Radio Communication

August 1988

KENWOOD

TS-680S — Performance plus

Plus what? Well, as avid ad. watchers will realise, the TS-680S bears a truly remarkable resemblance to the successful TS-140S, as indeed it should, because they are basically the same animal under the skin, and that is why the TS-680S has all the performance of the TS-140S plus the added feature of the 6 metre band.

Kenwood seem to have timed the introduction of the TS-680S extremely well because reports indicate that we are on the run up to a splendid sunspot cycle, and under those conditions six metres is an amazing band. The potential for DX on six metres is really high, and chatting "across the pond" is like a cross town net on an otherwise silent band.

My original comments on the TS-140S concentrated on its value for money, and in this respect the TS-140S represents the perfect balance between performance, features, and price. For the man who wants to extend his amateur radio horizons that bit further, the TS-680S does this admirably. The TS-140S currently costs £862; the TS-680S £985. I'll let you decide whether six metres appeals to you enough to warrant the difference. It's certainly more cost effective than adding a transverter.

As always, a comprehensive colour brochure is available from us, which gives full details of both the TS-140S and TS-680S. If you want to have "hands-on" experience, the managers of our branches around the country will be delighted to assist, as will any of the appointed Kenwood dealers. For the record, the only appointed dealer in London (apart from our own branch at Eastcote) is Radio Shack, in Broadhurst Gardens. Anyone else offering you Kenwood equipment in London has no connection at all with the UK sales and service network for Kenwood.

TS-680S £985 inc vat

LOWE ELECTRONICS LTD.

Chesterfield Road, Matlock, Derbyshire DE4 5LE

Telephone 0629 580800 (4 lines)

Sole Appointed UK Distributor for KENWