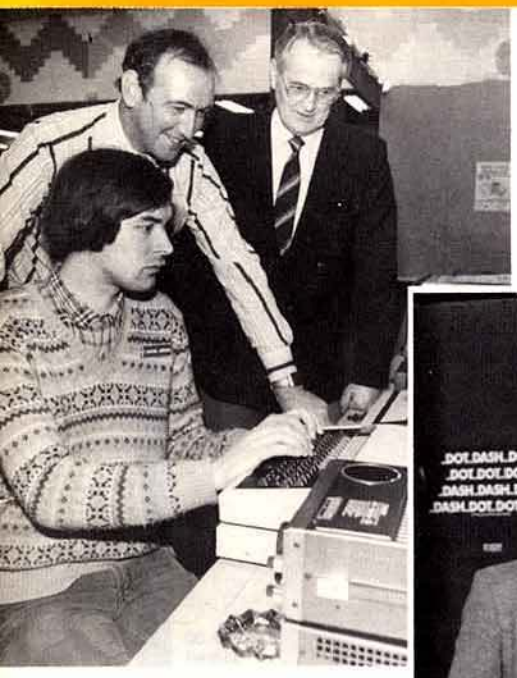
February 1985

RADio COMmunication

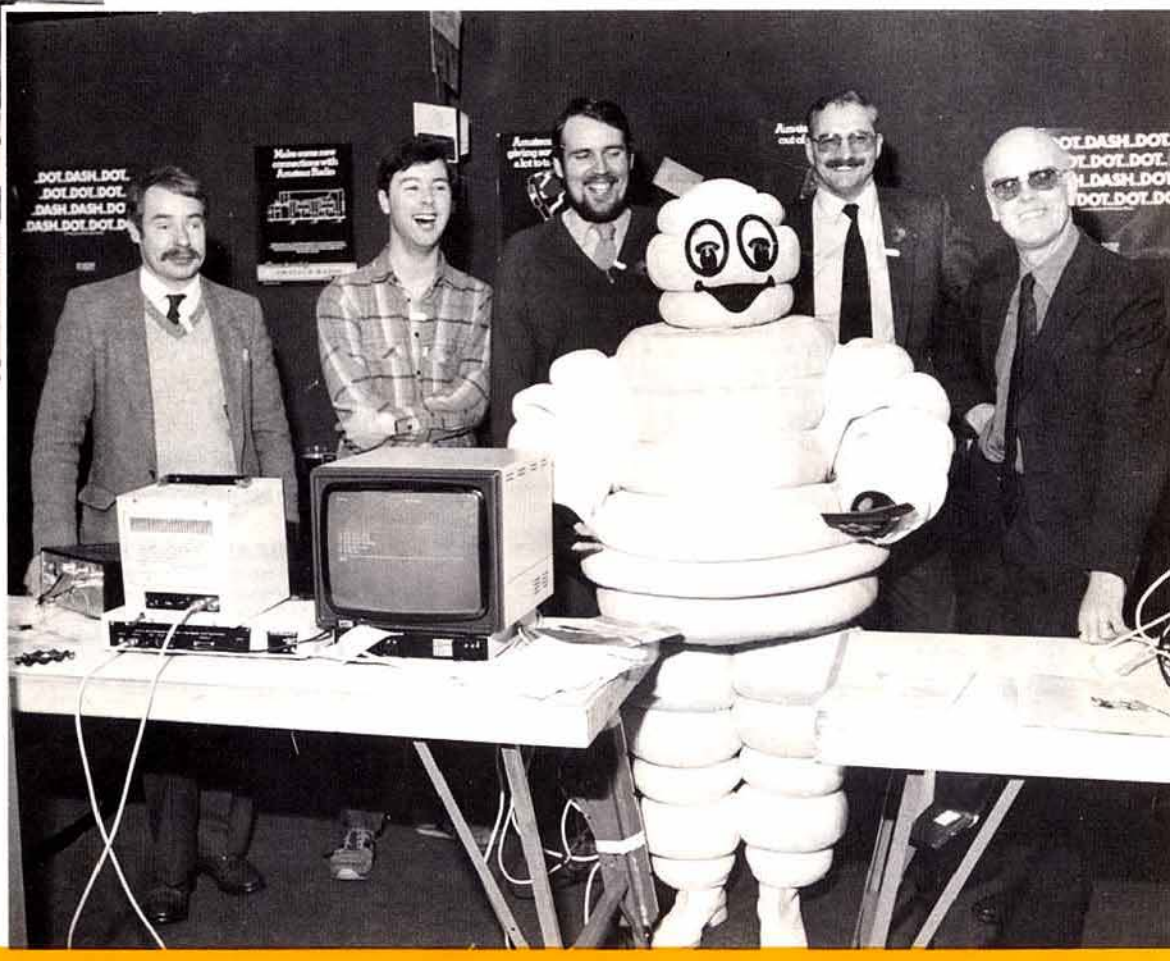


Adrian, GM1FML, and Jim, GM0AAJ, demonstrate the CAT system to Eric Lapham at the Arrow Electronics stand

SEEN AT THE

Scottish Home Computer & Electronics Show

HELD IN GLASGOW IN NOVEMBER 1984



A mysterious visitor at the West of Scotland ARS stand with (l to r): Gordon, GM4NUN; Graham, GM1JZQ; Des, GM8YBP; Tom, GM4FDM; and Stan, GM8MRW

Photos: GM4SRL

Journal of the Radio Society of Great Britain

Amcomm of London

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MK 705 Dual lever paddle marble base	23:78
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CONTENTS

Technical articles on subjects of amateur interest are always welcome and should be sent to: The Editor, *Radio Communication*, 88 Broomfield Road, Chelmsford, Essex CM1 1SS.

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.

A contribution will only be considered for publication on the understanding that the person submitting it is the original author and owner of the whole copyright, and that on acceptance for publication such copyright will become the property of the RSGB in consideration of the above-mentioned payment by the RSGB to the contributor.

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

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We here at TRIO-KENWOOD have over the years developed a range of equipment designed by our professional engineers for you the active radio amateur. Our products range from the top notch TS930S HF amateur band transceiver to the smallest accessory. Each piece of equipment is specifically designed with the requirements of you, the radio amateur in mind. It has always been our policy at TRIO-KENWOOD to improve the specification and reliability of equipment by listening to the valuable comments of radio amateurs all over the world. The important relationship between yourself, the radio amateur and TRIO-KENWOOD is through our authorised distributor for the UK, LOWE ELECTRONICS LTD.

We give below a list of approved dealers in the UK. Any dealer not on this list has no connection with the UK distributor network and has no direct factory backing. Great care should be taken when purchasing your amateur radio equipment, to ensure that the dealer is factory approved. In any case, first contact our sole distributor for the UK: Lowe Electronics Ltd., who will be pleased to advise you of your nearest dealer.

Sole Distributor Lowe Electronics Ltd.
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143 Reculver Road, Herne Bay, Kent.
Tel: 02273 63859/63850

the TH21E two metre hand-sized handheld, the rig that not even a mouse could hide behind!

I am not for one moment suggesting that current hand-helds should be photographed with an elephant but I have heard many amateurs refer to their existing hand-helds as "bricks". That the TH21E could not be called. In fact, I am tempted to say it is the rig that not even a mouse could hide behind. Over the fourteen years I have watched amateur radio equipment develop from cumbersome to perfection. I remember John, G3PCY, showing me the first TR2400 and our mutual amazement at how TRIO could put so much radio in such a small package. Later developments produced the TR2500 and its 70 centimetre version, the TR3500 and left me in no doubt that TRIO would soon produce a compact inside pocket transceiver. At the same time it became apparent that a simpler rig with performance would have great appeal. That transceiver is the TH21E and being typically TRIO is right first time. Size is not the most important feature, it's just the way the transceiver feels when picked up, impossible to put down. I am not going to give its dimensions, I will just say that it is hand-sized, the true inside pocket transceiver. As an owner and with the rig always on your person the hobby of amateur radio expands to an all day event. **Never miss a contact, never miss a friend.**

- 1 watt output in high power position, 150mW in low position.
- Full coverage of the 2 metre amateur band from 144 to 146MHz.
- Frequency selection by simple thumbwheel switches.
- Full repeater facilities including reverse repeater.
- The rig comes complete with nicad pack and charger.

TH21E including nicad & charger, £179.48 inc VAT.
TH41E 70cm version, £199.00 inc VAT.

TRIO-KENWOOD CORPORATION

Shionogi Shibuya Building, 17-5, 2-chome Shibuya, Shibuya-ku. Tokyo 150, Japan

TRIO-KENWOOD COMMUNICATIONS, GmbH
D-6374 Steinbach-TS, Industriestrasse, 8A West Germany

TR9130 TWO METRE ALL MODE TRANSCEIVER

This rig is proof, if one needed it, that TRIO do not bring out new models just for the sake of it. The TR9000 is remembered as a classic rig and today people are still asking for second hand ones. They're even a rarity on our S/H shelf. The TR9130 incorporates the improvements that all amateurs asked for, green display, reverse repeater, tune whilst transmitting, higher power, more memories and of course memory scan. TRIO's answer, the TR9130.

TR9130 . . . **£479.62** inc VAT.

TS780 DUAL BAND BASE STATION TRANSCEIVER

The TS780 is the perfect base station VHF/UHF transceiver for the enthusiastic operator. The rig has all the necessary control functions essential for operating on both today's busy two metre band and the wide open spaces of seventy centimetres. Full repeater facilities plus reverse repeater are included and the transceiver has the usual memory channels (10), two VFOs, up/down frequency shift microphone, IF shift, two priority channels, memory and band scan etc. A superb rig, I have one myself, write for a full enthusel

TS780 . . . **£934.69** inc VAT.

TR7930 TWO METRE FM MOBILE TRANSCEIVER

Those who have used or owned a Trio TR7800 will know what I mean when I say that Trio, with the introduction of the TR7930 have improved on the unimprovable. The Trio TR7930 improves on the TR7800 by giving a green floodlit liquid crystal display, extra memory channels, both timed and carrier scan hold, selectable priority frequency and correct mode selection (simplex or repeater). The most significant change is the liquid crystal display, but closely following this must be the ability to omit specific memory channels when scanning and the programmable scan between user designated frequencies.

TR7930 . . . **£338.03** inc VAT.

R2000 GENERAL COVERAGE RECEIVER

The amateur bands are only a very small part of the radio spectrum, many other transmissions are available for the short wave listener. Broadcast stations provide an alternative source of current information both political and regarding the life style of the country. Fitted with the internal VHF converter the R2000 covers continuously frequencies from 118 to 174 MHz giving access to amateur two metre transmissions (am, fm, ssb and cw) plus a lot more. Having 10 memories, memory scan and programmable scan the R2000 provides in one rig the perfect receiver.

R2000 . . . **£456.63** inc VAT.

TS930S HF TRANSCEIVER WITH GENERAL COVERAGE RECEIVE FACILITIES

Much has been said about the TS930S transceiver and it now has a place high in the affection of those amateurs fortunate enough to own one, indeed it has become the "flagship" of the TRIO range. Providing full amateur bands plus a general coverage receiver (150kHz to 30MHz), the TS930S has every conceivable operating feature for today's crowded frequencies.

TS930S . . . **£1250.00** inc VAT.

TR2500/TR3500
HANDHELD TRANSCEIVERS

Two first class hand held transceivers, one for two metres and the other for seventy centimetres. Ten memory channels, band and memory scan, repeater shift, reverse repeater and a low power position make the rigs extremely useful for the radio amateur who wishes to keep in touch with his local scene. A comprehensive range of accessories, base station charger, speaker microphone, mobile mount etc. can be added to enhance operation, accessories used with one rig being compatible with the other.

TR2500 . . . **£257.58** inc VAT.
TR3500 . . . **£281.60** inc VAT.

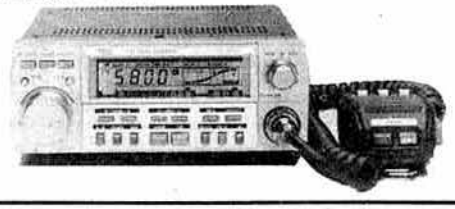
TS530SP HF AMATEUR BAND TRANSCEIVER

A logical progression from the reliable TS520 series the TS530S was the most popular HF rig in the range. I use the term "was" because TRIO decided to cease production and supplies were no more, however the demand from radio amateurs worldwide for the transceiver have continued and TRIO have reintroduced the rig. A standard HF valve transceiver without the frills but providing today's amateur with all necessary facilities for reliable world wide communication, the TRIO TS530SP now with notch filter

TS530SP . . . **£698.00** inc VAT.

TW4000A DUAL BAND FM TRANSCEIVER

I have been waiting for this rig for the last three years, now it is here and I am using one, words fail me. More details on opposite page and colour leaflet available . . . **£510.97** inc VAT.



just a part of the range

FOUR WHEEL DRIVE

For as long as amateurs have used directive beams, be it either on the HF, VHF or UHF bands there has always been a need for a means of turning the array. Some have used string, the more fortunate amongst us have used a rotator. When buying a rotator, our advice up to now has always been, buy the largest you can afford. Our reasoning being that your aerial array will undoubtedly grow and sooner or later the overloaded rotator will break. Usually your aerials are also destroyed.

The new range of rotators from DAIWA, the MR series make this advice obsolete. They are designed so that additional motors can be added around a central core, each motor increasing the rotator's turn and braking capacity. The MR series will accept up to four motors being initially supplied with one. As the number and size of aerials increases, additional motors can be added, and both turning capacity and braking effort increased. Additional motors can be added at any time, each adding 700 kg/cm of torque and 5000 kg/cm of brake power. No additional cable runs are required, an internal harness for each motor being included, and, of course the main frame and reduction gear train have been designed to handle extremely large aerial arrays that would require the full set of four motors. There are four models, pre-set and standard and two high speed versions for the operator who can afford to sacrifice a degree of torque in order to increase the speed of rotation.

A full colour leaflet describing the rotators in detail is available on request.

MR750E standard model	£193.95 inc VAT
MR750PE pre-set model	£217.64 inc VAT
MR300E high speed version (39 sec)	£193.00 inc VAT
MR400E high speed version (25 sec)	£193.00 inc VAT
MR760U standard motor unit	£64.64 inc VAT
MR300U high speed motor unit	£64.64 inc VAT
LMC lower mast clamp	£14.00 inc VAT

If I am absolutely honest,

I am not certain whether I own a NRD515 because of its unbelievable performance as a general coverage receiver or just for the sheer pleasure of having and constantly admiring probably the finest piece of equipment available today.

Perhaps it comes down to the same thing, certainly the other NRD owners I have spoken to have all expressed the same feelings, that the NRD515 is a receiver in a class of its own.

As a person not owning the receiver, you may ask what sets this particular one above all the others. This is difficult to define—the feel of the equipment when wandering over the crowded band, its signal handling capability and selectivity can only really be appreciated by use. Technically, the equipment is above reproach. JRC's manufacture and production control methods as applied to other items in the range are equally applied to their amateur products. The other items referred to, only a small part of the vast range, are marine radio equipment, Marisat mobile terminal, Omega navigators, Doppler sonar, echo sounder/fish finders, communication satellite earth stations and a complete range of avionic beacons, radar and associated products. Indeed, a wide range of application of electronic and radio technology for land, sea and air.

You may be forgiven for associating such advanced technology with complexity of operation, a piece of equipment that needs an operator with an electronics degree. However, this assumption is incorrect. The NRD515 is easy to use with the minimum of controls to ensure the operator really enjoys his listening time. Digital readouts, MHz, mode and filter bandwidth switches together with a VFO knob that will tune the band continuously without using any other control, from 100KHz to 30MHz or vice versa. To assist with difficult band conditions the NRD515 has pass band tuning and the medium wave broadcast section to 600KHz to 1·6MHz has a preselector control to cope with crowded conditions. To give real "armchair copy" JRC have introduced the NCM515 remote control keypad. As its name suggests, the NCM515 enables frequencies to be quickly keyed into the receiver. Four memories are provided, two rates of frequency stepping in increments of either 100Hz or 10MHz and finally the ability to add to or subtract from the operating frequency by any frequency step. Add the optional 600Hz CW filter and the 96 channel memory unit and, as the other NRD515 owners would say, "a joy to own".

NRD515.....monitoring receiver	£965.00 inc VAT
NDH515.....96 channel memory unit	£264.00 inc VAT
NCM515.....remote frequency controller	£125.00 inc VAT
NVA515.....speaker	£34.50 inc VAT
CFL260.....500Hz cw filter	£39.10 inc VAT
CFL230.....300Hz cw filter	£64.00 inc VAT

LOWE ELECTRONICS LTD.

Chesterfield Road, Matlock, Derbyshire DE4 5LE
Telephone 0629 2817, 2430, 4057, 4995.

EMPORIUM NEWS

Good morning,
First of all, news for those of you **lucky enough** to have obtained a **6 metre licence.** I am sure you are all familiar with the TR9000/TR9130 series of mobile/base station transceivers and will be pleased to learn that **we have decided to import a few TR9300 transceivers** – the **6 metre** versions. From the limited information I have available the rig would appear to have the usual 6 memories, 2 VFO's, FM, AM, USB, CW and LSB modes. It also has a green display, similar to the TR9130, which is very easy to read. **The new transceiver** seems just the rig for the 6 metre band. Obviously, at the moment, the TR9300 will only be available in limited numbers. **To obtain one** of these sets, or receive further information, telephone or write to us here at Matlock. Anyone who has used, or seen, the TR9130 will appreciate its simplicity of operation. **The TR9300 is part of the same series** and, as such, is built to the same high standards.

£281.60(2600E)
£299.89 (3600E)

Just a word on the **TR9130.** Still the ideal multimode 2 metre transceiver for the operator who wants a rig that can be used both at home or in his car whilst out and about. It is also ideal for use on holiday later on in the year. There are many good reasons why you should have a rig with you constantly.

Many people have now purchased a **TH21E or TH41E,** finding that the transceiver is no problem to carry, even in an inside pocket. I must admit that I was surprised at the popularity of the TH41E, 70cm version. **Many of the newly licenced amateurs** have bought them, so too have the old hands who see the new rig as the first real alternative to a converted Pye Pocketfone. I have a TH41E alongside the television at the moment and I must admit my usage of our local 70cm repeater, GB3DY, has increased. Later in the year when I am out in the garden having a barbecue, the **TH21E** or the **TH41E** will be most convenient. Available at a cost of £199.00, the TH41E is what 70cm has been waiting for. A **simple low cost** compact transceiver that everyone can own.

I have just completed a permanent barbecue at the rear of my house, just alongside my Strumech tower. I fancy that I may even operate from the open air by bringing the TS711E down from the shack and by re-routing cables I will still be able to use the beams some 47 feet above ground level.

On a serious note, has anybody discovered a way of keeping the pigeons off the aerial elements? This proving to be quite a problem at my QTH.

The new power supplies from **Daiwa,** which have been featured on the opposite page, need no introduction. **A full range** covering 5, 8, 12 and 20 amps, each being metered, protected, but above all, **reliable.** Just the right sort of PSU to power up your valuable transceiver or accessory. The Daiwa power supplies are priced accordingly: **PS300 30** amp max – 22 amp cont £176.80, carriage £7.00, **PS120M** 12 amps £87.33, carriage £7.00, **PS80M** 8 amp £72.68, carriage £3.00, **PS50M** 5 amp £55.91, carriage £3.00. All of these prices are inclusive of VAT. Not only are we selling the power supplies to radio amateurs but many companies, which require a bench PSU, are ordering from the range.

Short Wave listeners will remember the **KX2** aerial tuning unit and also the **KX3,** which was the later model. These were both ideal for the Trio R600 and R2000. I am pleased to say that the KX3 tuning unit is again in stock at a price of £53.74 including VAT, plus carriage of £2.50. **Enhance your listening,** match your antenna to your receiver by using a KX3.

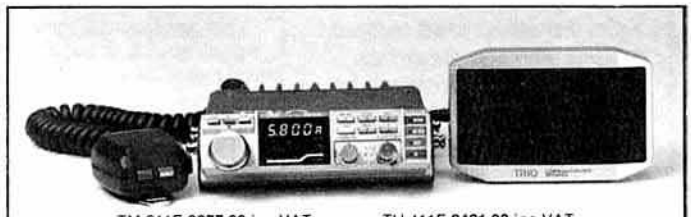
The most **observant** amongst you will have noticed **the mouse** featured in both this month's and last month's advertising. Many have asked whether it was actually alive or stuffed. Well, at the beginning of the photo-session it was definitely alive, but after the rig had fallen over on it a few times, I am not so sure. Sorry, I jest, the mouse, which is 'male' and called **'Hermogenes',** lives happily in Dave's pet shop here in Matlock. Dave, who is always helpful, readily agreed to his involvement. Many unkind readers have already suggested that I chose the largest mouse I could find in order **to make the TH21E look even smaller.** One of my colleagues here at Matlock did in fact suggest that it wasn't actually a mouse. Perhaps he knows me too well. Involving animals in our advertising is a new venture, and probably one that I will not repeat, after all **Dave** says he **knows a chap** with **a giraffe.** Just the thing for a Strumech tower advert. Of course, I am sure that someone will complain that the mouse is obscuring the top of the rig and the controls cannot be seen, but never mind.

Now, can I draw your attention to the **World Radio and TV Handbook.** At the end of the year we always have one or two left, so instead of asking full price we charge a little more as you are privileged to get one of the last ones. Sorry, I jest again, we do reduce the price. I can hear you ask, what's the point of buying a **World Radio and TV Handbook** that's out of date? The answer is simple and well known to its regular readers. With the exception of the interesting articles, the frequencies do not change a great deal. Well they do, but not that you would notice. In fact there are **certain people** who knowing this fact, and being careful with their money, only buy a copy each alternate year. To catch up on the articles they miss is simple, they read someone elses! Fortunately, you don't fit into this category so ring around and **see if you can pick up a copy cheap.**

I would like to take this opportunity to thank **Radio Cambridge** for the 15 minute spot they gave to our shop in Cambridge and the special short wave weekend we held there recently. **Chris, G8HVV,** who works in our shop at Cambridge was interviewed about the hobby of short wave listening. I heard the programme and was amazed. I had not realised that Chris knew so much. Anyway, we were delighted with the 15 minute slot, **many thanks to Radio Cambridge.**

We now have in stock the 70cm version of the new **Trio TR2600E** 2 metre handheld, the **TR3600E,** and it is of similar specification to its 2 metre brother. Of course, it has the new DCS facility and will store, and send, within the data burst your callsign. The **TR3600E** costs £299.89, including VAT, plus £7.00 carriage.

Also in stock, and on display in the shops, is the callsign display unit **CD10.** It costs £110.25 including VAT, plus £1.50 carriage. I've just tried one in the shack and discovered that it is extremely clever. **Equipped with 20** addressable memories, the unit will store the last 20 callsigns that called in your absence. The caller has to be using a Trio transceiver equipped with DCS. If you have the DCS set then they must also know the correct access code. **On your return** the CD10 can be interrogated and those who you wished to call, can then be contacted. The memories can be cleared quickly. In order to make the best use of memory capacity, each incoming callsign is checked with previously stored data. If the call is already in memory then it is just ignored, but if it is a new callsign it is allocated the next available memory position and stored. **Very clever** and it also explains why I couldn't get the pre-production version, which I have tried to use, to store more than one callsign. I was using my own, G8GIY, and of course **the CD10** was rejecting it, having already stored it once. Read the manual first I hear you say, but unfortunately, no manual was available with the first unit, hence my difficulties.



TM-211E **£377.22** inc VAT TH-411E **£431.03** inc VAT

The two new mobiles, the higher specification 2 metre **TM211E** and 70cm version **TM411E,** are now available and on display in each Lowe Electronics shop. Based on the current, and continuing, **TM201A** and **TM401A** the two new rigs have as standard, DCS.

Anyway, that's about it for now. Just had another **mountain** of estate agent information delivered with regard **to property** on the south coast, **Southampton, Christchurch, Bournemouth, Poole** areas, so I must sort through it quickly.

73, David G8GIY

B.N.O.S.

THE POWER SUPPLIERS

Maximise your signal...

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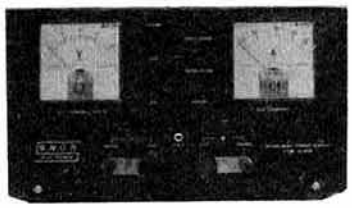
·POWER SUPPLIES



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- Continuous rated output
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12/6A 13.8V. 6A CONTINUOUS o/p £52.90
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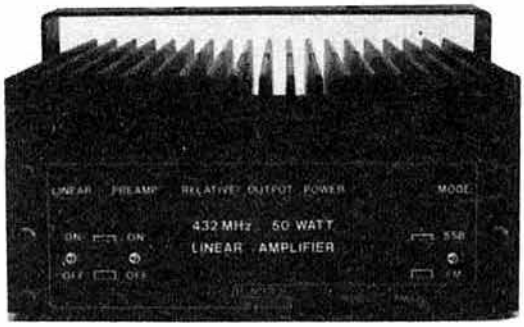

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If Performance, Reliability and a Product that gives you total control and maximum Flexibility is important to you, then our range of 70cm 50W Amplifiers are what you have been waiting for.

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LPM 432-3-50 .....£184.00
LPM 432-10-50 .....£155.25

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Performance and Reliability is Designed in so that they always give you 100%

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L144-3-100 .....£143.75
LPM 144-3-100 .....£172.50
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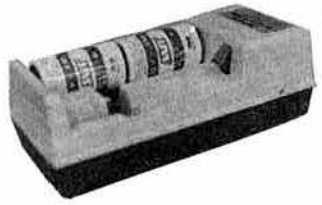
LPM 144-10-100 .....£149.50
L144-25-160 .....£178.25
LPM 144-25-160 .....£207.00
L144-3-180 .....£207.00
LPM 144-3-180 .....£235.75
L144-10-180 .....£207.00
LPM 144-10-180 .....£235.75

·NICADS & CHARGERS



NICADS

Format	Cap. (AH)	Height (mm)	Diam. (mm)	Prices 1-9	10-24	25-99
AAA	0.18	45.0	10.51	1.47	1.39	1.32
½AA*	0.10	17.4	14.7	1.38	1.31	1.24
½AA*	0.225	25.0	14.7	1.04	0.99	0.94
AA	0.50	49.5	14.7	1.08	1.02	0.96
AA*	0.50	49.5	14.7	1.14	1.08	1.02
NEW AA (SUPER)	0.60	49.5	14.7	1.18	1.12	1.08
½A*	0.45	28.0	17.2	1.18	1.12	1.08
RR*	1.20	42.1	22.6	1.86	1.76	1.66
C	2.20	49.7	25.9	2.85	2.70	2.56
D (SUB)	1.20	60.5	33.5	2.85	2.70	2.56
D	4.00	60.5	33.5	5.06	4.80	4.56
D*	4.00	60.5	33.5	5.10	4.84	4.60
F*	7.00	94.0	33.5	7.36	6.98	6.62
SF*	10.00	91.3	41.7	POA	POA	POA
PP3	0.11	49x26.5x17.5		4.52	4.29	4.07
PP9	1.2	81x52x66		POA	POA	POA

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AC1 SAFT MAZDA AA CHARGER, CHARGES 1 to 4 AA CELLS — £5.75

PC3 SAFT MAZDA PP3 CHARGER, CHARGES 1 or 2 PP3 CELLS — £5.75

MC4 JECKSON MULTICHARGER, CHARGES 2 or 4 AA, C or D CELLS £7.00

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the **TELEREADER** range

Those of you who have seen TELEREADER products will know that outstanding performance allied with ease of operation are the hallmarks of this particular company. The four models in our range are the CWR685E combined transmitter and receiver, the CWR675E having receive only and built in monitor, the CWR670E being a CWR675E without monitor and the CODE MASTER CWR610E which not only receives CW and RTTY (Baudot and ASCII) but doubles as a morse tutor. TELEREADER also have an AMTOR unit, the AMTOR10A, details for this are available on request.

The CWR685E has many outstanding features . . . . . .

CW, Baudot and ASCII receive and transmit: CW at 3-40 wpm, RTTY at 45.45-300 bauds (six speeds).

Built-in 5" green phosphor screen giving a clarity and brightness that I have not seen before.

An external QWERTY keyboard housed in a substantial metal case and supplied with 3 feet of connecting cable. Not a "rubber key or plastic faced touchpad" but a true keyboard.

6 Memory channels (63 character capacity each). In addition the 4 standard test transmissions (RY, QBF, Baudot all characters, ASCII all characters) are permanently stored in memory and can be recalled and transmitted in a variety of formats. 480 characters of transmitting buffer memory are also included.

Automatic and manual transmit/receive switching.

Printer output: Centronics compatible parallel interface for hard copy.

CWR685E

The TELEREADER CWR675E has a similar specification to the CWR685E having the built-in 5" green monitor but not including the transmit facility. The CWR675E provides for both the enthusiastic radio amateur and short wave listener access to both the amateur and commercial world of RTTY as well as providing a visual display of received morse code. The CWR670E is as the CWR675E but does not have the monitor.

The TELEREADER CWR610E Code Master is a compact CW/RTTY converter which also doubles as an audio-visual morse tutor. Features of the CWR610E Code Master are . . . . . .

CW, RTTY (Baudot and ASCII reception).

CW: 3-40 wpm, Baudot/ASCII: 45.45-600 bauds (seven speeds).

CW morse practice at 2-30 wpm.

Display characters: 612 characters × 2 pages.

Centronics compatible parallel interface for printer output.

UHF/VIDEO display output.

CWR685E....full receive/transmit.....**£771.64** carr £7.00
CWR675E....receive only with monitor.....**£449.17** carr £7.00
CWR670E....as above but without monitor.....**£392.80** carr £7.00
CWR610E....codemaster.....**£195.00** carr £3.00
PK675.....printer for CWR675E.....**£189.00** carr £7.00
AMTOR10A.amtor unit.....**£253.20** carr £3.00

all prices include VAT.

Whenever you enter a LOWE ELECTRONICS' shop . . .

. . . . be it Glasgow, Darlington, Cambridge, Cardiff, London or here at Matlock, then you can be certain that, along with a courteous welcome, you will receive straightforward advice. Advice given, not with the intention of "making" a sale, but the sort which is given freely by one radio amateur to another. Of course, if you decide to purchase then you have the knowledge that LOWE ELECTRONICS are the company that set the standard for amateur radio shops and after-sales service. The shops are open Tuesday to Friday from 9.00 to 5.30pm, Saturday from 9.00 to 5.00 pm and close for lunch each day from 12.30 till 1.30pm.

In Glasgow the LOWE ELECTRONICS' shop (the telephone number is 041 945 2626) is managed by Sim GM3SAN. Its address is 4/5 Queen Margaret's Road, off Queen Margaret's Drive. That's the right turn off Great Western Road at the Botanical Gardens' traffic lights. Street parking is available outside the shop and afterwards the Botanical gardens are well worth a visit . . .

In the North East the LOWE ELECTRONICS' shop is found in the delightful market town of Darlington (the telephone number is 0325 486121) and is managed by Don G3GEA. The shop's address is 56 North Road, Darlington. That is on the A167 Durham road out of town. A huge free car park across the road, a large supermarket and bistro restaurant combine to make a visit to Darlington a pleasure for the whole family.

Cambridge, not only a University town but the location of a LOWE ELECTRONICS' shop managed by Tony G4NBS. The address is 162 High Street, Chesterton, Cambridge (the telephone number is 0223 311230). From the A45 just to the north of Cambridge turn off into the town on the A1309, past the science park and turn left at the first roundabout, signposted Chesterton. After passing a children's playground on your left turn left again (between the shops) into Green End Road. Very quickly, and without you noticing it, Green End Road becomes High Street. Easy and free street parking is available outside the shop.

For South Wales, the LOWE ELECTRONICS' shop is located in Cardiff. Managed by Richard GW4NAD, who hails from Penarth, the shop (the telephone number is 0222 464154) is within the premises (on the first floor) of South Wales Carpets, Clifton Street, Cardiff. Clifton Street is easily found, being a left turn off Newport Road just before the Infirmary. Once in Clifton Street, South Wales Carpets is the modern red brick building at the end of the street on the right hand side. Enter the shop, follow the arrows past the carpets, up the stairs and the "Emporium" awaits you. Free street parking is available outside the shop.

LOWE ELECTRONICS' London shop is located at 223/225 Field End Road, Eastcote, Middlesex (the telephone number is 01 429 3256). The shop, managed by Andy G4DHQ is easily found, being part of Eastcote tube station buildings and as such being on the Metropolitan and Piccadilly lines (approximately 30 minutes from Baker Street main junction). For the motorist, we are only about 10 minutes' driving time from the M40, A40, North Circular Road (at Hanger Lane) and the new M25 junction at Denham. Immediately behind the shop is a large car park where you can currently park for the day for 20p. There is also free street parking outside the shop.

Although not a shop there is on the South Coast a source of good advice and equipment—John G3JYG. His address is 16 Harvard Road, Ringmer, Lewes, Sussex. (telephone 0273 812071). An evening or weekend telephone call will put you in touch with John.

Finally, here in Matlock, David G4KFN is in charge. Located in an area of scenic beauty a visit to the shop can combine amateur radio with an outing for the whole family. May I suggest a meal in one of the town's inexpensive restaurants or a picnic on the hill tops followed by a spell of portable operation.

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WORLD-WIDE USER

Isn't it about time you switched to Icom?

IC-751

The IC-751 could be called the flagship of the ICOM range as it features 32 memory channels. full HF receive capability, digital speech synthesizer, computer control and power-supply options. The 751 is fully compatible with ICOM auto units such as the AT-500 and IC-2KL. The IC-751 now has a remote push-button frequency selector pad.

Standard features include: a speech processor, switchable choice of J-FET pre-amp or 20dB pin diode attenuator and two VFO's, marker, 4 variable tuning rates, pass band tuning, notch, variable noise blanker, monitor switch, direct feed mixer in the front end, full break-in on CW and AMTOR compatibility.

The first IF is 70.045 MHz. Any XIT and RIT adjustment is shown on the display. The transmitter features high reliability 2SC2904 transistors in a low IMD (-32dB@100W) full 100% duty cycle. For more detailed information on this excellent set, please get in touch with us.

IC-290D/290E

290D is the state of the art 2 meter mobile, it has 5 memories and VFO's to store your favourite repeaters and a priority channel to check your most important frequency automatically. Programmable offsets are included for odd repeater splits, tuning is 5KHz or 1KHz.

The squelch on SSB silently scans for signals, while 2 VFO's with equalising capability mark your signal frequency with the touch of a button. Other features include: RIT, 1 KHz or 100Hz tuning/CW sidetone, AGC slow or fast in SSB and CW, Noise blanker to suppress pulse type noises on SSB/CW.

You can scan the whole band between VFO's/scan memories and VFO's. Adjustable scan rate 144 to 146 MHz, remote tuning with IC-HM10 and HM11 microphones. Digital frequency display, Hi/Low power switch. Optional Nicad battery system allows retention of memory.

Special Offers for 1985: 25 watt IC-290D reduced to £469 and the 10 watt IC-290E reduced to £399. The 70cm version IC-290E is reduced to £529. Take advantage of this money-saving offer.

*AT THE LAST COUNT

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0,000
RS CAN'T BE WRONG

IC-271 & 471

ICOM can introduce you to a whole new world via the world-communications satellite OSCAR. Did you know that you can Tx to OSCAR on the 430-440 MHz IC-471 and Rx on the 2m IC-271.

By making simple modifications, you can track the VFO's of the Rx and Tx either normally or reverse. This is unique to these ICOM rigs and therefore very useful for OSCAR 10 communications. Digital A.F.C. can also be provided for UOSAT etc. This will give automatic tracking of the receiver with digital readout of the doppler shift. The easy modifications needed to give you this unique communications opportunity are published in the December '84 issue of OSCAR NEWS. Back issues of OSCAR NEWS can be obtained from AMSAT (UK), LONDON E12 5EQ.

This range includes the IC-271E-25W, 271H-100W and 70cm versions IC-471E-25W and 471H-75W r.f. output. The 271E has an optional switchable front-end pre-amp. The 271H has a mast-head pre-amp AG-25, and the 471E and 471H use the AG35 mast-head pre-amp. Other options include internal switch-mode PSU's: the 271E and 471E use the PS25 and the 271H and 471H use the PS35. Also available are the SM6 desk microphone and a speech synthesizer that announces the displayed frequency.

Agent: Gordon G3LEQ, or telephone Knutsford (0565) 4040. Please telephone first, anytime between 0900-2200 hrs.
Gordon also sells Yaesu products.

IC-02E, IC-04E

The direct entry microprocessor controlled IC-02E is a 2 meter handheld features include: scanning, 10 memories, duplex offset storage in memory and odd offsets also stored in memory. Internal Lithium battery backup and repeater tone are included. Keyboard entry is made through the 16 button pad allowing easy access to frequencies, duplex, memories, memory scan and priority.

The IC-02E has an LCD readout indicating frequency, memory channel, signal strength, transmitter output and scanning functions. New HS-10 Headset, with earphone and boom microphone, which operates with either of the following:- HS 10-SB Switch box with pre-amplifier giving biased toggle on, off and continuous transmit. HS 10-SA Voice operated switch box, with pre-amplifier, mic gain, vox gain and delay. The IC-2E and 4E continue to be available.

You can get what you want just by picking up the telephone. Our mail-order dept. offers you: free, same-day despatch whenever possible, instant credit, interest-free H.P., telephone Barclaycard and Access facility and a 24 hour answering service.

Please note that we now have a new retail branch at 95, Mortimer Street, Herne Bay, Kent. Tel: 69464. Give it a visit, BCNU.

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ICS ... Data Communication by Radio

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THE "MICROPATCH"

Available for both the VIC-20 and Commodore 64 computers, the "Micropatch" is the simplest way yet to get on RTTY/CW/ASCII. All the hardware and software for a good performance system are included in one easy to install plug-in package. The software is so user friendly and the hardware so easy to install that this must be the ideal way for the newcomer to computers to get on the air with data communication. You can update to either the CP-1 or MBA-TOR (or both) later.

Principal features are:
- —12 Volt DC powered
- —RTTY/CW/ASCII transmit/receive
- —Built in 3 LED tuning indicator
- —All cables, connectors supplied
- —Wide/Narrow receive tones
- —Split screen display with on-screen clock, programmable memories, disc and printer operation
- —Keyboard selectable modes/Baud rates
- —Excellent manual
- —Nothing extra to buy

Two models are available, one for the VIC-20, the other for the Commodore 64.

Price: **£159.85**
p&p £1.50

FIRST CHOICE FOR THE NEWCOMER TO COMPUTER RTTY WHO REQUIRES GOOD PERFORMANCE WITH MINIMUM COMPLICATION

TI-1 TUNING INDICATOR

A superb multiple LED 'panadaptor' type RTTY tuning indicator. Connects in the Speaker lead between your transceiver and terminal unit. Calibrated to within 10Hz.

Prices may vary due to the fluctuating exchange rates.

Send large SAE for full details.

Switchable 170/425/850Hz shift IARU tones. Has its own built in extension speaker.

Price: **£109.25**
p&p £1.50

USA made

PKT-1 PACKET SWITCHING TERMINAL NETWORK CONTROLLER

The first commercially made TNC for the newest mode—packet switching.

Packet switching is the hottest mode in Amateur Radio—permits multiple QSOs on one frequency on VHF or satellites. Both current protocol standards are implemented.

12 Volt DC power input. Just connect between an ASCII terminal and your VHF FM rig and you're on the air.

Price: **£499.00**
p&p £2.50

MBA-TOR

This is the ultimate data communications software for the Commodore 64 and VIC-20 and is the result of the combined efforts of professional software writers on both sides of the Atlantic!

It fully implements AMTOR/RTTY/CW and ASCII modes and works with any terminal unit without external timers or add-ons.

The AMTOR implementation is up to the same standards as the AMT-2 and the split screen user interface is extremely easy to use.

Every operator convenience that you can think of has been built into this program—it really is a masterpiece!

Supplied with manual, overlays and cable on cartridge. TTL level terminal unit interface.

MBA-TOR-64 }
MBA-TOR-20 }

Price: **£69.00**
p&p £1.50

UK made

RM-1 RADIO MODEM

The RM-1 is a ruggedly built, low cost modem which offers the minimum needed to get on the air with conventional RTTY or high speed ASCII data communication. It is designed primarily for use on VHF with AFSK, where signal levels are generally good and QRM levels are relatively low. The RM-1 lacks the extensive filtering and tuning indicators of our other units, but the performance is surprisingly good for the price. It also provides adequate performance on HF, provided you do not want to work extremely weak signals.

Three modes are selectable:
- 170 Hz IARU tones for RTTY use
- Wide shift IARU tones for ASCII data transmission at up to 1200 Bauds (can also be used to demodulate 425, 850Hz shift RTTY).
- CW transmit and receive.

Other features are:
- —Interface and software compatible with the CP-1 and AMT-2
- —Plugs in in place of the AMT-2 for high speed data transmission.
- —Both TTL and RS232 level interfaces are provided
- —Tone reversal switch
- —12 Volt DC input
- —Simple MIC/SPKR/PTT connection to transceiver.

Price: **£89.50**
p&p £1.50

Software is available for VIC-20, CBM-64, BBC-B and Apple IIe computers
£39.00 (p&p £1.00)

THE RM-1 IS FIRST CHOICE FOR THOSE STARTING OUT ON RTTY WITH A RESTRICTED BUDGET AND FOR EXPERIMENTERS WANTING TO SWAP PROGRAMS AT HIGH DATA RATES ON VHF.

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'YAESU' FOR VHF EQUIPMENT—'SMC' YOUR SUPPLIER

NEW

FT209R/FT709R HANDHELDS

KEYBOARD ENTRY—SCANNING COMPREHENSIVE LCD DISPLAY

Two 4 bit CPU's: 10 memories (independent Tx & Rx), reverse/simplex (either) by single key touch, scanning; manual-auto band (full or partial) —memory, clear-busy, skip-select, programmable power save system (10 selectable dwell times). Large LCD ½" Digits + 10 special functions, "any angle". Meter; S/battery condition, VOX. 65 × 34 × 169mm.

INCREDIBLE

FT209R c/w FBA5	£209.00
FT209RH c/w FBA5	£229.00
FT209RH c/w FNB3	£259.00
FT209RH c/w FNB4	£269.00
CSC10	£6.90
CSC11	£7.65

For general accessories see FT203R list.
FNB5, FNB3, FNB4, YH2, MH12A2b, SMC8.9AA, NC15, MMB21

NEW

FT203R & FT703R HANDHELDS

"THUMBWHEEL" TINY HANDHELD

Ultra compact 65W × 34D × 153Hmm, synthesised handheld. Computer aided design and component insertion with chip capacitors and resistors has produced this modern marvel: 2.5W RF (10.8v) (3.5W RF (12V)). It has VOX (for use with YH-2 lightweight headset, and built in 'S'/PO meter. Supplied with tone burst, helical and appropriate case.

FT203R c/w FNB3	£185.00
FT203R c/w FNB4	£190.00
FBA5	£6.50
FNB3	£35.00
FNB4	£40.00
CSC6	£5.75
CSC7	£6.90
YH2	£29.90
MH-12A2b	£14.55
MMB21	£7.65
SMC8.9AA	£8.45
NC15	£57.50

FT2700RH—TWO-IN-ONE

The ultimate 2M and 70cms FM radio built on Yaesu's new die-cast aluminium chassis, allowing 25W output on both bands. Two 4-bit CPU's allow simple operation of the dual VFO's 10 channel memory, with back up. Dual; receiver front ends local synthesisers, IF's and transmitter RF stages gives full duplex capability. Comprehensive scanning facilities allow continuous or skip scanning between memory channels in the same band, combined with a MHz switch for changing from one band to another. Large green LCD gives aesthetically pleasing and easy to read display of transceiver operating status incl. memory and reverse repeater at a glance. The PO/S meter is a distinctive two colour graphical LCD incorporated into the main display.

FT2700RH	Tx/Rx, 2M/70cms, 25W/25W, Full Duplex	£520.00
FT2SYNTH	Voice Synthesiser Module	T.B.A.
OMT2700RH	Owners Manual	£2.65

FT270R/RH—LARGE ON OUTPUT

FT270R/RH is a 2M FM Transceiver built on a unique diecast aluminium heatsink with ducting which allows a continuous 45W output (RH model). The R model is rated at 25W output. The LCD display uses large 5mm digits allowing easy reading of all transceiver functions. Dual 4-bit microprocessors allow quick operation of dual VFO's, ten memories and scanning. Upper and lower band scanning limits can be set as well as monitoring priority memory channel. Optional voice synthesiser is available to give an audible indication of frequency, at the touch of a button.

FT270R	Transceiver 2M, FM, 25W synthesised	£325.00
FT270rh	Transceiver 2M, FM, 45W synthesised	£380.00
FT2SYNTH	Voice Synthesiser Module	T.B.A.
OMT270R	Owners Manual	£2.65

FT757GX THE BIGGEST SELLER

Every item normally sold as an extra is provided as standard, including AM and FM modes, a 600Hz narrow CW filter, iambic keyer with dot-dash memory, 25KHz marker generator, IF shift and width filters, effective noise blanker and AF speech processor . . . . all at no extra charge.

FT757GX	Transceiver General Coverage Rx	£759.00
FC757AT	Automatic antenna tuner	£249.00
FP757GX	Switch mode PSU (50pc duty)	£140.00
FP757HD	Heavy duty PSU (100pc duty)	£179.00
FIF80	Computer interface for PC8001 NEC	£106.20
FIF65	Computer interface for Apple II	£54.80
FIF232C	Computer interface RS232C	£58.65

FT77 THE IDEAL MOBILE

Employing all the latest engineering and manufacturing techniques the FT77 is intended to offer the essential modern operating features in the most economical, reliable and compact HF transceiver available.

FT77	8 Band Rx/Tx 100W output	£479.00
FT77S	8 Band Rx/Tx 10W output	£449.00
FP700	Matching AC PSU	£145.00
FC700	Matching antenna tuner	£105.00
FV700DM	Digital VFO unit	£209.00
MKT77	Marker unit	£10.75
FMUT77	FM unit	£28.35
AMUT77	AM unit	£23.75

GRIMSBY
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Talke Pits, Stoke,
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SCANNING RECEIVER

MS-8400

From S.M.C. the MS-8400 VHF/UHF microprocessor controlled scanning receiver with 40 programmable memory channels, keyboard entry of frequency or command; automatic band search, AM and FM selectable, 4 selectable scanning steps, priority channel, connections for external antenna, DC supply and loudspeaker. Supplied c/w telescopic antenna mounting bracket, etc.

SPECIFICATIONS

Frequency Range:	Low VHF 68,000 MHz ~ 88,000 MHz Mid VHF 108,000 MHz ~ 136,000 MHz High VHF 136,005 MHz ~ 174,000 MHz UHF 360,000 MHz ~ 512,000 MHz
Scanning steps:	5, 10, 12.5 and 25 KHz VMF (10, 12.5 and 25 KHz UHF)
Channels:	40 programmable memories
Modes:	AM or FM selectable
Scan rate:	Approximately 18 channels per second
Scan delay:	2 seconds **Priority sampling:** 4 seconds
Audio output:	1.2 Watts
Selectivity:	Better than -60 dB @ ± 25KHz
Power supply:	DC 12V ~ 16V 0.6A max
Memory backup:	9 volt, battery (PP3)
Antenna:	Telescopic antenna or External
Loudspeaker:	2.5" × 4" oval speaker
Size:	190(W) × 250(D) × 85(H) mm
Weight:	1.7kg

£249.00 inc.

Price includes free carriage

JAY BEAM

			p/p
4 METRES			
4Y/4M	Yagi 4 element	7dBd **£32.78**	£2.65
PMH2/4M	Phasing harness 2 way	**£17.82**	£1.65
2 METRES			
H0/2M	Halo head only	0dBd **£6.53**	£1.50
HM/2M	Halo with 24" mast	0dBd **£7.48**	£1.65
C5/2M	Colinear omni vert	4·8dBd **£86.25**	£2.65
LW5/2M	Yagi 5 element	7·8dBd **£15.53**	£2.65
LW8/2M	Yagi 8 element	9·5dBd **£19.55**	£2.65
LW10/2M	Yagi 10 element	10·5dBd **£25.30**	£2.65
LW16/2M	Yagi 16 element	13·4dBd **£35.07**	£3.65
PBM10/2M	10 ele Parabeam	11·7dBd **£49.45**	£3.65
PBM14/2M	14 ele Parabeam	13·7dBd **£60.95**	£3.65
Q4/2M	Quad 4 element	9·4dBd **£31.63**	£2.65
Q6/2M	Quad 6 element	10·9dBd **£41.40**	£2.65
Q8/2M	Quad 8 element	11·9dBd **£51.75**	£2.65
D5/2M	Yagi 5 over 5 slot	10dBd **£27.60**	£2.65
D8/2M	Yagi 8 over 8 slot	11·1dBd **£37.95**	£2.65
5XY/2M	Yagi 5 ele crossed	7·8dBd **£29.90**	£2.65
8XY/2M	Yagi 8 ele crossed	9·5dBd **£38.53**	£2.65
10XY/2M	Yagi 10 ele crossed	10·8dBd **£43.80**	£2.65
PMH2/C	Harness cir polarisation	**£11.50**	£1.65
PMH2/2M	Harness 2 way 144MHz	**£13.23**	£1.65
PMH4/2M	Harness 4 way 144MHz	**£31.62**	£1.65
70 CMS			
C8/70	Colinear Vertical	6·1dBd **£92.00**	£2.65
D8/70	Yagi 8 over 8 slot	12·3dBd **£28.18**	£2.65
PBM18/70	18 ele Parabeam	13·5dBd **£34.50**	£2.65
PBM24/70	24 ele Parabeam	15·1dBd **£46.00**	£2.65
LW24/70	Yagi 24 element	14·8dBd **£31.05**	£2.65
MBM28/70	28 ele Multibeam	11·5dBd **£23.00**	£2.65
MBM48/70	48 ele Multibeam	14·0dBd **£37.95**	£2.65
MBM88/70	88 ele Multibeam	16·3dBd **£51.75**	£2.65
8XY/70	Yagi 8 ele crossed	10dBd **£45.85**	£2.65
12XY/70	Yagi 12 ele crossed	12dBd **£55.20**	£2.65
PMH2/70	Harness 2 way	**£12.07**	£1.85
PMH4/70	Harness 4 way	**£24.73**	£1.85
23cm			
CR2/23CM	Corner reflector	13·5dBd **£43.13**	£2.65
PMH2/23CM	Harness 2 way	**£32.78**	£1.65

NB: PRICES INCLUDE VAT AT 15%
Carriage extra, mainland rate shown

MORSE EQUIPMENT

			p.p.
MORSE KEYS			
HK703	Straight Key	**£29.35**	£1.20
HK704	Straight Key	**£19.95**	£1.20
HK706	Straight Key	**£16.65**	£1.00
HK707	Straight Key	**£15.50**	£1.00
HK710	Straight Key	**£39.95**	£1.75
HK808	Straight Key	**£49.95**	£1.75
HK711	Key Mounting	**£32.75**	£1.50
BK100	Mechanical Bug	**£24.95**	£1.75
MK701	Single Lever Paddle	**£28.50**	£1.60
MK702	Single Lever Paddle	**£29.75**	£1.60
MK703	Squeeze Key	**£28.95**	£1.75
MK705	Squeeze Key	**£25.65**	£1.75
MK706	Squeeze Key	**£23.50**	£1.75
IKP60	Iambic	**£9.95**	FOC
HK802	de Luxe Brass Key	**£86.30**	£2.00
HK803	de Luxe Brass Key	**£82.65**	£2.00
HK804	de Luxe Brass Key	**£78.25**	£2.00
MHK831	Super de Luxe squeeze & straight key	**£189.00**	£3.50
MORSE EQUIPMENT			
KP100	Squeeze 230/13·8V	**£82.50**	£2.00
KP200	Memory 4096 Multi Ch Mem Back Up 230/13·8V	**£169.50**	£2.50
D70	Morse Tutor (Datong)	**£56.35**	FOC
MMS1	Morse Tutor (M/M)	**£115.00**	FOC
MMS2	Morse Tutor Advanced	**£169.00**	FOC
MICROWAVE MODULES—RRTY EQUIPMENT			
MM2001	RTTY to Video	**£189.00**	FOC
MM4001	RTTY Transceiver	**£269.00**	FOC
MM4001KB	RTTY Tx/Rx keybd	**£299.00**	FOC
MM1001KB	Morse Keyboard	**£135.00**	FOC
MM1000KB	ASCII CW conv c/w keybd	**£135.00**	FOC

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10M FM CORNER

Join the many others who have found that operating 10M FM can be a pleasant alternative to the overcrowded 2M band. The SMC Oscar 2 10M gives you 40 channels, channel 1 being 29.310 MHz and channel 40 29.7 MHz, a power o/p of approximately 4 watts and a receive sensitivity of better than 0.3μV for 12db sinad. Also for your enjoyment when the band opens up, we have incorporated a - 100kHz repeater shift (by using the original panel Hi/Low power switch), so from the car or at home you can enjoy 10M FM.

OSCAR 2 10m FM **£65.00 inc**

ACCESSORIES		**INC**	**P/P**
SMCGP27	¼ Wave vertical	**£29.00**	£2.65
SMCVA27	¼ Wave vertical no radials	**£29.00**	£2.65
SMC11V11S	Glass fibre loaded radials	**£35.15**	£2.65
SMC10SE	10M Mobile whip	**£15.95**	£2.00
RSL-28b	Yaesu 10M mobile whip	**£10.65**	£2.00
SMCGCCA	Gutter mount and cable	**£11.50**	£2.00
SMCSOCA	4M cable assembly 10SE	**£5.65**	£1.50
FLEXI 10	G. Whip mobile 10-80M	**£52.33**	£2.35
MULTI-M	G. whip mobile 10/15/20	**£33.92**	£1.85
FLEXIWHIP	G. Whip 10M mobile	**£19.21**	£1.85
GW BASE	Base for all G. Whips	**£6.90**	£1.00
SMTC3170L	Twin meter SWR bridge	**£17.25**	FOC
SMC100LP30	Low pass filter	**£5.30**	FOC
120406	4 Amp DC power unit	**£14.95**	£2.35
SP55	Extension L/S	**£16.50**	FOC

NB. PRICES INCLUDE VAT AT 15%
and carriage by post or Securior

PUBLICATIONS

	£	P/P
I.P.C. (PRACTICAL WIRELESS)		
Out of Thin Air	1.25	0.75
Passport to Amateur Radio	1.50	0.75
Wires and Waves	3.00	0.90
Are the voltages Correct	1.00	0.50
Introducing R.T.T.Y.	1.50	0.50
R.S.G.B.		
Teleprinter Handbook	11.65	1.35
Radio Communications Handbook	8.95	2.05
Test Equipment (Raio Amateurs)	4.70	1.30
Amateur Radio Techniques	4.75	1.35
HF Antennas for all Locations	4.75	1.35
Guide to Amateur radio (Soft)	2.75	0.75
Radio Amateur Operators Manual	4.25	0.75
1983 Call Book (UK)	1.00	0.80
1984 Call Book (UK)	5.00	0.50
R.A.E. Manual (10th Edition)	2.75	0.75
T.V.I. Manual	1.50	0.50
Morse Code for Radio Amateurs	1.00	0.50
VHF/UHF Manual (3rd Edition)	4.25	2.00
VHF/UHF Manual (4th Edition)	8.50	2.00
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Great Circle Map	1.50	1.20
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Transparent Overlay b0Km Rings	1.00	
Maidenhead Locator Map	1.50	1.20
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S.W.L. Antenna Handbook	8.45	0.75
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UNIVERSAL ELECTRONICS INC.		
Clandestine Confidential S.W.	6.35	0.85
World Press Frequences (RTTY)	6.35	0.85
RTTY Today, Modern Guide	6.35	0.85
MISCELLANEOUS PUBLISHERS		
Amateur Radio (Stokes/Budd)	8.95	1.30
Log Book (Jaybeam)	2.30	1.25
Maidenhead Locator Map	1.50	

Prices include V.A.T. at 15% (where applicable)
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ROTATORS

The finest range: be it Kenpro, C.D.E., Channel Master, SMC has over 19 models to choose from. Ask the experts for the right model to suit your requirements—it should save you money. Write, phone or call.

KR600RC

9502B

FU200	Thro'	3 Core	Light Duty	**£49.95**
KR250	Bell	6 Core	Lighter Duty	**£61.95**
9502B	Offset	3 Core	Lighter Duty	**£69.49**
AR40	Bell	5 Core	Medium Duty	**£115.00**
KR400	Bell	6 Core	Matches KR500	**£109.95**
KR500	Thro	6 Core	Elevation	**£139.95**
AR50	Bell	5 Core	5 Position (AR40)	**£139.00**
KR400RC	Bell	6 Core	Medium Duty	**£132.50**
CD45	Bell	8 Core	Heavy Duty	**£189.95**
KR600RC	Bell	8 Core	Heavy Duty	**£189.50**
HAM IV	Bell	8 Core	Heavier Duty	**£299.00**
KR2000RC	Bell	8 Core	Heavier Duty	**£366.50**
T2X	Bell	8 Core	Very Heavy Duty	**£365.00**
HDR300	Bell	8 Core	Digital Readout	**£699.00**

Control Cable			p.p.
RC5W	5 Way	mtr **£0.44**	£1.90
RC6W	6 Way	mtr **£0.59**	£1.90
RC8W	8 Way	mtr **£0.67**	£1.90
9523	Support Bearing for 9502b F4200	**£19.65**	£2.50
KC038	Lower Mast Clamp for KR400 600 etc	**£12.85**	£2.50

Prices including VAT and carriage, but carriage on accessories is extra unless sent with rotators

£15.95

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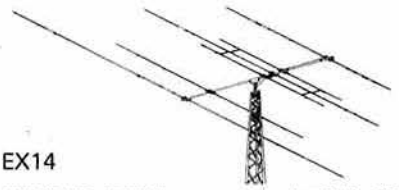
SMC N. Ireland, Bangor
(0247) 464875

HF ANTENNAS

SMC have the greatest range of HF antennas eg. Multi Beams/Quads, over 20 models. Shown below is the sensational new Explorer 14—contact us for full details.



EX14

MULTIBAND BEAMS		Inc VAT	P&P
EX14	Explorer 10-20m	£499.00	£7.50
TH3JNR	3 Ele 10-20m	£298.00	£4.50
TH5Mk2	5 Ele 10-20m	£649.00	£7.70
TH7DXX	7 Ele 10-20m	£755.00	£9.75
TB3	3 Ele 10-20 Jaybeam	£212.75	£5.90
HQ1	Mini Quad 10-20	£199.00	£4.00
G4MH	Mini Beam 1-20	£88.50	£4.50
TA33JNR	3 Ele 10-20 Moseley	£177.10	£6.00
Mustang 2	2 Ele 10-20 Moseley	£177.10	£6.90
Mustang 3	3 Ele 10-20 Moseley	£220.80	£6.90
GQ2E	2 Ele 10-20 Quad	£299.00	£5.90
GQ3E	3 Ele 10-20 Quad	£536.00	£9.20
GQ4E	4 Ele 10-20 Quad	£745.00	£10.00
Hyquad	2 Ele 10-15M dipole 20M	£345.00	£8.00
LP1007	Log Periodic 13-20 MHz	£2195.00	DIST
3Y1015D20	3 Ele 10/15M Dipole 20M	£179.00	£5.95
DB10/15A	3 Ele 10-15m	£[illegible]9.00	£4.80

TB3

MONO BAND BEAMS			
103BA	3 Ele Yagi 10m	£99.00	£3.95
105BA	5 Ele Yagi 10m	£220.00	£3.95
153BA	3 Eli Yagi 15m	£135.00	£3.90
155BA	5 Ele Yagi 15m	£339.00	£5.90
203BA	3 Ele Yagi 20m	£259.00	£4.90
204BA	4 Ele Yagi 20m	£420.00	£7.30
205BA	5 Ele Yagi 20m	£499.00	£9.40
18TD	Dipole Tape 10-80m	£230.00	£2.80

HF5V

HF5R

VERTICALS			
12AVQ	Vertical 10-20m	£54.00	£2.75
14AVQ	Vertical 10-40m	£73.00	£2.75
18AVT/WB	Vertical 10-80m	£119.00	£2.75
18V	Vertical 10-80m taped	£38.50	£2.75
C4	Vertical 10-20m	£89.00	£2.50
SMCHF5V	Vertical 10-80m	£66.50	£3.00
SMCHF5R	Radial Kit for above	£41.00	£3.00
TRAP DIPOLE			
SMCTD/HP	High Power 10-80m	£49.00	£2.65
SMC TD/P	Portable inc coax	£69.00	£2.65
MOBILE			
Tribander	10-20m Slide sw.	£29.33	£2.20
Multimobile	10-20m	£33.92	£1.85
Flexiwhip	10m only	£19.21	£2.20
Extra coils	For above to 160m	£7.25	£1.00
Flexiten	2, 10, 12, 17, 15, 20, 30, 40, 80M	£52.33	£2.35
Bases	For above	£6.90	£1.00

NB: PRICES INCLUDE VAT AT 15%
Carriage extra. Mainland rate shown.

POWER METERS

IN LINE POWER/SWR BRIDGES P.E.P., AVERAGE 1·8-440MHz

The Hansen range covers 30 quality models with top-of-the-line the FS710. This is a flat frequency response, peak envelope power and average in-line wattmeter with many novel features. Notable being the 'power independent' SWR scale—no forward power calibration knob, just direct reading SWR.

FS-500H

		HANSEN		
FS710H	1.8-60 MHz	15/150/1500W	PEP Auto SWR	P.O.A.
FS710V	50-150 MHz	15/150W	PEP Auto SWR	107.80
FS50HP	1.8-60 MHz	20/200/2000W	Interval PEP/SWR	106.70
FS50VP	50-150 MHz	20/200W	Interval PEP/SWR	106.70
FS500H	1.8-60 MHz	20/200/2000W	PEP	81.95
FS500V	50-150 MHz	20/200W	PEP	81.95
FS300H	1.8-60 MHz	20/200/1000W		53.50
FS300V	50-150 MHz	20/200W		53.50
FS200	1.8-150 MHz	20/200W	PEP/SWR Internal Battery	59.35
FS601M	1.8-30 MHz	20/200W	PEP	62.15
FS601MH	1.8-30 MHz	200/2000W	PEP	62.15
FS602M	50-150 MHz	20/200W	PEP	P.O.A.
FS603M	430-440 MHz	5/20W	PEP	62.15
FS210	1.8-150 MHz	20/200W	Auto SWR/ Power Meter	65.50
FS301M	2-30 MHz	20/200W		42.25
FS301MH	2-30 MHz	200/2000W		42.25
FS302M	50-150 MHz	20/200W		P.O.A.
FS711H	2-30 MHz	20/200W	Head/ Display	43.65
FS711V	50-150 MHz	20/200W	Head/ Display	43.65
W720S	130-430 MHz	20/200W	Head/ Display	41.50
FS7	145&(432 MHz)	5/20/(200)	(200W on 144 only)	P.O.A.
FS5E	3.5-150 MHz	20/200/1000W (1KW HF only)		42.75
SWR3E	3.5-150 MHz	20/200/1000W (1KW HF only)		28.75
SWR50B	3.5-150 MHz	Twin Meter		30.50
FS20DL	3-150 MHz	1/10W Dummy/SWR/Power		43.65
FS20D	3-150 MHz	5/20W Dummy/SWR/Power		43.65
FS800	1.8-150 MHz	6/30/150W Dummy/SWR/ Power		130.95
W720S	930 MHz	7.5/15W Head/Display		46.00
		JD		
JD110	1.5-150 MHz	10/100W		16.50
		MIRAGE		
MP2	50-150 MHz	50/500/1500W	PEP	P.O.A.
		SMC		
S3-30L	Mini (CB Style)			9.20
T3-170L	3.5-170 MHz	Relative	Twin Meter	17.25
		WELZ		
SP300	1.8-500MHz	20/200/1KW	SWR/ Power	121.50

T3-170L

NB: PRICES INCLUDE VAT AT 15%
Carriage free by post

SMC-HS

HF, VHF, UHF ANTENNAS MOBILE VERTICALS

SMC-HS Mobile Elements, tabulated below, feature an inbuilt PL259M connector, which mates with the SO239M on any of the four standard mounts. This arrangement is ideal for easy removal—band changes, comparative test, car wash, anti-vandal, system checks from the feed point, portable operation and for ease of garaging etc. All models have fold over bases (either lift and lay or locking collar) except the 78B which has an inbuilt ball in case the mount must be fitted askew.

SMC 78F

GCD

SMC258

GCD

SMC-HS MOBILE ANTENNAS		£	P&P
SMC6P2T/PL	Telescopic 2M PL259 fitting ¼λ	5.75	0.85
SMCT144h	Telescopic 2M ½ wave BNC	10.35	0.85
SMC6P2T/BNC	Telescopic 2M BNC fitting ¼λ	6.90	0.85
SMC2H/PL	Helical 2M PL259 fitting	5.95	0.85
SMC2H/BNC	Helical 2M BNC fitting	6.90	0.85
SMCHS430S	70cm ½ wave BNC 2.5dB¼	8.75	0.65
SMC2QW	2M ¼ wave 0dB¼ 1.6'	2.70	1.85
SMC2NE	2M ⅝ wave fold 3.0dB¼ 4.3'	7.95	2.00
SMC2VF	2M ⅜ wave fold 3.0dB¼ 3.5'	14.66	2.00
SMC78F	2M ⅝ wave fold 4.5dB¼ 5.7'	14.74	2.50
SMC78B	2M ⅝ wave ball 4.5dB¼ 5.6'	14.74	2.59
SMC78SF	2M ⅝ wave short 4.7'	16.95	2.50
SMC88F	2M 8/8 wave 5.2dB¼ 6.5'	22.95	2.50
SMC118M	Colinear 2M 11/8 7dB¼ 9.7'	39.85	2.65
SMC258	70cm 2×⅝ fold 5.5dB¼ 3.1'	26.95	2.00
SMC268E	70cm 2 section colinear 6dB¼	29.95	2.00
SMC358	70cm 3×⅝ 6.3dB¼ 4.7'	20.95	2.00
SMC70N2M	Dual band 2M 2.7dB¼ 70cm 5.1dB¼ (⅝λ & 2⅝λ)	20.95	2.00
SMCHS770	144/432 Duplexer 50W	19.55	1.85
SMC20SE	20M 1.72M 100W PEP	21.50	2.50
SMC15SE	15M 1.72M 130W PEP	16.85	2.50
SMC10SE	10M 1.72M 200W PEP	15.95	2.50
SMC17SE	17M 1.915M 200W PEP	18.75	2.50
SMC12SE	12M 1.915M 200W PEP	16.85	2.50
RSL-28b	Yaesu 10M mobile whip	10.65	2.00
SMCGCCA	Gutter clip 4 mtrs cable	11.50	2.00
SMCSOCA	Cable assembly 4M PL259	5.65	1.50
SMCSOCAL	Cable assembly 6M PL259	5.95	1.50
SMC50CALLR	Cable assembly 5M PL259	6.65	1.50
SMCROL	Rollet, 10mm thick (for above)	1.15	0.50
SMCTMCAS	Trunk mount c/w 6M cable	10.65	2.00
HDTMCA	HD trunk mount c/w 5M cable	16.10	2.00
SMCSOMM	Magnetic base c/w 4M cable	11.95	2.00
SMCSOWM	Adjustable wing mount base	4.95	0.90
SMCGCD	Gutter clip deluxe	5.30	1.50
SMCBSD	Bumper strap deluxe	10.95	1.50
HS88BK	Bumper mounted extension for 144 MHz antennae	23.35	2.00

SOMM

HS770

NB: PRICES INCLUDE VAT AT 15%

Head office
Mail orders
Service & Spares

S. M. HOUSE, RUMBRIDGE STREET, TOTTON, SOUTHAMPTON SO4 4DP, ENGLAND
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RADIO SOCIETY OF GREAT BRITAIN

THE NATIONAL SOCIETY REPRESENTING ALL UK RADIO AMATEURS

Founded 1913 Incorporated 1926 Limited by guarantee A member society of the International Amateur Radio Union

PATRON: HRH PRINCE PHILIP, DUKE OF EDINBURGH, KG

Membership is open to all those with an active interest in radio experimentation and communication as a hobby. Applications for membership should be made to the general manager, from whom full details of Society services may also be obtained.

Headquarters and registered office: **Lambda House, Cranborne Road, Potters Bar, Herts EN6 3JW**
Telephone (Dialling code 77 from London, 0707 from outside London) 59015. Telex 25280 (RSGBHQ G)
Secretary and general manager: D A Evans, G3OUF

COUNCIL OF THE SOCIETY

PRESIDENT: J Heathershaw, G4CHH (Mrs)

EXECUTIVE VICE-PRESIDENT *(To be elected)*

IMMEDIATE PAST-PRESIDENT R G Barrett, GW8HEZ

HONORARY TREASURER P F D Cornish, FCA, G3COR

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D S Evans, PhD, FIM, CEng, G3RPE
H M Holmden, G4KCC
G R Jessop, CEng, MIERE, G6JP
B O'Brien, G2AMV
D M Pratt, BEng, CEng, MIEE, MIERE, G4DMP
G R Smith, BSc, MBIM, G4AJJ
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Zone F *(Region 15)* J T Barnes, GI3USS
Zone G *(Regions 12, 13 and 14)* F Hall, GM8BZX

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Region 1	*(Cheshire, Cumbria, Gtr Manchester, Isle of Man, Lancashire, Merseyside)*	B Donn, G3XSN.
Region 2	*(Humberside N of Humber, North, South, West Yorkshire)*	*(Post vacant)*
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Region 5	*(Bedfordshire, Cambridgeshire, Northamptonshire)*	J S Allen, G3DOT. Tel 0582 21151.
Region 6	*(Berkshire, Buckinghamshire, Oxfordshire)*	F S G Rose, G2DRT. Tel 0494 814240.
Region 7	*(Gtr London S of Thames, Surrey including part of London N of Thames administered by Surrey)*	R Sykes, G3NFV. Tel 0372 372587.
Region 8	*(Kent, East Sussex, West Sussex)*	M Elliott, G4VEC. Tel 0795 70132.
Region 9	*(Cornwall, Devon)*	*(Post vacant).*
Region 10	*(Dyfed, Gwent, Mid Glamorgan, Powys, South Glamorgan, West Glamorgan)*	E J Case, GW4HWR. Tel 0222 810368.
Region 11	*(Clwyd, Gwynedd)*	B H Green, GW2FLZ. Tel 0492 49288.
Region 12	*(Grampian, Highland, Island Authorities, Tayside)*	M R Hobson, GM8KPH. Tel 0796 2140.
Region 13	*(Borders, Fife, Lothian)*	A Givens, GM3YOR.
Region 14	*(Central, Dumfries and Galloway, Strathclyde)*	T G Wylie, GM4FDM. Tel 0505 22749.
Region 15	*(Northern Ireland)*	*(Post vacant)*
Region 16	*(Essex, Norfolk, Suffolk)*	A Owen, G4HMF.
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Region 18	*(Cleveland, Durham, Northumberland, Tyne & Wear)*	*(Post vacant)*
Region 19	*(Greater London N of Thames, Hertfordshire)*	R J Broadbent, G3AAJ.
Region 20	*(Avon, Gloucester, Somerset)*	N F O'Brien, G3LP.

HONORARY OFFICERS

Aerial Planning Panel co-ordinator: (c/o MSO, RSGB HQ)
Audio Visual Library co-ordinator: R G Auckland, G2PA
Awards managers. HF: P Miles, G3KDB; **VHF:** Jack Hum, G5UM
HF manager: E J Allaway, G3FKM
Microwave manager: D S Evans, G3RPE
Observation Service organizer: R J Osborne, G4FJN
Slow morse practice transmissions organizer: M A C MacBrayne, G3KGU
VHF manager: K A M Fisher, G3WSN

Correspondence to RRs and honorary officers should be addressed directly to them (QTHR), not to RSGB HQ

ANNUAL SUBSCRIPTION RATES

Corporate member: UK and overseas (*Radio Communication* by surface mail): **£16.50 UK associate member under 18: £6.20 Family member: £6.60**
UK students over 18 and under 25: £9.30 (Applications should give applicant's age at last renewal date and include evidence of student status)
Affiliated club or society/registered group (UK): £16.50 (including *Radio Communication*); **£9.90** (excluding *Radio Communication*)
(Subscriptions include VAT)

RSGB QSL BUREAU

QSL cards for distribution should be sent to:
Mr E G Allen, G3DRN, QSL Bureau manager, 30 Bodnant Gardens, London SW20 0UD

A list of QSL Bureau sub-managers was published in January issue of *Radio Communication*, and amendments will be published under "Amateur Radio News".

RSGB NEWS SERVICES

Headline News
Telephone 0707 (77 from London) 59312 for a recording of the latest amateur radio news.

GB2RS Broadcasts
Sunday news broadcasts from stations throughout the UK using the callsign GB2RS on frequencies in the 3·5, 7 and 144MHz bands. Details of frequencies, locations and times were last published in the July 1984 *RSGB News Bulletin*.

Amendments are published under "Amateur Radio News". A full schedule can be obtained free on request by sending a large sae to the Membership Services Dept, RSGB HQ.

EDITORIAL

MORSE FOR CLASS B LICENSEES

As was announced by John Butcher, the Parliamentary Under Secretary of State for Industry, on 7 December 1984, Class B licensees will be allowed to transmit and receive morse on frequencies **above** 144MHz from 1 April 1985. They will not be required to pass any test, but will require a Notice of Variation to their licence which they will obtain via the RSGB. This facility represents the happy outcome of negotiations which have been going on between the DTI and the RSGB for some time.

The main reason for these efforts is simply to get more people proficient in morse, which many recognize as a most under-valued mode of communication. The present position seems a good example of a chicken-and-egg situation: until one is proficient in morse one cannot see its advantages; until one appreciates its advantages it is often difficult to generate an interest in learning it.

There are other hurdles. The morse examination is rather different from the RAE. To those who have sat so many examinations during their education that they have become part of their way of life, the RAE is just another examination—and rarely *that* testing if they have a technical background. The morse examination represents a test of practical skill in which few have any previous experience—most start from scratch—and this can come as a bit of a shock to those with a more academic background. Also, the nature of the test itself does not help—being restricted to the sending and receiving of plain text and sets of numbers with no intrinsic amateur radio content—so this experiment should certainly provide additional incentives.

The objectives of the change in licensing conditions are quite simply: to encourage the learning of morse by making it more interesting; to encourage people to learn the morse which is actually used in amateur radio, and to allow people to see in a most direct way the value of morse in getting through when other modes fail. It is hoped that as a result of the experience more people will be encouraged to become proficient in morse, which will have obvious advantages to themselves and to others.

Two features of the change are worth noting. First, Class B licensees must identify themselves by speech at the beginning and end of each transmission. This means, in practice, that they must confine themselves to the all-mode sections of the bands and avoid the cw-only parts, especially on the 144 and 430MHz bands. Second, it must be emphasized that it is an **experiment** which will be reviewed after 12 months. If the facility is seen to be used wisely, and to cause few problems or dissentions, then the RSGB will be in a strong position to press for a continuance of the experiment or for it to be made a permanent part of the Class B licence. On the other hand, if experience shows it generates problems, then the experiment is unlikely to be continued.

Obviously we hope that it will be successful, both for its own sake and because it will strengthen the case for obtaining further facilities for amateur radio.

David Evans, G3OUF

Amateur Radio News

Morse for Class B licensees

Readers are reminded that requests for notices of variation (*Rad Com* January p19) should be sent to: The Secretary, RSGB, Lambda House, Cranborne Road, Potters Bar, Herts EN6 3JW. It would be helpful if applicants could mark their envelopes "Class B Variation". Two first-class stamps, to the value of 34p, **must** be included to cover costs.

No selection process is involved. All current holders of UK Class B amateur radio licences are eligible to receive a letter of variation, and they will also receive a copy of leaflet entitled "Guidelines for Class B licensees using morse".

Name change for Society's headquarters

On 1 January 1985 the name "Alma House", which was the original name of the building in Cranborne Road, was changed to "Lambda House". In the interests of economy the new name will only appear on the Society's stationery when re-ordering of particular batches takes place.

The Amateur Radio Validation Document

The Department of Trade & Industry has advised the Society that some confusion has arisen over the purpose of the Amateur Radio Validation Document. This document is sent by the Post Office, on behalf of the DTI, to all amateurs who have renewed their licences since 1 October 1984. The document was introduced to provide a wallet-sized means of proving current validity of the licence, instead of having to carry the licence itself. It also provides a standardized format for notifying changes of name or address.

Upon receipt, the document should be signed and retained until either a change of name or address occurs or the licence reaches its expiry date. It should not be returned to the Post Office for any other reason.

W0ORE is go

The Public Affairs Director of NASA, Frank S Johnson Jr, has informed ARRL president Larry Price, W4RA, and AMSAT president Tom Clark, W3IWI, of the acceptance of the ARRL/AMSAT joint proposal for Tony England, W0ORE, to operate from space during space shuttle mission 51-F. NASA said: "We (have) determined that the space program and the public would benefit from our co-operation . . . . at this point we see no reason that we will not be able to meet most, if not all, of your objectives . . . . We feel that it is important that you begin arranging for the participation of schools and clubs as outlined in your proposal."

The RSGB has already begun initial planning to extract the maximum benefit from the flight. Mission 51-F, which also includes Spacelab 2, was originally intended to be launched in April 1985, but it is understood that July 1985 now looks a more likely time. More details will be given as they become available.

Additions to the Audio-Visual Library

The following new tapes have been added to the RSGB Audio-Visual Library: ARRL's World of Amateur Radio (VHS and Beta), the Dxpedition to VU7, (VHS and Beta), and Tony England's lecture at the 1984 Welsh Convention, (VHS only). The co-ordinator of the Audio Visual Library is Reg Auckland, G2PA, 80 High Street, Sandridge, St Albans, Herts AL4 9BZ. A list of available material may be obtained from the membership services department at RSGB headquarters, and affiliated clubs and societies may borrow material for use at their meetings. Bookings should be made via G2PA.

Changes to the Memorandum and Articles of Association

The two proposed changes to the Society's Memorandum and Articles of Association, published with the November 1984 issue of *Radio Communication*, were debated at the Extraordinary General Meeting of the Society on 8 December 1984. Both resolutions were accepted at the EGM and have been incorporated into the Memorandum and Articles of Association, a revised copy of which can be obtained by writing to the secretary/general manager at RSGB HQ.

Sir Walter Raleigh

Sir Walter Raleigh is the vessel associated with "Operation Raleigh", which is a worldwide four-year self-training expedition for young people, and you can expect to hear the callsign GB0SWR/MM in operation from the vessel as it circumnavigates the world. A number of rare islands should become operational during the voyage, and further information will be given as and when it becomes available.

Key role for G3DNQ

The Confederation of Information Communication Industries (CICI) has announced the appointment of Donald MacLean, G3DNQ, as deputy chairman of its board. CICI was formed on the initiative of the Cabinet Official's Information Technology Advisory Panel in November 1984, with the backing of 30 organizations which represent the information and entertainment industries of Britain. Mr MacLean is deputy chairman of Thorn-EMI Video Ltd: he is also president of the recently formed Federation of Associations and Companies of the UK Computer Industry (Federation Against Software Theft).

Raised in the House

On 27 November 1984 Stefan Terlezki (MP for Cardiff West) asked how much money was spent each year in combating abuse of the radio spectrum, and whether the amount was increasing. In reply, Mr John Butcher said that in 1983-4 about £1·3 million had been spent on combating the illicit use of radio. It was not clear whether abuse was increasing or decreasing, but complaints of radio interference fell from a peak of 73,000 in 1982 to 55,800 in 1983, and there was likely to have been a further decline in 1984. On the other hand, complaints concerning pirate broadcasting had increased, and correspondence concerning abuse of cb radio continued at a serious level.

On 30 November 1984 Mrs Angela Rumbold (MP for Mitcham & Morden) asked the Minister of State for the Home Department to look urgently at the present system of regulation and licensing of local radio. She mentioned the manner in which several pirate radio stations were operating outside the law, and proposed the concept of an "unprotected broadcaster". In reply, Mr David Mellor explained the basis on which broadcasting services had developed in the UK, and the engineering and legal considerations which had to be taken into account. He said that the Government could not license pirate broadcasting stations as they stood, and added that the way forward was to look to the development of community radio as a way of encouraging the development of community identity. The Government would seek to remove the obstacles and create the opportunities for community radio to develop.

Happy birthdays

The Wireless Institute of Australia which is the oldest national radio society in the world and is one year senior to the RSGB, celebrates its 75th anniversary in 1985.

The July 1985 issue of *Radio Communication* will mark the diamond anniversary of the RSGB's journal, first published as *T&R Bulletin* in July 1925.

Short Wave Magazine celebrates its 50th birthday this year.

Packet radio news

The board of directors of the ARRL has unanimously voted to adopt the Packet Radio Development Program. This is essentially a document by the senior technical editor of *QST*, Paul Rinaldo, W4RI, which sets out actions which ARRL could take in order to assist the development of packet radio. In practical terms, this means that the ARRL have approved the AX25 link-layer protocol, and their headquarters station W1AW will be configured for packet radio teleport operation. Tests with other teleports will be conducted under a special temporary authority to be granted by the

FCC. Various other provisions are also included.

The Sydney Amateur Digital Communications Group in Australia is planning a packet data highway between Sydney and Melbourne. Most of the group report that they are using V2 to make the VADCG TNC compatible with the TAPR TNC and to provide AX25. VK2AYD reports that he is operational on 14,125kHz at 0900gmt on Sunday mornings.

Region 9 election

Nominations for the position of Region 9 representative have been received in respect of Messrs A H Hammett, G3VWK, and E D P Pether, G4VEZ.

Not later than 11 March 1985, members residing in Region 9 may vote for one candidate in the form prescribed below. Completed ballot forms, which must reach RSGB headquarters by the above date, should be enclosed in a sealed envelope marked "Region 9 election", and addressed to "The Secretary". The composition of Region 9 is given on page 98 of this issue.

FORM OF BALLOT PAPER

I,.....
being a fully-paid-up corporate member of the RSGB residing in Region 9 wish to record my vote in favour of
Mr.....
as representative for Region 9
Signed.....
Callsign or BRS No.....
Address.....
.....

Raynet zonal representative elections

The Raynet Committee advises members that the undermentioned are declared as zonal representatives for a period of three years from January 1985.

Zone	Name
1 North East	Mrs S B Jebb, G6AJF
2 Yorks & Humberside	Mr I Shaw, G3KWT
3 East Midlands	Mr G A Griffiths, G3STG
4 East Anglia	Mr H W Holmes, G4TWT
5 Home Counties	Mr R P Jeffries, G4KAR
7 South West	Mr W J Colclough, G3XC
9 West Midlands	Mr D J Lankshear, G3TJP
12 Scotland	Mr D E Garrington, GM3RFA

No valid nominations for Zones 8 or 11 were received before the closing date. Mr C W Trotman, GW4YKL, has therefore been co-opted as the representative for Zone 8; in Zone 11 a co-option is currently pending.

News from the USA

The ARRL has continued to oppose the petitions presented by two American organizations who wish the 200MHz band to be shared with land mobile radio services. The FCC has now stated "The spectrum requirements for this band are currently undefined. However, ... a working group is developing an allocation plan for the 220-225MHz band. Therefore we will maintain all three allocations—amateur, fixed and mobile—pending the results of this effort. It is noted that no assignments will be made to the fixed and mobile services until the allocation and service rules are finalized". In its opposing comments to the petitions, ARRL has noted that there is ongoing need for long-range planning concerning the 216-225MHz part of the radio spectrum.

The FCC has issued a Notice of Proposed Rule Making which proposes to allocate the 1,900-2,000kHz band to the non-government radiolocation service on a primary basis; this is apparently because of an anticipated extension to the existing a.m. broadcast band. ARRL has filed a motion with the FCC to hold this Notice in abeyance pending the resolution of a related ARRL petition which asked the FCC to initiate an enquiry into the present use of the medium frequency band in the USA by non-government radiolocation users. The ARRL said that "the petition was filed . . . . because we have noted repeated instances of claims by licensees and users of non-governmental radiolocation stations of the need for additional spectrum above 1,800kHz. There are several cases of claims of entitlement to frequency bands now occupied by amateur radio operators made by radiolocation users without the slightest attempt to establish technical need. The FCC appears willing to acquiesce to these claims, which are unbacked by technical justification. This assertion is all the more apparent now that FCC has issued its proposal, as stated above, to allocate 1,900-2,000kHz to non-government radiolocation users".

Courses

The following 10-week courses will be held at the Canterbury College of Technology, New Dover Road, Canterbury. The instructor will be Derek Bradford, G3LCK.

Morse course, commencing 18 February.

RAE revision course, commencing 25 February.

Details from G3LCK, or Derek Buckley, G4OQD, at the college.

Sidebands

A well-known London railway station recently installed a state-of-the-art lighting system, with full automatic control using sensors to detect the level of ambient light. Unfortunately the sensors were so placed that as soon as darkness fell and the artificial lights were turned on, the system thought that dawn had come and switched the lights straight off for a programmed 6h in the middle of a Friday-night rush hour. Back to the drawing board . . . . .

A spread-spectrum frequency-hopping 144MHz beacon is now on the air in the USA: start and stop frequencies are 144·5 and 147·7MHz, with a 25kHz-spacing pseudo-random pattern.

Any radio amateur in the Midlands who is a freemason and would be interested in founding a Midlands amateur radio lodge, is asked to contact Mr J G Roberts, G4TIB, 8 Darley Abbey, Derby.

Mobile Rallies Calendar

All information for inclusion in this column must be sent to the editor, not to RSGB HQ.

10 February
Bury RS "Hamfeast", Mosses Centre, Cecil Street, Bury, Lancs. Only 30min from M66 junction 2. Talk-in on S22 (G3BRS/G6BRS). Doors open 11am. Details G1BWN, QTHR.

10 March
Northern ARS Association Exhibition & Mobile Rally. Central Hall, Belle Vue, Redgate Lane, Longsight, Manchester M12 4WH. Details G8NRF, QTHR.

10 March
Pontefract & DARS Components Fair. For the home-constructor and d-i-y enthusiast. Components, surplus equipment and antennas; no new black boxes. Open 11am-4.30pm, Carleton Community Centre, Pontefract, on A1 between Darrington and Pontefract. Details G4ISU or G4KMW, both QTHR, tel 0977 792784 or 792654.

24 March
White Rose Rally, University of Leeds. Details G4NDU, QTHR, or Box 73, Leeds LS1 5AR.

21 April
Lough Erne ARC Mobile Rally. Killyherten Hotel, Enniskillen. Details GI4CZW, tel 0365 24500.

28 April
Humberside Radio Rendezvous, Grange Farm Hobbies Centre, Franklin Crescent, Scunthorpe. Contact Ida G4ZGJ, tel Scunthorpe 732268.

28 April
Southend & DRS Mobile Rally, Rocheway Centre, Rochford, Essex. Talk-in on S22, 145·550MHz fm. Details from G4DEZ, tel 0702 617749; or G4RDS, tel 03745 50494.

5 May
Swansea ARS Mobile Rally, Patti Pavilion; adjoining St Helen's CC Ground on Swansea-Mumbles road A4067. Open 1030am-5pm. Talk-in on S22, GB2SWR. Details GW4HSH, QTHR, tel 0792 404422.

6 May
Mid-Cheshire ARS Mobile Rally, Winsford Civic Hall, High Street, Winsford, Cheshire. On A5 eight miles from M6 junction 18. Details G4VOH, QTHR, tel 06065 4719.

12 May
Swindon Radio & Electronics Rally. Oakfield School, Marlowe Avenue, Swindon, Wilts. Open 1030am. Talk-in on 144MHz (S22) and 432MHz (SU8/GB3TD). Details G8SFM, QTHR, tel 066689 307.

19 May
Northern Mobile Rally. Great Yorkshire Showground, Wetherby Road, Harrogate. Open 11am. Caravan site at showground. Details H. Moore, 269 Leeds Road, Ilkley, West Yorks LS29 8LL.

26 May
East Suffolk Wireless Revival. Details later. Info G4IFF, QTHR, tel Ipswich (0473) 44047.

26 May
Maidstone YMCA ARS Biennial Mobile Rally. Y Sports Centre, Melrose Close, Cripple Street, Maidstone. Details G3ISD, tel 0795 77431.

2 June
Spalding & DARS Mobile Rally. Talk-in from 10am. Details Betty Whitley, G4ZGT, 45 Exeter Drive, Spalding, Lincs.

9 June
Elvaston Castle Mobile Rally, Elvaston Castle Country Park, 5 miles SE of Derby on B5010. Organized by the Nunsfield House ARG. Open 10am. Talk-in GB2ECR on 144 and 432MHz. Details G4PZY, tel Derby (0332) 767994; G4CTZ, tel Derby (0332) 799452; or club hq tel 0332 755900. Trade enquiries G4HIJ, tel Ashbourne 43241.

16 June
Denby Dale Mobile Rally, Shelley High School, Nr Skelmanthorpe, Huddersfield. Talk-in on S22 and SU8. Open 11am. Details G3FQH, QTHR, tel 0484 862390.

30 June
Rolls Royce ARC Mobile Rally, RR Sports & Social Club, Barnoldswick, 10 miles N of Burnley, six miles S of Skipton, between A56 and A59. Details G4ILG, tel 0282 812288.

30 June
Buxton Mobile Rally. Pavilion Gardens, Buxton. Details G6MIF, QTHR, tel 0298 6174.

30 June
28th Longleat Amateur Radio Rally, Longleat Park, Warminster. Details G4FRG, QTHR, tel 0272 848140.

21 July
Cornish RAC Rally, Cornwall Technical College, Redruth. 10am–5pm. Talk-in on S22. Details G4RVP, tel Penzance 763549.

21 July
McMichael ARS Mobile Rally, Bells Hill, Stoke Poges, Nr Slough. Talk-in on S22 and SU8. Open 11am. Details G8IHF, c/o McMichael Ltd, Wrexham Road, Slough, Berks.

21 July
Anglian Mobile Rally, Stanway School, Colchester, Essex. Talk-in on 144MHz. Open 10am–5pm. Details G6HQI, 26 Pondfield Road, Colchester, tel 0206 860403.

28 July
Scarborough ARS Rally. The Spa, Scarborough. Open 11am. Talk-in on 144MHz (S22), 432MHz (SU8), and RB0, GB3NY. Details G4YWR, QTHR, ex-G6CXK, tel 0723 360587.

25 August
18th Preston Annual Rally, Lancaster University. Details later.

15 September
Peterborough Mobile Rally, Wirrina Sports Stadium, Bishops Road, Peterborough. 10.30am–5pm. Details G3EEL, tel Peterborough 62881 after 6pm.

Special Event Stations

All information for inclusion in this column must be sent to the editor, not to RSGB HQ.

2–3 February, GB0ATC
Operated at the 384 Sqn (Mansfield) ATC to commemorate the 44th anniversary of the ATC. All bands. Details G4TGB.

1 March, GB2SDD
To celebrate St David's Day, BSC Port Talbot ARS will operate on all bands from midnight to midnight. Special QSL cards will be sent. SWL reports will be acknowledged; ircs appreciated. St David's Day Award available for contact with GB2SDD and (a) five other Welsh stations during February and March (for residents outside UK), and (b) 10 other Welsh amateurs during February and March (for UK residents). Copies of logged entries, plus cheque or postal order to value of six ircs payable to SDD Station; should be sent to Mr R R Jones, GW4HOQ. "Bryn-Ynys", Strawberry Place, Morriston, Swansea, W Glam SA6 7AG.

1–31 March, GB2HW
To mark the 700th mayoral anniversary of High Wycombe. Active on all bands. Details G2DRT.

7, 9, 25 April GB2GWR
Operated from the main entrance of Temple Meads Station, Bristol, to celebrate 150 years of the Great Western Railway. From 10am to late, on 144 and 432MHz ssb, and 3·5, 7 and 147Hz ssb. Some cw may be included. Details G4ZCK, tel 0272 712675.

Other Events

All information for inclusion in this column must be sent to the editor, not to RSGB HQ.

3 March
Doncaster Amateur Radio Show, Doncaster Institute of Higher Education Annexe, Ellers Road, Bessacar. Opens 11am. Admission 30p. Talk-in on S22. Details G8XTU, tel Doncaster 531365.

23 March
RSGB National VHF Convention, Sandown Park Racecourse.

13–14 April
RSGB National Convention, National Exhibition Centre, Birmingham.

4–6 June
Scotelex '85, the 16th Annual Electronics Exhibition & Convention, organized by the Institution of Electronics. To be held in the Exhibition Hall, Royal Highland Society, Ingliston, Edinburgh EH28 8NF. Details from Exhibition Organizer, Institution of Electronics, 659 Oldham Road, Rochdale, Lancs OL16 4IE, tel 0706 43661.

OBITUARIES

The Society records with regret the deaths of the following radio amateurs:

Mr T G Caldicott, RS43357
Timothy Caldicott died in July at the age of 23. Illness prevented him taking the RAE, but he obtained great pleasure from listening when there was little else he could do.

Mr G W Flook, G1DRD
George Flook died on 23 October 1984. He had been interested in radio for many years before obtaining his licence. A Devonian by birth he had lived in the Northeast for many years.

Mr I Gane, G4NEF
Ian Gane died on 14 October 1984. He was president and a founder member of the Radio Club of Thanet. Ian played a very active role in club affairs and was always available for advice to old-timers and newcomers to the hobby alike.

Mr C M Gillman, G3BPN
Charlie Gillman died on 18 October 1984, at the age of 63. Having served in the RAF as a wireless operator, he was a "natural" CW man.

Mr E D Sykes, G4JRR
Mr Sykes, who died in December, was active on all bands, and was a member of the Chiltern ARC.

Also:

Mr D E Bingle, RS26537;
Mr D Dixon, RS85062, on 17 December 1984;
Mr Hickinbotham, G4AQC;
Mr E F Jacobs, G3XUK, on 7 September 1984;
Mr J MacWhannell, G6UBV, on 19 August 1984;
Mr L A Nicholas, G3FHX;
Mr W J Perkins. G3PFL;
Mr M Seaman, G8TRW;
Mr F J Wilson, RS84903;

The legendary Dr Mahon Loomis

The first radio amateur?

by R. F. FARLEY, G3SSJ*

DR MAHON LOOMIS, a Washington DC, USA, dentist who was a keen spare-time student of electricity, became obsessed with the idea of signalling without wires. After much experimental work at the expense of neglecting his family and dental practice, he gave a public demonstration of a system he had developed in 1866—before Marconi was born, and many years before the classical experiments of Hughes and Hertz. At that time electrical science was still in its infancy, and knowledge was confined to academic circles where it could be understood. Clark Maxwell had just published his famous paper on the dynamical theory of the electro-magnetic field, postulating the existence of radio waves, but it is most unlikely that Loomis would have even heard of it.

He set up two stations on peaks in the Blue Ridge mountains of Virginia, some 17 miles apart and about 2,000ft high, and from each station a kite was flown on a copper wire 600ft long. Each kite carried a 15in square of copper gauze connected to its wire, and earth connections were made by laying a coil of copper wire in "a wet place". A galvanometer was connected between each kite wire and earth, the equipment at each station being identical. There was one important dissimilarity; at the sending station the connection between the glavanometer and the kite wire was only made at a carefully pre-determined time, while the galvanometer at the receiving end was permanently connected.

Three connections were made at the transmitting station at half-minute intervals, and the galvanometer needle at the receiving station was seen to deflect at these precise times. After an interval of 5min the procedure was reversed, and duplicates of the signals were received at the former sending station. No telegraph key was used, the connections being made by hand. One cannot help wondering about leakage problems and the risk of shock from the accumulated static!

Loomis claimed that his signals were just as distinct as those travelling over a metallic conductor, but two days elapsed before the system worked, and even then it went suddenly dead after three hours. Nevertheless he records in his diary that "a solemn feeling seemed to be impressed upon those who witnessed the little performance, as if some grave mystery hovered there around the simple scene".

Letters patent No 129971 was granted to Loomis on 30 July 1872 by the United States Patent Office. It bears the title "Improvements in Telegraphing". In his specification he claimed to use "natural electricity for signalling without wires by using the earth as one conductor and the continuous electrical element far above the earth's surface as the other". He goes on to describe a scheme for using towers on mountain peaks, where the atmospheric electricity is found to be more abundant in moisture, heated air currents and clouds. The towers would be connected by insulated wires to suitably-located telegraph offices at lower levels. Loomis believed his system capable of development for intercontinental communication, and said so in his patent application.

Loomis seems to have had more than his share of ill fortune. In 1869 he succeeded in getting the backing of a group of Boston business men, but the great financial collapse known as "Black Friday" ruined the venture. For a time he returned to dentistry to replenish his funds, and in 1871 he started a new company in Chicago—but the great fire ruined his backers before any agreements were finalized.

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Considerable government aid had been given to Samuel Morse and other line telegraph pioneers, and Loomis decided to apply to Congress for financial assistance. In 1873 a Bill was finally passed, incorporating "Loomis Aerial Telegraph Company", and Loomis had asked for a grant of $50,000 in order to bring his system to a state of commercial viability. There was much political buck-passing, and one senator's words were typical when he said: "It is either a case of moonshine or it marks a great epoch in the progress of invention. I do not undertake to express an opinion on it. I leave it to the committee on patents". However, one Senator Bingham spoke in Loomis' favour, saying that: "even if nothing came of the ideas it would at least show that the House was willing to consider honest endeavour and not treat it with scorn". But alas, Loomis again returned to his dental practice without the money, after suffering much ridicule from the popular press.

Loomis died in 1886, a sad and forgotten man. Shortly before his death he told his brother George that he knew that he was considered to be a crank. He could have discarded his system altogether and made a success of dentistry, but he was convinced that in future his discoveries would be considered as important as those of Columbus, for had he not found his own new world in nature, guided by the hand of the Almighty? One day congressional records would give evidence of the credit that was due to him.

He further confided that he was remorseful for having neglected his family while he pursued the thing he considered to be the greatest concept that ever occupied a human mind. Others would use his discovery and enjoy the wealth and honours but he only wanted his grave to be marked by a rosebush, where song birds would rest—he even believed he would hear them singing.

It is now nearly 100 years since Loomis died, but it was not until the middle of this century that any serious attempt was made to re-evaluate his work. The culmination of this was that a tribute to him was read into the United States Congressional Record. Since then, a number of writers have recognized that he was the first person to propose electrical communication through space without wires by means of an electrical field. Perhaps, most significantly, it is now accepted that he was the first to demonstrate and apply for a patent and to form a company to exploit a system of radio telegraphy and to think of using an elevated radiator or antenna.

For many years it was considered that Loomis' system did not use high frequency alternating currents; certainly such currents were not known about at the time. However, in the light of more recent knowledge (as implied in the foregoing paragraph) it is generally believed that Loomis was generating and detecting radio waves without knowing it, but believing that the phenomenon was due to "connecting the opposite polarity of celestial and terrestrial bodies of electricity and relying upon the disturbances produced in the electro-opposite bodies of earth and atmosphere for telegraphic purposes" (Patent dated 30 July 1872).

Let us reconsider the demonstration of 1866 with this in mind. The same simple arrangement of galvanometer, kite antenna with copper mesh and earth connections were used at both stations. Both stations would have approximately the same amount of inductance, capacitance and resistance; therefore both would be resonant to approximately the same frequency.

Under favourable conditions an elevated wire would become highly charged with static (Loomis' "celestial electricity") and the accumulated static, on connection, would be discharged to earth via the galvanometer. The high instantaneous current would excite the circuit to produce a train of damped oscillations in the manner of a spark transmitter, decaying exponentially but also producing high frequency radiation from the kite wire, and at the natural resonant frequency of the system.

At the receiving end, it will be recalled, the earth connection was made by a coil of copper wire lying "in a wet place", and some two days had elapsed before the system worked. It is very likely that partial rectification had taken place in the junction formed between the copper (now partly corroded) and earth. This would certainly detect the signals from the receiving antenna but another possibility comes to mind: that of detection by coherence.

The earliest radio detectors were usually coherers, at least those in commercial use. The invention is usually attributed to Dr S. Varley and Dr Edouard Branley, who brought the device to some degree of perfection. The principle is very simple: if two conducting surfaces are brought into light contact, the resistance will be high; in the presence of radio frequency signals, the resistance falls to a relatively low value. This was the effect that Dr Hughes had stumbled upon with his nail detector, when he, too, was unaware that he was using high frequency emf waves. Later coherers used tubes of iron filings with metal inserts at the ends, and later still they had micrometer adjustments to enable optimum sensitivity to be found. From the foregoing it would seem quite possible that coherence was taking place in the earth connections of Loomis' system. Thus his system is not electrically very dissimilar to that of Marconi 30 years later.

It would be very interesting to repeat these experiments using modern instrumentation, but would-be experimenters should beware. In 1753 the St Petersburg experimenter Richtman was experimenting with wire-carrying kites in a thunderstorm and was killed by a sudden discharge, which produced a spark 7ft long! Even Dr Frankenstein would have hesitated at this!

Most nineteenth-century researchers working in laboratories were academics, and their interests were confined to the physical behaviour of their subject. They were not generally interested in using radio frequency waves for communication, and by 1900 many of them had turned their attention away from radio wave phenomena to other branches of physics.

Unlike these men, Loomis was a genuine amateur, but his vision extended beyond this into the creation of a public service. But the world had to wait 35 years for Marconi to come along and build a practical communications system from the work of the researchers; a system such as Loomis had dreamed of all those years before.

Although the young Marconi arrived at just the right time, he was hotly criticised by Giuseppe, his father, for "wasting his time and money on a useless idea". On the other hand he was lucky enough to have a sympathetic mother and good connections in England, plus the charisma that attracts investors and inspires confidence. He was also very determined, with great singularity of purpose; but then, unlike poor Loomis, he did not have to concern himself with people's molars!

Loomis was forgotten for a long time after his death. He was a man groping in the dark, and living in an age when cranks and charlatans abounded, which makes it easier to forgive the cynicism of the time.

In 1901, 35 years after the Loomis demonstration, Marconi received the famous letter S in Newfoundland from a giant experimental station in Cornwall. His detector was an Italian Navy coherer, his antenna was a wire borne aloft by a kite *á la Loomis*.

It would be nice to think that on the anniversary of the Loomis demonstration the song-birds in Dr Loomis' rosebush are joined by a few celestial trumpets. Also, if 907 Pennsylvania Avenue, where he had his dental practice, still exists, surely it is time to put up a memorial plaque. There should, in my opinion, at least be some commemoration by the ARRL in their headquarters, for was not Dr Loomis the first radio amateur?

Members' Mailbag

TRAPPED DIPOLE

Sir—Recent correspondents may not be aware of an earlier description of a "trap" dipole, long before it found common use in amateur circles. In the *Radio Engineers Handbook*, by F E Terman, published by McGraw-Hill in 1943, there is an identical antenna referred to as a "multi-frequency antenna", complete with a description and drawing showing the "trap" dipole as we know it today.

F E Terman makes reference to an article by Howard K Morgan, "A multi-frequency tuned antenna system", *Electronics*, Vol 13, August 1940, p42, which appears to be the origin of the concept used.

Unless W3DZZ was also Howard K Morgan, then it would seem that amateurs had less to do with the original ideas than many would think.

O Jackson, G3LKZ

PRIDE OR PREJUDICE

Sir—It saddened me to read the letter by Vincent Taylor in your November issue.

As one of the original participants in the events of 6 June 1944, I do not consider that the marking of the events some 40 years later could in any way be considered "nationalist jingoism".

It might be considered to be too much of a cliché to say the obvious, that these events contributed very much towards the freedom of our country which, in turn has given Mr Taylor the privilege of being able to communicate by amateur radio.

Come on Mr Taylor, let us have one moment of glory—we certainly didn't have it 40 years ago!

Leslie Stockdale, G4SFL

AERONAUTICAL MOBILE

Sir—May I once again make a plea for aeronautical mobile. Past objections were based on a probability of widespread Band 1 and Band 3 tvi due to harmonics of high-power hf transmitters. I have no tvi problems with my hf, vhf or uhf gear when operating within a few feet of my tv antenna.

There are many amateurs who are also glider pilots, and it would be quite useful if operation on 430MHz and higher were permitted, even with a 3dBw (2W) power limit. Such operation would be of interest to all amateurs, but especially, I hope, those with an interest in direction finding.

D W McQue, G4NJU

The original objections to the use of amateur radio in aircraft were based on the possibility of interference to the aeronautical mobile service. The force of these has somewhat diminished with the improvements in equipment design which have taken place over the years. The topic of aeronautical mobile licensing will be raised with the DTI during 1985 as part of the review of the amateur licence which will take place.

CAN YOU HELP?

Sir—I wondered if I could enlist the help of other purchasers of the TET HB33M antenna.

I obtained a data broadsheet for the antenna before purchasing it, which gave the bare minimum in the matter of specifications, but enough in the way of gain and f:b ratios to persuade me to obtain one. I naturally expected full performance data with the antenna, and information as to how it could be adjusted, eg, to optimize for cw or phone usage. Alas! only assembly instructions came with the antenna, and subsequent communication with the manufacturers via the importers merely elicited the fact that even these were in error. No further performance data or tuning instructions were forthcoming, and a series of attempts to obtain such information proved totally frustrating: all enquiries were met with a deafening silence on the part of the manufacturers. Moreover, such measurements as I have been able to carry out are far from encouraging, particularly in the matter of f:b ratios.

Would anyone who has carried out reliable measurements on this antenna, and has any information on adjustment of the antenna, be good enough to write to me—naturally, postage will be refunded.

Lloyd Kemp, G4DXL

10MHz OPERATION

Sir—The new licence was explained in your October issue, but the 10MHz situation is unusual. The licence shows that all the normal modes are permitted, including telephony. There is, it seems, an IARU Region 1 recommendation to use only narrowband modes like cw, rtty, etc. It is the etc that is of interest. When is a narrowband mode not a narrowband mode? I would have thought ssb was not narrowband. On three occasions I have heard two three-letter G4s and an early G3 working a VK on the band on ssb; I dont sling mud, so I will not reveal the calls. I believe they are outside the Region 1 recommendation.

The 10MHz situation should not exist. The licence should be the last word, and if it's wrong it should be changed. Is the 10MHz position just another administrative cock-up to go with UK cb, radiophones, garage-door openers, and so on? The authority's record is not good, is it! What about unlicensed operation? A local station was outbanding running nearly 1kW! They told him he was a naughty boy and gave him back his radio.

So it goes on. Let's get it right on 10MHz, after all we are sharing it with others. I await your comments with interest.

Peter Lewis, G4VFG.

Mr Lewis appears to have missed the point slightly with respect to operation in the 10MHz band. First, UK amateurs only have access to the band because of work done by the RSGB: the UK was one of the first countries in the world to release it to radio amateurs. At present the amateur service has secondary status and expects to assume primary status in 1989. As far as the licence is concerned, the types of transmission which are permitted in the 10MHz band are the same as those which are permitted in other hf bands—in other words, using ssb in the 10MHz band is not breaching the terms of the amateur radio licence.

However, there is a voluntary agreement within IARU Region 1 to use the 10MHz band for morse and rtty only. There are two main reasons why this agreement is felt to be important: one is that the band is only 50kHz wide (which makes it the smallest of all amateur allocations) and the other—which is related to the first—is the desire to see that no interference whatsoever is caused to the primary user. In the 10MHz band this is the fixed service. The voluntary restrictions to morse and rtty modes only are in the best long-term interests of the amateur service.

There is no suggestion that an "administrative error" has occurred, and it may be of interest to Mr Lewis and others to draw a parallel with the voluntary band plans which apply to virtually all amateur bands. These are in no sense mandatory, and there is no legal obligation to abide by them: however, it is in everyone's interests to act as though they were mandatory. There is no legal obligation to confine oneself to morse and rtty in the 10MHz band; but, here again, it is in the general interests of the amateur service if everyone does.

LOCATOR LINES

Sir—I would like to pick up a couple of points raised in articles by John Morris GM4ANB about locator systems in your October 1984 issue. I have been an active proponent of his new system since his article in your October 1980 issue, and I look forward to its implementation in 1985.

First, John rather scornfully refers to programs which he says "claim to convert old locators to new ones". Well, it becomes perfectly obvious to anyone writing such programs that the two system grids do not coincide, and I do not think that anyone is trying to mislead, as John seems to imply. To put the matter in perspective, the maximum error possible is in fact only plus or minus one smallest square in longitude; as the system grids do coincide exactly in latitude. This error is hardly important over dx distances, and is perfectly reasonable as a first estimate until the exact location can be checked.

Second, and more important, is the question of the earth's radius, which John raises in a separate article. It would be very helpful if we can agree on a figure, in order to end quibbling over dx distance records etc. The alternative is to get involved in complex calculations by taking full account of the earth's true shape. One way mentioned is to take the average of the polar and equatorial radii, and this gives a figure of about 6,367·6km. However, this is rather like calculating the average of the heights of a hamburger stall and of the NatWest Tower, and assuming this to be the average height of buildings in London! Another way of doing it would be to derive the radius from the average of the Equatorial and Meridional circumferences; ie, put an imaginary tape measure round the equator and then round the poles. This gives a figures of about 6,373·0km, and although it is a better one, it is still not entirely valid for similar reasons. The best way, I think, is to calculate the radius of a perfect sphere which has the same volume or the same surface area as the earth, using formulas dimly remembered from schooldays. These both give answers of about 6,371·05km, which falls rather neatly in-between the two previous figures. It is interesting to note that 6,371km is the figure used in the original LOCATE program written by G3USB, (*Rad Com* February 1971).

I therefore formally propose that for all practical purposes we treat the earth as if it were a uniform sphere of radius 6,371km. This gives very acceptable results in practice; the example quoted of ZK02a to YT75j comes out at 903·2km, which is only 1km different from the true distance calculated by John.

All the appropriate figures can be obtained from any good atlas, and anyone fancying a spot of heavy bedtime reading may be interested in Ordnance Survey leaflet No 72, *Transverse Mercator Projection*, which includes routines written in Basic.

Richard Sterry, G4BLT (IO93gp)

My thanks to G4BLT for raising some interesting points. He is absolutely right in that the maximum error of a "locator conversion" program is one in the smallest square, but an error is an error! It should be clear to any program writer that the two systems do not coincide at the sub-square level. Nevertheless, I have seen, in print, a computer program to "convert QTH locators to Maidenhead", with no warning in the program or the accompanying text of the possible ambiguity. My worry is that some amateurs will simply accept the print-out, even if it is wrong. The "it must be right, it came off the computer" syndrome is far from dead. You only need to work out your locator once, so why not do it properly, and set it right first time?

(On this subject, G6TRS has pointed out that the "hand algorithm" I gave in the article for finding locators can suffer from rounding errors on eight-digit calculators when the station is near a sub-square boundary. In steps 7 and 13 it is advisable to add 0·001 after the multiplication and before reading the number to the left of the decimal point. This ensures correct rounding.)

The question of the earth's radius is a complex one, and there can be no "right" answer, simply because the assumption made, that the earth is a sphere, is not true. I prefer to use the mean of the minimum and maximum radii on the principle of minimizing the maximum possible error, but, as G4BLT points out, there are good arguments for using other

values. There are three points that I would like to throw into the discussion:

(1) The spherical earth calculation assumes that the latitude of a station is the same as the angle at the earth's centre between the station and the equator. This is not strictly true, as latitude is normally measured from the stars. By experiment, I find that the error introduced by this assumption is usually rather greater than that from assuming a spherical earth.

(2) A much older craft, navigation, has already encountered this problem. A nautical mile is one arc minute along a great circle, and so varies with latitude. However, modern ship-board logging equipment uses the "international nautical mile" of 1·852km, which equates to an earth radius of about 6366·7km.

(3) So far as official IARU Region 1 vhf/uhf records are concerned, events have already overtaken G4BLT's comments. The record-keeper, SM5AGM, takes pains to find the exact positions of stations involved in a dx record, and then uses a calculation method that does take full account of the earth's shape!

John Morris, GM4ANB

AGM AND EGM

Sir—At the agm and egm, on 8 December 1984, we were asked to approve two simple and uncontentious changes to the Articles of Association. The first was to allow members of the Council to be paid appropriate fees for any article accepted by the Society for publication; a matter of simple justice that I thought would be passed within 5min. Not so. Some members spoke from the floor as if such an amendment would open the flood-gates of profligacy and give the Council the "open sesame" to line the pockets of the authors with RSGB money. On the second, to give Council discretion to waive or reduce subscriptions to particular classes of members, some members spoke as if the Council and staff simply couldn't be trusted.

Surely we are all well aware that those who are elected to Council have to devote a substantial amount of spare time to the Society, often to the detriment of their family interests and finances. The Council is elected to be trusted—not to be treated like a bunch of delinquents looking for loopholes to diddle us.

I thought the President, the secretary and Council members handled the situation well, and I congratulate them. I only hope that some others who were at the agm will have telephoned or written to the secretary giving their support. In my view this was not democracy in action but a most unreasonable display of criticism and carping of the Council by a vociferous, unbalanced and, I hope, quite unrepresentative minority of members who behaved abominably.

R. T. Reed, G2RX

SLOW MORSE TRANSMISSIONS

Sir—A recent synopsis made by G4ILD, who supports me in the slow morse broadcasts which total five evenings per week, has turned up the following information, due largely to the "surgery" which is held after each broadcast.

Period June 1981 to October 1984
Number of stations called in — 249
Number of passes — 125

Stations who did not pass were those who "gave up" after a week or two. *All* those who persevered passed.

A higher percentage of G8s than G6s or G1s gave up quite quickly.

Those who dabbled with atv, rtty or satellites form a large majority of those who failed to persevere.

A few (almost unbelievably) gave up to practice cb.

Middle-aged persons appeared far more willing to persevere with the broadcasts than their younger counterparts.

There were more failures on sending than receiving and, in this vein, more failures with figures than plain language.

Many failures were due to reliance upon morse tutors. The moral here is plain: random groups are useful for building up speed to a point, but are in *no way* a substitute for plain language.

The slow morse broadcasts are provided on a purely voluntary and unselfish basis. Use them, stick to them and, above all, for heavens sake let some-one know you are making use of the service. Nothing can be more disheartening than the impression that you are spitting into the wind.

E. Longden, G3ZQS

BRISTOL SPECIAL EVENT GROUP

Sir—It is the intention of a small group of people, whom I represent, to form a "special event group". We have already arranged a series of special event stations at Temple Meads, Bristol, station in 1985 starting in April; this includes Brunel's birthday, steam trains and the visit of the Orient Express. Suitable callsigns will be obtained, and it is hoped that a group callsign will also be obtained.

This is not an attempt to form yet another club, but an attempt to promote amateur radio in a way which can be interesting, informative and fun. The interest shown by the public in the ss *Great Britain* special event station GB8IKB held last April was most gratifying, and indeed the interest shown by fellow amateurs visiting the station and lending a hand leads us to believe that such a group would be well supported.

Members who may be interested in supporting the group are asked to contact me at 11 Sherwell Road, Brislington, Bristol (a postcard or QSL card with name, call, address and telephone number would be most suitable) so that we may assess the response and arrange a meeting at a suitable time and venue. It is thought that the cost involved would be fairly low, perhaps £2, which would cover insurance, licence, postage etc; the more people involved, probably the lower the cost.

Ron Miller, G4ZCK

MAST RECOMMENDATION

Sir—After two years of struggle, I finally obtained planning permission to erect a mast and antenna at my QTH, but as the issue had been a sensitive one I ended up needing a slightly non-standard mast size. Well, I don't know if you have ever tried to purchase a made-to-measure mast, but believe me, it is not easy!

I tried most of the major manufacturers, but generally they were not interested in small customers like myself. In fact, some even did not have the decency to reply to my letters.

Eventually I came across the firm of Precise Engineering Ltd, Blyth, Northumberland, and I could not have wished for a better service. My exact requirements were met in every detail, the price was highly competitive, and, with the greatest respect to other manufacturers' products, the finished structure makes some of them look positively flimsy.

I cannot recommend this firm highly enough, and would advise anyone thinking of purchasing a tower to contact them first.

Peter J Richardson, G4IBZ

AURORAL ACTIVITY

Sir—The article on auroral activity by Mr C V Smith in your November issue seems to me to be at variance with the known facts. The statistics he admits are low, but he considers the overall pattern will be valid. I suggest that all he has produced is a record of his operating habits and ability and his belief in what he thinks may occur during auroras. However, it is not a valid analysis of what happened.

Over very many years of studying aurora and looking at thousands of amateurs' logs from all over Europe, one thing stands out very clearly: what one operator thinks is a reasonable aurora another thinks is poor, or again very good. As a rule, signals are not all that strong, especially the dx, so the best operators with big antennas do much better. Locations play a part, but not as much as station and operator ability.

Now let us look in detail at 1982. We have four months with **no** recordings at all mentioned in Mr Smith's article, which is surely not valid. In fact, during that period 30 auroras occurred, eight of which could be classified as widespread; 13 July, for example, gave 446 contacts in 18 countries, including GM and LA. During September there were 13 auroras with the 6th giving 1,171 contacts in 20 countries, and the 26th with 809 contacts in 19 countries. These were the two biggest events of the year, yet they are not even on the reasonable size list. OK, so he missed out on these. Let's look at LA9BM; he is further north than Thurso in EU square but during the period 31 January—end of February he worked 11 auroras and 16 countries, which included a 51A contact at 1731 on 31 January. He worked GMs and Gs as well as more local LAs, SMs etc, and Russian dx. So there was no shortage of northern auroral activity.

I could go through the whole year in this vein, but it is sufficient if I say that my data shows that 1982 saw 120 auroras with 7,875 contacts reaching from the Arctic to the Mediterranean, from the Atlantic seaboard to deep inside Russia, and I do not claim to know about them all. I am not trying to belittle Mr Smith's efforts, but to point out that the only way to know what goes on in auroras is to take a good sample of data from the area in question and see how it correlates, otherwise you get misleading results.

If I could comment on his other points; he heard **no** signals from Iceland. I am not surprised, aurora is a "field aligned" mode of propagation and Iceland is *north* of the auroral oval. Alignment is not possible under "normal" conditions. It may be just possible if the oval moves far enough north, perhaps at solar minimum.

In order that members may have a better idea of what happens during auroras, I have made tape slide lectures for use by clubs which are in the RSGB library. These tapes are entitled "Aurora 1—What Causes Aurora?" and "Aurora 2—The Results People Had and the Boundary Fence Theory". "Aurora 3—Lights From Space", pictures of the aurora as seen by satellite, will be ready very soon.

C. E. Newton, G2FKZ
Auroral co-ordinator, Propagation Studies Committee.

WHEEL TALK

Sir—I wonder if it would be possible to establish an association for professional drivers within the world of amateur radio. I spend a lot of my time on the road, and encounter a large number of amateurs who are like myself, hgv drivers or otherwise employed in service or sales-related fields.

The idea of forming some kind of association was not, I must admit, wholly my own. It started some weeks ago when in QSO with a small group of mainly hgv drivers through the Motherwell repeater GB3CS. Another station suggested that we form our own club for "truckers", not a term I relish, but it started the seed of an idea.

A few weeks later when in QSO through the Barnsley repeater GB3NA, again with a group of mostly hgv drivers, the idea of a giant repeater for hgvs was joked about. I promptly passed on the idea of our own association. The idea was received with an enthusiasm I did not expect; the only change to the original idea being the inclusion of all professional drivers.

The outcome of this discussion is this letter, in order to feel the ground as it were. Although it is not intended to be too formal in structure, any ideas from any amateurs interested in such an association would be most welcome. Initially, write c/o PO Box 122, Earls Barton, Northampton NN6 0DE, enclosing an sae.

Martyn Thompson, G1KIA

NOVICE CW

Sir—I note with dismay the Society's obvious intent of pursuing the introduction of a novice cw licence for the hf bands (*Rad Com* November 1984 HF/LA committees reports).

Surely this part of the spectrum is already crowded enough. I suggest that these proposals are contrary to the wishes of the majority of "A" licence holders, and I feel that a referendum should be held before the matter is taken further. In any case, if the "B" licensees are permitted the use of cw, then the above proposal is irrelevant, since unquestionably a pass in the RAE must be the minimum requirement for any form of amateur licence.

Tom Morris, G4XTM

A view held by the Society's HF Committee is that there could be a licence facility which allows those who have not passed a 12wpm morse test to gain experience of hf operation prior to taking up a full Class A licence.

An HF Mobile Antenna

by C R FRY, MSc, MIEE, CEng, G3NDI, ex-VE2ARO*

The author's interest in electronics dates back to his school days. He was licensed in 1957 while at Birmingham University, where he and a number of other students resurrected the University Radio Society.

Following a short period of UK employment after graduation, he worked at a Government research establishment in Quebec City. Since returning to the UK in 1969 he has been with EASAMS Ltd.

In recent years the pressures of car maintenance, lack of space, a major reconstruction of the family house etc, have left little time for amateur interests, or his other hobbies. He hopes that the extra house space will allow more room for amateur operation on vhf/uhf as well as hf bands.

SOME YEARS AGO, following my return from VE2, I bought a large, glass-fibre tube with the idea of using it for a high-performance mobile antenna. This tube was a two-piece blank with a short, internal jointing tube to enable the two sections to be separated easily. It was much later, however, after I bought a car with sufficient room to install a KW2000A and a home-constructed power supply, that this intention materialized. This article describes some of the design aspects of the antenna and installation problems.

Electrical design

There have been many articles in the literature describing electrically-short antennas using various techniques to circumvent the otherwise highly-reactive input impedance over most of the hf band. The main technique is

Photo 1. The whip antenna mounted with both centre and base loading coils. The base coil is shown completely bypassed. The two twisted copper strips are clearly seen on the bottom section

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inductive loading, which is used to make the antenna appear longer electrically than its physical length. This loading may be distributed throughout the length of the antenna as a thin helix [1] or by a discrete coil. The earliest example of the latter appears in a brief mention in [2]. Other papers have described in detail the analysis of such loading [3, 4].

For my antenna, the possibility of using a thin helix wound along both sections of the tube was briefly considered, but the practical problems of tuning the whip for more than one band, and perhaps determining the number of turns needed, etc, would have required more time than was available. A discrete coil solution was therefore chosen.

The two parts of the glass-fibre tube were of equal length, which was convenient for the generally optimum positioning of the loading coil near the centre. I decided to minimize losses by using the thickest wire and largest coils that were reasonable. A large 10in by 2in "Airdux" coil in my possession could have been used at the centre, but it seemed more practical to use one of more modest size and see how the antenna behaved dynamically on its mount in the first instance. The coil was mounted on Perspex spacers just above the mounting box. As the overall length of the tube was 10ft, there was sufficient length for a λ/4 whip on the 28MHz band without loading. For this band the top section was directly linked to the bottom with a short length of wire. The complete antenna, mounted at the rear of my car, is shown in Photo 1.

A convenient way of making a quick-release mechanism with a good rf connection, was achieved by using blade terminals, which are available in various dc ratings from motor accessory shops; the crimping end was formed carefully round the antenna conductor, and then soldered to make a good joint. The centre coil had a connector at each end so that it could be completely bypassed, and the bottom, or base loading, coil had a single tapping point for 7MHz and three taps for 3·5MHz. The wiping action in joining these connectors helped to keep the contact surfaces clean.

The cast alloy box, mounted on a bracket made by the local

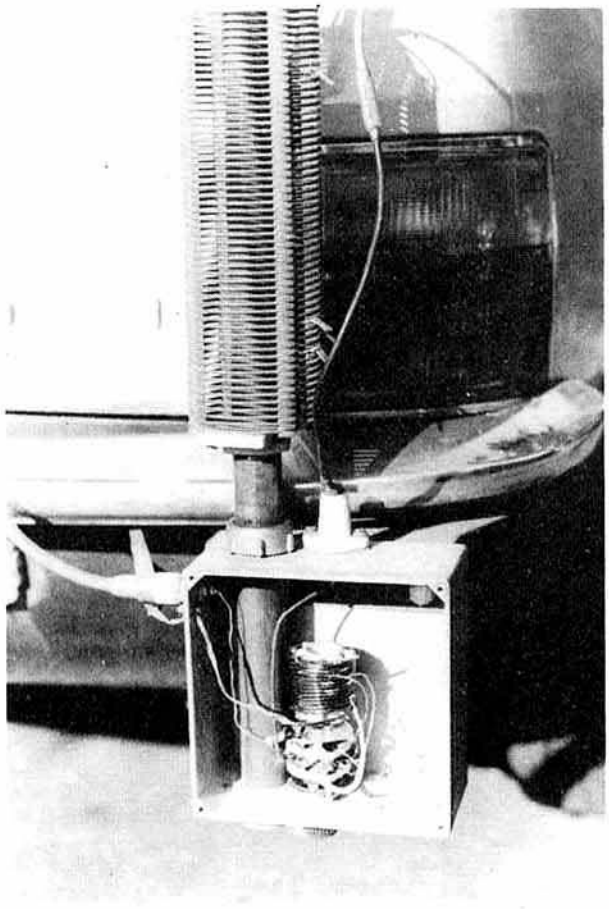

Photo 2. A close-up of the base mounting box with the lid removed, showing the matching coil and bandswitch. The use of 28mm plumbing fittings can be seen at the top and bottom of the box. A double-ended male coupling was carefully sawn in half. In the top portion a split compression ring is clamped by the large nut. It is sufficient to hand tighten the nut, and as a result the whip is quickly removed from the car

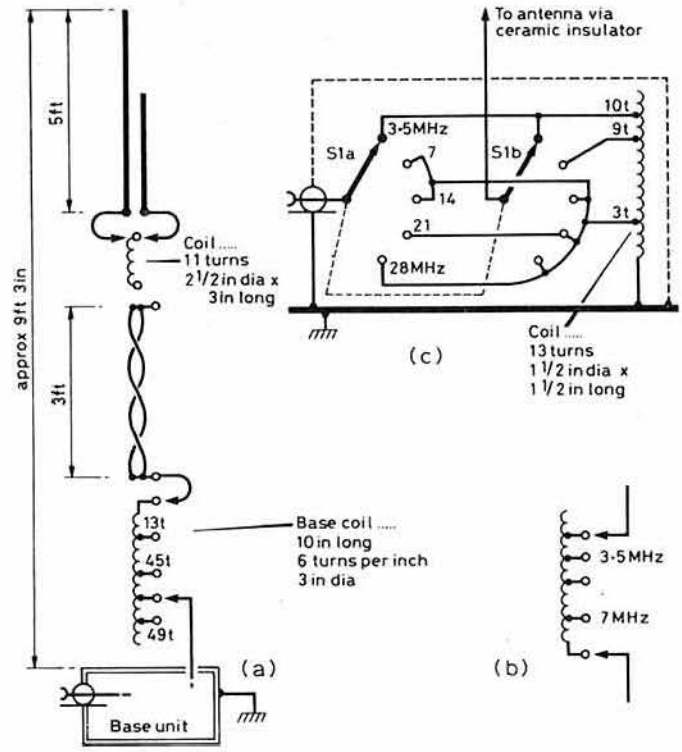

Fig 1. Details of the electrical construction of the whip. Connections to the base and centre coils are made with flexible, push-fit terminations. The base coil as originally tried is shown in (b). The switched matching coil inside the base unit is shown in (c). The overall height from the tip to the ground is approximately 11ft. The 3ft section is two lengths of 0·19in-wide flat, enamelled copper. On 28 and 21MHz the centre coil is bypassed. The shorter top section is cut to resonance on 28MHz. The longer section is used for all the other bands

blacksmith, supports the antenna and contains the small impedance matching coil and band-changing switch. A ceramic former and switch were used for this purpose and can be seen in Photo 2. The unoccupied space was intended for some form of automatic switching for band-changing with a suitable detector.

The coils and taps were cut-to-size with the aid of a homebuilt, dip oscillator and the station vswr bridge. The final result was the circuit shown in Fig 1. On each band the vswr achieved was very low, although on 3·5MHz at least the three taps mentioned earlier were required. A great deal of trouble was experienced with this bottom coil on 3·5/7MHz when attempting to load the transmitter, although the whip appeared resonant. This was eventually traced to the order of the connections on the coil, which had initially been as shown in Fig 1(b). Clearly some form of spurious coupling or resonance was the cause of the trouble as reversing the order effected a complete cure.

The centre coil was adjusted to provide resonance on 14MHz in conjunction with the three turns of the matching coil. The coil was bypassed on 21MHz, but used the same tap for matching with the longer of the two parallel wires on the top section. On 7 and 3·5MHz the centre loading coil was included in circuit. This had the effect of increasing the current flowing in the bottom section and effectively increased the radiation resistance. This resistance was in any case low for these bands with such a short antenna, and even an increase of 0·1Ω was desirable.

Mechanical construction

Unfortunately the body of the car did not allow a simple mounting arrangement to a solid chassis member. Furthermore, when mounted the antenna tip was some 11ft above the ground, so that a considerable wind leverage was exerted at high speed, and the vibration could also be a source of metal fatigue.

Steel angle and square tube for the mount were obtained from the local blacksmith. This was cut to size, notched where necessary, and then bent to fit the mounting position as shown in Fig 2. The assembly was taken to the blacksmith and temporarily held in position against the car while tack welds were made at appropriate points to hold the joints at the correct angles. The assembly was then removed for the proper fillet welds to be completed.

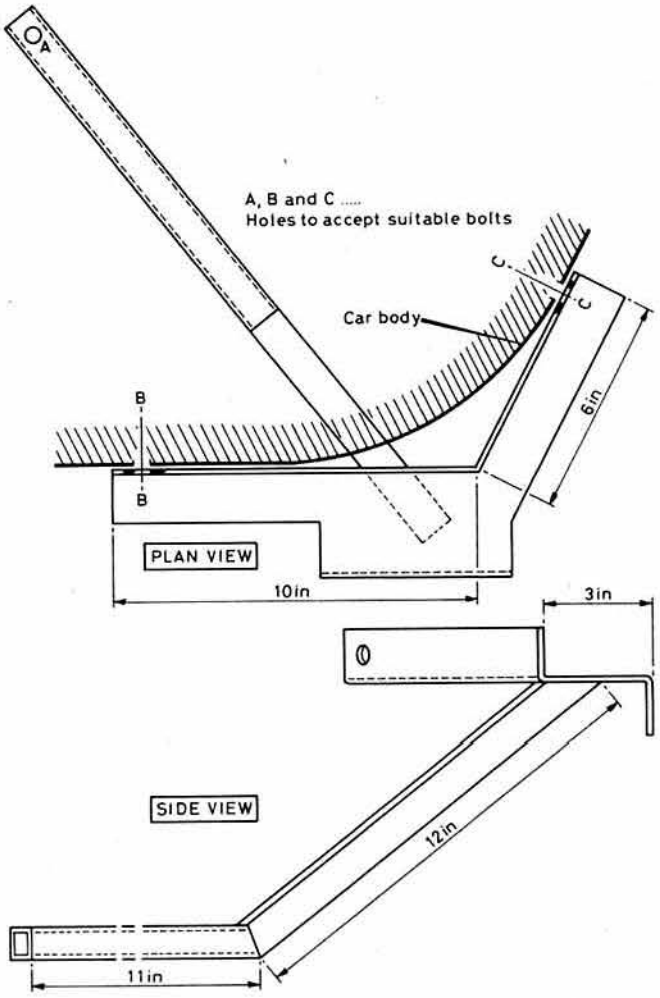

Fig 2. This shows the support bracket for the antenna. Bolt A is one of a number round the petrol tank circumference. Bolts B and C are those used to hold the bumper in place. The material used is mild steel angle of side 1·5in and 1in square section hollow bar. The finished bracket should be well cleaned and coated with a ferrous metal primer and top coat

The alloy box was fixed by two bolts in the position shown, using a steel plate under the heads to ensure the distribution of stresses over as large an area as possible. A steel box would have been a better choice if one had been available. A thin aluminium sheet was bent to form the lid, and to ensure a watertight seal a thin strip of inner tube rubber was glued to the mating surface. Four 4BA screws in the corners held the lid in place and ensured electrical continuity for the lid as a screen.

Although this mount was perfectly adequate when stationary, it was quite clear that provision was needed to stop any whipping and vibration when the car was moving; this would have rapidly caused failure of the box or other parts of the mount. An air louvre existed on the rear quarter of the car, and this was used to hold a thin nylon cord looped round the bottom section just below the centre loading coil. This cord was kept under slight tension and was found perfectly satisfactory in stopping any significant motion when the car was travelling at full speed.

Installation of the KW2000A

This transceiver is somewhat large compared to the latest solidstate units, but happily is still going strong and still with the original valves. It was positioned on the gear control hump on the car floor, and the power cables were passed through a grommet in the engine bulkhead. The power supply comprised two solidstate, power dc/dc converters in one box, based on the kit available a few years ago from G3LGK. The original transistors for the transmitter supply were changed to TIP35s.

Interference was expected during operation in the car, and this was borne out the first time the car was started. However, care had been taken to carefully screen various sections of the power supply and to use adequate hf decoupling. There appeared to be little power supply interference. The worst problem was found to be ignition noise and electric motor noise. The motor noise was quickly eliminated by placing 0·01μF disc ceramic capacitor directly across the brushes where possible. None of the normal techniques [5] had any appreciable effect on ignition noise, which gave a level of about S8 on the KW2000A S-meter. The electronic ignition was also changed back to the original contact breaker and coil without any noticeable effect.

Eventually it was decided that there was no option but to try screening the ignition. All the ht cable and sparking plug caps had already been changed in the first place. Clearly, before attempting what could be a lengthy task it was felt desirable to try and prove that the noise could be reduced. A roll of 0·5in-wide aluminium tape was used to wrap all the ht leads, and the ends were temporarily fixed to the nearest earth points. This had an immediate impact on the noise level, and kitchen cupboards were raided for some sheet aluminium foil, which was used for further screening round the distributor cap and the terminal end of the ht coil. While the effect was not as dramatic as before, the noise was now about S1/S2 and of little consequence compared with other noises, particularly from other cars' ignition systems.

The aluminium foil was removed and a more permanent installation carried out using braid on all the ht leads. A tin can was cut and soldered to form long, narrow tubes which slipped over each sparking plug. They were arranged to be a tight fit over the plug hexagon flats in order to ensure proper earthing. The ends of the braid were terminated in pigtails and small blade terminals. These pushed into corresponding sockets soldered to the plug screening cans.

A large, open-ended screening can was fixed to the ht coil, and the open end overlapped the end of the ht lead braid to which it was connected. Lucas make screening cans for some of their distributors, and one of these cans was purchased from the local agent. It is believed fully screened systems [6] are available, but these are normally only fitted to military vehicles because of the much higher cost involved. The use of the braiding and cans resulted in a simple and effective cure.

The alternator appeared to cause no interference. To complete the interference suppression, the bonnet was earthed to the body with braid straps, and the power supply was directly connected by braid to the engine

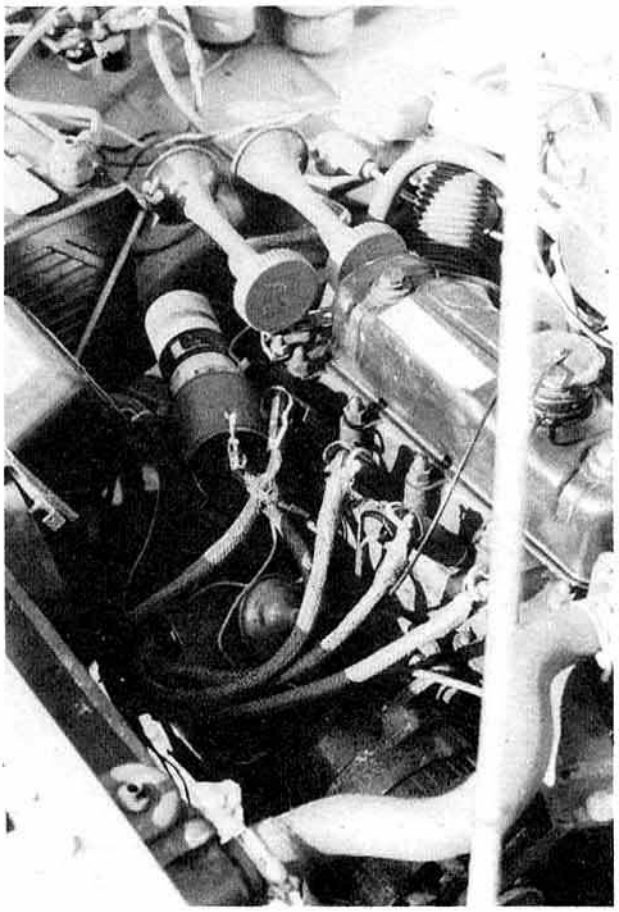

Photo 3. This shows the screening in place on the ht leads. The cans round the plugs, the ht coil and the distributor (lower centre) may be seen

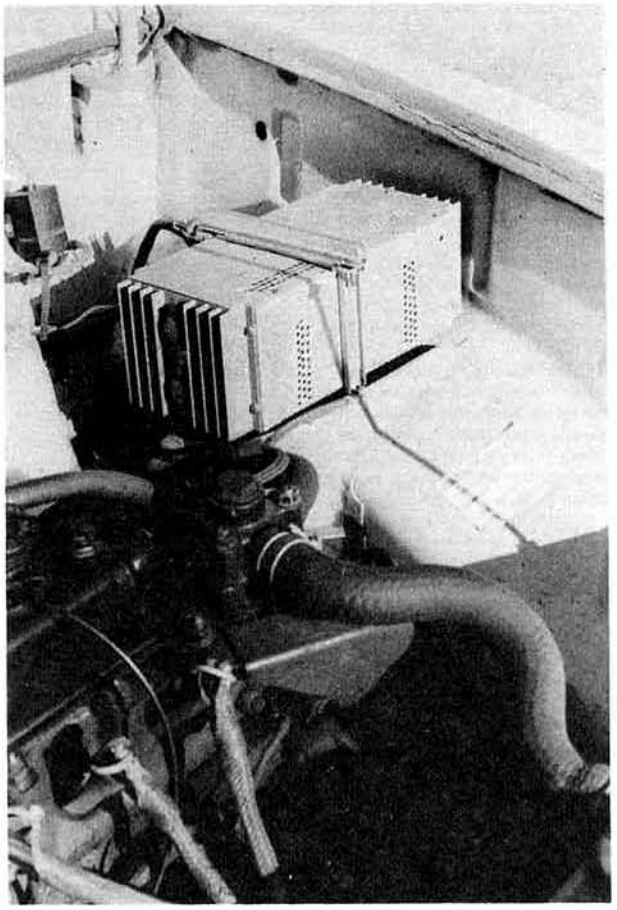

Photo 4. Another view showing a little more clearly the connections between the braid and the cans screening the plugs. The mounting arrangements for the power supply are also clearly illustrated

block. This seemed to have no effect but was done as a precautionary measure. The input cables to the power supply from the battery were left unscreened. The results of these efforts are shown in Photos 3 and 4.

Conclusions

The mechanical strength of the whip and its mount have been found quite satisfactory in all conditions, including motorway driving. Very little vibration is noticed owing to the stiffness of the glass-fibre.

The electrical performance has been outstanding on all bands and, in general, when a station has been called a contact has resulted. Reports have been received from the continental USA, Canada, Australia and New Zealand. Some of the more exotic European areas worked have been OH0, IH9 and HB0. On one occasion when calling VK3, the mobile signal was stronger than that of a nearby fixed station.

Slight problems have been experienced with the braid screen on one plug, where an intermittent arc formed between the braid and the entry of the cable into the plug. This was stopped by removing the earth pigtail and pushing the braid away from the plug.

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[2] "A solenoid whip aerial", W R Wilson. *Electronics* January 1941 p56.

[3] "Monopole with inductive loading", C W Harrison *IEEE Trans AP-11* July 1963, p394.

[4] "Efficiency and matching trade-offs for inductively-loaded short antennas", R C Hansen. *IEEE Trans COM-23,* April 1975, p430.

[5] "Suppression of vehicle interference for mobile radio operation", D W Morris, *Rad Com* May 1976, p337.

[6] *Radio Interference Suppression,* leaflets, Lucas Publication 2015, Sept 1960, and Bosch Handbook A2/1.

[7] "Short antennas for mobile operation", J S Belrose *The Mobile Manual for Radio Amateurs,* ARRL, 2nd edn, p125.

APPENDIX

Electrical parameters

The following calculations provide some estimates of various electrical parameters of the antenna and its performance. The calculations are only approximate, but for practical purposes are adequate. They are based on the procedures given by Belrose [7].

The inductance of an air cored coil is given by

$$L = n^2 \left[\frac{a^2}{9a + 10l} \right] \mu H$$

where n = number of turns
where a, l = coil radius and length
Using this expression, the following values are obtained

centre coil.....4·6μH
base coil.....55μH
matching coil (10 turns).....3·1μH

Radiation resistance

For a short antenna the maximum current amplitude exists at the feedpoint, and to a close approximation decays linearly to the tip. It is normal to refer the radiation resistance, R_r, to a maximum current point such as this. The resistance is given by

$$R_r = 0{\cdot}01215\ A^2\Omega$$

where A = the current distribution expressed as an area in degree-amp.

For a linear current distribution,

$$A = \frac{G}{2} \text{ for a current of 1A}$$

where G = antenna electrical height in degrees

For heights greater than about 0·2λ or 72°, this simple equation becomes progressively inaccurate. However, approximate values for R_r can be calculated as shown in the table below where the height h = 111in (see Fig 3).

Frequency (MHz)	Electrical height h		R_r (Ω)
3·7	0·034	12·2°	0·45
7·05	0·064	23°	1·6
14·15	0·13	46·8°	6·65
21·2	0·19	68·4°	14·2
29·0	0·26	95·4°	27·6

The value for R_r in the table is not correct when the centre coil is inserted, as the current distribution is altered towards a more constant distribution over the bottom section. Belrose [7] gives in his paper the additional equations for this case.

Losses

Using the nomographs in Beatty & Sowerby (*Radio Data Charts,* Iliffe, 1958) an estimate of the copper loss in the coils can be made, bearing in mind that the wire diameter used here does not necessarily meet the requirement to minimize the loss. The estimates are shown for just two frequencies.

	14MHz	3·5MHz
Centre coil	0·9Ω	0·4Ω
Base coil	—	1·4Ω
Matching coil	0·1Ω	0·2Ω

The earth loss resistance R_g is variable, but estimates may be in the range of 10–70Ω, for example.

Bandwidth

The operating bandwidth for this antenna provides no restriction on 7MHz and below. Some simple measurements in the author's drive (layer of asphalt/hardcore over dry sandy soil) gave a bandwidth, B = 220kHz at 3·725MHz, and including the centre coil the figures were 170kHz and 3·655MHz.

Using the normal equations

$$B = \frac{f_o}{Q} = \frac{f_o \times \text{total resistance}}{\text{coil impedance}} = \frac{f_o R}{2\pi f_o L}$$

then for the bottom tuning and matching coils

$$0{\cdot}22 \times 10^6 = \frac{R_g + 0{\cdot}45 + 1{\cdot}4 + 0{\cdot}2}{2\pi (55 \times 10^{-6} + 3{\cdot}1 \times 10^{-6})}$$

from which

$$R_g = 80{\cdot}3 - 2{\cdot}05 = 78{\cdot}3\Omega$$

Radiation efficiency

The power producing the received signal is that 'lost' via the radiation resistance. Assuming the above calculated value then on 3·5MHz without the centre coil the radiated power as a proportion of the input power is

$$= \frac{0{\cdot}45}{0{\cdot}45 + 1{\cdot}4 + 0{\cdot}2 + 78{\cdot}3} P_{in}\ W$$
$$= 0{\cdot}006\ P_{in}\ W$$

For 14MHz the ratio is better and becomes approximately

$$\frac{6{\cdot}65}{6{\cdot}65 + 0{\cdot}9 + 0{\cdot}1 + 78{\cdot}3} = 0{\cdot}08\ P_{in}$$

IDIOT-PROOFING THE CDE HAM 3 AND HAM 4 ROTATORS

by K M Orchard, TEng, MIElecIE, G3TTC*

After three years as an swl, Keith Orchard became G3TTC in 1964 at the age of 14. He commenced activity on top band with completely home-built gear for home-station, mobile and portable operation. This was followed by operation on 3·5 to 28MHz and 144MHz a.m., and later ssb. From 1971 to 1974 he was on Ascension Island as ZD8KO. He now divides his operation between hf and 144MHz, and he is also interested in construction and rtty.

Professionally he works in hf and mf broadcast engineering, and he is treasurer of his employer's amateur radio club. Other interests include folk dancing, for which there is no known cure.

Introduction

In its basic form, the *Ham* series of rotators has one shortcoming in that if one's finger slips off the BRAKE RELEASE switch while the rotator is turning, mechanical damage to the motor-gearbox assembly is likely to occur. By removing one of three switches fitted to the original control box and adding a relay internally, operation is simplified and the possibility of damage to the motor assembly removed.

The modification requires only a handful of components, a little metalwork and can be done in an evening or two. The brake assembly is operated by a 24V ac solenoid, the armature of which is coupled to a wedge which engages in teeth cast into the lower bell housing. When energized the solenoid withdraws the wedge from the teeth, and the rotator is free to turn.

Original version

Fig 1 shows the circuit of the control box. Bold lines indicate the modifications and should be ignored at this stage. The meter is conventional and displays the beam heading. Rotary switch S1 is in the mains supply, and S2 is a push-switch which forms part of the CALIBRATE potentiometer. S3–5 are three piano-key switches: S3 applies mains to the power transformer, hence energizing the brake release solenoid. When S4 or S5 is operated, power is applied to the motor to give clockwise or counterclockwise rotation repectively. S4 and S5 have no effect until S3 is operated.

To rotate the antenna, operate S3 and S4 (or S5). There is no risk of doing damage to the rotator at this stage because the electrical interlocking between S3 and S4/S5 ensures that the motor cannot be energized in either direction before the brake wedge is retracted.

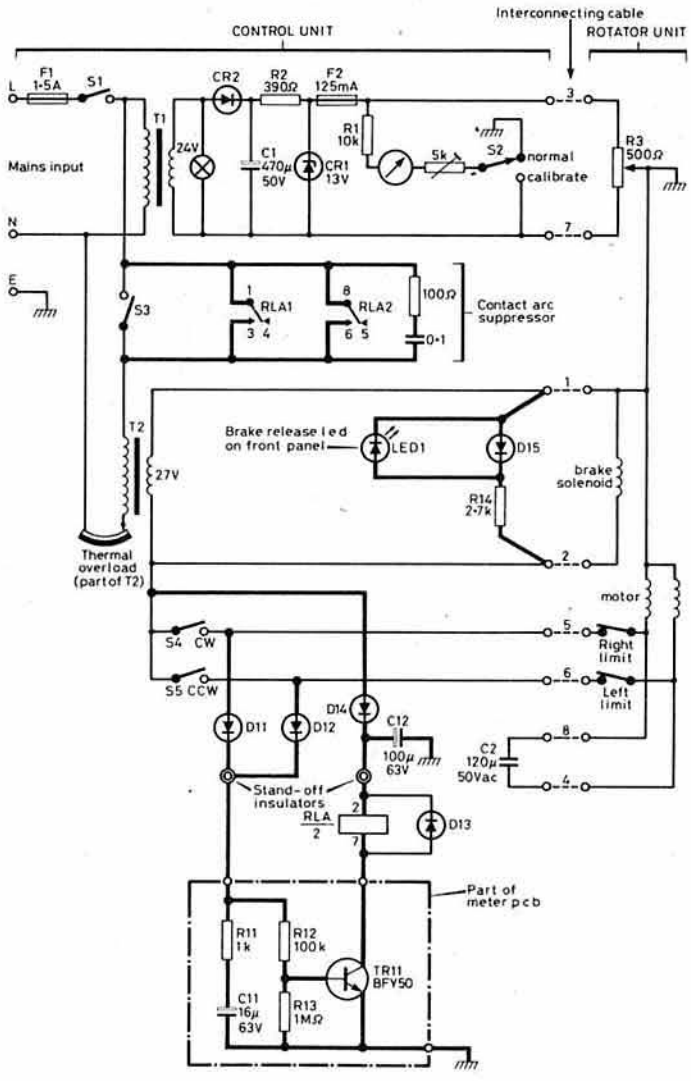
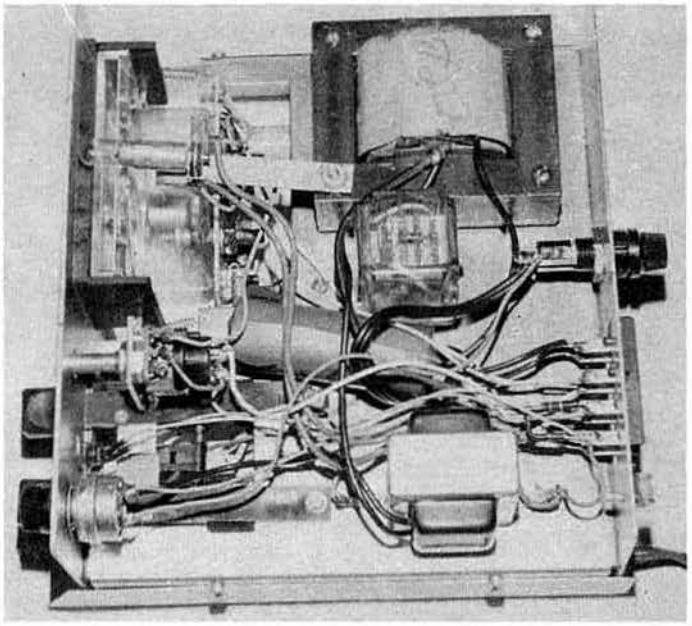


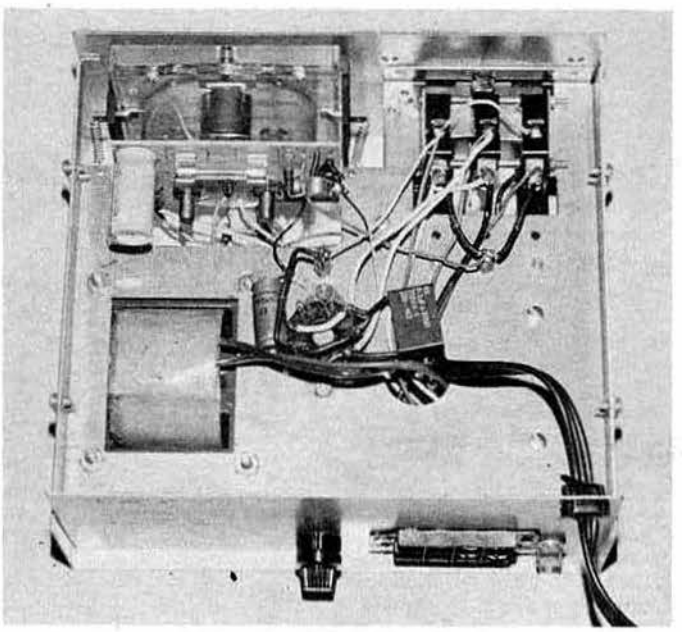
Fig 1. Circuit of control box, additions in heavy line

General view of control box

*5 Hurst Close, Chessington, Surrey KT9 1XE.



Top view of control box chassis



Bottom view of control box chassis

Once the antenna system has reached the desired position S4 (or S5) is released. Due to the momentum of the antenna, particularly a large hf installation, brake switch S3 should be held in the "on" position for several seconds to allow the antenna to come to a complete standstill before the brake wedge is allowed to engage. Later editions of handbooks carry a warning to this effect.

Modified version

The modification entails the removal of the middle switch lever, the fitting of small aluminium extensions to the switch levers of S4 and S5, and the addition of a few components. Bold lines in Fig 1 show additions to the circuit. TR11, RLA and associated components form a time delay circuit which ensures that the rotator brake solenoid remains energized for about 5s after the motor supply has been removed.

S4 and S5 each has a piece of aluminium bolted to its operating lever so that S3 is operated at the same time. When S4 (or S5) is operated, S3's contact closes and mains power is switched to T2, thus energizing the brake release solenoid. C11 charges quickly through R11 and D11 (or D12). TR11 conducts, energizing RLA. D14 and C12 provide a half-wave rectified, smoothed supply for RLA and TR11. Relay contacts RLA1 and RLA2 close in parallel across S3 without effect. LED1 is mounted in the panel space vacated by S3's switch lever, and indicates the presence of the brake release supply.

When the antenna system reaches the desired bearing, S4 (or S5) is released. S3 also opens, but to no effect as RLA1 and 2 are closed. C11 discharges slowly through R11, R12, R13 and TR11, and after about 5s RLA releases. RLA's contacts open to remove the mains supply from T2 and the brake solenoid releases. Five seconds is sufficient for a large antenna system to come to rest, although the delay period can be varied by changing C11. R11, R12, R13, C11 and TR11 can conveniently be mounted on the existing pcb fitted on the rear of the meter.

Components list

R11	1kΩ
R12	100kΩ
R13	1MΩ
R14	2·7kΩ
C11	16μF 63V electrolytic
C12	100μF 63V electrolytic
D11–15	Gen purpose Si power, eg 1N4002
LED1	Rectangular l.e.d. with holder. RS Components 587-103
RLA	Relay, 48V 1·9kΩ, 2p c/o, octal. RS Components 349-535
TR1	BFY50 or similar, Si npn

Miscellaneous:
Contact arc suppressor. RS Components 238-463. Octal base for RLA, two stand-off insulators. Four 8BA by 0·25in screws (or M2 by 6mm), nuts, washers. Four 4BA by 0.25in screws (or M3 by 6mm), nuts, washers. Aluminium sheet 16 and 18swg.

Method

Remove all three levers by undoing their securing screws; one lever can be put aside as it will not need to be refitted. Make up the two aluminium extensions as shown in Fig 2. Using the extensions as templates, drill the two 2·2mm diameter holes in each of the two levers and fix the extensions to the levers using 8BA or M2 screws. Take care when drilling the levers to make one left-hand and one right-hand arrangement. Refit the levers in the chassis and adjust them so that their extensions almost touch. It will be necessary to use a little trial and error to get the angle of each extension so that S3 (the middle microswitch) is operated at about the same time as S4 or S5.

Enlarge an existing 3mm hole in front of the rear panel fuseholder to 28mm (1·125in) to accept an octal holder for RLA. Solder R11, R12, R13, C11 and TR11 to the meter pcb as shown in Fig 3. By using this arrangement, existing pcb track is used; if a fine-tip bit is used it is not even

(Continued on page 117)

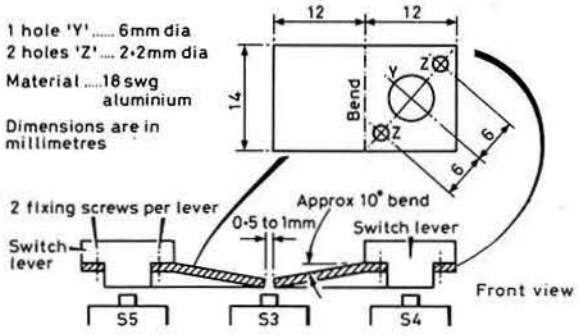


Fig 2. Aluminium extensions—two required

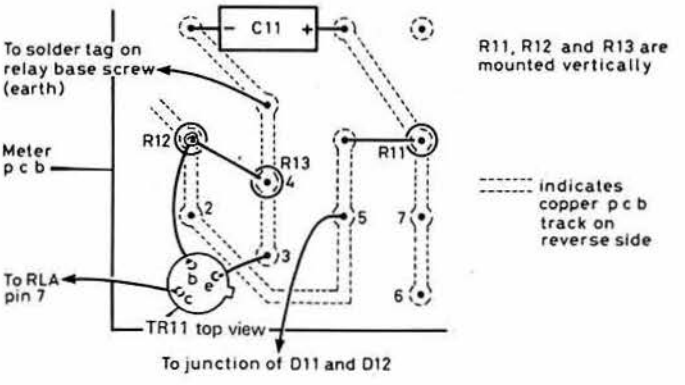


Fig 3. New components mounted on meter pcb

Technical Topics

by Pat Hawker, G3VA

THERE IS a widespread but often fallacious belief that "you only get what you pay for". The implication is that if you buy cheap equipment it is most unlikely to prove as satisfactory or as reliable or as easy to operate as a "top of the range" model. Retailers in the consumer industries sometimes take advantage of this belief, particularly the food industry, by offering a choice of virtually the same goods but under different brand names, confident that the vast majority of the customers will instinctively choose either the middle or highest priced article, while still not losing the custom of those unable or unprepared to pay the higher prices.

THIS MONTH

The cost of amateur radio

In amateur radio, it is often the higher-priced models that sell best, and at times I have the impression that all the diy hints and tips in *TT* and elsewhere, most of which are intended to show how costs can be reduced, are little more than a hangover from the thirties when the "real cost" of both components and assembled equipment was far higher than it is today.

It is sometimes suggested that modern hf transceivers are simply not available within schoolboy or student budgets. Yet within the UK there are already several million home computers, many with a full range of peripheral units, many of them used predominantly for "games" even when bought by parents on the basis of being educational tools. It is a much older age group, the pensioners, who have been hurt most by inflation.

If, at times, the cost of equipment seems high to those who recall the days of stable money, it is vastly cheaper than what taxpayers in all countries pay for "mil-spec" radio communication equipment. A two-way satellite terminal for Oscar may cost several hundreds of pounds to assemble; one for a merchant ship, such as the Marconi "Oceanray" about £20,000, but this is still vastly cheaper than the naval SCOT satellite terminals that run to almost £2-million per frigate.

The demanding (over-demanding?) specifications for Defence equipment have been highlighted by reports of the American services paying $110 for electric plugs available in hardware stores for about 5c; $7622 rather than less than $100 for a 10-cup coffee maker fitted in large cargo aircraft; $170 rather than under $25 for battery-operated torches . . . . . There is little evidence that the costly coffee makers provide better tasting coffee than the standard machines. Mil-spec transistors etc are required to operate down to much lower temperatures than you expect to meet in your shack (even though much will end up permanently installed in well-heated base stations).

I have always taken the view that if an amateur is willing to spend thousands of pounds on complex equipment that is entirely his or her own affair; but at the same time it is important that newcomers should be made aware of the fact that with a bit of make-do-and-mend, and a willingness to devote time rather than money to the hobby, it is still possible to get on the air with equipment that does not occupy excessive spectrum space or cause unnecessary rfi, for a modest outlay.

It was Neville Shute, engineer turned novelist, who insisted that a good engineer can do for ten-bob (50p) what any damn fool can do for £5; and E. F. Schumacher who wrote: "Any third-rate engineer can make a complicated apparatus more complicated, but it takes a touch of genius to find one's way back to basic principles".

Low-cost budgeting in amateur radio may involve the modification of cast-off professional or military equipment, the use of diy materials never intended for such purposes, the use of buildings and trees as antenna supports, and the savings that come from not having to count the time-cost of the labour involved in design, production and testing, willingly contributed as part of the enjoyment of the hobby.

How sporadic is sporadic-E?

For many years, Ron Ham has provided an annual report in *Rad Com* on his monitoring of sporadic-E vhf signals, from which it has become clear that there is no surefire way of predicting, except in general terms, just when this rather mysterious form of propagation will suddenly bring in strong signals from all over Europe on frequencies that may extend over all or part of the range 20 to 150MHz or thereabouts.

Results of a consolidated nine-year study of this subject by a team at the University College of Wales have been published in a paper "Sporadic-E propagation at frequencies around 70MHz" by K. J. Edwards, L. Kersley and L. F. Shrubsole in *The Radio & Electronic Engineer* May 1984, pp231-37. This is based on studies of skywave propagation between 59·25 and 77·25MHz by means of sporadic-E during 1972-81. It concludes that such propagation occurs mainly from May to August, with June and July being the months of both maximum number and maximum duration of these events. A small winter peak occurs (around December, early January) with February to April being the period of fewest events. The summer months show a double-peaked diurnal variation with a small pre-noon maximum and dominant evening peak at the lower frequencies in this range. At 77·25MHz, the double-peak disappears and is replaced by a steady rise to a single evening maximum. No regular trends associated with the solar cycle were detected, a conclusion found also in many of Ron Ham's reports.

In *Wireless World* April 1978, Dr E. B. Dorling, of the Mullard Space Science Laboratory of London University, described how knowledge of this curious phenomenon has been much increased from a combination of ground-based and rocket observations. He wrote:

"Sporadic-E was first seen to occur in the way it does, that is as very thin intense layers of ionization, by a British Skylark rocket flown from Woomera in 1958. By 1966 an association between these layers and sharp reversals in wind direction at high altitude had become recognized. Wind measurements in the very rarified atmosphere up to 150km or so revealed that a surprising pattern of wind reversals with height can occur; what is more, the measurements showed that the pattern often descends slowly over a period of hours, with, for example, a sharp wind shear first appearing above 150km height, then moving downwards to below 100km before fading. The cause of this rather unexpected wind structure appears to be the propagation of atmospheric waves horizontally over great distances.

"The sharp wind shears are at the root of the Sporadic-E layers, though in a rather complicated way. The winds, tenuous though they are at such heights, act to move the ions and electrons in the ionosphere across the earth's magnetic field, but interactions then occur in such a way as to displace the plasma vertically. Where strong wind shears of the appropriate sense exist, the plasma is squeezed into a thin concentrated layer, being moved downwards from above, upwards from below. As the wind pattern descends the layer descends too into an ever denser atmosphere, until finally at a height of about 100km it is brought to a halt . . . . .

"Sporadic-E then owes its transient character to interactions between atmospheric waves, the ionospheric E layer, and magnetic and electric fields. All but the magnetic field are constantly changing, so that the right conditions for layer formation occur—well, sporadically. If the question is asked why the explanation has been so long in coming—I should explain that physicists the world over have contributed to the solution—

the answer is that the region concerned, roughly 100–200km above the earth's surface, is inaccessible to satellites and therefore to regular on-the-spot measurements.

"One final point. Were the sporadic-E layers to be composed simply of ionized atmospheric gases, they wouldn't persist. They are, in fact, composed of ionized metallic atoms, mainly magnesium, silicon and iron, probably the remains of burned-up meteorites. The descending wind shears sweep up the metallic ions and bring them down as sporadic-E layers out of the thermosphere into the lower regions where atmospheric turbulence then churns them away into oblivion. Sporadic-E layers seem to be the product of Nature's vacuum cleaning!"

Thus I suppose that one could refer to sporadic-E contacts not as "meteor scatter" but as by "scattered meteors". And it is a relief to find that Nature's cleaning up is as sporadic and unpredictable as my own!

Industrial eht generators

Dr Dorling's letter on sporadic-E was prompted by some notes I had written on what at first promised to be an equally-mysterious phenomenon—the 27MHz "sweepers"—that were later proved to stem not from Nature but from long-distance propagation of unstable signals from industrial rf heating equipments, and since shown to be prominent also around 13–14MHz from glue-drying and similar industrial equipment.

In *TT* May 1984, p405, G3TDZ noted how these very-high-power self-excited oscillators, providing up to 25kW output, drift hundreds of kilohertz each time they are fired up. More recently, Ray Nicholson, G4SQG, who is professionally connected with the electric lamp industry, has sent along some details of lower-power rf eht generators. These use an oscillator and step-up transformer to provide a source of up to about 55kV, much as did some of the 25kV eht generators in early projection-tv models. G4SQG points out that they deliver quite a lot of rf, enough to light-up electric lamps of from about 10 to 40W rating.

He recalls the first unit of this type that came his way about 1950, comprising a power oscillator tuned to 200kHz. This completely blacked-out the BBC Droitwich sound radio programmes in the locality until the manufacturers supplied a large screened cage . . . . by the time he left that firm in 1969 there were 18 rf eht generators in virtually continuous operation during factory hours, used for checking the vacuum systems.

G4SQG enclosed some manufacturers' catalogue material and a circuit diagram of a typical eht generator from which it is clear that these generators are also used in connection with rubber and plastic coatings etc. Two of the three models are still listed as using 0·2MHz which, if accurately tuned, should hardly please local listeners to Radio 4. The third, however, is listed as 3·8MHz so that one must hope that it tends to drift higher rather than lower in frequency. All these units are in plastic enclosures with output leads to assist radiation!

His circuit diagram of a larger unit shows a single-valve seo working directly from unrectified 1·2kV ac; this one apparently is in a steel box but the rf output is fed to about 2m of wire. While the interference potential of these eht generators must be substantially less than the kilowatt rf heaters on (or near) the ism bands, it cannot be altogether negligible in view of the large number in almost continuous daytime use.

One wonders also what is the present dx record for 2·4GHz microwave ovens. These have grown rapidly in popularity, each containing a microwave transmitter of typically 1·5kW output or so, fed from rac. Admittedly attempts have been made by the manufacturers to reduce leakage of uhf power by improving the sealing of the doors (commercially necessary in order to reduce fears of safety hazards from excessive microwave radiation) but I recall commenting in 1980 on complaints by the Jodrell Bank radio-astronomers that they were receiving strong signals from microwave ovens on the sidelobes of their big dish at distances up to 20km or more. Later, Japanese broadcast engineers reported that harmonics from microwave ovens had proved a significant source of interference to the reception of 12GHz television signals from their experimental dbs trial using the BSE satellite.

Using 300Ω balanced cable

For many years I made good use of 300Ω ribbon cable for the element and feeder of single-band folded-dipole antennas. Ribbon cable was very economical, retailing then at around 6d (2·5p) per yard. In conjunction with a simple balanced form of pi-network atu (Fig 1) such an antenna provided a sure-fire, almost foolproof, system with a broad resonance that was not unduly affected by near-by objects, etc. I recall an indoor (roof-space) antenna of this type bringing me an RST589 report on 21MHz from BV1USB on Taiwan. Unfortunately, I never found any easy way of achieving good results on both 14 and 21MHz from a single folded-dipole antenna.

A practical snag was that the ribbon tended to deteriorate fairly quickly.

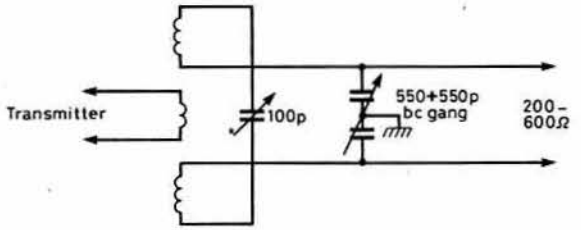


Fig 1. Simple form of pi-network atu suitable for feeding 300–600Ω balanced line, including folded dipoles fashioned from 300Ω ribbon feeder

Wind and ultraviolet radiation from the sun can cause such cable to split, although both black ribbon and the tubular form of 300Ω cable last longer. Soldered connections between ribbon feeder and ribbon element also tend to break due to the wind, unless care is taken to provide some form of protective clamping etc.

Brian Weller, ZS2AB, in *Radio-ZS* (April 1984) sets out some "tips for using ribbon cable" from which the following has been extracted:

"The cable has a very tough but relatively thin outer insulation, and the wire size is not very large. This combination tends to produce broken strands when the wire is stripped unless one is very careful. I have found a way to overcome this.

"When you are preparing to strip the cable for soldering, draw a line with a pen across the cable at whatever distance back from the end that you wish to strip it: lay a ruler or other straight-edge across the cable, and with a very sharp, fairly rigid blade, make a cut across the insulation. Do this gently, so as not to nick the strands inside. Turn the cable over and do the same on the other side. You will find that only a gentle pull with your sidecutters will cleanly remove the insulation from the wires. When making this cut, use a blade with a fairly rigid body. The so-called "carpet knife" blades are ideal. A razor blade is a bit thin, and not always easy to control.

"When soldering such a cable to a plug, slip a small piece of systoflex over each core and push this down over the completed connection after soldering. This supports the joint very well and will overcome the problem of broken wires after a bit of movement of the cable."

Simple keyer

Over the years, electronic keyers have become more and more complex, and it is rare to find an article describing a novel form of compact keyer intended primarily for use with a QRP transceiver that consumes less than 4mA, even on "key down" when fed from a stable 12V supply and with circuitry that fits on to 1·5in² of board space.

Jack Najork, W5FG, has come up with the circuit shown in Fig 2 *(Ham Radio* October 1984, p82) which uses a unijunction transistor (2N6027) as the basic timing device. It provides self-completing dits and dashes but without all the digital refinements and memories of so many modern designs. The unijunction transistor is a well-established and useful semiconductor device, though rarely used. It has a stable triggering voltage, very low value of "firing" current, good pulse current capability and low cost.

An exponential voltage is built up across C1 at a rate governed by RV2 until the unijunction transistor fires. Self-completion of dits and dahs follows, since the action of the ujt depends on the time constant. A "weight" control, RV3, in the emitter of TR2 controls the switching threshold (the on-off periods) of TR2 and TR3. TR3 is the keying

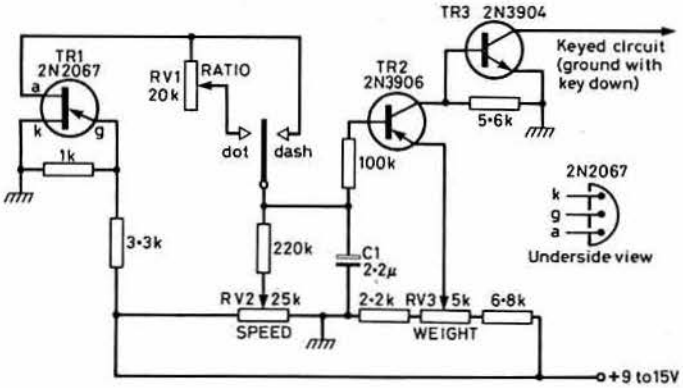


Fig 2. W5FG's simple electronic keyer for QRP. TR1 is a unijunction transistor, TR2 is pnp type 2N3906 or similar high-beta device. TR3 is npn 2N3904 or similar

(switching) transistor, and in the form shown is intended for keying the driver emitter, about 20mA, of a QRP transmitter. However, it is possible to use a keying relay (preferably reed type) in the collector circuit of TR3.

W5FG cheerfully admits the limitations of simple keyers and the precautions that need to be taken to achieve satisfactory performance. Of prime importance is that the dc supply (about 12V) *must* be stable, since poor regulation will result in erratic characters. Similarly this voltage once chosen, needs to remain the same unless all controls are readjusted. C1 should be 2·2μF, and TR2 should have a high beta, at least 60-70. If a keying relay is used, its characteristics are important and it should be capable of responding to a triangular waveform; there can also be problems of reed contact welding if one attempts to key an inductive load.

Circular polarization and crossed-Yagi antennas

The notes in *TT*, September and November 1984, on circular polarization continue to attract comment. Not surprisingly, Bill Sykes, G2HCG, does not accept the views of Dr Neill Taylor, G4HLX, as altogether valid, at least from a practical point of view. Although this is a debate unlikely to be readily settled one way or the other, it is only fair to provide space for G2HCG's reply:

"The radio amateur is noted for considering the practicalities of a situation, but G4HLX asks us to accept that the losses inherent in any method of phasing two feeders are unacceptable . . . Altering the phase of two feeders requires that their difference in electrical length be changed by a maximum of λ/2 to achieve 360° phase change. Surely the addition (or even subtraction) of this length to the total feeder length is hardly a measurable quantity and would not affect the noise factor of the system.

"On mast effect, G4HLX states that the reduction of vertical radiation from a + mounted crossed-Yagi is the result of currents induced in the conductive mast. True, but one should consider other factors that are involved. An important effect, especially on phased systems, is the mismatch caused by the presence of the mast in the plane of the elements. Unbalance in the matching of two antennas fed in quadrature to produce circular polarization means that in addition to correct phasing of the feeds, the power levels in each antenna must also be controlled, a much more difficult proposition. Mounting the antennas in the 45° × configuration, instead of +, ensures that the effect of the mast on matching is equal, this virtually ensuring equal power distribution to each antenna.

"The question of which mast effect is the most important, especially as currents induced in the mast would be dependent on the length and type of material used, can be answered only by practical tests. Signal strength measurements over a short path with × mounted Yagis show no measurable difference between vertical and horizontal components, indicating that the theoretical mast currents in this configuration have little or no measurable effect.

"A daily 'sked' over a 130-mile path between the south coast and Northampton has been carried out for more than 30 years with 100 per cent contact on fm with only occasional necessity to use ssb. Noise figures are obviously of first importance, but complete control of polarization has proved particularly interesting. On this long path horizontal polarization is, as theory predicts, better than vertical. There is, however, a quite consistent polarization shift of some 45° with a total loss of polarization in the troughs of fades. Circular polarization has always been the optimum on this path, and the recent discovery of the 45° shift explains why, since the use of circular polarization means that signals remain unaffected by the shift.

"Reception of Oscar 10 on 144MHz is also interesting. Those familiar with the reception of this satellite will be aware of the regular fading caused by its rotation. Turning the knob of the "Polarphaser" (as I now call the device outlined in the September *TT*) alters the signal strength and the apparent speed of rotation, sometimes virtually eliminating the QSB, as the varying polarization lobes of the satellite antenna are explored."

Coaxial phasing lines

Bob Roberts, G2RQ, is concerned with the problem of setting up a crossed-Yagi to obtain circular polarization on 144MHz or 435MHz which requires that the pieces of coaxial cable feeding the two parts of the antenna should differ in electrical length by exactly a quarter-wave. He writes: "The dimensional accuracy desirable at these frequencies is high, being measured in parts of an inch, yet it is difficult to determine this parameter with any satisfactory precision using conventional techniques.

"One possibility is to calculate the physical length from the velocity factor quoted for the cable. But that factor may not be known or may only be known uncertainly; and, in any case, not every batch of cable will show coincidence with a quoted average figure.

"Another possibility is to determine by cut-and-try the resonant frequency of an approximate length shorted at one end, that end being then coupled to a dip meter. But stable dip meters are not commonplace at 144MHz, and rare, indeed, at 435MHz. And when that determination has been made, it is still then necessary to compensate by arbitrary judgement for the effect of the shorted coupling end and for the effect of subsequently adding connectors. (*Note*: I recall an idea for coaxial tuning stubs is to use a pin to short-circuit temporarily inner and outer, to adjust stub resonance without actually cutting the cable—*G3VA*).

"I would like to call attention to a straightforward method of determining the correct length absolutely, by electrical measurement. It requires only patience, an swr meter and a willingness to sacrifice a foot or two of cable. The swr meter can be of ordinary, inexact, quality: only comparative readings are needed.

"The procedure begins by the attachment of any arbitrary length of cable, through the swr meter, to a transmitter set at low power (1 to 2W will be enough). The cable, which can be the whole length provided by the supplier, is left open-circuited and the swr is measured and recorded. The cable is then progressively shortened in equal snips: a 1in snip is convenient for 144MHz and 0.5in for 435MHz. It is then practicable, and desirable as a cross-check, to record the remaining length each time a measured snip is cut off. Each swr reading should be taken with care, with the meter reset as necessary each time. The method will average the errors, but it is still desirable to make each measurement as accurately as possible. One *can* plot the resulting sequence of figures, but experience shows that not to be necessary. The turning points of the curve can be determined quite precisely because the rate of change slows down at the peak and at the trough. Any supplementary calibration happening to be present on the meter face can be used to assist this operation: it need not be linear. Note that most simple swr meters give their most reliable performance at the lowest power which will adequately operate them.

"The two pieces of cable required for the two parts of the antenna to be phased can then be cut to any length convenient for the phasing harness so long as they differ by exactly the length determined in this operation. If identical end connectors are then fitted, in an identical manner, one may have confidence that the correct phasing requirement has been exactly and securely obtained. The method can also be used in other applications where phasing by feeder length is necessary."

Simplified tuned circuit and inductance formulas

Walter Borland, G3NXM, feels that readers may be interested in simplified forms of two of the basic formulas used in calculating resonance and inductance, as follows:

(1) The basic formula for a tuned circuit is $f = 1/(2\pi\sqrt{LC})$ but f, L and C are in the basic units of hertz, henrys and farads. It can be changed to the more useful form of: $f^2 = 25{,}330/(LC)$ where f is in megahertz, L in microhenries and C in picofarads.

(2) Another formula inconvenient in its basic form is that for winding a multi-layer coil: $N = \sqrt{[3d \times 9l \times 10t \times L/(0{\cdot}2d^2)]}$ where N is number of turns, d is diameter of the coil former, l is the winding length, t the thickness of the winding, and L the inductance. This involves several variables, so a lot of trial and error may be required. However, the formula can be simplified to: $N = 1350L/(dn^2)$ where n is turns per inch of the wire. Decide on the length l, multiply by n (tpi), divide it into N, and the result will be the number of layers. The result may include part of a layer but, as G3NXM points out, that does not matter.

FM, nbfm and the spectrum

Steve Whitt, G8KDL, has rightly noted a misleading over-simplification in my comments (*TT* November 1984, p964) on the possibility of radiating higher-quality speech when using the vhf fm channels for local contacts. I inadvertently gave the impression that restricting the af range on fm had no effect on spectrum occupancy. I should have made it clearer that what I had in mind was that with carefully limited deviation it is possible for local contacts to transmit audio up to at least 5,000Hz within a 25kHz channel.

Theoretically, the sidebands of an fm transmission extend to infinity, although in practice the energy in the outer sidebands falls off very rapidly. A working expression used to determine the minimum i.f. bandwidth of an fm receiver is $2\Delta f + 2B$ where Δf is the peak frequency deviation and B is the highest baseband frequency (this assumes a stable local oscillator). Thus, in a stereo broadcast signal where the maximum deviation is ±75kHz, the af maximum around 15kHz, but with stereo and (in the USA) up to two "subsidiary communications" (sca) subcarriers, B may be 50 to 75kHz or more, so that the spectrum required could be as much as 300kHz. An amateur *nbfm* transmission with ±5kHz deviation and af restricted to 3kHz occupies at least 10 + 6 = 16kHz. With a 5kHz af range this increases to 10 + 10 or 20kHz. This still fits quite well into a 25kHz channel. Figs 3 and 4 show the basic spectrum distribution of fm signals at various frequencies and modulation indices.

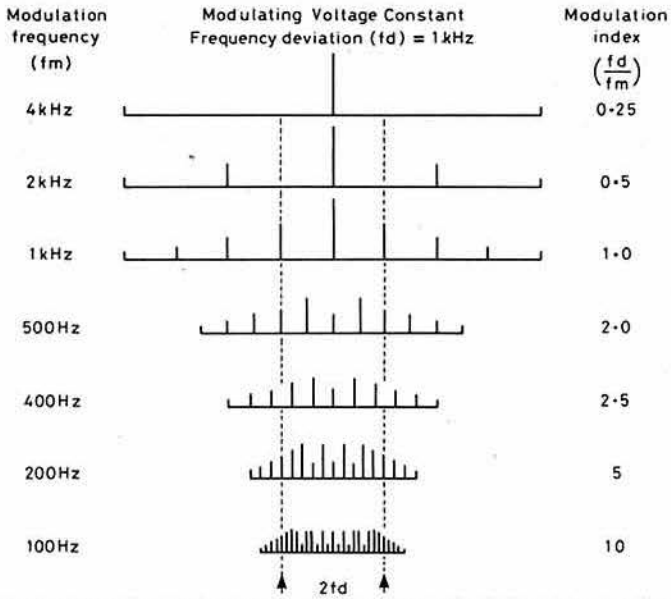


Fig 3. Sideband components of an fm signal with constant modulating voltage and ± 1kHz deviation at different audio frequencies

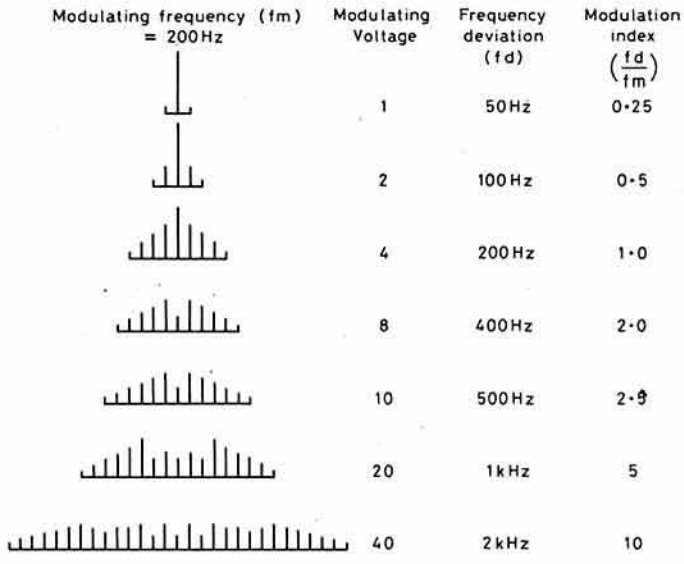


Fig 4. Sideband components of an fm signal modulated with 200Hz tone at various modulating voltages

Thus on fm, as G8KDL noted, one *does* conserve spectrum by limiting af bandwidth, even if this is only one of the factors determining the transmission bandwidth, but the practical channelling protocol means that what is saved has little practical significance.

With the disappearance of most conventional amplitude-modulation with carrier, the old debate about the relative communications efficiency of different modes has largely vanished, but it may be worth pointing out that to arrive at a valid conclusion one *must* take into account the form of detection used in the receiver.

Communication theory tells us that we can exchange bandwidth for snr and hence transmitter power, which is why, for direct broadcasting from satellites, the video signal will be transmitted as wide-deviation fm, and the channels at 12GHz will be 27MHz wide (with some power radiated in the adjacent channels). This means that a geostationary fm transmitter of 100–200W peak output can do the work of an a.m. transmitter of about 10kW or so. But remember that part of the power advantage is lost if the detector has a high minimum "threshold". This is why there has been so much interest in recent years in "threshold extension" detectors, such as those based on phase-locked loops (pll). And, of course, you achieve virtually none of the power advantage of fm with an nbfm deviation of around ± 5kHz.

A paper "Receiver techniques for reception of C-MAC dbs signals" by D. K. W. Hopkins and B. Beech of the IBA (*IEE Conference Publication No. 240* "Tenth International Broadcasting Convention") discusses some of the ways in which 12GHz dbs receivers can be improved, including the use of low-cost pll threshold extension demodulators (Fig 5) for the vision signal, with separate discriminator detection for the psk digital sound/data signals.

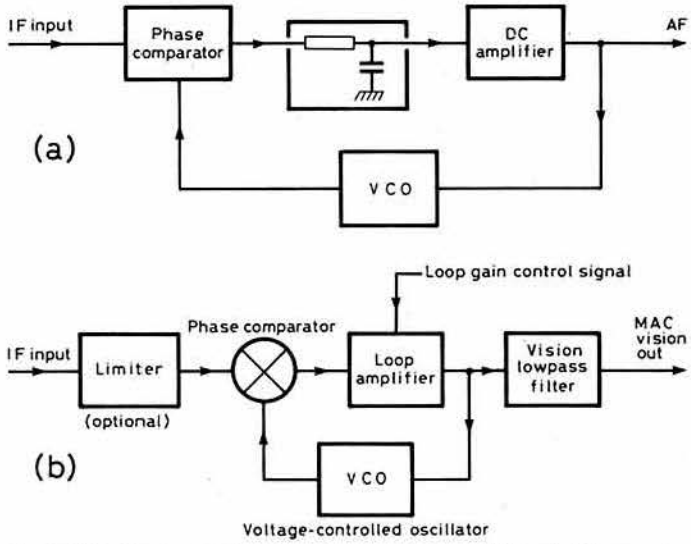
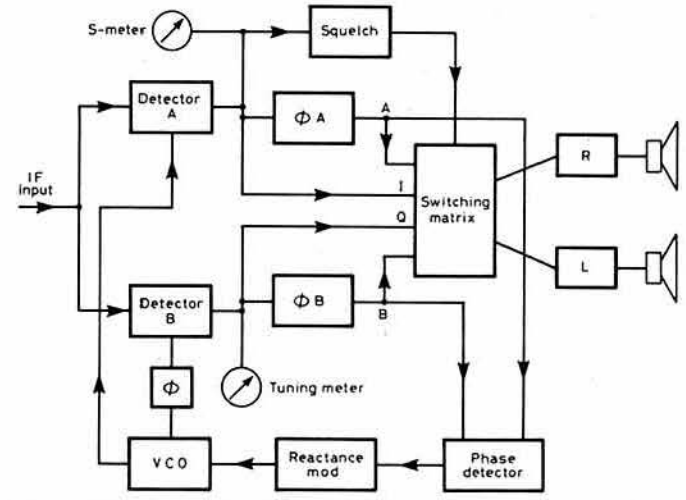


Fig 5. (a) Basic phase-locked-loop fm demodulator. (b) Threshold extension vision fm demodulator proposed for C-MAC/packet dbs. Second-order loop, natural frequency 18MHz nominal. Damping factor 3 (zero in loop 500kHz)

Many years ago I reprinted in *TT* a table stemming from R P Haviland of General Electric (US) that showed the relative communication efficiency for speech (in decibels) in the presence of random interference from a signal using the same mode (Table 1). This showed how widely efficiency varies depending on the form of demodulation. The six demodulation systems examined were: envelope detection; slope detection (this is a normal fm discriminator and not the "slope" demodulation of fm with an envelope detector); product (synchronous) detector; select product (product detector with sideband selection); lock-loop (synchronous (product) demodulation using a phase-lock loop): and bi-aural demodulation (a specialized form of lock-loop); and bi-aural demodulation (a specialized form of lock-loop synchronous demodulator with independent presentation and selection of usb, lsb and permitting bi-aural presentation of double-sideband signals): Fig 6.



	Switch matrix	Audio R	Audio L
1	am/dsb	I	I
2	fm	Q	Q
3	reject usb	A+B	A+B
4	biaural	A+B	A−B
5	reject lsb	A−B	A−B

Fig 6. Block outline of a flexible detector system developed by R P Haviland to investigate communications efficiency of a.m./fm/ssb/dsbsc modes, including bi-aural synchronous exalted-carrier detector (*Wireless World* November 1972 pp525-8)

Table 1—Relative communications efficiency for speech (dB) in the presence of random interference (same mode).

Mode	Envelope	Slope	Product	Select Product	Lock-Loop	Bi-aural
AM (dsb with carrier)	−3·2	—	−6·2	−3·2	−3·2	+2·8
NBFM	−20·4	−7·4	−10·4	−7·4	−7·4	−1·4
SSB	—	—	+10	+10	+7	+10
DSB (suppressed carrier)	—	—	+7	+10	+10	+16

It will be noted that nbfm emerges rather poorly from this comparison (about 4dB down on a.m. and 17dB down on ssb) and that the efficiency of all modes depends on the form of demodulation. The real attraction of nbfm to amateurs is that it causes less rfi and is more suited to the limitations of solidstate power amplifiers. It is also apparent from Table 1 that the *most* effective form of transmission is not, as commonly assumed, ssb, but dsb with suppressed carrier when this is received with a bi-aural demodulator.

It seems worth repeating this comparison in view of some recent articles in various journals that have been singing the praises of fm without distinguishing carefully between narrow and wide deviation. There is the problem, of course, that many fm rigs are set up with a deviation of ±7/10kHz rather than ±5kHz or so—but that is another story.

GaAs and computer-aided design

In the late 'sixties I recall going on a press jaunt to Racal at Tewkesbury on the occasion of the opening of what I believe was the first centre in the UK dedicated to computer-aided design (cad) of electronic circuits. Although crude by modern standards of sophistication, it was demonstrated that one could feed in the required response characteristics and specification of an amplifier and out would pop the optimum component values for the circuit.

I was much impressed, at least until one of my colleagues was told by the computer to fit a capacitor of an impossibly high value, of the order of farads if I recall correctly. No doubt he had specified some impossibly low frequency response, but the incident stuck in my memory as underlining the fact that if you ask a computer a stupid question the beasts are quite prepared to give you a stupid answer, unless the software tells it not to.

Yet one notices of late that the amateur radio journals are increasingly providing circuit and antenna information based on computer analyses, not always supported by practical experiments or measurements. Seldom is the warning given that the results and conclusions may be right or wrong, depending upon the correctness or otherwise of the information fed into the machine, the quality of the software programming and the validity of the basic mathematics.

An otherwise well-informed article "Quiet! preamp at work" by Paul Shuck, N6TX (*Ham Radio* November 1984, pp14–16, 19–20) on the problems of intermodulation distortion and other effects on vhf receiver performance of adding a low-noise, high-gain preamplifier, is marred by the author presenting some sweeping conclusions purely on the basis of computer imd analyses.

N6TX claims that while there is little difference in optimum performance at 144MHz with either good bipolar or mosfet devices in vhf/uhf preamplifiers, "an undisputed winner in all areas of vhf and uhf performance" is the gallium arsenide field effect transistor. This type of device, he claims, offers exceptionally high gain, low noise and wide dynamic range performance. Yet I cannot help feeling that his computer tells him this is so simply because he has fed into it device characteristics that may or may not represent what can be achieved in practice.

In *TT* (April 1984, p315) on the basis of practical experience, Chris Bartram, G4GDU, of Mostek argued that it is far from certain that GaAs devices, available at acceptable cost, are capable of doing all that is popularly claimed for them on 144MHz, even though such devices undoubtedly provide superior noise and gain performance on the microwave bands: Fig 7. For example, he had found the third-order intercept point is unlikely to exceed 6dBm and more likely to be about 0dBm. Yet N6TX uses the figure 11dBm, so it is not surprising that he is able to claim for GaAs devices (no specified type numbers given) a spurious-free dynamic range of 84dB compared with 78dB for similarly unspecified bipolar and mosfet silicon devices, and 107dB for a high-level doubly-balanced mixer. This inevitably leads him to conclude that the optimum choice for any vhf/uhf receiver front-end is a GaAs fet amplifier followed by a high-level doubly-balanced mixer.

He may or may not be right. In his notes, G4GDU questioned where "the myth of exceptionally good dynamic performance with GaAs devices came from", although he showed how, unless interpreted very carefully, some manufacturers' literature can suggest a third-order intercept point above 10dBm.

N6TX, however, is on less contentious ground in drawing attention to the problem of biasing semiconductor devices to achieve a valid compromise between low-noise and wide dynamic range.

It may also be recalled that G4GDU drew attention to the extremely good strong-signal performance that can be achieved in vhf receivers by the use of complex non-dissipative negative feedback, though this technique is generally confined to specialist high-cost professional equipment. Although, rightly, there is much interest in the use of GaAs devices on shf and above, in view of the extremely attractive low-noise/high-gain characteristics of these and other "3–5" semiconductor materials, it has to be recognized that there remain considerable difficulties in these materials, both in the laboratory and in the bulk manufacturing process, limiting availability and increasing the cost. It is unlikely that they will ever be as cheap as good silicon devices.

Over-voltage sensing ic devices

The three-terminal ic voltage regulators have established a firm and popular place in the homemade psu firmament. Originally for 1A maximum current rating, but later for 5A and, most recently, I gather, available for up to 10A, they are gradually replacing the discrete series-pass regulators except for the really heavy-current units.

A further step towards simple but safe power units is the introduction by Motorola of three-terminal and pin-programmable over-voltage sensing circuits in integrated form. Two devices, MC34061 and MC34061A, combine with two external programming resistors and a thyristor to provide quick-acting crowbar protection for a psu. The MC34061, a three-terminal ic, has a ±2 per cent tolerance on trip voltage; the similar looking MC34061A ± 1 per cent. For power supplies above 11V, a resistor in series with the thyristor gate is recommended to limit the power dissipated by the protection circuit to approximately 2W. Adding an external capacitor across this resistor provides a time-constant "delay" to give noise immunity and thus avoid the trip functioning on extremely short transients.

Also being introduced is an eight-pin dip device (MC34062) which provides a pin-programmable crowbar circuit in conjunction with an external thyristor (scr). The on-chip tapped resistor allows the circuit to be programmed for trip voltages from 3·5 to 40V with each of the five programming pins set to the standard trip point for a psu output of 5, 12, 15, 24 or 28V. Both devices sell in the USA, in 100-up quantities, for less than a dollar.

Getting it taped

Stan Kaplan, WB9RQR, in the Ozaukee Radio Club Newsletter and Hints and Kinks (*QST* October 1984) has drawn attention to the usefulness of adhesive copper tape. Such tape, as has previously been reported in *TT*, is made specifically for use in the electronics industry for such purposes as rf screening. However, the material that WB9RQR discovered is sold in the USA (and possibly the UK?) for use by hobbyists making stained-glass windows, so enabling the pieces of stained glass to be soldered together. It is made in widths from $\frac{1}{32}$in upwards, and the adhesive on the tape withstands the heat of soldering.

WB9RQR considers that, for amateur radio, "the possibilities for such tape seem endless". Among those that he has found useful are: making circuit traces on plain board for simple pcb projects, if necessary cutting the tape into narrow strips with scissors or razor blade; winding coils on

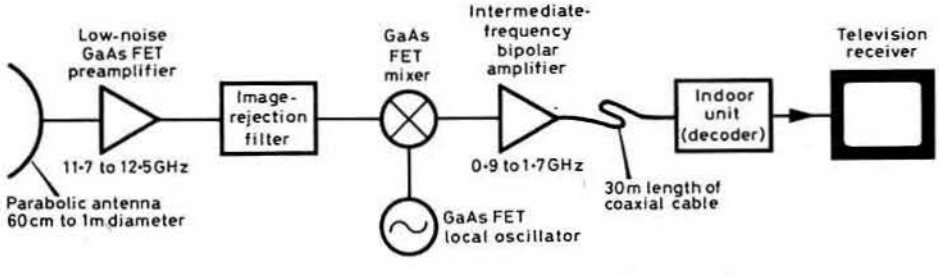


Fig 7. Block outline of experimental 12GHz receiver for dbs television reception showing the important role of GaAs devices. It also underlines the potential tvi problem from 1·3GHz amateur transmissions breaking into the 0·9 to 1·7GHz i.f. cable

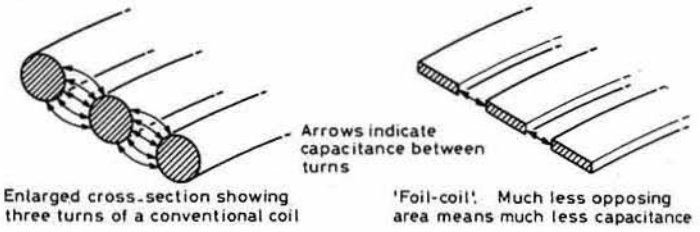


Fig 8. Cross-sectional areas showing how the distributed capacitance of a coil is reduced by using copper-foil tape

cylindrical formers, adding "Such coils are ideal for a transmatch atu because they exhibit low distributed capacitance" (Fig 8); and for the conversion of a standard reel relay insert into a switchable coaxial connector (an idea he based on an article in *Design News* 28 March, 1983 "Foil tape converts reed switch to switchable coaxial conductor"): see Fig 9. The copper on the hobby tape is 0·0015in thick, so that the current rating for a given thickness of strip may need to be considered. The adhesive provides insulation of an uncertain quality, but this matters little if the base material is suitable for the particular application.

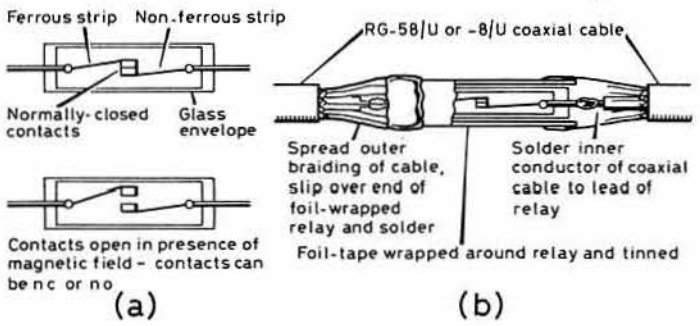


Fig 9. (a) The anatomy of a reed switch; (b) how a coaxial reed relay can be made with the aid of copper-foil tape

70MHz on the cheap

Even if high-quality MoD surplus is in short supply, there are other useful pickings. R. A. Sansoni, G4MWR, points out that many of the "illegal" cordless telephones are now becoming available at give-away prices. Approved frequencies for cordless telephones are now 1·642 to 1·782MHz (base transmit) and 47·456 to 47·543MHz (remote transmit), but there are still in use or in the shops a large number of units with base transmit frequencies about 49MHz and remote transmit 70 to 72MHz. BT have the power to confiscate any unauthorized equipment found connected to their network, and users and dealers are faced with equipment for which there is now virtually no market.

G4MWR finds that the 70MHz base receiver and 70MHz remote transmitter can form the basis of a 70MHz band transceiver of useful performance. He writes: "The sets are crystal-controlled (receiver 59MHz, transmitter 14MHz) with fm deviation of 5 to 7kHz. I have found some models with a receiver sensitivity as good as 0·175μV. Transmitter power can vary from 0·5W to 1·5W on the remote units (authorized models are limited to 0·1W). And there is another bonus; the versions using the 70–72MHz portion for both transmit and receive correspond in channels to the 25kHz spacing and location. The only modification required is to choose the crystals, replace them and disable the logic coding in the receiver or take the af out from the discriminator to a small af amplifier."

Tips and topics

G6ZCY draws attention to a possible source of conductive paint "Chipshield" as demonstrated on "Tomorrow's World" for BBC1, for reducing rf radiation from home computers but which could be applied to any plastics enclosure etc to reduce rfi by providing screening: Bee Chemical Co (UK) Ltd, Kangley Bridge Road, Lower Sydenham, London SE26 5BA. However, at the time of writing he had no details of prices, quantities etc.

G3KXF approves of the publicity given to the recent power-line tragedies, but was surprised to see than nobody referred to the problem of power-line noise radiation which should deter operators from siting antennas anywhere near dangerous power lines. With his motto of "put amateur back into amateur radio" G3KXF fears that "off the shelf" equipment operators may learn little about the does and don'ts of antenna siting and so run into danger. He recalls that one of the first lessons he learned was to avoid "power line QRN".

Dr A.F. Gerrard, G4TFU, was recently caught out by assuming (on the basis of the rather misleading Ambit catalogue details) that the SBL1 double-balanced mixer has the same pin connections as the now less readily available MD108. I recall this point has been made previously in *TT*, but it is worth repeating. You cannot simply substitute an SBL1 for an MD108 without changing the pin connections.

Feedback on the "underground hazards" item in the November *TT*. G3ZPF notes that the mention of manholes should read: "Manholes are usually about 1m deep. Bases should be at least 900mm (*not* 200mm) deep in order to be immune from seasonal movements in the ground." The point he was trying to make was that on large, flat housing developments manholes could be much deeper. Normally the bottom of the base should be about the same depth. □

IDIOT-PROOFING THE CDE HAM 3 AND HAM 4 ROTATORS

(Continued from page 111)

necessary to remove the pcb. Two stand-off insulators should be fitted: one just in front of RLA, and the other in the hole vacated by the securing screw of S3's lever. D11, D12, D13, D14 and C12 are fitted below chassis. R14 and D15 are fitted directly onto terminals 1 and 2 of the rear panel terminal board, and two wires brought forward to LED1 which is fitted in the space between the switch levers of S4 and S5 and secured with a dab of glue. The L.E.D. lead-out wires are bent up to clear the lever extensions. The point-to-point wiring should be self-explanatory from a study of the circuit diagram.

Other modifications

Another worthwhile modification is to make the CALIBRATE potentiometer less susceptible to erroneous adjustments. Before modification it was panel-mounted with a knob identical to the adjacent on-off rotary switch, hence the possibility of moving the calibrate setting instead of operating the on-off switch. The modification involves making a bracket on which to mount the potentiometer so that the end of its shaft is level with the front panel. By cutting a slot in the end of the shaft it can be adjusted with a screwdriver.

Fig 4 shows the L-shaped bracket required. It is secured to the chassis by two screws to the left of S5.

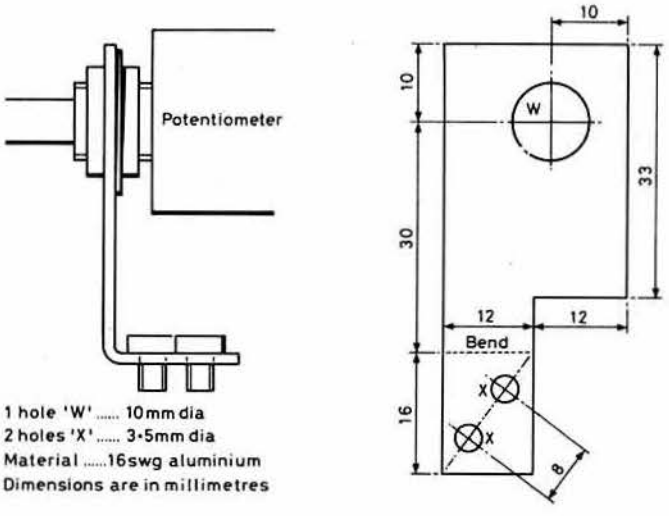


Fig 4. Mounting bracket for CALIBRATE potentiometer

If you have a rotator of American origin, check that the mains input fuse is wired in the *line* feed. In four units which I checked it was found that if the three-pin American plug supplied was used with a British socket, the fuse was found to be in the *neutral*. This is a dangerous situation, since a transformer insulation failure would cause an excessive current to flow in the mains input wiring and possibly make the chassis live. □

4-2-70

*by Ken Willis, G8VR**

NINETEEN EIGHTY-FIVE was to see the introduction of the so-called Maidenhead system of QTH location. By listening on the air and reading my correspondence, it appears that few have yet adopted the new nomenclature. It may take a little time to get as excited about working JM75 as it did when it was HV square, but need this be so? People have been heard on the air complaining that the Maidenhead locators have extra digits. They do, but although the old and new systems were constructed on slightly different bases, in practice they do not differ all that much. In the past, Henry, 9H1CD, might have given you HV03e as his locator during that Es contact. In future he can be expected to give it as JM75FV. Just as in the old system one was usually interested only in the "HV" part of the locator, in the new system simply "JM75" is all that is required to identify the square. Better still, the system is unambiguous, whereas the old one had more than one HV square in it (as there are only 26 letters in the alphabet), so repetition around the globe was inevitable.

Having said that, since many of my contributors have written using the old system, I have not altered their text, so please bear with me until I get the computer set up so that I can make the changes; or, preferably, use the new locators yourselves. Remember this was a British innovation conceived by the previous *4-2-70* contributor, John Morris, now GM4ANB. Won't it be nice when summer is back and Henry is giving all and sundry 5 and 9 from JM75FV!

Aurora

Dave Johnson, G4DHF (Bourne, Lincs), received a most interesting letter from Henry Snip, PA3BWY, who operates maritime mobile and is mainly interested in the hf bands. Henry is a weather observer with the Dutch Meteorological Office, and makes two or three voyages each year on the weathership *Cumulus*. More recently he became interested in vhf after experiencing some auroras, and wrote to Dave requesting more information on the vagaries of propagation at these (for him) high frequencies around 144MHz. Using an FT48OR and a quarter-wave homebrew groundplane antenna on 144MHz, he caught two auroras on 15 and 16 November while in position 52·1°N, 19·7°W, which is out in the Atlantic well south of Iceland.

On 15 November at 2350gmt he heard GM4TXX calling "CQ". He heard no more until 0030 (now 16 November) when he heard GM3WTA, G4ERG, G4XEN, G4KUX, G4SHC, G4YHF, G4DHF, GM4TXX plus other unidentifiable calls, all between 0030 and 0215gmt, when he says "Big Brother seemed to pull the big switch". Being the first time that he had heard "hissing keys", he said that he omitted to write down everything he heard, but in his letter, Henry's scientific training shows through for the wealth of information contained in a report on an event which was completely new to him and not properly understood at the time.

The aurora was partially visible to PA3BWY. From 2100gmt a glow "crept over the northern brink". At 2300 it reached the zenith, and shortly afterwards a corona appeared in red, green and white-yellow. Henry called all the stations he heard, using his groundplane, and after a call to G4SDC (was it G4SHC I wonder?) that station sent QRZ?. G4KUX's signals were described as being "loud beyond belief".

The significance of this report is that some of the stations heard were reaching areas beyond their theoretical "boundary fences" (see RSGB *VHF/UHF Manual* for full description of these limits), and G4DHF says that for the second time this year his own signals have been so reported. Dave also says "Imagine what Henry might have heard if he had used a *real* antenna. Yes, and the beam headings for maximum received signal would have been useful information too. Looked at another way, it indicates the penalty suffered by UK amateurs in having so much sea to the west instead of a land-mass populated by other operators.

Our reliable auroral reporter John Dunlop, GM6LNM (Port Glasgow), observed this event also, plus others on 7, 17 and 21 November. Only the 15/16 November event was at all strong, when John copied DL0PR as well as GB3LER. Beam headings for beacons were "changing all the time" with him, and he had a feeling that the auroral curtain was overhead at times, though it was never visible to him.

John Branegan, GM4IHJ (Fife), added some more auroral dates to the list, namely 28 October, 2, 5, 6, 8, 9, 11, 17, 20, 21, 29 November and 2, 3 December. Many of these were weak and brief, but the exciting thing to me is that northern stations with sophisticated equipment are now monitoring so actively that almost every day some auroral activity is reported. John also noted a very high incidence of auroral-Es after the *first phase* of a radio aurora. There will be more to report on John's activities in a later issue.

50MHz

The 50MHz permits issued by the UK licensing authority produced ripples of interest and excitement all around the world in countries where enthusiasts for this part of the spectrum are to be found. LA6HL, in a 144MHz contact with G8ECI, was obviously pleased with the news that his own country was following the UK lead, and predicted that the first Norwegian stations would be active by the end of 1984. So far no reports of LA contacts or stations heard have reached *4-2-70*. LA6HL said that at least two Icelandic stations were equipped for this band.

From much further afield, from Revesby, NSW, Australia, Norman Burton, BRS11494, wrote on behalf of a local amateur, VK2BNN, who is a dedicated 50MHz operator. The allocation in Australia is 52 to 54MHz, incidentally, which is rather inconvenient for any attempts to work between the UK and VK (quite apart from the mere propagation problem!), but nevertheless, Norman says that there would be considerable interest from "down under" for some regular tests to find out whether anything could be heard in the UK of a transmission on 52MHz or thereabouts emanating from VK. A schedule along the lines of a test tape transmitted on 50MHz for about one hour a day is suggested, with 14MHz used as a liaison frequency, or even the use of the telephone if something momentous occurred. Apart from VK2BNN, there is another local operator with 400W on the band who would be interested in these tests. BRS11494 goes on to mention reception of BBC Band 1 tv signals there in the 'fifties, and also comments that in 1937 the late Don Knock, VK2NO, was heard in North Wales by an operator with the name of Mellamby. Unfortunately there is no mention of precise dates to indicate whether these "happenings" were at a sunspot maximum when some F-layer propagation was occurring. I frequently make the comment that we know very little about what goes on in the ionosphere, but without multi-hop chordal-hop ionospheric reflections it is difficult to envisage how a 52MHz signal could arrive on the other side of the globe by any of the other accepted modes of vhf propagation. Nevertheless, any station or stations wishing to participate in such tests should write to me, and I will forward a copy of the BRS11494 letter, leaving them free to make whatever arrangements seem appropriate. Norman Burton, although a "British Receiving Station" says he has been a member of RSGB for almost 40 years.

Jack Hum, G5UM, asks what should be done with the "upper half" of the 50MHz allocation which permit-holders are allowed to use, ie 51–52MHz. He suggests it be reserved for local contacts, and that fm be used in this part of the band. If ever a general allocation of the band is approved we shall need to adhere to a band plan as on other frequencies, and the VHF Committee has already given much thought to this matter. Anyone with strong views on the subject should write to me and I will bring the correspondence to the attention of the committee. Jack also comments on the reception of beacon GB3NHQ on 50·05MHz, saying that it is a boon to the many who listen but are not permitted to transmit during tv hours (or at all!). He reckons its range to be about 200 miles, even under "normal" conditions.

In an interesting article by Nigel Cawthorne, published in the November 1984 issue of *International Broadcast Engineer*, the "Green Paper" is reviewed and the point made that from the first week in 1985 the UK will be one of the few, if not the only, all-uhf tv country in the world. He goes on to comment on the tremendous demand which will arise for allocations within the 21MHz in this part of the spectrum which then becomes available in Band 1, plus the need to minimize, by careful planning, interference

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between UK users and Continentals who will still be transmitting tv on these frequencies. He is not talking just about amateurs, though, when he says "tv viewers in neighbouring countries no more wish to have their pictures cut up by mobile radio transmissions than the mobile radio operators wish to have their service broken up by the buzz of tv carriers".

In an interesting report on 50MHz operation, Phil Guttridge, G3TCU (Godalming), commented on good tropospheric conditions on the band during 10/11 December. The 70MHz beacons GB3ANG and GB3CTC were heard well above noise (40dB in the case of CTC), and on Sunday 11 December on 50MHz he copied GM3ZBE at 559 on cw at 0820, his first ever GM at copyable strength on this band by tropo. Next day (12 December) he copied GM3DOD, also via tropo. Phil said that the "newcomers" to 50MHz were lucky to experience a major aurora in the first week of their operation, probably the biggest such event since the initial permits were issued. During the Geminids, Phil put in a night session followed by an early morning one, and on 13 December worked GM3WOJ in a random ms contact, completing within 1min. By 16 December, conditions for the 70MHz contest had become "absolutely awful". *C'est la guerre.*

Expedition to Foula

Stewart Cooper, G4AFF (Weymouth) has sent details of an expedition to the Shetlands, including the Island of Foula (YU70e), which is planned for 9 to 20 April 1985. Most of the operation will be on the hf bands, but between 13 and 18 April meteor scatter cw will be employed from the Island of Foula on the 144MHz band. A TS780 feeding a 6N2 amplifier, plus 2 × 13 element KLM long Yagis with GaAsfet masthead preamp should make for a very potent station on both send and receive. Skeds can be made by telephoning G4AFF on 0305 775456, or by writing to him QTHR. Shetland is now quite well-represented on 144MHz, and has often been worked from the south in big tropo events, but YU square is a rarity.

European operators on ms will be queueing up for skeds with this expedition station. For those in the UK lucky enough to get in on the act, remember the distance is a bit short, so some antenna elevation could pay dividends—or use an antenna with a bit less gain and a wider vertical polar diagram. For the really adventurous, try some backscatter. Don't write to ask me what YU70e is in the new locator system, because I haven't yet worked it out!

Meteor scatter

The Geminids shower did not seem all that spectacular to me. As an experiment I listened on a standard TS700 with no preamplifier and with 18in of coathanger wire stuck in the rear as an antenna, and around the peak heard identifiable ssb bursts from YU and HG on the random channel (144·200MHz). Ian, G4YUZ (Hoddesdon), arranged 15 skeds in the period 12 to 16 December to bracket the shower, but only four were completed. Five on ssb were unsuccessful, two of the far-end operators failing to turn up. Three of the cw skeds produced nobody at the other end either, a problem which is becoming more acute for stations in the less exotic squares. European operators on the vhf net sometimes seem to make skeds rather than offend the station requesting them, but then fail to appear, a very unpleasant experience when one has quitted a warm bed in the small hours. Ian also had some skeds on 70MHz, both of which were successful. The first was in-band with GM3WCS (YQ) and the other with F9HS (BD), who listened on 70MHz and transmitted on 144MHz. On 70MHz Ian used a five-element MET antenna 50ft above ground, fed from a 2N6084 amplifier.

David Butler, G4ASR, who edits the *VHF/UHF Newsletter*, has specified some dates on Saturdays and Sundays to be meteor scatter activity periods in an endeavour to create more activity in this mode between major showers. Each month will have two activity periods, Saturday 2200 to 0200gmt and Sunday 0400 to 2400gmt, using cw on 144·100MHz with 5min periods, or ssb on 144·400MHz with 1min periods. The usual convention of UK stations taking second period when beaming to the east will be adopted. Suggested dates are:

Feb	9 (Sat)	27 (Sun)	Aug	10 (Sat)	25 (Sun)
Mar	9 (Sat)	24 (Sun)	Sept	7 (Sat)	22 (Sun)
Apr	13 (Sat)	28 (Sun)	Oct	12 (Sat)	27 (Sun)
May	11 (Sat)	26 (Sun)	Nov	9 (Sat)	24 (Sun)
June	8 (Sat)	23 (Sun)	Dec	7 (Sat)	22 (Sun)
July	13 (Sat)	28 (Sun)			

The Saturday dates are for the shorter sessions, the Sundays being the "all-day" schedules. Meteor scatter enthusiasts are asked to pass on this information via the vhf net or elsewhere to amateurs in other countries, and to send details of any contacts made during these activity periods to G4ASR, PO Box 73, Hereford HR2 9EW, tel 087 387 679 (evenings).

I was fortunate to receive a letter recently from John Stace, G3CCH, a pioneer meteor scatter experimenter who made his first contact via this mode as long ago as 1960 when he worked OE6AP. In those days equipment was far less sophisticated and generally, for vhf, all homebrew. In these days of digital read-out transceivers it is difficult to appreciate that just making sure that both stations were on the same frequency was itself a feat —and a limiting factor in successful ms working. John described the construction of various crystal-controlled oscillators, even the technique of building a pair of them on exactly the same frequency, sending one to the station at the far end to ensure that he came up on the correct frequency. Frequency counters of all types were also built, the ultimate in those days being an oscillator phase-locked to BBC Droitwich on 200kHz, with multipliers giving accurate 200kHz markers on 144MHz. Attempts to get good stability included burying one frequency standard several feet in the ground to provide a cheap but stable oven! Later, even the transmitter frequency-determining circuits were buried to minimize drift. No quartz clocks or watches were available in those times either, so a 1MHz standard was built with dividers down to 50Hz, amplified to provide 200V for driving a synchronous clock. This source was again divided to provide a pulse at the 5min point to operate the send/receive relay to signify the end of a period.

Micro-chips having not yet been invented, keying at high speed was a great problem, and many mechanical devices were tried, such as a drum with a rolling contact and insulating tape providing gaps between morse characters. Later, discs with the edges cut in morse characters were used; imagine today hearing YU2CCB on the random channel and having to cut a disc before you could call him! Endless loops of magnetic tape were also used, until G3MNQ produced a fully-electronic keyer. Early transmitters used very hot QQVO6-40 valves, or radar triodes operated at extremely high anode voltages, until the 4X250 became available. Despite all these problems, G3CCH persevered and in 1960 worked OE6AP, in 1961 OH1NL, in 1962 OK2WCG, in 1965 UA1DZ, and in 1969 OH2BEW and OY2BS. Then followed a remarkable series of skeds with TF3EA in Iceland, first worked on ms in May 1970 and the final, 51st contact, with him being made in September 1973. Several of these contacts were made at hand-speed cw—rather tiring on the wrist! Unfortunately TF3EA died shortly after these tests were concluded. In a later series with SM3BIU started in 1974, 256 complete contacts were made up to the time the tests ended in January 1983. In all, John made 553 complete contacts, mostly using sporadic meteors. Apart from one or two locals, G3CCH was the only station TF3EA ever heard on 144MHz! Are we not fortunate that pioneers such as these paved the way for present-day ms working. Next month I will publish something of what John had to say about antenna systems for ms work. His "giant" colinear was at the time a source of both wonder and envy to those of us with "big" 4-over-4 slot antennas.

We are entering a period when meteor activity will be low for two or three months, but don't give up—several operators have shown that contacts can be made all-year-round using sporadic meteors with patience and adherence to good ms operating practice.

Repeater news

Once again, quite a lot of repeater information has come to hand this month. I also receive correspondence from those who say that repeaters are not a "proper" subject for a vhf/uhf column, though I do not subscribe to this view myself. I rarely, if ever, access a repeater, but I have frequently done so in the past and I know what a boon they can be to operators who spend much time mobile or to those who are unable to erect large external antenna systems. So I always welcome repeater information—my only problem being in trying to allocate space fairly to all the many aspects of vhf communication which we are free to use.

Russell Luckock, G3VDX (Worcs), says that his local repeater, GB3MH (Malvern Hills), is rarely mentioned. This is in fact one of my favourite parts of the British Isles, Elgar country. The original group which conceived GB3MH comprised G2AFD, G3MTI, G3NUE, G3PWJ, G3VDX and G3WGY. More recently G8TXG joined the group with responsibility for GB3MS, the 430MHz repeater, and G4BBB has also joined the ranks of the committee. The group operates entirely on voluntary donations, which should be sent, incidentally, to G3VDX QTHR. Future plans include much rewiring and antenna maintenance to continue the record of consistent service which these repeaters have provided over the years despite having twice been struck by lightning and suffering vandalism.

Writing from Fleet (Hants), Les Steele, G8MEH, notified some changes affecting GB3SN (R5, Alton) which is now run by the UK FM Southern Repeater Group. After completing nearly 10 years' operation, the original unit was replaced by a Mk2 version at the end of October 1984. Technical support for this was provided by the Farnham (Surrey) VHF Group. The improvements to the system brought about by this change include a 10dB increase in receiver sensitivity and a new logic system derived from much experience with the Farnham Group's own uhf repeater (GB3FN, RB15). The system is designed to provide more reliable operation for mobiles with

"fluttery" signals, while the audio requirements (for the user) are much simplified. Timeout is fixed at 2min with a pip-tone timeout sequence, though audio can be restored by a stronger station. As with GB3FN, a "T" is sent to indicate timeout rather than a "K".

GB3FN, which has worked well since February 1983 is now scheduled for some technical improvements, a back-up unit being already built to operate while engineering work progresses. Transmitter stability of a very high order is planned, with a single directional antenna system to enhance coverage towards the west. A change to 24V battery operation will also be made to give protection from mains supply cuts. The repeater lives in a second world war pill-box in a hilltop, so it is prone to dampness especially if the power fails. Both GB3SN and GB3FN are based on modified Storno 600 series base stations, optimized for low distortion and linear audio response. Thanks both to Les Steele and to Dave Chater-Lea, G4EPX, for all this information.

The Aylesbury Vale Repeater Group controlling GB3VA and GB3AV notified members in its December newsletter of an annual general meeting to be held on 6 February at the Village Hall, Stone, some three miles southwest of Aylesbury on the A418. Only members will be entitled to vote. Talk-in is to be provided on S22 and GB3AV if this reaches prospective attendees in time for this information to be of use. The group has proposals before the RMG for two proposed new installations, namely co-sited 430 and 144MHz repeaters in the Hemel Hempstead area. Provisional callsign allocations are GB3BV (430MHz) and GB3VB (144MHz). Both a suitable site and most of the necessary equipment are already available. More on these matters, and information on the status of the existing group's repeaters in a later *4-2-70*.

The newsletter of the Kent Repeater Group had on its cover an illustration showing how the group has achieved good coverage of the county through its six repeaters. It was sad to note that the editor of the group's publications, Wally Broad, G8GTF, died of a heart attack on 28 October. He will be greatly missed by the group.

Travellers through Kent to the Channel ports are well served by the Kent Repeater Group's installations, shown above

The winter issue of the *Central Scotland and Borders FM News* edited by Colin, GM8LBC, contains its usual wealth of topical and technical information. It was news to me that the licensing conditions for the new IoM repeater GB3GD (see *4-2-70* January 1985) include the requirement for GB3GD to use a tilt on the antenna to minimize radiation towards areas outside the Isle of Man. It will be interesting to see how it works out, for if it does not, then some further channel changing may be required. This information came from the newsletter, and Colin goes on to say in his editorial that if northern amateurs believe they have problems fitting in repeater channels, they should try operating "south of Lancashire". Many of us know only too well what he means. South of Potters Bar it can be even worse.

The Sussex Repeater Group December newsletter arrived just too late for detailed comment, but it was mostly concerned with their annual general meeting, held on 18 December, and the constitution of the group, from which it is obvious that these people run a very professional organization. More on their activities next month.

A newcomer, to me, was a newsletter from the North Cambridgeshire 70cm Repeater Group operating GB3WI (Wisbech RB15), sent by Gordon Smith, G6XMU. The newsletter is available to all who send an 8·5 by 4·5in sae plus a small donation to either G6XMU or G4NPH, both QTHR. The GB3WI team is progressive and wishes to improve its repeater installation. For this, funds are required, and one way of obtaining these will be to mount a stand at the 1985 Spalding Rally selling radio "junk". So anyone who wishes to donate the contents of his/her attic to the group, please contact Gordon, G6XMU, QTHR.

Tropo

Nineteen eighty-four was not noted for major tropospheric openings but, as if to make amends, there was a very good event between 10 and 12 December, when stable weather conditions and a high-pressure system extended over the British Isles and across much of Europe.

Mark Watson, G4WNZ (Isle of Wight), had a very interesting contact when he worked IW1AHH (DF15c) on ssb on 144MHz at 1900gmt on 10 December. Signals were 53 both ways, and Mark also worked French stations in ZE, ZF and DI squares, plus a German in EI. Beacons logged at the same time were GB3ANG, FX3THF, FX0THF, ON4VHF, FX7THF, FX8VHF, FX5THF and DL0PR. He also noted the presence of EA1VHF and IX1A, both very weak and short-lived, but what a fine haul of beacons seldom heard in most parts of the UK. Equipment at G4WNZ comprises an FT290R with 30W to a 13-element Tonna at 75ft asl. He is in ZK25f, which is IO90JQ in the new system.

The extent of the opening can be judged from this report from Chris Knight, GM1IHD, of Kennoway, Fife. He says he is a "relatively new operator, amazed at the strength of signals from Europe". Relatively new or not, in a continuous 6h session he worked no fewer than 186 stations in Europe, his best dx being I1CCX at approximately 2,000 miles. How come we old-timers never hear Italy via tropo? Being in a rare square helped Chris somewhat, since PE1KKJ waited 2·5h for a contact with him. Chris was impressed by the patience and manners of the European stations.

This opening was also very good on 432MHz and higher, in fact at times progagation was better on 432 than on 144MHz, a phenomenon noticed quite often but seldom commented upon. On the higher frequency, Paul Thompson, G7MEN (Southport, Lancs), worked F1CYB (BH) on 10 December using 10W to a 19-element Tonna. Spurred on by this, next day he used only the 1W from his barefoot FT790R to work G6YLO (AL) who was using an indoor antenna, followed by ON5NY and DL7QY (FJ), this one over a distance of 1,034km. On 12 December he worked (BG). He says these are "not too startling" but that his modest station did not do too badly compared with the eight-stacked Tonnas and 400W which were on the band at the time. Paul also wishes that more people would use the 432MHz band, as he is willing to talk to anyone and needs some more British squares. This is a plea heard very frequently. 432MHz is a very good band, and the antennas almost small enough to fool the planning authorities into thinking that you have a tv installation on the roof, whereas by the time some fifty-odd starlings have settled on my 144MHz 16-element, it looks more like an aviary than a suburban residence, quite apart from the dire consequences on any washing pegged on the the line immediately below their line of fire.

Dave Hewitt, G8ZRE (Chester), took part in an interesting demonstration of the amateur spirit on 12 December when he heard G8XVH in the Midlands calling GJ, EI or GD for the benefit of PA3BSR who wanted to work any of these prefixes. Having earlier heard GD1ASB on the band, Dave tried to raise him, but when this failed, looked him up in the callbook, and with the aid of Directory Enquiries, managed to phone George (GD1ASB) who immediately came up on 144·208MHz to work the Dutch station, who with his 10W was delighted with his first-ever GD contact.

Frank Brisley, G4NRJ (Peterborough), managed his best-ever "catch" of dx contacts in a single event by working 52 stations in France, Belgium, W Germany, Holland, Denmark and Sweden on the 144MHz band. He said that several gave their Maidenhead locators, but in the old system the squares he worked included, ZH, BF, BG, BJ, BI, BH, EO, EN, FM, FO, EQ and GR. Frank uses an IC290E, a B108 80W linear and a 10-element Yagi, showing what can be done with a nice compact station.

From here and there

John Hunter, G3IMV (Bletchley), a long-time leader in the 144MHz RSGB squares awards table, has now received a 70 squares 15 countries award for 432MHz operation, many of his squares being worked on cw. John's proficiency in cw is legendary. On 432MHz he uses a Trio TS780, a Sota 50W amplifier and a 21-element Tonna. We need much more cw on 432MHz. Why not give it a try, especially when the use of morse by Class B operators comes into force in April?

Antenna specialists might like to note some IEE sponsored meetings on these and related topics scheduled for 1985. An antenna symposium will be held at Queen Mary College, London, on 11/12 April, and an international conference on antennas is set for 16-19 April at Warwick University. Further details from the Electronics Division, IEE, Savoy Place, WC2 0BL.

EDJ4GL reports that the DARC International Slow-Scan Television Contest will be held between 1200gmt 16 March and 1200gmt 17 March 1985. All of the authorized sstv bands may be used, Class 2 being for vhf/uhf, and Class 3 for receiving stations. Only two-way video exchanges of callsign, report and serial number will count. It will be permitted to call "CQ-SSTV Contest" on phone. Further information including scoring system by sending sae to G8VR. □

RSGB NATIONAL VHF CONVENTION

Sandown Park Racecourse, Esher, Surrey

Saturday 23 March 1985

- **One day exhibition and lecture programme**
- **Exhibition by specialist groups**
- **Presentation of trophies**
- **Equipment test facility**
- **Comprehensive trade exhibition**
- **Full lecture programme on vhf, uhf and microwave subjects**

PROGRAMME

1030 **Convention opens.** Entrance through racecourse turnstiles. (Open to exhibitors from 0800 through special exhibitors' entrance) **Refreshments.** Snack bar in the hall will be open from 1100 to 1600, and the licensed bar will be open throughout the convention.

Equipment test facility operated by Don Hamilton, G8DON

1345 **Convention address and presentation of trophies** by RSGB President, Joan Heathershaw, G4CHH

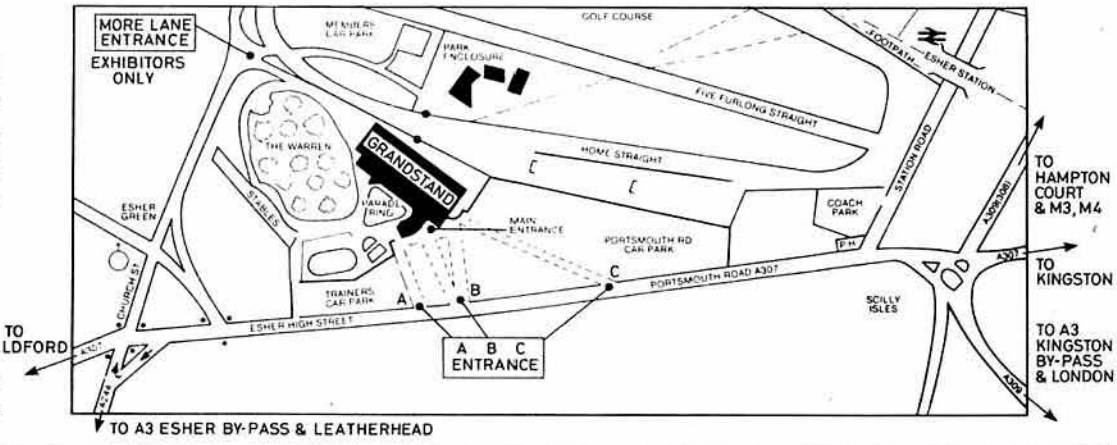
LECTURE PROGRAMME

Detailed arrangement for lectures will be notified on arrival

	Stream A	Stream B	Stream C
1415	"VHF/UHF receiver front-end design", Dr Ian White, G3SEK	"Getting a repeater going", Chris Young, G4CCC	"Microwave measurements", Mike Walters, G3JVL
1515	"Construction of high-power amplifiers for vhf and uhf", Geoff Brown, GJ4ICD	"ATV repeaters and the future", Graham Shirville, G3VZV	"Microwaves in radio astronomy", Dr Ian Morison, G1GZC
1615	VHF Committee forum	"How packet radio works", Ian Wade, G3NRW	"Satellite television", Dr Steve Grenhaugh
1715	Lecture session ends		
1800	Trade exhibition closes. Convention ends		

Please note that there will be no social evening this year

ACCESS MAP TO SANDOWN PARK



Map by courtesy of United Racecourses

APPLICATION FOR TICKETS

RSGB NATIONAL VHF CONVENTION 23 March 1985

Please supply tickets as under:	Cost	Number		Cost	Number
Convention and exhibition.....	£1.00	.....	**Convention and exhibition (under 18)**.....	£0.50	.....
			Convention and exhibition (under 14).....	Free	.....

I enclose cheque/postal order for £.....

Name.....

Address.....

This application for tickets must be sent to: RSGB Publications (Sales), Lambda House, Cranborne Road, Potters Bar, Herts EN6 3JW. Cheques to be made payable to RSGB.

Advance purchase of tickets will reduce entry time to the convention. Applications must reach RSGB HQ by 3 March.

Computing

*by John Morris, GM4ANB**

Grey-line calculator

Program 1 is a short number cruncher which calculates the time of sunrise and sunset and direction of the "grey-line", that line of twilight between day and night at dawn or dusk along which useful propagation can often be had.

Most of the work is done by the subroutine in lines 1000 to 1160, which you may like to pull out and use in more comprehensive programs. It takes the station latitude (radians north) in N and longitude (radians east) in E, the day of the month (1 to 31) in DY, month number (1 to 12) in MN, and year (four digits, such as 1985) in YR. On exit, TR is the time of sunrise, in hours since 0000gmt and AR is the bearing of the sun at that time in radians. The sunset time and bearing are in TS and AS. Note that AR and AS are bearings to the sun, not of the actual shadow line. The grey-line great circle directions can be found by adding and subtracting 90° to the sun bearing.

There is only room to give a brief overview of the subroutine's operation, with apologies to those unfamiliar with the astronomical terms. Lines 1000 and 1010 calculate the number of days that have passed since the last day of 1979. The next three lines find the sidereal time at the start of the day in question. Lines 1050 to 1090 calculate the ecliptic longitude of the sun at noon. Given that this changes by less than 1°/day, no correction is made for the difference between the position at noon and those at sunrise and sunset. Lines 1100 to 1120 perform a coordinate transform to get the equatorial coordinates of the sun, from which the approximate sunrise/sunset times and bearings are found by the last four lines of the subroutine. Refraction, parallax and the sun's finite diameter are all ignored in this. Their net effect is to make the real dawn a few minutes earlier than predicted, and sunset a few minutes later. Two functions, defined in lines 10 and 20, are used. FNA returns the fractional part of a number. FNC performs an arc-cosine operation. If your computer provides either or both of these, then substitute as appropriate.

The main program, lines 100 to 170, illustrates how the subroutine is used. The home station latitude and longitude should be inserted in line 100. The example shown is for 56°3'N, 3°20'W. Note the "-" sign for E, indicating that the station is west of the Greenwich meridian. The date is INPUT and the subroutine called and then lines 130 and 140 convert the bearings from radians to degrees, and the times from decimal hours to hours and minutes. To get the grey-line bearings 90° must be added to and subtracted from the direction of the sun. This is done within the PRINT statements.

Rather more complex grey-line programs can be built up from Program 1. For the purposes of making a calendar it is quite permissible to let the month number, MN, stay at 1 and use a FOR loop so that the day number, DY, goes from 1 to 365 to cover the whole year. If you do this then note that YR and MN can be changed by the subroutine, so should be re-initialized each time it is called. Another possibility is to take the grey-line bearing and write a routine to track it around the earth, seeing which interesting locations it hits.

Take care with the many numerical constants when typing in the program. To check it, use the latitude and longitude shown in the listing, and compare the results with Fig 1. If all is well then change line 100 to suit your own location.

If you are interested in this subject and want to experiment with programs, then I recommend *Practical Astronomy with your Calculator*, by Peter Duffet-Smith (Cambridge University Press, 2nd ed, 1981, ISBN 0 521 28411 2). This excellent little volume presents a series of "hand algorithms" that can very easily be converted to computer programs, and also explains the terminology.

Program 1

```
10 DEF FNA(X)=X-INT(X)
20 DEF FNC(X)=PI/2-ATN(X/SQR(1-X*X))
100 N=(56+3/60)*PI/180: E=-(3+20/60)*PI/180
110 INPUT "DAY, MONTH, YEAR";DY,MN,YR
120 GOSUB 1000
130 AR=INT(AR*180/PI+0.5): HR=INT(TR): MR=INT(60*FNA(TR))
140 AS=INT(AS*180/PI+0.5): HS=INT(TS): MS=INT(60*FNA(TS))
150 PRINT "Rises ";HR;":";MR;" Grey line ";AR-90;"/";AR+90
160 PRINT "Sets ";HS;":";MS;" Grey line ";AS-90;"/";AS+90
170 GOTO 100
1000 TP=2*PI: IF MN<2.5 THEN YR=YR-1: MN=MN+12
1010 D=INT(365.25*(YR-1980))+30*MN+INT(0.6*MN-0.3)+DY-31
1020 T1=(D + 29218.5)/36525
1030 T1=6.6460656 + T1*(2400.051262 + T1*2.581E-5)
1040 SE=T1/24-YR+1900
1050 MS=TP*FNA((D+0.5)/365.2422 - 0.010452395)
1060 T1=MS: T2=0.016718
1070 T3=T1 - T2*SIN(T1) - MS: T1=T1 - T3/(1-T2*COS(T1))
1080 IF ABS(T3)>1E-6 GOTO 1070
1090 EW=2*ATN(1.01686*TAN(T1/2))+4.932237686
1100 SD=0.39781867*SIN(EW): CD=SQR(1-SD*SD)
1110 SI=SIN(EW)*0.91746406: CO=COS(EW): RA=ATN(SI/CO)
1120 IF CO<0 THEN RA=PI+RA
1130 AR=FNC(SD/COS(N)): AS=TP-AR
1140 TH=FNC(-TAN(N)*SD/CD)
1150 TR=23.934*FNA(1+(RA-TH-E)/TP-SE)
1160 TS=23.934*FNA(1+(RA+TH-E)/TP-SE): RETURN
```

```
DAY, MONTH, YEAR? 12,2,1985
Rises  7 : 52  Grey line  25 / 205
Sets  17 : 2  Grey line  155 / 335
DAY, MONTH, YEAR? 23,9,1985
Rises  6 : 7  Grey line  0 / 180
Sets  18 : 3  Grey line  180 / 360
```

Fig 1: Example run of Program 1

Rules for rtty programmers

RTTY has been around for quite a while, but is nevertheless very well suited for use by computers. Historically, rtty stations used clumsy (or magnificent, depending on your point of view) electro-mechanical teletypes. Nowadays, more and more rtty operators are turning to the less-dramatic but more socially-acceptable little plastic box. One of the great things about using computers for rtty is that it is practically impossible to tell, over the air, whether a signal comes from a traditional teletype or from a computer, and the two types of machine can communicate quite happily. In the jargon, this is known as "backwards compatibility". But just how compatible is compatible? Getting a computer to send and receive ITA No 2 code at the appropriate speed is not too difficult, but there are some rather more subtle features which must also be taken care of.

Ian Wade, G3NRW, edits the BARTG magazine *Datacom*, and has strong views on this subject. His favourite hate is the program which transmits great long strings of text with never a single new-line sequence (carriage return/line feed). This is fine if the text is being received by another computer, which is quite capable of scrolling the screen every time the cursor hits the right-hand margin, but a teletype has a problem. Unless it actually receives a new line, the print head will just sit jammed against the

*6A Morlich Grove, Dalgety Bay, Near Dunfermline, Fife KY11 5UX.

right-hand end stop, clattering away making a nice black blob on the paper. This is not the most effective form of communication known to mankind.

To be able to hold its head up in society, therefore, any program which claims to turn a computer into an rtty terminal must ensure that new lines are sent at suitable points. At the very least a new line should be sent automatically when 69 characters have been sent since the last new line. This is a minimum requirement, and will ensure that the result at the receiving station is at least readable, but it does cause words to be split messily between lines. The computer can go one better. The method I use is to send a new line whenever a space is typed and 60 or more characters have been sent since the last new line. If no space is typed after the 60th character then a new line is forced in any case after the 69th character. Except when a long word happens to occur at the end of a line, the result is much tidier.

There are other facilities which can usefully be added. Good rtty programs allow the user to type normally, and insert the LETS and FIGS shift characters automatically as required. There is no reason why they should not insert characters at other times, too. Unshift on space is a technique whereby a LETS character is sent before every transmitted space. This ensures that if a garbled character has left the receiving station stuck in figures shift then it will at least come back for the next word. Unshift on new line is similar. Under weak-signal conditions it is also useful to send certain important characters more than once, in particular, FIGS and LETS.

Oddbits

The British Amateur Radio Teletype Group, BARTG, is concerned with more than just rtty these days, and anyone interested in data communication in any form will find something of interest in the well-produced pages of *Datacom*, their quarterly journal. Membership costs £5 per year. The group has a stand at most of the major amateur gatherings of the year, or you can send the usual sae to John Beedie, GW6MOK, "Ffynnonlas", Salem, Llandeilo, Dyfed SA19 7NP, for more information.

The Sinclair Amateur Radio User Group was formed in 1981 and is just what its name suggests. UK membership costs £5 per year. A 16-page newsletter, containing program listings and items of interest to Spectrum and ZX81 owners, appears five times a year. An sae to Paul Newman, G4INP, QTHR, will bring details.

I am always pleased to receive letters from readers of this column, and the response since its introduction has been excellent. However, I would make two pleas. First, if you want an answer then please include an sae —I get funny looks at the post office when I buy stamps by the hundred, and my beer budget is getting depleted. Second, don't ask me to recommend which computer you should buy, because I won't! □

EPHEMERIS

Satellite news and views

*by R. O. Phillips, G4IQQ**

Satellite status report

I have received a number of requests for a general summary of the characteristics of the currently operating satellites, and have therefore produced the following information based on available data.

Satellite	RS5	RS7	RS8	Oscar 9	Oscar 11
Inclination (degrees)	82·96	82·96	82·96	97·6	98·23
Period (min)	119·5	119·1	119·7	94·3	98·5
Ave height (km)	1,674	1,648	1,667	489	690
Uplink frequencies (MHz)	145·910 to 145·950	145·960 to 145·600	145·960 to 145·600	n/a	n/a
Downlink frequencies (MHz)	29·410 to 29·450	29·460 to 29·500	29·460 to 29·500	n/a	n/a
Beacon 1 (MHz)	29·331	29·341	29·461	145·825	145·826
Beacon 2 (MHz)	29·452	29·501	29·502	435·025	435·025

Notes

1. RS5 and R57 carry robot transponders which enable automatic cw contacts to be made with the satellite. The input and output frequencies are, respectively, 145·826/29·331MHz (RS5) and 145·835/28·341MHz (RS7).
2. UoSAT Oscar 9 also carries four hf beacons, but only that on 21,001kHz is active. Additionally there are beacons on 2·4 and 10·47GHz.
3. UoSAT Oscar 11 carries an additional beacon on 2,401·5MHz.

*170 Shirehall Road, Hawley, Dartford, Kent DA2 7SN.

The orbital characteristics of Oscar 10 are usually given in the form of so-called Keplerian elements. These elements are used as opposed to the relatively simple information indicated above to allow calculation of the more complex orbit of the satellite. The critical elements are the epoch time (which is simply the reference time for the specific orbital condition), inclination, eccentricity, mean anomaly, right ascension of the ascending node (RAAN: cf EQX longitude), argument of perigee, and the semi-major axis. I propose to devote some space in a subsequent issue to explain these terms in more detail. So, for Oscar 10 the major orbital elements are:

Inclination	25·86°
Eccentricity	0·0603343
Mean motion	2·205 revolutions per day
Semi-major axis	26,106·12km
Anomalistic period	699·3414min
Apogee	35,480km
Perigee	3,978km

The RAAN, argument of perigee and mean anomaly depend on the precise epoch time and therefore cannot be generalized. In order to be able to compute when the satellite is available, it is necessary to obtain all of the above data for a particular time. To complete the picture, the characteristics of the communication transponders on Oscar 10 are given in the table below.

	Uplink frequencies	Downlink frequencies	General beacon	Engineering beacon
Mode B	435·175 to 435·025	145·828 to 145·978	145·810	145·987*
Mode L	1,268·850 to 1,269·050	436·950 to 436·150	435·020*	435·040

* These beacons are not currently in service.

Oscar 10

Operation through the satellite has become increasingly difficult over the last few months, and it appears that operational requirements of the spacecraft will cause this situation to prevail for quite some time. In order to obtain an adequate illumination of the solar panels it has been necessary to depoint the main spacecraft axis away from the earth by an angle of about 30°. This has resulted in a loss of sensitivity on the uplink, and decrease in level of the downlink signals. In addition, the perigee of the orbit continues to rotate around the orbital plane, and towards the end of March the perigee (and of course the apogee) will occur over the equator. At this time the maximum elevation will fall to the around 32° for those in the south of England. This event should prove very interesting, as it will provide an ideal opportunity to evaluate the characteristics of the geostationary satellite orbit, gso, at least from the point of view of coverage. After the luxury of the very long distances available through inclined, elliptical orbits, it may well be that the limitations of the gso are considered to be so great as to kill off the plans for such a project.

One of the problems with the particular orbit of Oscar 10 is that its orbital inclination, at 26°, is somewhat less than the desired value of around 63° which provides a very stable orbit. So, from now on those of us in the northern hemisphere will experience decreasing availability of the satellite.

As far as the operating schedule is concerned, the plans indicated in *Rad Com* January 1985 have been followed quite closely, and the next change is expected around the beginning of March when it may be necessary to carry out further attitude manoeurves. Assuming no earlier changes, the schedule for February should be as follows:

Mean anomaly	Status
15–51	Mode B
52–68	Mode L
69–200	Mode B
201–14	OFF

As a result of collaboration between AMSAT-UK and those responsible for setting the operating schedules, it has been possible to continue the previously planned times for the transmission of the GB2RS news bulletins. The schedule for the available Sundays in February is given below:

Date	Time (gmt)	Elevation	Azimuth
3 Feb	1400	31	240
10 Feb	0930	41	150
17 Feb	not available		
24 Feb	1130	38	214

UoSAT

The UoSAT group at Surrey continues to make both satellites available, and has set a very good example to other satellite operators in terms of keeping users informed. During one of the de-spin manoeuvres at the end of November it appears that a rather large pointing off-set was introduced into UoSAT Oscar 11. Gravity gradient stabilization has now been restored, resulting in more consistent signals from the satellite.

Other news

The official publication of AMSAT, *ORBIT*, will no longer be produced but will be replaced by something along the lines of *Amateur Satellite Report*. The latter has a much better record of meeting its publication dates, but it is not clear at this time whether *ASR* will continue when the new offering begins.

A very comprehensive analysis of the orbits of RS1 and RS2, carried out by Niko, PAoDLO, has given strong support to the theory that the satellite transmitting "55" on 29·4MHz is in fact RS1. This work must have involved a great deal of time and effort (the satellites were launched in 1978) and was further complicated by several changes in the identifiers given to the various objects associated with the launch.

One proposal to come from the AMSAT annual general meeting was for a satellite project in conjunction with a number of non-amateur satellite groups. If the scheme attracts sufficient interest, the idea would be to orbit an optical telescope with the data being relayed to ground using digital communications links operating in the amateur satellite bands. The proposal is likely to be a controversial one, particularly in amateur circles where it is generally felt that there is already enough pressure on the limited spectrum allocated to the amateur service. □

Microwaves

*by Mike Dixon, G3PFR**

Operating news

Although 1984 seems to have been a comparatively poor year for "lifts", particularly at vhf and uhf, there do seem to have been a fair number of openings detected and exploited by microwave operators, particularly in the last quarter of the year.

December provided yet another lift: 10, 11 and 12 December allowed some quite spectacular contacts. John, G4BYV, reported working DL3NQ (JO43) as the result of a CQ call on 2·3GHz, and then repeated the contact on 3·4GHz at good strength at a QRB of 641km, giving him his 14th square on 3·4GHz. He reports quite wide use of 1,296MHz, low power and dipoles being used for local "natters" in both East Anglia and the nearer Continent. John also reported that Simon, G3LQR, worked DC8UG (JO30, QRB 489km) on 3·4, 5, 7 and 10GHz, together with another contact with DC0DA (QRB 489km) on 5·7GHz, all these contacts taking place on 12 December.

G4FRE/P and G8HPU/P (JO01) both worked DC8UG on 3·4GHz on 11 December at a distance of 478km, exchanging signals of 5/7. The remarkable thing about Dave's contact was that it was made with a "beer-can" feed and no dish! Weather conditions at the time were freezing fog, and he reports that an attempted contact on 5·7GHz failed because the FT290 synthesizer refused to function due to the low temperature. He reported hearing no Dutch 10GHz beacons on this occasion.

On 1·3GHz Derek, G8ECI (Louth, Lincs), worked a number of Continental stations; on 10 December, five French stations (all in JN18) and one German station (in JN39). The following day the opening was slightly more northerly, encompassing five German stations and two Dutch stations in the JO field (squares 21, 22, 31, 40 and 50). His tally on 12 December was three German stations in JO 43, 53 and 62. One of the latter, DG2LO, was running a mere 100mW output but was received at a consistent 5/2 to 5/3 throughout the contact. Derek's equipment comprises four 29-element quad-loops at 55ft, 100W output, and an NE720 preamplifier (unusually) *not* at mast head. He is always willing to try skeds with anyone wanting to work JO03AK (old AN). As he works abroad on a "month on, month off" basis, he suggests that it would be a good idea to telephone to ascertain whether he is QRV—his number is 0507 86202.

From Jack, G5UM (microwave awards manager), comes a report that Bill Capstick, G3JYP, who has been very active on all bands between 30 and 432MHz for a great number of years, has won the fourth "Supreme" award of 1984 (No 56) by a dint of Senior awards on 70MHz and 144MHz plus a "standard" award on 1·3GHz. Being a native of Cumbria (or Westmorland, as it was) I am well aware of the difficulties surmounted in Bill's achievement. Operating from Appleby in the Eden Valley, his QTH is surrounded on all sides except north west by mountains up to 2,300 ft. Exceptional persistence must have been required to add the third award needed although, as Bill added, it seems to have been easier than on 432MHz, with scatter (aircraft?) aiding in several contacts. His equipment on 1·3GHz consists of 40W rf to a dish at 50ft. Along with the "Supreme" went the standard 1·3GHz award (No 54), the distance award (F1FH1 at 600km) and a 144MHz award for Bill's son Mark, G4RCD. It seems that Appleby is to remain radio-active.

Mick, G4PRJ, sent a summary of his first year's operation on 1·3GHz and says that he, too, has noticed "strange" effects, especially on over-sea contacts with beam headings up to 70° off the correct bearing (*Microwaves*, November 1984). His equipment is modest; 2W to rf to a single 23-element beam at 30ft above ground. His QTH is 20ft above sea level, two miles east of Eastbourne, which is in an excellent location to exploit over-sea conditions. His summary reads: 87 contacts in 27 squares. QSOs at 0 to 100km, 9; 100 to 200km, 12: 200 to 300km, 39: 300 to 400 km, 9; 400 to 500km, 4; 500 to 600km, 7; 600km-plus, 7. His closing comments were "What a great first year I have had on 23cm—it has been memorable! Thanks to all who persevered with my little signal and have given me new squares or just an enjoyable QSO. It has been my pleasure to confirm AK12e for other operators—point your beams this way, I'm always monitoring 1,296·2".

From the German national club, DARC, comes news of a new international sstv contest to be held on 16/17 March, starting at 1200h and lasting 24h. Class 2 entry is vhf/uhf with five points per contact plus multipliers of 2 (144MHz), 4 (432MHz), 6 (1·3GHz) and 10 (2·3GHz and above). Only two-way contacts will count, with the usual type of contest exchange; log "deadlines" is 2 May 1985. Further details can be obtained from RSGB HQ.

Finally Adrian, G8PSF, wrote a kind of "Rakes Progress" concerning his efforts towards multi-band microwave operation. "It has been a bit quiet on 23cm....Did a lot of building this summer—little "tropo" to interfere with projects....Built a 1·5m dish—a lot of hide-hammer bashing of aluminium T sections into parabolic ribs....Bruised fingers and a lot of blue mutterings, with the family viewing the whole project with dismay....Also into the bargain, a three-band log periodic feed for 23, 13 and 9cm—tested by G3JVL who showed it to perform as predicted—also covers Meteosat at 1·6GHz....Got the whole lot up very late in October, 25ft had to suffice—rotator proved inadequate....A little dx around on 11 December—DK1VC (300W into a 2m dish) was 5/9+ 40dB on 23cm —some weaker PAs around and some strong ON signals....all this with the dish lowered to 6m—couldn't expect miracles, no mast head preamps....Now remains to consider a three-band mast head preamp, complete my 3·4GHz transverter and other things....Acquired some useful Wayne-Kerr wavemeters covering up to 8GHz—log periodics stop working when doused with rain or snow/ice—Simon, G3LQR advocates housing in a plastic sweet-jar (free from local shops)—really does appear to work well—will send a photo in spring."

Such is amateur radio! With the festive season just about finished it only remains to thank contributors for their news and to hope that 1985 will see some remarkable results reported on the microwave bands.

From here and there

Class B licensees are reminded that from 1 April 1985 they will be able to use cw for an experimental period of one year. This will be particularly pertinent to microwave operation, where the reception of "small signals" will be enormously enhanced by the ability to use the key under marginal conditions which often exist where low power is in use under "ordinary" conditions. For instance, the users of 1 or 2W from barefoot transverters would find a huge increase in readability if the QSO took place in cw rather than ssb, and I suspect that many operators who have not yet used this mode are in for quite a surprise! At risk of being repetitive, the procedure is to apply for a "letter of variation to the licence", addressing the request to The Secretary, RSGB, marking the envelope "Class B Variation" and enclosing two 17p stamps.

Les, G3BNL, the beacon-keeper for GB3SWH operational on 10GHz from Bushey Heath, Hertfordshire, asks for reception reports. This is a common plea from beacon-keepers, and in this respect (to misquote Gilbert and Sullivan) a beacon-keeper's lot is not a happy one! It is quite easy to get reports to the respective beacon-keepers without needing to know who they are: a QSL with reception details can simply be sent to the special callsigns section of the QSL Bureau and it will find its way to the keeper concerned. The more potent narrowband beacons, such as SW Hertfordshire, GB3SWH, have been heard in some surprising places, and my guess is that many reports have not reached the right quarter simply because we tend to take the beacon service for granted. □

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

SWL News

*by Bob Treacher, BRS 32525**

Overseas news

Eric Trebilcock, BCRS195, who lives in Victoria, Australia, wrote to make it clear that this column is read 'down under'. He has been in amateur radio for 58 years and is still going strong. At the time he wrote, Eric had just completed a worldwide trip which took in South Africa, Sweden, the USA and the British Isles. In 101 days he covered 44,000 miles and met many amateurs en route. On the radio scene, 78 countries had been logged on 10MHz, of which 54 had been confirmed.

Also from the Pacific, a letter from P29AF continued the "worst QSL" theme. An Italian swl wins the booby prize this month for this useless report; apart from P29AF's callsign, the only message was, "Please I should like your QSL card for my collection, thanks". The card was completely devoid of any information, ie time, date, frequency, signal report. The idea of collecting blank QSL cards is an obvious waste of time and money and will not find favour with the recipients. So, if any other swls have similar ideas, please forget them! P29AF will, on the other hand, be only too pleased to QSL all accurate and informative reports on his signals.

SSTV

One of our leading sstv operators, G3WW, sent me the best swl report he had received on sstv (not from a G, unfortunately). The report was from a Dutch listener, PA-5205, and included a black and white photograph of G3WW's signals pasted to the QSL. G3WW was extremely impressed, and indicated that the ultimate report would have been a colour photograph. SSTV photographs might well tempt other listeners to purchase equipment to monitor sstv traffic, if I can find space for them.

144MHz/432MHz

Perhaps the best tropospheric conditions of 1984 occurred on 10, 11 December, well after I had taken the antennas down for their winter break! David Whitaker, BRS25429, telephoned news of the openings while this contribution was being written. The 432MHz band seemed to fare the best for dx, with stations in southern Germany being heard from ZN square. The best dx heard included DK9SU (EI18g), DG9ZH (EK75g) and DL7QY (FJ61e). Five new squares were added to Dave's all-time total—42 in little over three months, and this when conditions were generally flat. On 10 December the 144MHz band produced an LX in CJ square, together with F6GIA (DI74f), F1EZQ (CH15d) and F6GYH in CI76b. On the QSL front, SMs 6KTC (GS45c), 7BHM (HQ71e), 7LSW (IR62b), 7MXO (HR24e) and 0FMT (IT) were all well received, plus OE3OBC (II52b) whose card took Dave's square confirmations to 126.

Martin Parry (YN) BRS52543, also caught the same lift, logging French stations in AI, BH, CI, DI and ZH, an LX in DJ square, and several DLs in DK and DL squares on 144MHz. 432MHz produced Frenchmen in AK, BI, BH, ZH and ZJ, PA0s in BL, CL and CM, and Germans in DK and FJ squares.

During the Geminids meteor shower on 13 December, Dave Whitaker caught his first-ever ms reflections. He heard F1JG, OK3KCM, OE5OMM, YU2RSD and IV3GBO.

HF news

Two letters arrived too late for consideration last month. One was a first-timer from Malcolm Harrington, BRS20249, who is a fellow member of the HF Contests Committee. He had often threatened to enter the countries table, but had not seriously got down to checking through the logs until late in October. YJ8RG was the most interesting station reported, his 110th country this year, which in view of his hectic business schedule really is not at all bad. The second, from Paul Crankshaw, BRS48909, mentioned two new ones in the now rather forgotten CQWW Contest, namely VP2VCW and CT4BD on 1·8MHz. Outside of that event, cw produced TF5GW, ZB2EO and VK6HD, and 7MHz provided FH4AA, P44A and H44IA. During early December the chance was taken to get two rare European countries on 1·8MHz, both IA0KM and HV2VO being active; QSLs via I0MGM and I2BBJ respectively. FH4AA was active on 3·5MHz, while AH8A and VK9ZA were regularly active on the 7MHz ZL2AAG net.

*79 Granby Road, Eltham, London SE9 1EH.

1984 HF COUNTRIES TABLE
(Top 12 only)

Station	DXCC	28	21	14	7	3.5	1.8	Total
BRS8841	245	94	197	221	162	140	46	860
BRS52543	230	106	165	198	154	142	53	818
BRS48909	231	95	159	197	163	134	58	806
BRS25429	221	111	152	184	135	135	60	777
BRS44395	189	98	164	154	114	70	52	652
BRS31879	186	106	122	147	111	96	45	627
BRS10906	215	73	141	188	100	98	11	611
BRS1066	177	69	137	141	91	57	58	553
BRS18529	132	1	59	56	71	89	16	292
BRS44984	—	41	65	86	56	40	0	288
BRS50134	149	4	8	13	106	103	36	270
BRS20249	110	21	63	66	33	60	7	250

Note: There are no updates for the dx listings table.

1984 UHF/VHF TABLE

Station	QTH loc	70MHz Squares	70MHz DXCC	144MHz Squares	144MHz DXCC	432MHz Squares	432MHz DXCC	Total via*
BRS52543	YN	27	7	81	19	24	9	167 a-d
BRS25429	ZN	—	—	76	18	42	11	147 a,b,c
BRS32525	AL	—	—	69	23	26	7	125 a,b,c
BRS62088	AL	—	—	29	8	10	3	50 a,b,d
FE8957	BF	—	—	30	8	2	2	42a
BRS18529	AL	—	—	20	5	—	—	25a
RS49875	YN	—	—	13	5	2	2	22a
BRS44984	AL	8	2	—	—	—	—	10a

* a = tropo, b = ES, c = AR, d = Ms.

Coming more up to date, late December provided some useful dx on the lower frequency bands; 1·8MHz being in particularly good shape. Stations from the USA and Canada were audible on ssb from midnight, and again at around 0630. W1-4, 8 and 9 and VE1 and 3 were all copied. Other notable dx included HP3FL and 3X4EX.

On 3·5MHz AA6AA and ZL4BO were heard around 1500 on ssb. Although late December is usually good for grey-line propagation on 3·5MHz, the W6 was audible a good 40min before the normal time for reception in G-land (between 1540 and 1555). 7MHz also carried much dx traffic during afternoon hours, with perhaps the best loggings being VU2DK at 1430, and 5R8AL.

Looking at the higher bands 3D6AK is very active on cw and is frequently active on weekdays at 1600 on either 14,032 or 21,032kHz while at weekends he tries the lower frequency bands, including 1·8MHz late Saturday/early Sunday. David Hunter, BRS84664, was quite active on 14MHz; his best were of PZ1AP, VK6LM, PT7BZ and KC7UU/5N8.

Robert Small, BRS8841, was also busy, logging PY7SAR/PY0F, PY0FF and PY0FJ on 14,7 and 3·5MHz. ST5ALR/M was also heard from the Sudan. Two new countries on cw were DL7AH/C56 and HV2VO, while on 21MHz cw produced P46S, VS6TA, 9Y4W and 5L8E. UA9OO/YA6 was also, reputedly, active from just inside the Afghan border; we will all await the QSL card. Y22TO was a new one on 1·8MHz, where Robert had his best confirmation of the month from 9K2BE.

Brad Bradbury, BRS1066, did much listening on 1·8MHz with good results, while on 10MHz, SM was added for a new one: they have had use of 10, 18 and 24MHz since 1 December. John Hartin, GI1DWM, wrote following his return from 5A, where he uses his listener call ORS53932. He uses an AR88 and a long wire from his QTH 150 miles south of Benghazi. He hears many Gs and wishes he could give everyone a new country! 7MHz and 1·8MHz are considered poor—7MHz because of the Italian QRM!, and 1·8MHz because of the limited activity. It is worth noting that all the European and dx traffic on ssb is located mainly between 1,825 and 1,850kHz, with the Russian's around 1,875 to 1,900kHz. John hopes to provide more reports when he returns to 5A.

Contest calendar

John Goodrick, BRS44395, has added several contests to the table published in December last year. He mentioned the AGCW QRP CW, 3rd weekend of January and July, the IPA in November, the SPDX in April, the WAB and Verulam events from nearer home. John is a keen contester and pointed out that some contests give listeners the opportunity to apply for awards without obtaining QSL cards. All that is required is a copy of the contest log to enable the adjudicators to verify the heard QSOs. He gives the PACC, Y2DX, HB, and UBA contests as examples for claiming the PA Listeners Century Club, Y2-KK and RA-Y2, H-26 and WABP awards. Any listener needing more information on these and other awards available to swls should refer to the RSGB *Awards Handbook*.

Finale

That's all for another month. News, views, table scores for April should reach me no later than 21 February with late copy by 1 March. □

The Month on The Air

*by John Allaway, G3FKM**

Expeditions

The Holon/Bat-Yam Club of Israel is visiting the deepest point (on land) on earth in the Dead Sea area between 0800 6 April and 0800 13 April. The station will be located at Ein Gedi and will use the special callsign 4X5DS. Special QSLs will be issued and an award will be available for stations having had QSOs on: (1) at least three of the seven days of the expedition; or (2) at least three bands; or (3) on all three modes (ssb, cw, and rtty) to be used. Activity will on on 3·5, 7, 14, 21 and 28MHz.

VERON HQ station PA0AA

Last month details of morse transmissions from the RNARS were given, and readers may be interested to know that PA0AA also transmits special programmes. These are on Fridays and start at 1830 with news in Dutch. This is followed by news in English at 1845, morse for beginners at 1900, morse for advanced operators at 1930, and an rtty news bulletin in Dutch and English at 2000. The Dutch news is repeated at 2030 and the English at 2045. In addition, on the last Friday in each month a proficiency run in morse is given at speeds of 15, 20, 25, 30, 35 and 40wpm, beginning at 2100. From the beginning of April until the end of September these times are one hour earlier because of European summertime. Frequencies used are approximately 3,603, 14,103, 144,800 and 423,800kHz. A guide to the morse course (in English) is available in exchange for six ircs from: Service Bureau, VERON, PO Box 220, 5670 AE Neunen, Netherlands.

DX news

VK0YL, on Macquarie Is, was mentioned last month. There is now another YL operator in the area—Robyn, VK0AK, who is at Mawson Base in Antarctica. She began operating at Christmas and promises to be active on all bands. CE9AK is also on the air from Antarctica and has been on 7MHz cw around 0400.

DX-NL reports that HV2VO is having his call pirated by an amateur in Rome and that the offender seems to be using cw on 7 and 14MHz. Edmund very rarely uses cw himself, and when he has a visitor who uses cw there is always a mention of the fact on ssb.

It is believed that there may be an amateur operator in the relief crew which was due to arrive on Marion Is early this year. It has been some time since ZS2MI has been active.

Two active stations in the Central African Republic are TL8TX, who can be found near 3,787kHz from 0400, and TL8DC who favours 21, 210kHz from 1600. TT8CW in Chad was, at the time of writing, devoting alternate hours between 1600 and 2130 on 14,004–14,030kHz. Otherwise he uses 14,195 or 21,335kHz. Also, according to the *Long Island DX Bulletin*, 5R8AL is to be found on 7,045kHz or nearby at 0230. Alain says that 3·5MHz operation is not allowed in the Malagasy Republic. He works near 21,335kHz from 1800, and moves to 14,185kHz when propagation changes. 9Q5JE keeps a schedule with QSL manager DK0HT at 1500 on Mondays on 21,345kHz. 6W1NQ appears every Saturday at 1400 on 21,250kHz.

Rick, formerly HC1MD/HC8MD, now lives in the USA and has the call NE8Z. QSLs for HCs 1EE, 1MD, 1MM, 5EE, 7EE, 8EE, 8MD, 8MM, 8VHF, HC9A, and HDs 5EE, 8CD, 8EE, 9EE, 9X, 0E and 0EE can be claimed from Rick.

A new station on Christmas Is, VK9XZ, is reported to have been heard on 3·5 and 7MHz and promising to be on the hf bands soon. *DX News Sheet* says that VK6IR and others may be considering making a visit to the island, but that they have a problem obtaining accommodation. The same source says also that VU2DVP and VU2CVP are active on 3·5MHz for about 15min around 0030. They transmit on approximately 3,895kHz and listen around 3,795kHz. Schedules may be fixed by writing to PO Box 6330, Coimbatore 37, India.

Jim Smith, P29JS, keeps a schedule with his wife at 0620 on 14,220kHz, and then continues with his net. Net enthusiasts may be interested in obtaining a copy of a list of some 150 nets arranged in day and time order. This is available from Dieter Konrad, OE2DYL, Bessarabierstr 39, A-5020 Salzburg, Austria, in exchange for 10 ircs.

Father Moran, 9N1MM, operating at G3AAE during a visit in December 1984

Amateur radio in Czechoslovakia

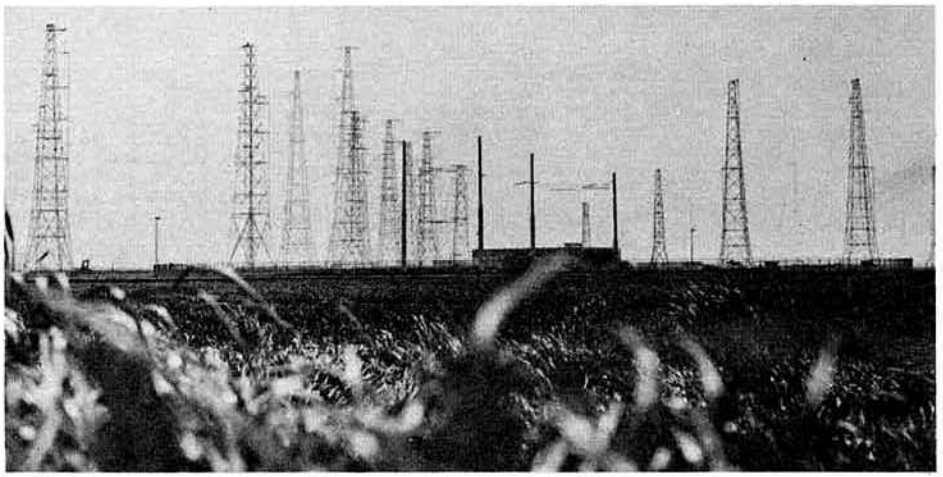
OK1DKW is a member of the RSGB and has very kindly provided some information on Czech amateur radio. First of all, there are three licences: A, B and C. A and B have hf and vhf, with A allowed 300W maximum output and B 100W (all modes). Class C has 1·8, and parts of 3·5 and 28MHz with 25W of A1A only as well as all modes on vhf. There are also phone-only vhf licences and "youth novice" licences for those between 15 and 19 years of age. The last use the OL prefix and are allowed to use 1·8 and 144MHz with 10W output. The 18 and 24MHz bands have not been released yet, but 10MHz is in use. Prefixes denote the following: OK1 (Bohemia), OK2 (Moravia), OK3 (Slovakia), with OK1 speaking mostly Czech and the others Slovak. OK4 calls are on ships and use /M when on a river and /MM when at sea. OK5, 6 and 7 are special stations, and OK8 is reserved for guest licences. OK9 is used for experimental stations, and OK0 for beacons, relays and special stations. As mentioned previously, OL denotes a youth novice, and these letters are followed by the number of the 10 regions in the country (OL1-OL0). Club stations with three suffix letters have K, O or R as the first letter of the prefix.

Czechoslovakia does not have reciprocal licensing with the UK and other countries, but guest licences are issued to visitors. Applications should give details of name, surname, address, date and place of birth, passport number, occupation, planned duration of stay and address in Czechoslovakia plus a photocopy of the applicant's own licence and details of radio equipment. These particulars should be sent to the Federal Ministry of Telecommunications, via the Central Radio Club, at least four months before the planned visit. A fee of 100 Czech crowns is payable to a post office on arrival.

Overseas news

The *Bangkok Post* dated 14 November 1984 carried a large article referring to the 20th anniversary celebrations of the Radio Amateur Society of Thailand. The communications minister, Samak Sundaravej, was in attendance and gave an assurance that he was working for the full legalisation of amateur radio in the country. At present, there is only limited availability on vhf on several spot frequencies on 144MHz. It would appear that HM the King of Thailand has an interest in amateur radio, and has in fact already been on the air. HS0A was on the air from the celebrations and made some 200 QSOs—it was operated by qualified Thai and visiting amateurs.

* 10 Knightlow Road, Birmingham B17 8QB



The new Flevo transmitter site of Radio Netherlands, whose curtain-array antennas will be used by PA6FLD

Radio Nederland Wereldomroep is based at Hilversum. On the third weekend of this month (16/17 February) two ordinary amateur radio stations will be connected to the new transmitter site and to some of the largest antenna arrays in the world. The plan is to use the new Flevo antennas on amateur frequencies for 36h. The results should be most interesting, as the opportunity to use antennas with such high gain is very unusual. The organizers say that this is about as near to the shortwave enthusiasts dream station as possible! The station will be on the air from 0600 on 16 February until 1800 on the 17th. One transmitter will use a non-directional antenna for European work, and the second will use giant curtain arrays—following the normal pattern of English language broadcasts in beam direction. Both cw and ssb will be used, and the callsign will be PA6FLD. Special QSLs will be issued and listener reports will be welcomed and QSLd. Beam directions will be: (Saturday) 0730, VK; 1030, VK and Caribbean; 1430, SE Asia; 1830, Africa; 2030, W Africa; (Sunday) 0230, E Coast USA; 0530, W Coast USA.

The Austrian society OVSV has announced that amateurs in OE now have permission to use 1,850 to 1,950kHz on a secondary basis with 100W of output power (A1A only). This allocation is for one year only.

Contest stationery

GW4BLE (S.Cole, 14 Brierley Close, Trenewydd Parc, Risca, Newport, Gwent NP1 6RE) has very kindly offered to help those with a *bona fide* interest in contest operation. He has available log/check lists for many of the international events (*viz* CQWW, CQ WPX, ARRL DX, ARRL 10m, ARRL 160m, All Asia, IARU Radiosport, WAE, VK/ZL, SAC etc) and says that, should any reader require copies he would be pleased to help on receipt of an sae. He also mentions that much useful information is available in the *CQ Contest Book* which is available from Garry Hammond, VE3XN, PO Box 333, Listowel, Ont, N4W 3H4, Canada.

Contests

UBA Trophy

0600 23 February to 1800 24 February

This is the second (ssb) part of this contest. Rules did not reach the writer in time for the cw section in January to be publicised. Bands 3·5 to 28MHz. Class (A) 3.5 plus 7MHz—16h only, single operator; (B) all bands, single operator—26h operation only; and (C) multi-operator, 36h, single-transmitter. Exchange RS and serial number from 001. ON stations will indicate their province (a total of nine). QSOs with Belgium count 10 points as do those with Belgian Forces in Germany. QSOs with other Francophone countries count one point (this contest runs concurrently with the REF contest). Final score is QSO points times total of provinces plus FBA (a maximum of 10 per band). Logs should show date, time station worked, reports exchanged, points and multipliers. Enclose summary sheet showing scoring, class, name, callsign and QTH, plus the usual signed declaration. Separate logs should be submitted for each band, and listeners may enter. Post before 1 April to UBA HF Contest Committee, ON6JG, Oude Gendarmeriestraat 62, B-3100 Heist op den Berg, Belgium.

In the **1984 CW** event **G4IQM** came fourth with 3,443 points (Class A). In the **phone** section **Class B GW4BKG** was second with 1,808 points.

Those working for the Worked All Belgian Provinces Award may send a list showing details of QSOs with stations in all nine provinces with their logs and $3 or 10ircs.

Second BYLARA Contest

1900-2200 21 February

1000-1300 23 February

3·5 and 7MHz. Activity around 3,690 and 7,088kHz (also 144 and 432MHz). YLs work yls and oms, oms work only yls. Exchange RS/T plus serial number. Five points per member worked, three per non-member yl, and one per om. No multipliers. Listeners log members (five points) and non-member yls (three points). Entries may be in following sections: hf phone, hf cw, and vhf. Only one period may be counted but more than one section may be entered. Post logs before 6 March to Mrs D. Wood, GM4COO, 13 Scotland Drive, Dunfermline, Fife KY12 7SY.

PACC Contest

1200 9 February to 1200 10 February

1·8 to 28MHz. CW and ssb (in respective band-segments) but no cross-mode. Single- and multi-operator and listener sections. Exchange RS/T plus serial number. Netherlands stations indicate their province (GR, FR, DR, OV, GD, UT, YP, NH, ZH, ZL, NB and LB) and these are the multipliers. Each QSO counts one point, and a station may only be worked once on each band (phone or cw). Total score is points total times sum of multipliers from all bands. Listeners count one point per PA station heard, and logs should show code given by both stations in each QSO. Logs should show date, time, band, station worked, numbers sent and received and if multiplier. Enclose a signed declaration with a summary sheet and post to PACC Contest, F.Th.Oosthoek, PA0INA, PO Box 499, 4600 AL Bergen op Zoom, Netherlands before 31 March.

In the **1984** contest UK entrants were: **G2HLU** (7,215), **GM3KLA** (6,854), G3ESF (5,544), **GW3MPB** (4,917), G4IQM (4,536), G3HRY (3,036), G4VKW (2,800), G4KHM (2,400), G4UPS (2,204), G3ZRH (1,876), G3TXF (1,352), GM8SQ (1,323), GW4BKG (1,121), and G4ISK (360). **RS 44984** scored 96 points. Sample summary and log sheets are available from G3FKM (sase please).

In the **1983 OK DX Contest, G3ESF** scored 19,845, G3HRY 6,968, G4VKW 2,512 (in the all-band section) and **G4HLN** 5,973 and G4ACY 140 on 14MHz. **GM4ELV/QRP** scored 729 points on 14MHz and **GW3MPB** 2,574.

Worked All Britain Contests

16 February - 1·8MHz

12 May - LF

3 November - CW

Copies of rules from G3FKM (sase please); or in greater detail from Steve Lawrence, G4EOF, 7 Ashfield Road, Market Harborough, Leics LE16 7LX. Note that there are also two vhf contests.

ARRL DX Contests

0000 16 February - 2400 17 February (CW)

000 2 March - 2400 3 March (Phone)

Single-operator single- or multi-band, multi-operator single- and multi-transmitter sections. There is a QRP section for less than 5W input. Exchanges consist of RS/T plus figures indicating power input. W/VE stations indicate state/province. Each QSO counts three points, and the multiplier is the number of contiguous USA States/Canadian provinces worked on each band added together. Certificates are given to the leading stations in each country, and to all making more than 500 QSOs. The latter must include "dupe" sheets with their entries. Entry forms are available from ARRL DX Contest, 225 Main St, Newington, Conn, 06111, USA—please send a large sae and some ircs. Forms are not available from G3FKM.

Awards

The Islands on the Air Award (IOTA)

Many readers will already be familiar with these awards, which are available to licensed amateurs and listeners for confirmation of QSOs with, or reports from, various islands. Special awards are issued for Africa, Antarctica, Asia, Europe, N America, Oceania, S America, Arctic Islands, British Isles and the W Indies; and there are also a World Diploma and a Century Club Award. A 15-page directory lists all those islands which count towards the awards and

QTH CORNER

NA5E/C5	via W3GXK, M.Zimmerman, 8711 Allenswood Road, Randallstown, Md 21133, USA.
GB4DIS/MM	Dr Fay, REA Vessel Service, 1 Dock, Barry, S Glam CF6 6UZ.
HI0A	via W2KF, PO Box 1133, Cherry Hill, NJ, 08034, USA.
HI0B **HI0C**	HI8IH, RC Dominicana, Box 1157, Santo Domingo, Dominican Republic.
JW0EQ	via LA5NM, Box 210, 9401 Harstad, Norway.
TL8CK	F6EWM, 6 rue Voltaire, 93270 Sevran, France.
VK0AK	via VK2DEJ, 8 Toni Crescent, Ryde 2112, NSW, Australia.
VP8HZ **VP8NX** **VP8VK**	B. Adams, G4RFV, 38 Waterloo Road, Poole, Dorset BH17 7LF.
YB3ATB	PA0LOU, L van der Nadort, Laarpark 14, 4881 ED Zundert, Netherlands.
ZK1XS **ZK1XV**	PA2DXY, Androorn 11, 1273 BJ Huizen, Netherlands.
8Q7BX	C. Amorati, I4ALU, Via Battistelli 10, 40122 Bologna, Italy.

contains full information. This is available from Geoff Watts, 62 Belmore Rd, Norwich NR7 0PU, price 75p (overseas $2 or six ircs).

The WSRY Diploma
The Scandinavian Amateur Radio Teleprinter Group awards this to those who have made QSOs with Scandinavia on rtty. There are four classes: General, Bronze Ribbon, Silver Ribbon and Gold Rosette. The number of QSOs needed for each category is as follows (European applicants/others): 16/8, 35/15, 50/25 and 75/50. The General class must be applied for first. Listeners may also apply. For the Gold Rosette it is essential that at least one rtty QSO has been made with LA, SM, OH, OX, TF, OY and OZ. In this case contest logs submitted to SARTG for any contest may be used, or photocopies of the seven QSLs may be submitted. The award costs 10 ircs for the General and six more ircs for each further stage. Apply to SARTG Contest & Awards Manager, Carl Jensen, OZ2CJ, PO Box 717, DK-8600 Silkesborg. Denmark.

Final 1984 28MHz Countries Table

G3XQU—141	G3XTT—59	G3KSH—36
G4SKI—109	G3WVG—58(ssb)	G4FVK—29(ssb)
G4VJK—108(ssb)	5B4DN—55	G3URA—27(cw)
G4MUW—101(ssb)	G4OTU—51(cw)	G4RHW—23
G3KDB—98(cw)	GW4TEJ—51	G4SXK—20
G4RAB—95	G4GOF—51	GM3CHX—19
G4TTR—91	GM4CHX—47	GI4PCQ—17
G3SXW—88(cw)	G4OBK—40	G2FQR—17
G3TXF—85(cw)	GW4OFO—39	G2DHV—15(cw)
G4PEL—83	G6HW—38(cw)	G4RWP—14
G4DXW—72	GM4LKJ—37(ssb)	G4LZZ—13(ssb)
G4NXG/M—66	G4SDZ—36	

Around the bands

A very lean period this time, no doubt due to the combination of poor hf band conditions and the counter-attractions of the Christmas holiday period.

The following managed to send in reports to arrive before the deadline: G2HKU, G5JL, G3s GVV, IGW, KSH, VMW and YRM. G4s EHQ, UOL and UYR and RS10906.

Calls listed in italics were heard/worked using A1A.

1·8MHz. 0000 *HZ1AB, K5NA, RA9AKM, 4X4NJ, 5H3BH, 8P6KY.* **0100** *EA9CE, HH2VP, YV1OB.* **0200** *4U1ITU.* **0300** *UL7PX.* **0500** *SV0AA, T77C, W1, 2, 4, 5, 8, W0CD, 9H3DH.* **0700** *CT2FN, EA8QO, N5VV, (N.M.), W0IFH (Tx).* **2200** *RL8PLY, TK5VN, UG6GAW.* **2300** *HV2VO, K5UR (Ark), RA9AKM, W1, 2, 3, 4. ZD7AU.*

3·5MHz. 0000 *JT0APE, JW0EQ, TR8AG, TT8CW, UA0YO, 1A0KM.* **0100** *FM7WD, FY0GA.* **0600** *V3ZZ, VP2VA.* **0700** *CT3WT, LU2DX, OX3KP,* TF5TP, W2BA. **2100** VK6LK, YB0JH. **2200** A92EB, JA, W1FC. **2300** C31OF, *FM7DD,* PY0FF, *RI0AA* (Obl 189), *VS6DO, VS6TA.*

7 MHz. 0100 *VP2VEG.* **0600** *OA4JR.* **0700** *JA* (to 0900), *PY* (to 0900), *PY0FS.* **0800** *FM7BW, HI3PC, VK, ZL.* **0900** *HC5NAI, JW0EQ.* **1700** 9M2CO. **1800** OY2J. **2200** *C30LBV.* **2300** *W7ZQ, WP4D, YV5INU.*

Dr Graham Beastall, Scout area commissioner for Greater Glasgow, going "on air" at the area's JOTA station GB0GGS last year. The station was run for the Scouts by the Glasgow Battalion of the Boys Brigade at BB House, Glasgow. Looking on is GM4HYF, the battalion's amateur radio instructor.
Photo: **GM4SRL**

10MHz. 0600 *ZC4HA.* **0700** *SK7AX, ZL4RD.* **0900** *4X6CA.* **1500** *VK6ABL, 5B4PW.* **1600** *VE7, W7* (LP). **1700** *KU1H* **1800** *ZS6.* **1900** *W9SWM/V2A.* **2000** *3B8FP.* **2200** *LU.*

14MHz. 0700 FK8CP, XT2BR, ZL. **0800** *CE9AJK,* VK, YI1BGD, 9V1DG. **0900** *JA, JY4KR,* KH0AC, *P3SSA.* **1000** KL7H, VKs 5BC, 7AZ. **1200** 6Y5NR. **1300** K6VU, KC2TU/TF, VK3, VK6. **1400** *T77C.* **1700** *K6OU,* 8J1RL. **1800** *HH3BK,* S83H, SV0AC/SV9, 5H3HM, *5T5CZ.*

18MHz. 0900 *F, G, LA.*

21MHz. 0900 *A92EM, JA, JY9WR, TR8IG, ZL, ZS.* **1000** VU2TF. **1100** A4XJQ. **1200** DL4AH/C5. **1400** *HV2VO,* J28EB, XT2BR, *3B8FK,* 5N2NDC. **1500** H5AE, *LU8DY,* VQ9YR, 5N8GLH. **1600** A24SC, *CX5RV, ZD8TM, ZS6ANL.*

24 and **28MHz**—no reports.

Thanks to all who contributed to this month's column and also to the editors of the following for information: the *Long Island DX Bulletin* (W2IYX), *DX News Sheet* (G3ZAY), the *Ex-G Radio Club Bulletin* (GI3OEN/W6), *Long Skip* (VE3XN), the *Lynx DX Group Bulletin* (EA2JG/EA3CBQ), *DX'press* (PA0GAM), *CQ Magazine* (W1WY), and *DXNL* (DL3RK).

Please send items for **April** issue to reach G3FKM no later than 1 March. □

Contest News

National Field Day 1985 rules

Packets of contest stationery will be sent to prospective entrants during May.

1. The general rules for RSGB hf contests, published in the "Operating Guide" supplement, *Rad Com* January 1985, will apply.

2. **Notification of the site.** Each group intending to compete must send details of the site to be used to: RSGB HF Contests Committee, c/o Mr D J Lawley, 220 Shipbourne Road, Tonbridge, Kent TN10 3EL, to arrive not later than Saturday 27 April 1985. Details must include name of the person responsible for the entry; the address to which contest stationery should be sent; section to be entered; name of group; callsigns to be used; national grid reference and sufficient access information for an inspector to be able to locate the site.

3. **When.** From 1600gmt Saturday 1 June 1985 to 1600gmt Sunday 2 June 1985.

4. **Eligible entrants.** Any group of RSGB members within the prefix zones G, GD, GI, GJ, GM, GU and GW. NFD is a multi-operator contest.

5. Operation must be from a portable station not located in a permanent building or semi-permanent structure such as a Portacabin etc, and not using a mains supply. No equipment or antennas may be installed on the site prior to 24h before the start of the contest. This does not apply to the storage of equipment.

6. **Mode.** CW(A1) only, in the 1·8, 3·5, 7, 14, 21 and 28MHz bands.

7. **Sections.**

(a) Open section. The station shall consist of a transceiver (or transmitter and receiver) with an additional receiver if desired, which may only be used for monitoring purposes. There is no restriction on the number or type of antennas, but the maximum height must not exceed 60ft (18·3m).

(b) Restricted section. The station shall consist of a transceiver (or transmitter and receiver) 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.

Both sections. Standby equipment may be at hand but not powered or connected in any way simultaneously with the main equipment.

The presence on the site of any amplifiers 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 the operation of the station will be barred from entering any RSGB contest organized by the HF Contests Committee for **five years.**

8. **Scoring.** Points will be scored as follows:

(a) Fixed stations in Europe (including the British Isles)	2 points
(b) Fixed stations outside Europe	3 points
(c) Portable and mobile stations in Europe (including the British Isles)	4 points
(d) Portable and mobile stations outside Europe	6 points

The contacts on 1·8MHz and 28MHz should be scored as above and the totals multiplied by two to obtain the claimed score.

9. **Group contacts.** Points must not be claimed for contacts made by a competing station with members of its own group.

10. **Entries.** These are to be in accordance with general rule 7 with the following exceptions:

(a) Separate logs must be used for each band using the standard RSGB hf log and NFD cover sheets.

(b) An additional standard cover sheet, summarizing the overall multiband entry, must be included.

(c) Entries must be postmarked no later than Monday 17 June 1985 and sent to RSGB HF Contests Committee, c/o Mr D J Lawley, 220 Shipbourne Road, Tonbridge, Kent TN10 3EL. Entries sent to RSGB headquarters or having insufficient postage will not be accepted.

(d) Duplicate contacts must be marked as such without any claim for points. Unmarked duplicates will be penalized at 10 times the claimed score and logs containing in excess of five, regardless of band, will be disqualified.

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 group having the second highest checked score in the section with the largest number of entries.

(d) The Scottish NFD Trophy to the Scottish group having the highest checked score.

(e) The Frank Hoosen Trophy to the group having the highest checked score on the 14MHz band.

(f) Certificates of merit to the groups in each section with the highest checked scores on the 1·8, 3·5, 7, 14, 21 and 28MHz bands.

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.

13. Inspections. All stations are subject to inspection by nominated 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 being given, 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.

Low Power Contest 1985 rules

1. Aim of contest. To encourage QRP operation.

2. Eligible entrants. Single-operator stations only. UK entrants must be fully paid-up members of the RSGB.

3. When. Sunday 21 April 1985, 0700-1100gmt and 1300-1700gmt.

4. Sections. **(a)** British Isles stations using 5W input or less.
(b) Overseas stations using 5W input or less.

5. Frequencies. 3·5MHz and 7·0MHz bands only.

6. Mode. CW(A1A) only.

7. Contest call and exchange. CQ QRP. Exchange RST and serial number starting at 001, plus input power, eg 579001 3W.

8. Scoring. 15 points for each completed contact with another QRP station. Five points for all other contacts. Overseas stations may only claim points for UK contacts.

9. Logs. Separate logs must be submitted for each band. All exchanges to be shown.

10. Declaration. Each entry must be accompanied by the following declaration: "I declare that my station was operated in accordance with the rules and spirit of the contest and in the event of any dispute the decision of the Council of the RSGB will be final." The declaration must be signed and dated.

11. Address for logs. RSGB HF Contests Committee, c/o N S Cawthorne, G3TXF, 10 Wilton Grove, New Malden, Surrey KT3 6RG.

12. Closing date for logs. Logs must be postmarked not later than 13 May 1985.

13. Awards. The 1930 Committee Cup will be awarded to the leading station in Section (a). Certificates of merit will be awarded to the leading three stations in each section, and to the highest placed entrant in each section using 1W input or less.

March 144/432MHz & SWL Contest 1400-1400gmt 2-3 March 1985

The following general rules, published in the "Operating Guide" supplement, *Rad Com* January 1985, will apply: 1, 2, 3, 4d, 5a, 6a, 7a, 8b, 9, 10a, 11a, 12b, 13-24. Single-band entries for 144MHz only will not be accepted.

All entries and check logs to: VHF Contests Committee, c/o C Sharpe, G2HIF, 20 Harcourt Road, Wantage, Oxon OX12 7DQ.

March 432MHz CW Contest 1300-1700gmt 31 March 1985

The following general rules, published in the "Operating Guide" supplement, *Rad Com January 1985,* will apply: 1, 2, 3, 4a, 5a, 6b, 7a, 9, 10a, 11a, 12b, 13-24.

All entries and check logs to: VHF Contests Committee, c/o G M C Stone, G3FZL, 11 Liphook Crescent, Forest Hill, London SE23 3BN.

April 70MHz & SWL Contest 0900-1500gmt 21 April 1985

The following general rules, published in the "Operating Guide" supplement, *Rad Com* January 1985, will apply: 1, 2, 3, 4e, 5a, 6a, 7a, 9, 10a, 11a, 12a, 13-24.

All entries and check logs to: VHF Contests Committee, c/o D A Yorke, G4JLG, 40 Edge Fold Road, Worsley, Manchester M28 4QF.

70MHz Fixed Station Contest results

While an entry of 21 stations out of an estimated total of approximately 70 active stations represented a fair proportion of support for this event, the contest was particularly disappointing because of the prevailing conditions. These were described by everyone as being at the best poor to downright abysmal throughout. Fewer than a quarter of the stations taking part claimed their best dx as being over 300km, and the remainder had their potential to return a higher score severely limited by working every station that was active within this radius.

Nevertheless, in spite of these handicaps, those who did support the event from start to finish appeared to enjoy it more than might have been expected. The high operating standards, the relative freedom from QRM and the leisurely operating pace seem to have contributed to this in no small measure, if the comments on the 427 coversheets are to be taken at face value.

Only one station registered any complaint, and when the close proximity of the stations concerned is taken into account it is difficult to appreciate how the mutual QRM could have been reduced. Several stations, however, suffered some QRM from radiotelephones, although it is doubtful if any contacts were lost as a consequence.

The logging standards were, as always on 70MHz, very good. The estimation of distance between QTH locators was particularly accurate and it must be concluded that practically all must have been determined by calculation on a computer.

The winning station, G4ZAP, is to be congratulated on making such a high score under difficult conditions; this station together with the runner-up, G4MGR, receive certificate awards for their achievements. *G2HIF*

Posn	Callsign	Score	QSOs	QTH	Best dx	Km
1	G4ZAP	347	56	ZN72	GU2FRO	410
2	G4MGR	290	41	YN55	G3DAH	362
3	G3UKV	282	48	YM28	G3DAH	297
4	G4GFX	276	58	YM79	G4ANT	265
5	G4LDZ	247	31	AM27	GW3NYY	381
6	G4FOH	239	45	ZM60	GD2HDZ	363
7	G3TBK	225	37	ZN77	GW3NYY	275
8	G3TCT	221	43	ZL59	G4MGR	297
9	G4LNV	186	44	ZL46	G4MGR	254
10	G3NPI	179	41	ZM76	GW3NYY	216
11	G4CIZ	178	42	ZL55	G4MGR	257
12	G4SHP	169	37	AL41	G4MGR	301
13	G3TCU	167	39	ZL67	G3VIP	267
14	G4HLX	162	38	ZL23	G4ANT	227
15	G4ZTR	161	32	AL13	G4MGR	297
16	G3BPM	156	24	YK07	G4ZTR	240
17	G4LVK	100	27	YM60	G4SHP	178
18	GW4HBK	95	17	YL25	G4LDZ	340
19	GW4ALG	82	16	YL27	G4SHP	195
20	G5UM	80	20	ZM26	G3DAH	183
21	G3TUX	64	18	ZL77	GW3NYY	237

A check log from G2DHV is gratefully acknowledged.

Contests Calendar

February	
2, 3 February	7MHz Phone *(Rules in September issue)*
2-3 February	YU DX *(Rules in January* MOTA)
3 February	144MHz CW *(Rules in January issue)*
9, 10 February	1st 1.8MHz *(Rules in December issue)*
9-10 February	PACC (*Rules in February* MOTA)
10 February	70MHz Cumulative
16 February	WAB 13 (*Rules in February* MOTA)
16-17 February	ARRL DX CW (*Rules in February MOTA)*
17 February	432MHz Fixed *(Rules in January issue)*
21, 23 February	Second BYL ARA (*Rules in February* MOTA)
22-23 February	CQ WW 160m DX SSB *(Rules in January* MOTA)
23, 24 February	7MHz CW *(Rules in September issue)*
23-24 February	UBA Trophy (*Rules in February* MOTA)
24 February	70MHz Cumulative
2, 3 March	144/432MHz *(Rules in February issue)*
2-3 March	ARRL DX Phone (*Rules in February* MOTA)
9, 10 March	Commonwealth *(Rules in October issue)*
10 March	70MHz Cumulative
16 March	Town & County
24 March	70MHz Cumulative
31 March	432MHz CW (*Rules in February issue)*
7 April	ROPOCO 1
21 April	Low Power (*Rules in February issue*)
21 April	70MHz (*Rules in February issue*)
May-September	10GHz Cumulatives
May-September	Microwave Cumulatives
4, 5 May	432MHz-24GHz
12 May	WAB LF (*Rules in February* MOTA)
18, 19 May	144MHz
19 May	Region Round-up
1, 2 June	HF NFD (*Rules in February issue*)
8 June	1,296MHz Trophy
9 June	432MHz Trophy
22, 23 June	Summer 1.8MHz
6, 7 July	VHF NFD
13, 14 July	SWL
21 July	Low Power Field Day
27 July	432MHz Low Power
28 July	144MHz Low Power
18 August	1,296/2,320MHz
25 August	ROPOCO 2
7, 8 September	IARU Region 1 FD
7, 8 September	144MHz Trophy and IARU
2, 10, 18, 26 September	28MHz Phone Cumulative
22 September	70MHz Trophy
5, 6 October	432MHz-24GHz and IARU
8 October	432MHz Cumulative
13 October	21/28MHz Phone
16 October	1,296/2,320MHz Cumulative
20 October	21MHz CW
24 October	432MHz Cumulative
27 October	70MHz Fixed
1, 17 November	1,296/2,320MHz Cumulative
2, 3 November	144MHz CW
3 November	WAB CW (*Rules in February* MOTA)
9, 25 November	432MHz Cumulative
9, 10 November	2nd 1.8MHz
11, 19, 27 November, 5, 13 December	28MHz CW Cumulative
1 December	144MHz Fixed
3, 19 December	1,296/2,320MHz Cumulatives
11 December	432MHz Cumulative
15 December	70MHz CW

HF propagation predictions for February 1985

Using the table

The time is presented vertically at two-hour intervals 00(00)gmt to 22(00)gmt for each band, ie ♀ = 0000, ♀ = 0200, ♀ = 0400 etc.

The probability of signals being heard is given on a 0 (indicated by a dot) to 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 dagger (†) sign in the 28 and 3·5MHz columns respectively. The higher probability figures are printed in BLACK, lower probability in RED and lowest probability in GREEN type.

	28MHz				21MHz				14MHz				10MHz				7MHz				3·5MHz			
GMT	000 024	001 680	111 246	122 802	000 024	001 680	111 246	122 802	000 024	001 680	111 246	122 802	000 024	001 680	111 246	122 802	000 024	001 680	111 246	122 802	000 024	001 680	111 246	122 802
EUROPE																								
Moscow	.	1	11	.	.	36	651	.	.	188	788	2	21	665	557	722	874	533	235	788	†4	2	2	4††
Malta	.	1	11	.	.	46	664	.	.	187	788	61	452	665	567	864	998	632	235	799	†††	3	2	5††
Gibraltar	.	.	.	.	.	4	433	.	.	78	888	61	131	186	667	862	897	754	334	798	†††	†2	2	4††
Iceland	.	.	.	.	.	.	221	.	.	5	787	4	.	57	667	83	551	164	345	785	†††	†3	2	4††
ASIA																								
Osaka	.	.	.	.	.	1	.	.	.	65	1 1	.	.	153	224	2	.	21	12	542	.	.	.	35
Hong Kong	.	1	.	.	.	45	2	.	.	156	521	.	.	23	334	3 1	1	1	12	655	.	.	.	353
Bangkok	.	12	2	.	.	57	72	.	.	136	554	.	2	13	235	412	3	1	12	667	.	.	.	35†
Singapore	.	23	21	.	.	67	761	.	.	136	566	.	2	3	235	513	2	1	12	666	.	.	.	354
New Delhi	.	23	2	.	.	167	73	.	.	335	561	.	41	2	234	213	73	.	2	578	4	.	.	35†
Teheran	.	33	32	.	.	177	771	.	.	544	567	1	632	311	235	635	873	.	2	678	†4	.	.	35†
Colombo	.	33	32	.	.	167	772	.	.	223	567	2	1	1	235	635	52	.	2	678	4	.	.	35†
Bahrain	.	34	32	.	.	267	771	.	1	533	566	1	742	2	235	645	872	.	2	688	†4	.	.	35†
Cyprus	.	44	441	.	.	188	886	.	21	766	678	621	875	633	346	877	996	311	123	688	††4	.	.	4††
Aden	.	44	33	.	.	266	785	.	2	422	367	511	822	2	135	766	862	.	2	688	†5	.	.	355
OCEANIA																								
Suva (S)	.	.	.	.	.	.	11	.	.	4	552	1	.	33	334	4	.	121	12	3	.	.	.	.
Suva (L)	.	.	.	.	.	52	.	.	11	175	421	441	1	453	223	52	.	22	2	3	.	.	.	.
Wellington (S)	.	.	.	.	.	1	21	.	.	35	553	.	.	53	335	2	.	121	12	3	.	.	.	.
Wellington (L)	.	.	.	.	.	1	.	.	11	63	.	341	2	253	111	531	.	121	1	3	.	.	.	.
Sydney (S)	.	1	.	.	.	56	33	.	.	276	565	.	.	143	335	3	.	21	12	62	.	.	.	3
Sydney (L)	.	.	.	.	.	1	.	.	.	45	2	61	.	53	221	452	.	21	1	42	.	.	.	2
Perth	.	33	2	.	.	178	742	.	.	246	567	1	2	13	235	633	.	.	2	674	.	.	.	35
Honolulu	.	.	.	.	.	.	.	.	.	.	.	3	.	11	213	41	1	121	2	2	.	3	.	.
AFRICA																								
Seychelles	.	12	33	.	.	145	785	.	2	322	367	511	821	.	135	766	851	.	2	688	†2	.	.	35†
Mauritius	.	34	441	.	.	166	786	.	21	222	457	621	851	.	135	777	84	.	2	588	†	.	.	25†
Nairobi	.	44	441	.	.	166	686	.	21	422	257	732	873	2	25	887	883	.	2	588	†5	.	.	25†
Harare	.	13	553	.	.	56	688	1	23	422	247	842	883	2	15	788	883	.	2	588	†5	.	.	25†
Capetown	.	12	664	.	.	45	778	3	31	332	236	863	874	31	13	798	885	1	1	488	††2	.	.	5†
Lagos	.	26	664	.	.	77	778	4	34	253	225	873	895	52	3	698	888	4	.	488	5††	.	.	5†
Ascension Is	.	14	335	1	.	57	667	5	243	73	223	673	898	441	.	388	889	61	.	168	†††	3	.	3†
Dakar	.	5	545	1	.	48	777	61	233	75	324	773	788	352	1	488	879	62	.	168	†5†	3	.	3†
Las Palmas	.	3	433	.	.	38	888	5	122	87	667	872	788	575	434	798	989	742	112	479	†††	5	.	5†
S AMERICA																								
South Shetland	.	.	112	1	.	2	556	51	133	55	554	442	577	353	221	123	355	521	.	1	22	2	.	.
Falkland Is	.	.	344	1	.	4	777	51	133	56	533	342	688	353	2	124	588	621	.	2	255	4	.	.
Rio de Janeiro	.	1	1 1	1	.	6	535	51	123	16	322	352	688	343	.	36	889	621	.	15	†††	4	.	2
Buenos Aires	.	.	213	1	.	4	746	51	23	36	522	341	588	253	2	24	689	621	.	2	4††	4	.	.
Lima	.	.	222	1	.	.	766	5	1	.	532	221	356	131	2	2	589	531	.	1	2††	4	.	.
Bogota	.	.	222	1	.	.	765	4	.	11	542	231	245	43	21	13	688	431	.	2	4††	4	.	.
N AMERICA																								
Barbados	.	.	222	1	.	1	766	5	1	5	532	341	356	123	2	35	887	531	.	4	††5	4	.	.
Jamaica	.	.	11	1	.	.	465	4	.	.	553	23	234	32	22	13	688	431	.	2	4††	4	.	.
Bermuda	.	.	11	.	.	.	565	4	.	3	543	44	233	13	211	134	788	321	.	14	†††	4	.	.
New York	.	.	11	.	.	.	255	4	.	.	554	54	222	2	331	233	687	221	.	13	4††	4	.	.
Mexico	.	.	11	.	.	.	55	3	.	.	154	21	122	21	231	1	277	231	.	.	5†	4	.	.
Montreal	.	.	.	.	.	.	155	3	.	.	555	54	121	2	332	233	687	221	.	13	4††	4	.	.
Denver	.	.	.	.	.	.	3	2	.	.	46	42	12	1	33	211	366	22	1	.	4†	4	.	.
Los Angeles	.	.	.	.	.	.	2	1	.	.	16	41	1	11	24	21	145	121	1	.	2†	4	.	.
Vancouver	.	.	.	.	.	.	.	.	.	.	3	51	1	.	14	32	144	121	2	1	25	4	.	.
Fairbanks	.	.	.	.	.	.	.	.	.	.	.	2	.	11	113	52	231	121	12	321	2	3	.	.

The provisional mean sunspot number for November 1984 issued by the Sunspot Index Data Centre, Brussels, was 22·4. The maximum daily sunspot number was 59 on 25 November, and the minimum was 0 on 6, 7 November. The predicted smoothed sunspot numbers for February, March, April and May are, respectively: (classical method) 34, 32, 31 and 30; (SIDC adjusted values) 28, 26, 24 and 23.

Club News

The following is the latest information received by RRs from RSGB affiliated societies, clubs and groups in time for inclusion in this issue. Basic unchanged information on other affiliated organizations will be published again in the July 1985 issue.

RSGB affiliated organizations are requested to report all programmes and new items to their regional representatives regularly. Information for inclusion in the **April** issue should reach them by **19 February** and for the **May** issue by **15 March.**

Club programmes are given in order of date, subject, time and place of the meeting. All callsigns of club secretaries and other contacts are QTHR (correct in the current *RSGB Call Book*) unless otherwise stated.

All clubs welcome visitors and would be pleased to hear from potential new members.

REGION 1—RR B. Donn, G3XSN, 7 Thurne Way, Liverpool L25 4SQ. Tel 051-722 3644.

Barnoldswick (Rolls-Royce ARC)—6 February ("Transmission lines and antennas", David Coomb). 8pm. Rolls-Royce Sports & Social Club, Barnoldswick. Sec L Logan G4ILG, tel 0282 812288.

Bolton (B & DARS)—6 February ("G-QRP", Rev G Dobbs). 8pm. Horwich Leisure Centre, Details Phil Ingham, G6HDD, tel Farnsworth 791918.

Bury (BRS)—12 February ("Building and launch of Oscar 10". To be followed by a question and answer session on amateur satellites and AMSAT-UK by David Cadman, G8UVE). Informal meetings 5th, 19th and 26th. 8pm. Mosses Centre, Cecil Street, Bury. Details Brian Tyldsley, G4TBT, tel Burnley 24254.

Chester (C&DRS)—26 February (Visit by Bert Donn, G3XSN, regional representative. 8pm. Chester Rugby Union Football Club, Hare Lane, Vicars Cross, Chester. Details Alan Warne, G4EZO, tel Chester 40055.

Crewe (South Cheshire ARS)—11 February (Visit by Bert Donn, G3XSN, regional representative). 8pm. Victoria Club, Gatefield Street, Crewe. Sec Nick Gutten, G6ICW, tel Crewe 60062.

Fylde (FARS)—5 February ("Secret listeners"), 19 February (Informal and morse class). 7.45pm. The Kite Club, Blackpool Airport. Sec H Fenton, G8GG, tel 725717.

Manchester (South Manchester RC)—1 February (Club quiz), 8 February (Lecture to be announced), 15 February ("Radio astronomy", Ian Morrison, G1GZS, of Jodrell Bank), 25 February (Radio question time—ask the panel of experts!), 1 March ("Operating from VP8", slide talk by Ron Smith, G3SVW). 8pm. Sale Moor Community Centre, Norris Road, Sale. Sec David Holland, G3WFT, tel 061-973 1837.

Oldham (OARC)—4 February (Committee meeting), 11 February ("QRP operating", Rev Dobbs, G3RJV), 4 March (Committee meeting), 11 March ("Antennas", G2JT). 8.30pm. Wheatsheaf Hotel, Derker Street, Oldham. New sec John, G3SAO.

St Helens (StH & DARC)—7 February (Film), 14 February ("Home construction", G8TYY), 21 February (Quiz), 28 February (Arrangements for Belle Vue), 7 March (Rally pre-view). 8pm. Conservative Rooms, Boundary Road, St Helens. Details Alan Manchester, tel 56025.

Thornton Cleveleys (TCCARS)—4 February ("PTFE", Dave Morley, Petrochemical & Plastics Division, ICI), 11 February (Advanced morse class, Ian Cobbe, G3ZRZ), 18 February ("Computer frauds", Alan Reilly, G6KOE), 25 February (Demonstration of Amtor by Pete Reilly, G4BVW, and Ray Hargreaves, G4YVQ), 4 March (Visit by Bert Donn, G3XSN, regional representative). 7.30pm. Norbreck 1st Scout Hut, Carr Road, Bispham. Sec Mrs E E Milne, G4WIC, tel Cleveleys 821827.

Warrington (WARC)—5 February ("Meteor scatter operating", Richard Staples, G4HGI), 12 February (Homebrew construction awards), 19 February (Beginners evening), 26 February (Open forum), 5 March (Preparations for NARSA Club stand). 8pm. Grappenhall Community Centre, Bellhouse Lane, Grappenhall, Warrington. Sec W Green, G8HLZ, tel 0925 814740.

Wirral (WARS)—6 February (Film night), 20 February (Technical talk), 6 March (Slide show: "Past dxpeditions", G3EGX). 8pm. Heswall Parish Church Hall, Heswall. Sec Cedric Cawthorne, G4KPY, tel 051-625 7311.

Wirral (W & DARC)—6 February (Seventh annual general meeting), 13 February (Film night), 20 February (D&W, The Victoria Lodge, Tranmere), 27 February (Equipment demonstration by a local dealer), 6 March (D & W, The Wheatsheaf, Ness). Second and fourth Wednesdays in each month at Irby Cricket Club, Mill Hill Road, Irby. Sec Gerry Scott, G8TRY, tel 051-630 1393 or 227 1018.

There are still quite a few clubs from whom I have not had any correspondence. Would club secretaries please let me have their information in good time. I would also like to thank all the clubs who have sent me their club news and booklets, and to the clubs which I have already visited for their kind hospitality. *RR1*

REGION 3—RR G. Ross, G8MWR, 81 Ringwood Highway, Coventry CV2 2GT. Tel Coventry (0203) 616941.

Several club talks are now available, please contact me for details. If you are prepared to give talks in the Midlands please let me know so that we can maintain a useful listing for club secs.

Will club secs **please** inform me of your club activities so that details can be included here. *RR3*

Birmingham (South Birmingham RS)—6 February ("Messages from the crab nebula"). 7.45pm. Hampstead House, Fairfax Road, West Heath, Birmingham. Sec Tim Scrimshaw, 10 Somerdale Road, Birmingham B31 2EG.

Bromsgrove (BARC)—8pm, Avoncroft Arts Centre, Bromsgrove. Sec G6EAM, tel Kingswinford (549)-298580. Please note corrected phone number.

Coventry (CARS)—1 February ("Crime prevention"), 8 February (Night on the air), 15 February (Film night), 22 February (Night on the air). 8pm. Scout HQ, 121 St Nicholas Street, Radford, Coventry. Sec G4JDO, tel 73999.

Dudley (DARC)—4 February (Committee and natter night). 7.45pm. Allied Centre, Greenman Alley, Tower Street, Dudley. Sec G4NRA, tel (0384)-278300.

Hereford (HARS)—1 February (AGM), 15 February (Informal meeting). The Old Gaol, Gaol Street, Hereford. Sec G3WRQ.

Much Wenlock (MWARES)—11 February (Computer evening), 25 February ("CW is obsolete"—a formal debate). 8pm. Raven Hotel, Much Wenlock. Sec G3ZSL, tel (07462)-861332.

Redditch (RARC)—14 February (Videos: "Secret Listeners" and "World of Amateur Radio). 8pm. WRVS Centre, Ludlow Road, Redditch. Sec G3EVT, tel (0789)-762041.

Rugby (RARS)—20 February (TX test night), 27 February (RX test night). 7.30pm. Cricket Pavilion, "B" entrance. Rugby radio station. Sec G4TWH.

Shrewsbury (SARS)—7 February (Natter night), 14 February (Project/contest discussion), 21 February (Talk by chief eng, Radio Shropshire), 28 February (Calibration evening). 8pm. Old Bucks Head, Frankwell, Shrewsbury. Sec G6DQY, tel Bashchurch 260668.

Stratford-on-Avon (SoAARC)—11 February (Surplus sale), 25 February (Technical topics and project review). 7.30pm. Bearley radio station, Stratford-on-Avon. Sec G8OVC, tel Stratford 750584.

Warwick (Mid-Warwicks ARS)—12 February (Members equipment), 26 February (Natter night). 8pm. 61 Emscote Road, Warwick. Sec G4TIL, tel Southam 4765.

West Bromwich (WBCRC)—Change of venue: Sundays, 8pm. "Hop and Barleycorn", Dartmouth Street, West Bromwich.

Willenhall (W&DARS)—Change of venue: Wednesdays, 8pm. Saracens Head, Bloxwich Road South, Willenhall.

REGION 4—RR M. Shardlow, G3SZJ, 19 Portreath Drive, Darley Abbey, Derby DE3 2BJ. Tel Derby (0332) 556875.

Buxton (BARS)—12 February (Open forum), 26 February (TBA). 8pm. Haddon Hall Hotel, Lomdon Road, Buxton. Sec Dave Cooper, G6MIF, tel Buxton 6174.

Derby (D&DARS)—6 February (Junk sale), 13 February ("Leicester repeaters", G4MQS), 20 February (Night on the air), 27 February (Video show). 7.30pm, 119 Green Lane, Derby. Sec Jenny Shardlow, G4EYM, tel Derby 556875.

Grimsby (GARS)—7 February (Quiz night), 21 February (Direction finding). 7.30pm. Cromwell Social Club, Cromwell Road, Grimsby. Sec George Smith, G4EBK, tel Grimsby 887720.

Loughborough (L Falcon ARC)—1 February (Open forum), 8 February (SSTV), 15 February (Visit), 22 February ("Test equipment", G8BUB), 1 March (Social evening). 8pm. Brush Sports & Social Club, Fennal Street, Loughborough.

Mansfield (MARS)—1 February ("Packet radio", G6CUK), 19 February ("Bee keeping", G4ODD), 1 March ("Raynet", G4NOR). 7.30pm. Victoria Social Club, Princes Street, Mansfield. Sec Keith Lawson, G4AAH.

Melton Mowbray (MMARS)—15 February (Construction contest). 7.30pm. St John Ambulance Hall, Asfordby Hill, Melton Mowbray. Sec Richard Winters, G3NVK, tel Melton Mowbray 63369.

Nottingham (ARCON)—7 February (Forum), 14 February ("Then and now", G2DWZ), 21 February (Activity night), 28 February (Junk sale). 7.30pm. Sherwood Community Centre, Mansfield Road, Nottingham. Sec Jim Towle, G4PJZ, tel Nottingham 624764.

Spalding (S&DARS)—8 February ("RTTY", G3RED). 7.30pm. White Hart Hotel, Spalding. Sec Betty Whitley, G4ZGT, tel Spalding 2781.

Worksop (WARS)—Change of venue: now The Unicorn Hotel, Bridge Street, Worksop. Sec Carole Gee, G4ZUN, tel Worksop 486614.

REGION 6—RR. F. S. G. Rose, G2DRT, 84 Cock Lane, High Wycombe, Bucks HA3 7EA. Tel Penn (049481) 4240.

Reading (R&DARC)—Alternative Tuesdays, 8pm. Clubroom of the White Horse PH, Peppard Road, Emmer Green, Reading. Details Chris Young, G4CCC, tel Reading 471761.

Oxford (RAFARS)—Third Wednesday in odd numbered months, 7.30pm. Civil Service Social Club, Marston Road, Oxford. Net 11.45am 3,710kHz ssb last Sunday monthly. Details G6ZH, QTHR. Tel 0491 651259.

Sincere thanks to members for their support in the 1985 Council election. *RR6*

REGION 7—RR R. Sykes, G3NFV, 16 The Ridgeway, Fetcham, Leatherhead, Surrey KT22 9AZ. Tel 0372 372587.

Ashford (Echelford ARS)—11 February (Surplus equipment sale), 28 February ("Broadcasting station in Equador"). The Hall, St Martin's Court, Kingston Crescent, Ashford, Middx. Sec Bob Crane, G4PHS, tel 01-977 4157.

Biggin Hill (BHARC)—19 February (RTTY demonstration). 8.30pm. St Mark's Church Hall, Church Road, Biggin Hill. Sec Ian Mitchell, G4NSD, tel 09598 376.

Cray Valley (CVRS)—7 February (My Shack), 21 February (Natternight). 8pm. Christchurch Centre, Eltham High Street, Eltham SE9. Sec P Clark, G4FUG.

Crystal Palace (CP & DRC)—16 February (AGM and constructional contest). 8pm. All Saints Parish Room, Upper Norwood SE19. Sec Geoff Stone, G3FZL.

Surbiton (308 ARC)—26 February (TBA). 8pm. The Coach House, Church Hill Road, Surbiton. Details Ray Lancaster, G1EOO.

Sutton and Cheam (S & CRS)—15 February (Junk sale). 8pm. Downs Lawn Tennis Club, Holland Avenue, Cheam, Surrey. Sec Alan Keech, G4BOX.

Thames Ditton (TVARTS)—5 February (HF forum). 8pm. Thames Ditton Library, Watts Road, Giggs Hill, Thames Ditton. Sec R Muir, G3LHN.

REGION 8—RR M. Elliott, G4VEC, 20 Haysel, Sittingbourne, Kent ME10 4QE. Tel 0795 70132.

Brighton (B & DRS)—Wednesdays, 8pm. Seven Furlong Bar, Brighton Racecourse. New sec Peter Turner, G4IIL, tel Brighton 607737.

Chichester (CARC)—5 February (Meeting in the Long Room). 21 February (Club meeting). 7.30pm. Fernleigh Centre, 40 North Street, Chichester. Details Chris, G4EHG.

Dartford (DDFC)—5 February (Pre-hunt meeting), 10 February (Club hunt). Pre-hunt Tuesday meetings at Horse & Groom PH, Leyton Cross, Dartford Heath, after 9pm. Details Pete, G8DYF, tel Greenhithe 844467.

Hastings (HERC)—20 February (Wood & Douglas presentation (prov)) 23 February (HERC/RAYNET/SARS combined social at Horseshoe Inn, Windmill Hill), 22 February (Visit by RSGB President at West Hill CC).

Medway (MARTS)—1 February (Construction contest), 8 February (Club agm). 7.30pm. St Luke's Church Hall, King William Road, Chatham. Details Andy, G4TQS, tel 0634-363960.

Maidstone (MYMCAARC)—1 February (Natter night and cw), 8 February ("Linear amps vhf construction with demonstration", G8VR), 15 February (Natter night and cw), 22 February (TBA). 8pm. YMCA Sportscentre, Melrose Close, Cripple Street, Maidstone. Details Alan, G6FZD, tel 0622-50709.

REGION 10—RR E. J. Case, GW4HWR, 2 Abbey Close, Tyrhiw, Taffswell, Mid-Glam CF5 7RS. Tel 0222 810368.

Cardiff (CRSGBG)—11 February (Films, probably including "The History of the Telephone"). 7.30pm. Pantmawr Hotel, Tyla Teg, Pantmawr Estate, Whitchurch, Cardiff. Sec Cyril Laws, GW6ZHP, tel Cowbridge 3212.

Cardiff Highfields (HARS)—Thursdays, 7pm. Highfields Centre for the Physically Handicapped. Allensbank Road, Cardiff. An on-going programme of activities includes, morse lessons, radio theory lectures, film shows and hf instruction for Class B licence holders at our shack. New sec Rob Lannon, GW6ZHM, tel Cardiff 750315.

Carmarthen (CARS)—Second and fourth Fridays in each month, 7.30pm. West Wales Hospital Club, The Quay, Carmarthen. Forthcoming lectures and demonstrations include antennas and propagation, single-band transceiver project, trouble shooting, IARU locator system, df techniques, and buffet dance on 23 March. Our first rally on 18 November, was generally successful, and an annual event is planned.

Newport (NARS)—Mondays, 7pm. Brynglas House, Brynglas Road, Newport. This year is the club's 10th anniversary and a variety of events will be held, including a trip to Lundy Island for a 24h, seven-day operation from 5 to 12 October. A special lecture day is being arranged, this to include various radio related subjects. 4 February (Free night). New sec Dudley, GW6ZUQ, tel 02912 6867.

Swansea (SARS)—7 February ("GMT as a radio parameter", Ray Macario, GW8RSW). 21 February (Visit to university CCTV studio—some hands-on experience if we are well behaved!—also a demonstration of the Russian GORIZON communications satellite by Alan Davies of the university staff). 7.30pm. Lecture Room N, Applied Sciences Building, Swansea University. Details Roger Williams, GW4HSH, tel 0792 404422.

REGION 11—RR B. H. Green, GW2FLZ, 1 Clwyd Court, Tan-y-Bryn Road, Colwyn Bay, Clwyd LL28 4AH. Tel 0492 49288.

Colwyn Bay (Conwy Valley ARC) (GW6TM)—14 February. Green Lawns Hotel, Bay View Road, Colwyn Bay. Sec J N Wright, GW4KGI, tel 0745 823674.

Hawarden (Alyn & Deeside ARS)—7 and 21 February. 8pm. Shotton Conservative Club, King George Street, Shotton, Deeside.

Porthmadog (P&DARS)—21 February ("50 years in amateur radio", GW2HFR). 8pm. Harbour Cafe, Ffestiniog Railway, Porthmadoc. Sec Mrs L Jones, GW4WKQ, Henllys Back, Llanbedrog, Pwllheli, Gwynedd LL53 7PG, tel 0758 740445.

Rhyl (R&ARC)—4 February (Talk by a local amateur. Subject of his own choice), 18 February (Activity night). 7.30pm. The Mona Hotel, Market Street, Rhyl. Sec GW1AKT, tel Nantglyn 469.

Members of the Milngavie & Bearsden Amateur Radio Group who obviously enjoyed their sixth annual dinner which was held at the Country Club, Blanefield, on 15 December 1984. The dinner was organised by Vic, GM3VTB (back row, second from right). *Photo:* GM4SRL

Wrexham (WARC)—6 and 20 February, 7pm. Friends Meeting House, Holt Road, Wrexham, Clwyd. Sec G4HRH, The Hollies, Sedgeford, Whitchurch, Salop SY13 1EX.

REGION 16—RR Alan Owen, G4HMF, 102 Constable Road, Ipswich, Suffolk IP4 2XA. Tel 0473 51319.

Braintree (B&DARS)—6 February (RTTY, Amtor and packet, Barry West, G8NMP). 8pm. St Peter's Church Hall, St Peter's Close, Braintree. Sec Leslie Whitehead, G6XJC, 24 Gilhurst Way, Braintree, CM7 7SY, tel 0376 23813.

Colchester (CRA)—7 February ("Model radio-controlled aircraft", Neil, G1DGO), 21 February (Simple and safe aerial erection", Alan, G3MYA), 7 March ("How is your interference", Robert G3DPW). 7.30pm. Colchester Institute, Sheepen Road, Colchester. Sec Frank Howe, G3FIJ, 29 Kingswood Road, Sheepen Road, Colchester, tel 0206 851189.

Felixstowe (F&DARS)—Second and fourth Mondays in each month, 8pm. The Feathers, High Road West, Walton, Felixstowe. Details Ernie Long, G3MJS, tel 272426.

Ipswich (IRC)—13 February (tba), 27 February ("Packet radio", John, G8ONH). 8pm. Rose & Crown, Norwich Road, Ipswich. Sec Jack Tootill, G4IFF, tel Ipswich 44047.

Leiston (LARC)—5 February ("Setting up a contact station", John, G3XLL), 21 February (Start of the aerial construction project), 5 March ("Walters musical machines", G2FXR—bring the xyl). 7.30pm. Sizewell Sports and Social Club, St George's Avenue, Leiston. Sec Mrs I Westcott-Freeman, G6ORK, 16 Hayling Road, Leiston, tel Leiston 831597.

Martlesham (MARS)—6 February ("Encryption systems", Charles, G4GBA), 7.30pm. British Telecom's Research Laboratories. Contact G3ZNU by previous Monday to clear admission.

Southend (S&DARS)—Fridays, 7.30pm. Rocheway Youth and Adult Centre, Rochford. Contact Alex Adams, G3YDA.

Stowmarket (S&DARS)—4 February (Junk sale), 4 March (AGM). 7.30pm. Red Cross Hut, Station Yard, Stowmarket. Details Jim Lowe, G8SCB, tel Needham Market 721296.

REGION 17—RR T. Emery, Wilverley, Old Lyndhurst Road, Cadnam, Southampton SO4 2NL.

Note to all Region 17 clubs. I have now run out of advance programme information for a number of clubs in the region. Please help me to advertise your club activities. *G3KWU*

Basingstoke (BARC)—12 February ("Raynet", G6BBW). 7.30pm. The Village Hall (opposite The Swan), Sherborne St John, Basingstoke. Chairman, G4WIZ, tel Tadley 5185.

Bournemouth (BRS)—1 March ("The sands of time", G3KWU). 7.30pm. Kinson Community Centre, Kinson, Bournemouth. Sec G4EKE, tel (0202) 877945.

Eastleigh (Itchen Valley ARC)—1 February ("Development of the microcomputer in the '70s", G3ABA). 15 February (Equipment sale on behalf of the RAIBC (ex G2BQ and G3HRJ). 1 March (AGM). 7.30pm. The Scout Hut, Brickfield Lane, Chandlers Ford. Sec G6DIA, tel (0703) 863039.

Farnborough (F&DRS)—13 February (Equipment evening hf/vhf—members' favourites). 27 February (Open evening for RAE students and visitors). 7.30pm. Railway Enthusiasts Club, Access Road, off Hawley Lane, Farnborough. Chairman, G8ATK; secretary, G4MEE; treasurer, G4IZB. PRO G4MBZ, tel Farnborough 837581.

Horndean (H&DARC)—4 February ("The RSGB", G3KWU). 8pm. Merchiston Hall, London Road. PRO G4BEQ.

Liphook (Three Counties ARC)—6 February ("Propagation", G3LTP), 20 February ("RSGB in the regions", G3KWU). 8pm. The Railway Hotel, Liphook. Sec G3TBT, tel Passfield 368.

Swindon (S&DARC)—7 February ("Satellite telemetry since Sputnik", G3MQD), 21 February ("Home construction the professional way", G3LTZ). 7.30pm. Oakfield School, Marlowe Avenue, Swindon. PRO G4ZAZ, tel (0793) 37489.

Weymouth (SDRS)—5 February, (Bring your rig along to a "rig forum"). 7.30pm. Army Bridging School, Wyke Regis. Sec G6HKD.

Winchester (WARC)—16 February (AGM). 7.30pm. The Log Cabin, Stockbridge Road, Winchester. Sec G3SHQ, tel Twyford 713003.

REGION 19—RR R. J. C. Broadbent, G3AAJ, 94 Herongate Road, Wanstead Park, London E12 5EQ. Tel 01-989 6741.

Cheshunt (CDARC)—6 February (Club project discussion, G4ZCX), 13 February (Natter night), 20 February ("AMSAT UK", G3AAJ), 27 February (Natter night), 8.15pm prompt. The Church Room, Church Lane, Wormley, Nr Cheshunt, Herts. Details Roger Frisby, G4OAA, 2 Westfield Road,

Hoddesdon, Herts, tel 09924 64795. Club magazine *Hamster.*

Chiswick (ABCARC)—19 February (The new Maidenhead location system, a discussion). The Committee Room, Chiswick Town Hall, Chiswick, London W4. All present and past members are welcome. Sec W G Dyer, G3GEH, tel 01-992 3778.

Harrow (RSH)—1 February ("Use and abuse of vhf", G3OSS), 8 February (Activity night on 80m), 15 February ("SSTV", G8ASI), 22 February (activity night on 40m). The Harrow Arts Centre, High Road, Harrow Weald. Talk-in on GB3HR (B14). Details from G8XBZ or G4AUF, tel Rickmansworth 779942 or 01-868 5002.

Havering (DARC)—6 February (Informal), 13 February (tba), 20 February (Pre-contest briefing), 27 February (W McClintock, G3VPK, RSGB Council member). 8pm. The Fairkytes Arts Centre, Billet Lane, Hornchurch, Essex. Details from G4UQR, tel Upminster 26904.

London (CSARS)—First and third Mondays in each month, during lunch hour. The Civil Service Centre, Monck Street, Millbank SW1. Nets on Tuesday, 7.30pm, 144.575fm and 8pm on 3.720. Details from G Gostin, tel 01-632 6444 daytime.

St Albans (Verulam ARC)—12 February (Informal), 26 February ("CW is a dying art", a debate, for the motion G3HDB, against the motion G3RTE). 7.45 for 8pm. RAFA-HQ, New Kent Road, St Albans. Sec Hilary, G4JKS, tel St Albans 59318.

Members' Ads

CONDITIONS OF ACCEPTANCE

These subsidized flat-rate advertisements are accepted as a service to members of the RSGB only. They must be submitted on the Members' Ad form printed on the back of a *recent* address label carrier used to mail *Rad Com* to the advertiser: this will automatically provide proof of membership and should not be more than two months old. No acknowledgement of receipt will be sent, and advertisements not clearly worded or punctuated, or which do not comply with the conditions of acceptance, will be returned. No correspondence concerning this service will be entered into.

Trade or business advertisements, even from members, will not be accepted for "Members' Ads" but should be submitted as classified or display advertisements in the usual way. Traders who are members must enclose a signed declaration that the items for sale or wanted are part of, or intended for, their own personal amateur station.

The RSGB reserves the right to refuse advertisements, and accepts no responsibility for errors or omissions, or for the quality of goods offered for sale.Advertisements for citizens band equipment will not be accepted.

Warning. Members are advised that they should, as far as possible, ensure that the equipment they intend to purchase is not subject to a current hire purchase agreement. The "purchase" of goods legally owned by a finance company could result in the "purchaser" losing both the goods and the cash paid.

The current rate is £2 for 40 words or less: advertisements containing more than 40 words will cost an additional £1 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.

The closing date for the **April 1985** issue is **Thursday 21 February**

Post to: MEMBERS' ADS, RSGB, 88 BROOMFIELD ROAD, CHELMSFORD, ESSEX CM1 1SS
Do not post to RSGB HQ or Advertising officer.

FOR SALE

Trio TS830, with mic, and cw filter, fitted plus two spare pas, perfect cond, £565. FT290R, plus nicads, mobile mount, perfect, £215. Both plus carriage. G3KLF. Tel Fareham 236906, weekend or evenings only.

Switch mode psu by ITT, 15V, 2A adjustable and 5V 20A. Ideal disc drive etc, weighs under 10lb, almost new, £27.50. Also tiny 5V 20A for every ttl application, £17.50. G3OHW, QTHR. Tel 04626 74011.

Hallicrafter HT37 tx, £125. Hallicrafter SR400 tx/rx, 400W, £200. Collins 32V3 tx, £250. Collins 75A4 rx, £375. G3GBB. Tel 0284 66496 evenings and weekends.

Solartron stabilized psu, variable 500V, 350mA, plus spare 12E14, valves, and manual, £45. Mint 0·02 per cent, precision Wheatstone bridge with fitted galvo, in wooden case, calibrated 1984, £37. Laboratory meters, £4. Voltage and current generator, £4. Part exchanges considered. Tel Brewood 850760.

45ft tiltover aluminium mast, complete with TET beam, Daiwa rotator, and controller, and setting out drawings. Whole rig is gale-proof. Reason for sale, moving QTH. G3UZN, QTHR. Tel 0263 713238.

Yaesu FT200 hf tx/rx, homebrew psu, with manual, circuits, mic, gd wkg order, £15 ono. carriage extra. *Wanted:* 5/6-band hf tx/rx with digital readout. W.H.Y? G4BLT, QTHR. Tel Wakefield (0924) 255515.

FT250 hf tx/rx, with heavy duty homebrew psu, comp with spare valves (including brand new pas), mint cond, exc performance, £175, carriage extra. GM3VEY. Tel 0224 868263 evenings.

FT77S, with fm board and cw filter, as new cond, £345. FP707, matching psu, £90. FTV707, transverter frame only, £35. FC707 atu, £55. The four above units with 144MHz transverter module, £545. Yaesu 432MHz transverter module, £180. Heil HC3 microphone, £10. Heil microphone equaliser EQ300, £30. MM 4m converter, £15. 30m LDF4.50 Heliax, used two years, £25. Sony ICF7600D all band rx, £130. All items ono, can be delivered SE England. Tel John, Chelmsford 355331, early evening please.

Realistic DX300, gd cond, will sell or exchange for gd 2m linears to suit Yaesu FT290R. Also require dip meter for 2m. Would also consider 18AUT/WB, 10-80m trapped vertical in ex for DX300. G1EQF, QTHR. Tel Lavington 3462.

Icom IC745, latest nine-band hf tx, many features, 100W, o/p in superb cond with orig packing, £660. DX33 3ele tribander beam, vgc, £98. FL110 hf s/state linear, 100W o/p, use with any QRP rig, £85. Tel 01-578 4484.

KLM KT34XA, high performance triband 6ele Yagi, specially imported, offers? Also heavy duty Westower 58ft fully extended with head unit and 15ft heavy-duty al tubing, £350 ono. Emoto 1103MXX, rotator suitable above antenna, £150 ono. G3UKS, QTHR. Tel 073 529 2672.

Yaesu FR101DD rx, 21 bands all modes and 2m, £250 ono. Yaesu FR50B 160-10m rx, £80 ono, or swap for Trio R820 rx and cash. *Wanted: Ham radio* and *QST* magazines, also Trio R599 rx. J Wright, 12 Norn Hill, Basingstoke, Hants RG21 2HD. Tel 0256 468649.

Teletype ASR33, with acoustic cover and plinth, full and half duplex RS232 interface, £25. Can assist with transport at cost. G6JKV, QTHR. Tel Dick, Reading (0734) 416821, evenings and weekends.

FT250 hf tx/rx, with psu, plus FV200 ext vfo, gd cond, £250, buyer collects. C78 standard 70cm uhf portable mobile rig, charger, nicads, case, mobile mounting bracket, £175. Electronic organ manuals, several. G3JKN. Tel Denham (0895) 832229.

Tono 9000E, with light pen, mint cond, £445. TW4000A (female, talking), £395. CBM3008, software, books etc, offers. W.H.Y? Protel mic 3 comp levels, graphic equalizer etc, £40. Swop SX200N for h/h scanner similar range. Tel Rayleigh (0268) 774089 after 3pm.

Belcom Liner 2 ssb tx, £75. Telford TC7 tx, 2m, a.m./fm, with TC7 tunable i.f. 24-26MHz, £45. Siemens teleprinter type 37E, £5. Oscilloscope d/beam, No 1, Mk2, £10. Buyer collect/pay carriage. G8IMW, QTHR. Tel 0743 66371.

Yaesu FT200, FP200, all 28MHz xtals, manuals, £240. G3LLL rf clipper (for FT200), £25. Europa B 144MHz converter, £50. All items mint, never used. Woden DTM16, tfmr 650-0-650V, 250mA, £10. Choke 16H 150mA, £1.50. Carriage extra. G3AIZ, QTHR. Tel 0245 71790.

Lowe Colour Genie 32k computer comp with technical manual, software, and six months' membership of the user group, £120. *Wanted:* Low-band Pye Bantams etc for sea cadet operations. G4IUT. Tel 0952 79512.

Icom IC2E 2m fm, handheld 1·5W o/p, comp with charger, earphone, manual and original packing, only £105. Would exchange for IC202 or similar. G4LJW, QTHR. Tel Jon, Bedford (0234) 781323.

Yaesu 8Ω spkr FSPI, £6. ATU YW3, £8. Magmount 2m car aerial, £10. Daiwa SR11 rx, 144-146MHz, plus five xtals, £30. G4RRG. Tel Peter, Worcester (0905) 352110.

TS7500 2m synthesized, base or mobile. Readout by channel numbers, 12W o/p, as new, perfect, all accessories. £125. G2KF not QTHR. Tel Newquay Cornwall 78741.

RTTY terminal unit, £35. Commodore cassette deck type C2N, £20. Creed 75 maintenance manual (ITT EM75), offers. instant rom adapter GA1, for PET, £5. Transverter MMT28/144, £65. *Wanted:* Bird 250H, YO901P, Heathkit ID209OE. G3AZI, QTHR. Tel 0772 37815.

Ringo Ranger Mk2, 2m colinear, 5el Jaybeam, mobile whips λ/4 and 5λ/8 w/l with car mount, all clean, no corrosion, £25. G2KF not QTHR. Tel Newquay Cornwall 78741.

Icom 240 2m fm mobile, 10W, £65. 2m transverter MMT144/28, all leads/connectors £75. Both perfect wkg order. G4MQK, QTHR. Tel Norwich 0603 56329.

Yaesu FT1. The rig that has everything. Full gen cov fitted with a.m. and fm, and three cw filters. The ultimate in hf rigs, now worth over £1,600, will haggle around £950. Also Datong FL3, only £85. Both items as new in original cartons. G4UJW. Tel 01-346 8597.

IC2E vgc, λ/8 helical, λ/4 whip, two ICPB3 nicad packs and BC25E charger, handbook, original packing, £130. Collect. G6HLD, QTHR. Tel 01-993 1722.

TR9130 Kenwood plus mobile mount, two MC40S mics, handbooks and original packings, exc cond, almost unmarked, only used mobile, £375. Collect. G6HLD, QTHR. Tel 01-993 1722.

Spectrum computer, rtty interface and software, £25. G1EVP, QTHR. Tel 061-480 1933 after 6pm.

Drake TR5, fitted noise blanker, new cond, £425. Datong FL3 audio filter, £90. *Wanted:* hf linear 572B valves. G4IZG, QTHR. Tel Worthing (0903) 41109.

Icom ICR70 rx, with fm board, exc cond, £400 ono. G4UTQ, QTHR. Tel 0670-824454.

Eddystone 840A rx, £50. HRO, three coils, psu, £45. MM1000 KB keyboard, new, £90. Buyers to collect. Tel 0602 257396.
Collins KWM-2A, round emblem, late series, PM2 psu, 312B-5 vfo, manuals, £550. Heathkit DX100 a.m./cw, hf, tx, £20. R107 rx, gd original order, £20. Pair new 813, pair used, £25. *Wanted:* Collins 51J4. Tel Telford 608060 (office).
Two Philips 1700 video recorders, both wkg and in gd cond with 14 video cassettes, £100. G3LEI, QTHR. Tel 0474 534374.
Mobile (G3FIF) type long telescopic whip plus 160m coil, £8. Metal instrument cases, one with lid, £10 lot. Inspect. Mains tfmr 350-0-350, 100mA, 6V, 5A, 5V, 4A, drop though shrouded, £5. G3MBL, QTHR. Tel 01-445 4321.
Tono 0550 communications terminal, £125. G3PMC. Tel 02514 3916.
Pye F27AM spares. Mains tfmr, £15. Aerial relay, £3. QQVO3/20, £10. Various valves, pcbs, r/t handbooks. GU3HKV, QTHR. Tel 0481 47278 6/7pm Tues to Fri only.
Trio TR9000 2m multimode mobile, comp as when new, £250. MMT432/144R, £120. Both in mint cond. *Wanted:* IC202S, and IC402. Also low-power linear amplifiers, ie 10 to 30W, to suit. G6TKI, QTHR. Tel Gravesend (0474) 59346.
KW202 rx, £110 ono. Icom 215 2m fm portable rx, 15 channels all wkg, nicads charger, £95 ono. KW Vanguard cw/a.m. tx 50W, £20. Buyer inspects and collects. G2CMH, QTHR. Tel 0273 559752.
Antenna wire, new multi-strand 7/22swg cadmium copper antenna wire, suitable G5RV, long wire dipole etc, 150ft, £4, postage £1.72. Longer or shorter lengths supplied at pro-rata price, sase for sample. G3WMM, QTHR. Tel Colchester (0206) 842453.
MMT432/144 transverter, £85. *Wanted:* Nascom keyboard. GM8SHU. Tel 031-452 4971.
Yaesu dynamic desk mic, £15. Two Acos xtal hand mics, £2 each: One swr meter, £6. All items plus postage. G4DHE, QTHR. Tel 02572 78630.
DX100 a.m./cw 160-10m tx, £65. 10m fm portable (Icom 1050), with nicads and flexi-aerial, £35. 2m mobile aerial asp magnetic mount, £10. Send sae for clearance list. G3XVL, 31 Philip Road, Ipswich Suffolk. Tel 215047.
Westower HD3, comp, £300. FV101B, £50. Motor for CD44/45, (unused), £5. Tel Crabtree 0287 38888 or 01-541 1099.
Trio TS700 2m base station, fm, ssb, cw, a.m. 10W o/p, 240V ac 12V dc power supply, little used, mint cond, handbook, £75 ono. G4EUU, QTHR. Tel Havant 483879.
Yaesu FT102, exc cond, very little used, includes FT102 spkr MD-1B8, a.m./fm, plus many other accessories, genuine reason for this station clear-out, £850 ono. G4PNU. Tel 0242 68 382 evenings.
Rxs. Radio Shack DX300, digital 100kHz-30MHz, £125. Racal RA17, c/w matching Redifon RA10 isb/ssb adapter, new front panel, £175. Eddystone EB35, a.m./fm, 150kHz-22MHz, plus fm band, £35. All c/w handbooks/circuits, fully wkg, nice clean cond. G3JKV, QTHR. Tel 0306 884359.
Trio TR7730 2m 25W fm rig, £145. Trio TR7010 2m 10W ssb rig with vfo, £95. Jaybeam MBM48/70 70cm antenna, £23. G6ADL, QTHR. Tel Kettering 710004.
Yaesu FT790R 70cm portable, nicads, eight months old, unmarked, £220. Weltz SP15M swr power meter, £25. FDK Palm 2 2m handheld, six channel, charger, £65. Yaesu FT290R, Mutek nicads, charger, case, £200. Mobile mount, £15. G6HBI, QTHR. Tel Chris 0794 22374.
Pet 3032 computer with Computhink disc interface card, several books and all manuals, £180 ono. Buyer collect. Malcolm, G3TCG. Maidstone 0622 813474.
SX200N scanning rx 26-88, 108-180, 380-514MHz, with WB aerial and mains supply unit, as new, original packing, £190. Tel 025 14 28526.
Good though dirty IC202S, plus Oscar xtal IC4E and IC2E. *Wanted:* mobile 70cm multimode synthesized. Appearance need not matter. G8APX, QTHR. Tel 0254 84215.
Radio Communication back numbers almost complete from 1955 some before, offers. FRG7 full wkg order nice cond, £140. G8BIH. Tel 0420 82739 evenings.
***RadCom* 1971-1982.** 12 yrs inclusive any reasonable offer accepted. Collection of about 70 old radio and tv books of the 1930-50 period, offers. G3HQX, QTHR. Tel Winchester 880312.
Yaesu FT790 vgc, nicads, charger, case, £230. FT202 2m handheld nicads, £60. Vic 20 plus 16k ram, £55. heathkit RA-1 rx, £30. G4VFT, QTHR. Tel Horndean 591853.
German WW2 like new HE1 communications rx, wkg cond, very rare. I would like to trade with adjustment for complete as possible systems, eg Mk123, WS68, WS22, WS62, R109, T76. Also late model military radios such as UK/PRC320 etc radios that have a wideband multimode capability. Need WW2 to present military manuals accessories eg for WS, A14 etc. Any intelligence equipment of WW2. I am a serious collector. WA4MRR, Tony Grogan, 5 Rollingwood Drive, Taylors, SC 29687 USA.
Oscilloscope Telequipment Serviscope S31, has fault on ht, may only be EZ81 rectifier or electrolytic capacitor. Unwanted so replacement not tried, otherwise exc cond with service manual, operating instructions, £15. GM3GNM, QTHR. Tel 035-02-950.
Philips PCR com rx type ZA26707, serial number 11740, needs new valve, complete with power pack, £15. G3ZUF, QTHR. Tel 995 7677 day.
FT1 complete with fm unit, Curtis keyer two cw one a.m., all fitted, £1,400. FL2100Z linear, £450. FC102 atu, £100. All used once only. G4PSC, QTHR. Tel 0246 201521 after 6pm.
IC720A, cw filter, £499. ICPS20, £110. ICAT500, £215. AMT-1, £110. KR500 elevation rotator, unused, £85. Leader 0/500MHz dummy load wattmeter, £40. ZX81 16k ram psu, proper keyboard, neat metal case, £25. Buyer collects. G4PLZ. Tel 061 485 2154.
MM432/50 50W linear with preamp, as new, £110 incl post. Yaesu SP102, matching speaker with audio filters, as new, £35 incl post. J. H. Clarke, Coach House, Willinghurst, Shamley Green, Surrey GU5 0SN.
Portable acoustic coupler. OEL PAC-M2/0 300/300 baud full duplex, RS232 absolutely as new, £35. Cost £110. G8THE, QTHR. Tel Richard, 0580 892252.
Icom SP3, speaker, brand new, £30. G4CHP, QTHR. Tel 0508 470365.
Codar CR70A with speaker, best offer secures. Tel Andrew 021-357 8692.
Blowers PAPST RL90 18/50 220V 50Hz, as used in Dressler QRO linears, brand new, £10 plus pp. Intel 8251 disc controller chip for BBC micro, £85. GW61GY, QTHR. Tel John 0978 760587.
FTDX401 hf tx/rx 10-80m QRO 560W p.e.p., cw filter, fan etc, std equipt, poss can deliver N Wales coast area, £195. G4GXQ, QTHR. Tel Paul 061 485 7752.
Trio TS830S comp with YK88C YG455CN SP230 MC50 VF120, £550 ono. Vibroplex brass racer iambic, £45. G3KDB, QTHR. Tel Lichfield 53398 evenings.
FR50 rx 10-80 plus 10MHz bands, new cond, calibrator, manual, £90. FL50 tx, cw, ssb, a.m. ptt, vox, vgc, manual, £85. Cash sale, buyer collects. FL50 and FR50 tx/rx together, very reliable. G3FK, QTHR. Tel 0202 873175.
Yaesu FTV107R modified for Trio TS9305 tx/rx, tune 28-30MHz and full transmit/receive on 2m, same colour/size as TS930, professionally modified, brand new in box, £140 ono. *Wanted:* Yaesu FT290R or FT90R mint cond. Tel 01-9984936 after 7pm, (Ealing).
TBS8 radio equipment 60-80MHz a.m./cw xtal-controlled, made by RCA about 1944 for use in convoy escort vessels. Two large heavy units in mint cond with handbook, of little practical use but may be of interest to preservation society or collector. Offers or exchange for gd AR88 or Eddystone 770R. Tel 0947 604589.
VCR97, £3. VCR139, £3. Suitable tfmr, £3. Large hivolt 0·001 variable, £4. Thermoamp 3A, £3. RCA 100kHz xtal unit, £3. 500kHz10x, £2. Lots vintage valves ht and audio tfmers. SAE add carriage. G6NZ, QTHR. Tel Portsmouth 819968 evenings.
TH3JNR, £100. Homebrew 8el 4m beam, £20. MM70/144 4m transverter, £70. Europa 4m transverter 10m in/out, £25. MM432/144 70cm transverter with satellite band, £130. Buyer collects or pays freight. All ono. G3RSI. Tel 0252 850982 after 7pm.
Sony ICF 7600D digital rx 150kHz to 30MHz and fm virtually unused, complete with mains psu and all accessories, cost £180, sell for £125. Tel Mike 041-334 2811 after 6pm.
Trio TS820S with DG-1 digital display, cw filter YG88C, plus MC10 dynamic mic, and including lowpass filter LF30A, handbook plus copy of workshop manual, £500. Trio remote VFO820, £80. One owner, all in mint cond. G3HJT, QTHR. Tel 01-890 6487.
FT102, £490. Dentron MLA2500 2kW linear, £390. Both items lightly used and perfect. G4DRF. Tel Lincs 0526 52965.
TH6DCXX 6-ele tribander, new, never been assembled, £300. 30ft Altron wind-up tilt-over mast with KR400RC rotator, £250. 23cm UPX6 cavity linear amp with psu, £110. MM432/28/S transverter, £100. G6HKT not QTHR. Tel 0272 633869 daytime.
Jaybeam. One MBM48/70, four Q6/2m, gd cond, £15. Stolle rotator, £25. Buyer collects. G8AWZ. Tel Norwich (0603) 898192.
QRO 144MHz linear, part-built, comprises wired boxed grid circuit for two 4CX250Bs. Includes sockets, chimneys, coils, variables, blower, diagram fit plate circuit for 1kW amp, £48. Europa B re-valved, £55. Trio 2300 boxed, £130. G4ILW, QTHR. Tel 091-487 2261 7-8pm.
RTTY system. TAL interface and terminal unit 45·5, 50, 75, 110, 135 baud. Vic 20 computer starter pack complete, switch box plus leads, six months old, £135. G4JEF, QTHR. Tel Rattlesden 7764.
SSM Z-match, £25. Set of valves for FT200 including pair 6JS6Cs, all new in boxes, £25. QQVO64OA, new, boxed, £10. Some other valves, also new vidicon tube. *Wanted:* three 6146Bs, also 70cm linear 1W in. G4FDR. Tel Wendover 622225.
HF linear eight bands pre-amp 15W in 350 out 12V (40A) using mobile with hf set scanning desk mics, complete outfit, £750. Will split or swop, hf base station hf linear (mains). WHY? G4ROJ. Tel Worcester 26439.
Trio DM81 dip meter, new, unused, cost £75, sell for £60. Two ST5 readers, £1 each. Buyer to collect. G4NTY, QTHR. Tel 061 790 7673 after 6pm.
Yaesu FT203R 2m handheld only five months old, still under guarantee, FNB4 high power battery pack in perfect wkg order, £150. G8VQT, tel Bury St Edmunds (0284) 5004.
Microwave Modules 144/28 ssb transverter, very little used, tested by manufacturer, £75, no offers. Reg postage extra. G6ZJA not QTHR. Tel Pembridge, Herefordshire (05447) 350.
Digital VTS2 A18 visual display unit, direct replacement for ASR33 RS323 and Zoma loop 75 to 9600 band Asci, £85 ono. G6EII. Tel Allan, 0925 572332.
C58, as new, £150 ono. Offers for Wood and Douglas 2m synthesizer with 15W amplifier. lightweight five-element and ringbase ants. Tired HRO with all coils, needs new valves. G8PIY, QTHR. Tel 0256 24307 after 6pm.
Trio TS130V, cw filter, £350. PS20, £35. DFC230, £70. VFO120, £35. Yaesu FT708R speaker/mic case, mobile adapter, bracket, spare nicad, £175. All mint cond with manuals, boxes. Postage extra. *Wanted:* FTV901R YO901. G4PSS not QTHR. Tel Steve 091-4822025 evenings only.
Microwave Modules 2m 100W linear MML144/100-S 10W in 100W out as new, £120 ono. *Wanted:* buy or copy "Radio astronomy" series in *Practical Electronics* June 1971 to March 1972. G8LMY not QTHR. Tel Billericay (Essex) 02774 58489.
TMK320P (Sanyo MBC2000) CPM2·2 basic Wordstar, all manuals, twin 5·25in, 328k discs 2 × RS232, new, £550. Mk14, £40. Prestel modem, £20. Old valves plus rxs, offers. 12AVQ, £25. Brother EP22 printer, £90. Portable mast, £20. G4GYA. Tel Tamworth 0827 286395.
Datong D70 morse tutor, £37 post paid. G4LVT, 40 Woodcroft Road, Wylam, Northumberland NE41 8DH.
Yaesu FRG7 communications rx, covers entire hf spectrum 500kHz to 29·9MHz. ssb, a.m. and cw. Unmarked cond, £125. Tel North West London 01-205 1985.
Icom 720A, c/w psu, mint cond, never used, £650 ono. FT208R, new, in box, unwanted gift, £185. Tono 500E, brand new, £685 ono. Tel 0252 874380.
Collins aircraft tx/rx 608-S1 with roller coaster, 100 xtals, all modular, exc cond, £30. Two control boxes for these, £25 each. Storno CQM613 and SQM613 2m tx/rxs, believed ok, £30 each. Hallicrafter S27 refurbished, exc, £50. Barnes QTHR. Tel 0229 54466.
Comp receiving stn, hf, vhf, uhf, rtty. Ideal for satellites comprising Eddystone 830/7, MM converters for 2m, 70cm rtty, with switched psu, plinth spkr, £250. Deliver 50 miles Manchester, or petrol. G6TPQ, QTHR. Tel 061-633 3895.
FT200, FP200, all 10m xtals, handbook and spare pas, vgc, £195. MM2000 rtty converter mint, £75. Heathkit rx SW717 vgc, £15. Buyer collect or carriage extra. G3IMI, QTHR. Tel Wellingborough 680181.
G2DYM trap dipole 7, 14, 21, 28MHz with 75Ω twin feeder, £11. SEM Z-match same bands plus Eezitune, £17. G5KC, QTHR.
Microwave Modules MMT 432/144, 70cm transverter, £110. Tandy GCP11S printer, five colours, paper etc: BBC "B" cable, £50. G4XIP. Tel Basingstoke (0256) 56356.
KW107 Supermatch, £60. Eight-element Jaybeam, AR40 rotator, £35. Icom 22A 2m fm, £45. Compukit UK101 64k memory, Basic X, Basic 5, Cegmon, via

board, disc drive, vortex operating system, rtty program, £175. Word Wizard disc, £15. G3ZJU, QTHR. Tel 01-527 4492.

Power supply IC-PS740, 20A, mint cond, boxed. For internal use hf tx/rx, £80 ono or w.h.y? G1GDY. Tel (Suffolk) 0787 75931.

IC271E with Mutek board and MC80 desk mic, £550. MML 144/50S, £60. FT77S hf tx/rx with fm board, calibrator, £375. G3TUX. Tel Chris 0428 56225 (office hours).

70cm PF5UH handheld, xtalled RB10, £30. 5W 70cm mobile tx, £45. G3PLX rtty unit c/w keyboard, £55. Tel 0376 510664 after 6pm.

Yaesu FC700 atu, used once, unwanted gift, £75. Tel Crewe 582996.

HW8 QPR hf tx/rx, gd cond, £85 ono. G4SHB, QTHR. Tel 0453 45653.

Collins 75S-1 with matching spkr, manual and 240V-110V transformer, vgc, no mods, £250. G4YAJ, QTHR under G6YBN. Tel Leeds 782568.

T4XC R4C AC4 power supply, two manuals, connecting links, no mods, buyer collects, £400. G2UZ, QTHR. Tel Leeds 784074.

Hi-Q balun and pair of traps for trapped dipole, unused, new, £18. G4PJY, QTHR. Tel Oakham 2721.

FT200 FP200 all 10m xtals, G3LLL rf clipper, mic and spare pa, buyer collects, £200. G4TOO, QTHR. Tel Martin, Chelmsford 84485.

Yaesu FT203R, as new, £155. NC15 charger, used little, £40. G4UWY, QTHR. Norfolk.

Yaesu FT7 tx, immac cond, £200, incl first-class compen delivery. G4YDM, QTHR as G6CHB. Tel John, 091-4162606.

KW2000E, £230 ono. FT707S with FV707DM and FC707, will split, £450. G4WOA, not QTHR. Tel Bill Newton 0992 468394.

70cm handheld TR3500, still under guarantee, with charger etc, £200 ono. *Require:* Pye (Cambridge model No 9146) stereo cassette, any cond, approx 10yrs old, for spares. Price negotiable. G4KFW. Tel 021-357 2009.

FT790 surplus to requirements, gd cond, never used mobile, £190 ono. Alinco 70cm 10W linear amp 1W in, £40 ono. Various WG15 bits and pieces, £5. All prices plus postage. *Wanted:* 70cm transverter, microwave bits and pieces. G6HHV, QTHR. Tel Merseyside 051 327 5804.

Standard C110E handheld fm tx, case, antenna, manual, rechargable batteries, charger, all in mint cond, bargain, £135. G4XZW. Tel Laurence Mendes 038 677 727 (day) 798 (evening).

Creed 444 c/w tape reader/perforator, auto tape pause, lectern. Pag tu with mic socket/switch, vgc, £80 ono. G6JXW, QTHR. Tel Overstrand (026 378) 488.

Cushcraft R3 triband trapped vertical antenna, remote tuned from shack, halfwave on 20, 15, 10. No radials required, 2kW traps, comp with 20yd h-core control cable, proven dxer, cost over £250, bargain £125. GM3DPK, QTHR. Tel 02612 5373 after 6pm.

FL2100B hf linear amplifier, 1200W p.e.p. i/p, easily runs maximum legal o/p, new valves installed recently, £250. SX200N scanning rx 27-512MHz, £180. Both in gd cond. G4GOC, QTHR. Tel South Cheshire 812020.

Yaesu FRG7700M, £225. Eddystone 770R 19 to 165MHz, £75. Eddystone 770V 150 to 500MHz, £75. SX200N, needs new power switch, otherwise ok, £150. AR2001 mint, £250. Tel Llandovery (0550) 20201.

Unused coil 100yd tinned copper 7/029 wire, carriage £6, realistic offers invited. Also collectors item, DIX one-meter circa 1921/2 early type volt ammeter with shunts and series-R. *Wanted:* Q-multiplier for 455KHIF. G3WVC, QTHR. Tel 0929 471534.

FC902, £95. Shure mic CB43, £12. QRP swr/pwr meter, £5. All new. *Practical Wireless* 50 copies, *Amateur Radio* 20 copies, *Ham Radio Today* 22 copies, *QST* 48 copies, 1976-79. TF144G manual. Offers plus postage. G2HKU, QTHR. Tel 0795 873100.

Immac equipment of late G3BPN, all boxed. Yaesu FT902DM with cw filter, £500. FT901DM scanning vfo, £100. FT901R transverter 144/432, £225. FC902 ATU, £85. Accept £850 unsplit. Icom ICR70, £325. LAR vhf omni-match, £20. DRAE wavemeter, £10. New Altron AT42 un-erected 44ft mast, purchased June 1984, special 33:1 ratio winch, carries full manufacturers guarantee, cost £514, sell £395. G3JLN. Tel Farnham Common 2466 (office) High Wycombe 30993 (evenings).

FRG770M, £250. SX200N, £210. AR22R rotator, £35. YC305 frequency counter 5Hz-30MHz, £25. FT101 series workshop manual, £20. Recordacall remote 80A telephone answering, £100. Sentinel hf preamp, £5. Polaroid 350, £50. 10-15-20 triband vertical, £15. G3AAG. Tel 0730 892143.

Radio Amateur Callbook, USA and foreign 1984 editions, complete with spring, summer and fall supplements. Set of eight books, cover price US$62.90 for £25, incl postage. GU3MBS, QTHR. Tel 0481 57605.

7ft 45f/d QRP dish on mount, as new, £305. Buyer collects. G4IHT. Tel 0533 700827.

Vibroplex key No 40133, absolute mint cond, £45 ono. Yaesu desk mic YD844A, £12. G4LZY, QTHR. Tel Cheltenham (0242) 523042.

Yaesu FT230R 2m 25W fm mobile, scanning mic, vgc, £180. G4VUK, QTHR. Tel 061-798 9570.

Trio 2300, £100. 2200GX xtalled all repeaters and reverse SU23, £100. 7930 mobile 25W, £250. VFO30 for 2200/F200, £35. EA12, £160. 880/2, £180. All gd cond, boxed. Collection, delivery by arrangement. G4HMF, QTHR. Tel (Ipswich) 0473 51319.

TRS80 model four 64k twin disks, printer DPM110 plus CTR80 cassette, 130-plus discs, paper, manual, books, covers disc cab, w/p programs, all types mains filters: Total value £3,000, sell offers £1,000-plus, or exchange, w.h.y?, vhf-uhf equipment plus cash. Tel 0473 85526.

Clearout to make space. ASR33 with stand/manuals, 20mA current loop interface, £25. ICL7561 14in green screen vdu, £25. *Wanted:* Good Starphone battery for SF1 portable. G8MMM, QTHR. Tel 051 336 7143.

Trio antenna tuner model AT120, £65. Frequency range five bands 3·5 to 29·7MHz. Built-in swr meter, max power 150W, measurable range 1·0:1 to 10:1, i/p impedance 50Ω. Blades, 1 Rectory Close, Garforth, Leeds. Tel Leeds (0532) 863771.

Eddystone 940 comm rx 480kHz to 30MHz, five-band bfo, noise limiter, variable selectivity, xtal filter, 13 valves, gd cond, recently re-aligned, with original manual, £100. Spare valves, £6. G8KDL. Tel Steve, Ipswich 0473 644829 (day), 0473 54405 (evening).

Trio TR3500 handheld, eleven months old, mint cond, case, charger, £175 ono. Trio TS780 dual-bander base station, mint cond, £695. MM 100S linear, 10W in suitable for above, mint cond. Buyer collects. Tel Morden (Surrey) 01-540 3959.

FT707 hf tx/rx 100W, plus FP707 power supply, mic and manual, mint cond, £375. Multi 700E 25W 2m fm tx/rx, mic, manual, mobile mount, little used, £125. G3XSZ, QTHR. Tel Reigate (07372) 46051 after 7pm or weekend.

FL2000B linear, superb cond, £250. Cowl gill motor with p/p, £20. LPF, £6. Various test gear, Raleigh Sun Ten, £85. 12V p/p, £15. *Wanted:* HRO spare knobs, dial tuning gang, cabinet etc, G3IPM, QTHR.

FT102, barely used in two years, fm board fitted, original packaging, exchange, w.h.y?, or £550 cash. G4KMU, QTHR. Tel Southampton 558843.

Yaesu FRDX500 exc cond, with manual, nine bands plus 2m conv facility, £150. Also DRAE morse tutor, almost new, £35. Tel Coalville (Leics) 810503.

KW202 rx, notch filter, built-n Q-multi, spkr, £120. Heath RF-IU sig gen, £18. *SWM* with index Nov 1964 to April 1979, £15. KW Viceroy tx, cw mode needs attention. £40. G3WXT, QTHR.

Video Genie micro level two with keypad, c/w Radsoft rtty programme/tu, the ultimate rtty station with an excellent computer, £165. 10m fm mobile rig (SMC), as new, boxed, £40. Postage extra. G4PSS not QTHR. Tel Steve 091-4822025 evenings.

Linear amplifier with preamp, Lunar 2m model 2M30-160P, up to 25W in for 160W out, new, £100. Tel 0624 22342 evenings.

Heathkit SB301 SB401 rx/tx, SB600 spkr, built-in psu, all xtals, manuals, vgc, £200. LCL 10m tx/rx fm 40 ch, £25. QTHR. Tel Camberley 24706.

Antennas. Four 17-el Tonnas and power divider, £100. DX33 3-el tribander, £80. Two 14-el Cushcraft junior boomers and power divider, £50. Five-band hf vertical, £30. MMT144/28, £60. MML432/50 amplifier, £70. G4NQC, QTHR. Tel 01-697 3250.

WANTED

Hirshmann lightweight rotator and controller or similar type. Must be straight-through type. G1GOF, not QTHR. Tel Bedford 767904.

Good price paid for early 'thirties radio rx, Philips, Pye, Ekco preferred. Cond immaterial, provided complete. G2ACK, QTHR. Tel 0342 21221.

Suitcase tx/rx any spares, incomplete or damaged sets. WS (Canadian) No 29, particularly any connecting leads for this set. Any original ex-WD manuals, instruction books, handbooks for any army sets or similar. G3UCT, Taylor. 8 Government House Road, York. Tel 0904 29777.

Connecting leads with or without key for army wireless sets 18, 62 and C12. Also psu 12V for C12 and vibrator, psu for 18. G4YVL, John. Tel 01-3002532 evenings.

Shortwave Magazine July 1982 and November 1982, very gd price paid for unmarked copies. G8THE, QTHR. Tel Richard 0580 892252.

Yaesu YO-100 monitor scope to complement FT101, must be comp with manual and in wkg order. G3MBW, QTHR. Tel Yorks 0943 74794.

One Eimac SK620A socket and one SK626 chimney, needed urgently to complete radio club project. No offers of sim/equiv products please. Going price paid for correct items. G4ILW, QTHR. Tel 091 487 2661 7-8pm.

Radio Handbook by William Orr, 22nd ed, also *Rutherford* by EVE, and other old radio books. G6NZ, QTHR, or Portsmouth 819968 evenings.

Roller coaster and wide-spaced 350 pF var capacitors, one ganged other single, for antenna coupler. G3JJU Hurst, 31 Avon-dale Road, Fleet, Hants. Tel Fleet 5831.

L347 Mullard high-voltage tfmr, part of L343 transmitter. Any information would be welcome. G3KVT, QTHR. (0603) 860452.

Service manual for Telequipment 'scope S54A. 60ft tower and rotator. GW3VFW, QTHR.

Manuals on Kahn Research ssb adapter type RSSB 62-1-B CV1982, Watkins Johnson 340A vlf rx, Airbourne Instruments Laboratory R1283 vhf rx. Also HP410C valve voltmeter, change wheels for Avo wavewinder. Wideband vhf/uhf antenna multicoupler (one antenna in eight out via low-noise amplifier). Mutex BBBA500 BBBA860. Top-quality 19in audio monitoring panel. Nuvistors 7587, 8056, 7895, 7586. N-type bulkhead socket back to back. Any help greatly appreciated. G6EII, Allan. Tel 0925 572332.

FTV901R YO901, must be in mint cond. Also FRDX400S with 6m converter SP230 spkr. G4PSS not QTHR. Tel Steve, 091-482202 evenings.

FM board plus full fitting details for my FT101Z 1979. Does anybody have a full band plan chart for 30MHz thro vhf to uhf, including airband public service etc. Details please. *Swap:* Transendent music synthesizer monophonic type 3 octave keyboard, many facilities dynamic sweep portamento, vco and vcf pitch controls. Mint, boxed, worth £130, swap for gen cov rx FRG7 or similar. Not QTHR, tel.John, Rotherham 74747.

Furzehill oscilloscope type 0-120 manual (or even just circuit diagram) needed. A. R. Bartle, 105 Mayfield Road, Thornton Heath, Surrey CR4 6DP. Tel 01-684 0610.

Service info, test point voltages etc, Lafayette rx model HA600A G2DMR, QTHR. Tel 07373 58729.

FT101 or similar tx/rx, also QRP Argonaut, Shimuzi etc, also Datong FL1/2/3, also telescopic antenna pole. G2CYN, QTHR. Tel 01-935 7119 1-2pm weekdays.

For Trio 9R59DS 2m converter. Plus any info, handbook circuit diagrams for Eddystone 840A, photocopies acceptable. BRS85999 Ochsner, 124 Burnthouse Lane, Exeter Devon. Tel 0392 30342.

HQ-1 mini-beam and GP5 or similar with radials. Electronic keyer with memory and paddles. All in gd cond please. G4YYH. Tel Ron, (Camborne) 0209 712456 work, 718021 home.

Johnson Senior Matchbox, please can anyone help. Also still looking for a Mullard L347 mains tfmr. G3KUT, QTHR. Tel 0603 860452.

KW109 super-match atu, must be exc cond. G3VDU. Tel Pete, Nuneaton 343680.

Buy or borrow, manual for Yaesu FT201, all costs met. G4XTM. Tel Leeds 0532 751622.

RTTY receive unit, preferably with Centronics parallel printer port, for use with Trio 1000 rx. Tel Richard Creak, Danbury (Essex) 024541 3725.

Details of ssb mods to AR88D and AR88LF rx. Also any other improvements. Buy or borrow manual for 77OU rx. Your costs gladly refunded. G8IDL, QTHR. Tel 0638 76230.

Motorola Spirit pagers, must be high-band 156,000-162,000kHz, tone reeds unimportant, three required, with batteries and chargers if possible. Must be cheap. Tel Portsmouth 667630.

Bird 43 elements, Bird type 74 coaxial switches any configuration, Europa 70MHz, prewar RSGB ARRL books, *T&R Bulletins* pre 1935, early call books, QRO 70cm linear Trio 401A. Price and details, Alan, G4HMF, QTHR. Tel (Ipswich) 0473 51319.

Xtals US army govt surplus type FT241A, channels 31, 32, 33, 34, 309, 310, 311, 312, any qty. Percy, G2BUJ, 32 Pound Lane, Pinehurst, Swindon, Wilts SN21PS.

Please, Racal RA63'D' ssb adapter and If adapter. Also required roller coaster for home-brew project. Have Ham International multimode 3 to

swop for RA63'D'. Would like to purchase case for RA17L. Tel Eddie 01-445 0528.

B2 or A Mk3. Would be interested in any of the suitcase or resistance sets, spares, manuals, in any cond. G4OFO. Tel 01-949 2317.

HRO bandspread coils for 14 and 3·5MHz, or information to make above from existing coils. GM1BOH, QTHR. Tel 0324 23533 weekends only.

Help! Loan of circuit or manual for admiralty reel-to-reel recorder type 103620 WRW432 also used by RAF. It's an approx 15in cube, weight 56lb. G3JAG, QTHR. Tel 061 773 9170.

Any unconverted Pye PF1 Pocketfone rx, in working order if possible, and any original xtals for the above units. Details of xtal frequencies, price etc, also any amateur radio software for Atari computers. Tel Ian, Lincoln 46145.

Bug keys for use by dedicated cw operator and collector. Any semi-automatic mechanical keys of US manufacture by McElroy, Lionel, TAC, Vibroplex etc. Any age any cond. G3TSS, QTHR. Tel 043-471 3125.

Base for 4CX250, need not be uhf type. Please help and state price. PP. G3KPW. 78 Tregrea, Camborne, Cornwall TR14 7SU. Tel Camborne 717612.

Hf linear for Trio 830S, prefer Trio TL922 or Yaesu FL2100Z. Details to Paul Chambers. G6NUU, QTHR. Tel Newark (Notts) 830508.

Young radio club requires modern hf tx/rx, compat Amtor use. Max age three yrs or less. All replies answered. John, G4NEN or G4YBS, QTHR.

Operating instruction manual for Tektronix oscilloscope type 545, serial 7214, also test leads probes for same. G4PZX, QTHR. Tel Alex 0206 28 856.

SSTV. Any technical information on Robot model 80 sstv camera, Robot model 70 sstv monitor, and Robot model 61 monitor. Buy or borrow, please help. G6NPG. Tel Ian 0992 764614.

813 amplifier, choke, National R175A or similar pi-tank type. neutralizing cap, Johnson N250 or similar. Also vfo for FDK Multi 2. G2CVY, QTHR.

Front panel mounted turns counter for roller coaster inductance. Surplus or name of supplier. G3KAJ, QTHR. Tel Chorley 71343.

K2RIW and psu. G4XOL. Tel Mark, Newton-le-Willows Merseyside 6216.

Hf linear required, also RSGB *Call Book* 1950-5 vintage. Also tubular mast. G3GKC, QTHR. Tel Bradford-on-Avon (02216) 3622 after 6pm please.

Icom linear amp IC20L, for use with IC215. G4MTX, QTHR. Tel 0780 63604.

Valves 4-1000, 8877, 5/500, 4CX1000, preferably with bases, gd price paid for decent specimens, also want vacuum variable capacitors. Tel 0937 844510 after 6pm.

Waveguide 16 flanges, square type copper or brass. Please write to Wilson Convery, G6WQN, Leith Nautical College, 24 Milton Road East, Edinburgh.

Hf tx, five- or six-band, with digital power o/p, gd cond, consider nine-band if not too expensive, eg FT101ZD or W.H.Y? For affiliated society. G4BLT, QTHR. Tel Wakefield (0924) 255515.

KW160 atu for top band. G4CJL, QTHR. Tel Stalbridge (0963) 63357.

Valves type BW1124, BR1126, BW1121, as used in rf industrial induction heating, closed circuit tv camera and monitor, microwave intruder alarm. G3SMK, QTHR. Tel Earlswood (Warks) 3423 after 7pm.

Have you written any ham-related software for Osborne 1, (80 column)?, particularly Oscar 10. Also for Sharp PC1251 and Microlog ATR6800. Anything considered and paid for if useful. G3AAG. Tel Petersfield 0730 892143.

Valves ECH11, EBF/11, EF/11, EL11, EM11, AC/TH1, AC/TP, AC/ME, V914, MH41, VMS4B, HL1320, VP1321, U4020, etc. Service information on German pre-war domestic set Siemens/4W. G4OOW, QTHR. Tel Hinckley 612091 after 7pm.

Pneumatic telescope mast. Colour video camera, video recorder. G6CUQ, QTHR. Tel 052-789 2282.

Info on rtty, demod DM170A, T3 and T4 for AR88LF, *For sale:* Pre- and post-war test eqpt, valves, xtals, tfmrs, motors, rectifiers, meters etc. please state needs. GM3FAK, QTHR. Tel 0436 5407.

Tektronix eht tfmr, (circuit designation T801 part number 120-0308-00), for oscilloscope 545B, or details of number of turns to rewind same either on existing core, or similar UK equivalent. G3AZI, QTHR. Tel 0772 37815.

Bird elements. G3YJI, QTHR. Tel Walton on Thames (0932) 223228 evenings weekends.

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GENERAL

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OUTPUT FREQUENCY RANGE	:	144 – 146 MHz
MODES OF OPERATION	:	SSB, FM, CW, FSK, AM
REPEATER SHIFT	:	Simplex, Normal (– 600 kHz) Reverse (+ 600 kHz)
INPUT/OUTPUT IMPEDANCE	:	50 ohm
RF CONNECTORS	:	SO239 (PTFE)
POWER CONNECTOR	:	5 pin DIN socket
DC POWER REQUIREMENTS	:	13.8V DC at 6 Amps peak

TRANSMIT SECTION

OUTPUT POWER	:	25 Watts
INPUT LEVEL RANGE	:	¼ mW to 300mW
ALC RANGE	:	20dB
LEVEL OF SPURIOUS OUTPUT	:	– 65dB or better

RECEIVE SECTION

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The unit incorporates the usual repeater features: — simplex, normal repeater (– 600 kHz), and reverse repeater (+ 600 kHz) and is ideally suited for all modes of communication on the 2 metre band.

The MMT144/28-R is housed in an aluminium extruded enclosure, which has both excellent electrical screening and thermal stability characteristics. Connectors are located on the rear panel together with the input level control and the DC supply fuse. Protection against reverse polarity is included. Antenna changeover at 144 MHz is achieved internally by a low-loss PIN diode switch.

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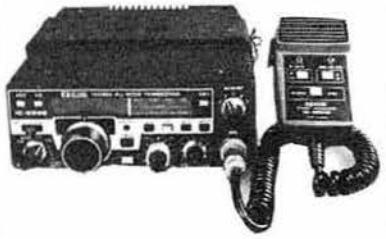

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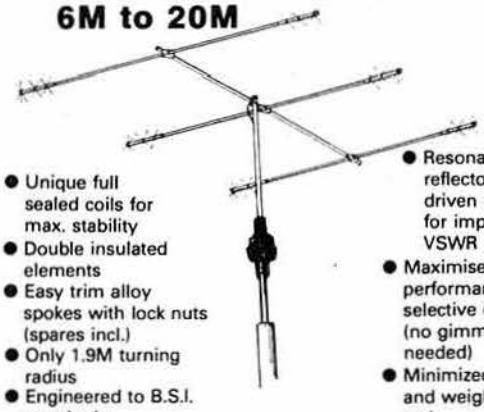

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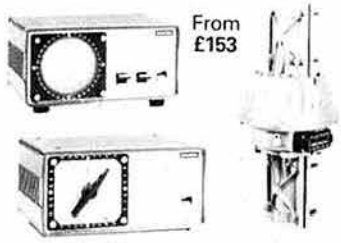

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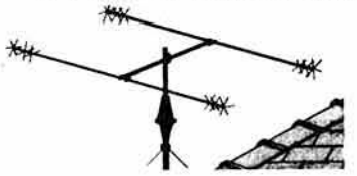

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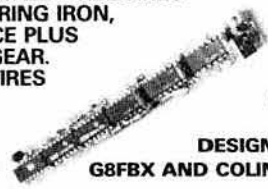

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Radio Communication bound volume, 1980 (Parts 1 and 2)	£14.93	£13.44
Radio Communication bound volume, 1981	£14.93	£13.44
Radio Communication bound volume, 1982	£15.93	£14.34
Radio Communication bound volume, 1983	£16.90	£15.21
Smith charts, pad of 25 (Chartwell D7510)	£2.23	£2.01

ORDERING INFORMATION

NON-MEMBERS. Use left-hand price columns. Note that members' sundries are only available to members of RSGB.

MEMBERS. Use right-hand price columns. It is essential that you quote your call sign or BRS number so that you can be recognised as a member.

PRICES. These include postage, packing and VAT where applicable. For airmail despatch, please ask for price before ordering. Goods are obtainable, less p & p, at RSGB headquarters between 10am and 4pm, Monday to Friday.

POSTAL TERMS. Cash with order. **Stamps and book tokens cannot be accepted.** Cheques and postal orders should be crossed and made payable to "Radio Society of Great Britain". Our Giro account number is 5335256. Please write your name and address clearly on the order, and allow up to 28 days for delivery.

Other publications

	Non-members' price	Members' price
Active-filter Cookbook (Sams)	£12.71	£11.44
All About Cubical Quad Antennas (RPI)	£5.83	£5.25
Amateur Single Sideband (Ham Radio)	£5.46	£4.91
Amateur Television Handbook (BATC)	£2.55	£2.30
Amateur Television Handbook Vol 2 (BATC)	£2.77	£2.49
Antenna Anthology (ARRL)	£6.00	£5.40
ARRL Antenna Book (ARRL) (New edn)	£8.78	£7.90
ARRL Electronics Data Book (ARRL)	£4.47	£4.02
Beam Antenna Handbook (RPI)	£6.83	£6.15
Better Short Wave Reception (RPI)	£6.83	£6.15
Care and Feeding of Power Grid Tubes (Varian)	£6.99	£6.29
CMOS Cookbook (Sams)	£13.07	£11.76
Complete DX'er (W9KNI)	£7.77	£6.99
Complete Shortwave Listener's Handbook (Tab)	£12.21	£10.99
Design of VMOS Circuits with experiments (Sams)	£8.50	£7.65
FET Principles, Experiments and Projects (Sams)	£8.04	£7.24
FM and Repeaters for the Radio Amateur (ARRL)	£4.30	£3.87
G-QRP Club Circuit Book	£4.52	£4.07
Guide to Oscar Operation (AMSAT)	£1.78	£1.60
Hints and Kinks for the Radio Amateur (ARRL)	£4.47	£4.02
How to Troubleshoot and Repair AR Equipment	£10.47	£9.42
IC Op-amp Cookbook (Sams)	£11.76	£10.58
International VHF FM Guide	£2.45	£2.21
Newcomer's Guide to Simplex and Repeaters on 2m (UK FM Group)	£1.24	£1.12
**Power Supply Handbook* (Tab)	£10.99	£9.89
Radio Amateurs Antenna Handbook (RPI)	£6.88	£6.19
Radio Amateurs Callbook (1985) (DX listings) (ARC1)	£16.63	£14.97
Radio Amateur Callbook (1985 USA listings) (ARCI)	£16.93	£15.24
Radio Amateurs Handbook (1984) (ARRL)	£6.66	£5.99
Radio Amateurs Handbook (1985) (ARRL)	£15.80	£14.22
RTTY Today (UEI) (A modern guide to rtty)	£7.19	£6.47
Radio Frequency Interference (ARRL)	£4.18	£3.76
Satellite Experimenters Handbook (ARRL)	£10.11	£9.10
Satellite Tracking Software for the Radio Amateur (AMSAT-UK)	£4.47	£4.02
**Secrets of Ham Radio DXing* (Tab)	£7.92	£7.13
Semiconductor Data Book (Newnes)	£7.97	£7.17
**Shortwave Listeners' Antenna Handbook*	£10.10	£9.09
Shortwave Propagation Handbook (Cowan)	£7.79	£7.01
Simple Low-cost Wire Antennas (RPI)	£6.83	£6.15
Solid State Design for the Radio Amateur (ARRL)	£7.87	£7.08
Television for Amateurs (BATC)	£2.23	£2.01
Towers International Transistor Selector	£13.95	£12.56
Towers International MOS Power & FET Selector	£10.95	£9.86
Towers Op-Amp Selector	£9.50	£8.55
**UHF-Compendium Parts 1 and 2*	£14.93	£13.44
Understanding Amateur Radio (ARRL)	£4.73	£4.26
Understanding the Oscilloscope	£10.10	£9.09
VHF Propagation Handbook (Nampa)	£3.75	£3.38
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World Atlas (RACI)	£3.35	£3.02
World Radio TV Handbook 1984	£12.81	£11.53
**99 Test Equipment Projects You Can Build*	£8.00	£7.20

***Items marked with an asterisk may not be available immediately. Please telephone before ordering to confirm availability.**

RSGB KITS

Morseman kit 1	£12.78	£11.50
Morseman kit 2	£19.52	£17.57
Morseman kit 3	£36.11	£32.50
Z80 ic for Morseman	£8.17	£7.35

MORSE INSTRUCTION AIDS

G3HSC rhythm method of morse tuition

Complete course (Two 3-speed lp records and one ep, plus books)	£8.99	£8.09
RSGB morse course Stage 1 (to 5wpm)	£4.54	£4.09

On all overseas orders for G3HSC course, including orders from Eire, add £1.12 for additional packing and postage from supplier

MAGAZINE SUBSCRIPTIONS

QST (including ARRL membership). One year	£31.53	£28.38
Two years	£60.00	£54.00
Three years	£89.74	£80.77
By air via KLM (to W Europe only) one year	£44.81	£40.33
Ham Radio Magazine (per annum) (incl air delivery)	£25.35	£22.81

NEWSLETTER SUBSCRIPTIONS

Microwave Newsletter, VHF Newsletter, DX Newsletter. For details contact the membership services department at RSGB headquarters.

ORDER FROM: RSGB Publications (Sales),
Lambda House, Cranborne Road, Potters Bar, Herts EN6 3JW

(Raynet supplies should be obtained from Mrs J. Balestrini, Merrivale, Willow Walk, Culverstone, Gravesend, Kent)

The Dynamic Duo!

TVHF230c hf transverter
£334·90 + £5 p&p inc. VAT

TVVF50c 6m transverter
£189·90 + £5 p&p inc. VAT

Following hard on the heels of our revolutionary TVHF230c hf transverter (all 9 hf bands from 2m multimode!), comes the TVVF50c 6m transverter. Designed to provide transceive operation on 6m from a 2m multimode, the TVVF50c genuinely sets new standards in single-band transverter performance. A very clean 10W output from a pair of rugged PA transistors in push-pull is fully ALC controlled. The 2m input will accept anywhere between 1 and 10W drive to provide full transmit output *without overdriving*. On receive, our innovative mosfet balanced pair design contributes to 2.2dB typical noise figure, and in conjunction with our custom-designed diode ring double-balanced mixer provides a typical third-order input intercept point of +4dBm.
Remember that input intercept + gain = output intercept: some specs can be *very* misleading!!
Available shortly will be the TVVF50a 10m to 6m transverter with much the same features and performance—if you're interested, then please ring for details. Meanwhile the TVVF50c is available for £189.90 (plus £5.00 carriage) including VAT. For those of us without money under the floorboards, by the time you read this we hope to be licensed credit brokers, and have full credit facilities available, in addition of course to Access and Visa.
(In the UK, transmissions on 50MHz require special authorisation)

GLNA 433e
Last month, I briefly mentioned our new GLNA 433e (not to be confused with the GLNA 432e!) 70cm masthead-mounting preamplifier—now in full production. With a genuine sub-dB noise figure from a 'professional' GaAsFet, excellent filtering and strong signal performance, fitting the GLNA 433e to your system at masthead should be quite a revelation! Housed in a high-quality polycarbonate enclosure, the preamplifier uses type 'N' sockets for performance and reliability, and has been designed not to provide a ready home for mosses, lichens, fungi and other cellular cryptogams!!
The GLNA 433e will comfortably switch up to 50W throughpower, either through its rf switching function, or by hard-line ground-on-transmit control, and will automatically sit in the straight-through mode with dc power removed–failsafe!
Priced at **£79.90** (plus £2.50 p&p) including 15% VAT, the GLNA 433e should now be available from stock. For more details please ring or write. Thanks.

LBPF 432u
Following on from our LBPF 144u low-loss bandpass filter is the LBPF 432u unit for the 70cm band. With <0.3dB insertion loss, the unit may be left in circuit all the time with no noticeable reduction in system performance. The passband (430–440MHz) VSWR is <1.2:1 from a two-pole no-zero filter, designed to provide best possible roll-off characteristics with low insertion loss and high power handling. Housed in an epoxy-coated diecast box with bnc connectors, the LBPF 432u is priced at **£19.95** (plus £1.50 p&p) including 15% VAT.

OTHER PRODUCTS:

		£
SLNA 50s	50MHz low-noise switched preamplifier using BF981	**44.90**
SLNA 144s	144MHz low-noise switched preamplifier using BF981. 15dB typical gain, 0.9dB typical nf, 100W through-power	**39.90**
SLNA 144u	Unswitched version of the SLNA 144s	**22.40**
SLNA 144ub	Unboxed version of the SLNA 144u	**13.70**
SLNA 145sb	Transceiver optimised preamplifier for the FT290	**27.40**
SBLA 144e	Masthead-mounting 144MHz high performance low-noise high dynamic range preamplifier with balanced pair of BF981's 13dB typical gain, 1.1dB typical nf, 250W through-power	**89.90**
GFBA 144e	Ultra-high performance masthead-mounting GaAsfet 144MHz preamplifier using advanced negative feedback circuitry for superb dynamic performance. Supplied with ATCS 500 sequencer-controller. 13dB typical gain, 0.9dB typical nf, 1000W pep (ssb) through-power	**139.90**
GLNA 432e	Masthead-mounting 430-440MHz ultra-high performance GaAsfet preamplifier. Supplied with ATCS 500 sequencer-controller. 13dB typical gain, 0.9dB typical nf, 250W pep (ssb) through-power	**149.90**
TLNA 432u	Unswitched bipolar 430–440Mhz preamplifier. 12dB typical gain, 1.5dB typical nf	**29.00**
TLNA 432ub	Unboxed version of the TLNA 432u	**20.40**
BLNA 432ub	Sub-miniature 430–440MHz preamplifier. 14dB typical gain, 1.3dB typical nf. Requires external filtering	**13.70**
BBBA 500u	20-500MHz high dynamic range preamplifier. Ideal for scanners	**32.90**
RPCB 144ub	Complete replacement front-end for the FT221 and FT225	**74.90**
RPCB 251ub	Complete replacement front-end for the IC211 and IC251	**79.90**
RPCB 271ub	Complete replacement front-end for the IC271eh	**89.90**
GOIF 107ub	Gunn diode WBFM 'back-end' processing board	**49.65**
XBPF 700ub	Microstripline bandpass tvi filter	**2.95**
CISA 001	UHF (f) to BNC(m) coaxial adaptor	**1.60**
ATCS 500	Sequencer-controller	**33.90**
VFAT 206	25W 6dB attenuator (suitable for use with the TVHF 230c)	**19.65**
LBPF 144u	2m low-loss bandpass filter	**19.95**
LBPF 432u	70cm low-loss bandpass filter	**19.95**

Carriage/Postage Rates

GFBA 144e, SBLA 144e, GLNA 432e, GLNA 433e	2.50
TVHF 230c, TWF 50c	5.00
All other products above	1.50

ALL PRICES INCLUDE 15% VAT

CAVEAT EMPTOR!
Several (so-called) companies also make (or distribute) pre-amplifiers and transverters in the UK. However, only a very small number (ourselves included) have been able to invest in the very expensive test equipment necessary to produce such high performance equipment. To set up even a 'simple' 2m preamp *properly* requires sophisticated specialised test equipment and engineering back-up not generally found in the amateur radio business. If the manufacturer or distributor isn't even VAT registered, then how can he afford such equipment on a turnover below the tax threshold? Beware of 'part-time' service: it may seem to cost less, until something goes really wrong! At muTek we spend all of our working lives trying to make better amateur radio products. We have the people and equipment to do it properly.
On a more-or-less related subject, during a recent sales trip to our Dutch agents ('mecom', of Bedum, near Groningen), I happened upon a photograph of a certain replacement front-end for the IC211/251 transceivers made by a German company not a million kilometres from Stolberg (are your ears burning Ulrich?!), bearing much more than a passing resemblance to our RPCB 251ub. Ah well, they do say that imitation is the sincerest form of flattery . . . P.S. Our German distributor still buys our board in quantity!!
73! Stephen, G4SJP

muTek limited —the rf technology company
Dept. RC, Bradworthy, Holsworthy, Devon EX22 7TU (0409 24) 543

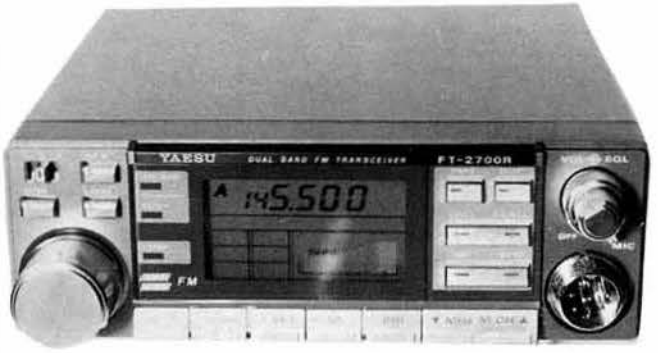
Access BARCLAYCARD VISA

YAESU

NEW MOBILES

FT270R/RH

AUTHORISED YAESU



2M & 70cm FULL DUPLEX FT2700RH

The FT2700R, virtually two transceivers in one case, is designed to be the ultimate in convenience, for FM mobile or base station operation, on the 144 *and* 430MHz bands. Using Yaesu's new one piece die-cast aluminium chassis concept, the FT2700R provides 25 Watts continuous output on either band, for full duplex (or simplex!) operation whilst obtaining optimum circuit shielding and efficient heat dissipation.

SCANNING
Two 4-bit CPU's provide convenient control together with simple operation of the dual VFO's, 10 channel memory with back up and two calling frequencies.

Dual, receiver front ends, local synthesisers, IF's and transmitter RF stages make this the first mobile transceiver capable of *true* full duplex cross-band operation.

PRIORITY
Comprehensive scanning features include "PMS" (programmable memory scan) which permits continuous or skip-scanning between two memory channels in the same band. A MHz 'stepping' switch is fitted for quick transition from one band to another. Priority channel monitoring is available whilst on the same or another band!

CROSS BAND
Independently programmable transmit and receive frequencies, standard repeater shifts (with reverse facility), offers total freedom of operation.

READOUT
The large green back-lit dimmable LCD offers an aesthetically pleasing and easy to read display of the complete operating status of the transceiver, including memory and reverse repeater indications at a glance. The PO/S meter incorporated in the main display is a distinctive graphical two colour type. (Optional Voice Synthesiser available, see FT270R/RH text.)

The FT270R/RH is constructed on a unique massive diecast aluminium ducted heatsink which enables significantly larger output powers to be obtained from a transceiver substantially smaller than any similar radio to date. The FT270RH, with fan assisted cooling provides 45W RF output whilst the conventional R version offers 25W. Both FT270R and RH are fitted with a "low" power switch which provides around 10% of full output.

DISPLAY
The FT270R/RH uses a high visibility back-lit LCD, with large 5mm digits, providing a readout of frequency and all important transceiver functions. Pleasant green illumination and newly developed wide angle LCD ensure easy visibility day or night from most angles.

MICROPROCESSORS
The dual 4-bit microprocessors of the FT270R/RH provide maximum ease of use combined with an extremely wide range of operating functions. Dual VFO's, ten memories and programmable band scan limits are all easily selectable from the front panel.

MEMORIES
The FT270R/RH can memorise a number of scanning parameters for maximising performance. Upper and lower limits may be set (for quick scanning of the band). The ten memories may be scanned for a busy channel or for monitoring a priority channel. The scanning can be either manually or carrier controlled.

VOICE SYNTHESISER
For easier and safer 'eyes on the road' mobile operation an optional voice synthesiser (FVS-1) is available to give an audible indication of frequency, memory channels and VFO selections at the touch of a convenient microphone mounted button. The FVS-1 is of course ideal for those with impaired vision.

45 WATTS OUTPUT FT270RH

GENERAL SPECIFICATIONS

Mode	: FM (F3, G3E)	Antenna	: 50ohms, unbalanced
Supply	: 13.8V ± 15%	Modulation	: Variable reactance
Circuit	: Double Conversion	Deviation	: ±5KHz
	: 21.6MHz, 455KHz	Tone Burst	: 1,750Hz
Sensitivity	: 0.2μV @ 12dB Sinad	Spurious	: −60dB (or better)
	: 1.0μV @ 30dB Sinad	Maximum BW	: 16KHz
Selectivity	: 14KHz −6dB	Microphone	: 600ohms, nominal
	: 28KHz −60dB	Temperature	: −10°C + 60°C
Image	: −60dB (or better)		
Audio	: 4 to 16ohms	**OPTIONS**	
	: 2W in 8ohms (10% THD)	FVS-1, MF-1B3B, SP55, YH1, SB10	

FT2700RH

Frequency	: 144-146MHz
	: 430-440MHz
Power out	: 2m 25/3W
	: 70cm 25/3W
Supply	: 7A (25W Tx)
	: 3A (3W Tx)
	: 0.6A (Sq Rx)
Stability	: 2M ± 10ppm, −5 +50°C
	: 70cm ± 5ppm, −5 +50°C

DIMENSIONS (Ex/Inc Projections)
150W, 50H, 130/185D mm, 1.6Kg

FT270R/RH

Frequency	: 144-146MHz
Power out	: RH; 45W/5W
	: R; 25W/3W
Supply	: RH; 9A/3.5A Tx
	: R; 6A/2.5A Tx
	: 0.6A (Sq Rx) R/RH
Stability	: ± 10ppm (−5 +50°C)

DIMENSIONS: (Ex/Inc Projections)
140W, 40H, 143/175D mm, 1.25Kg

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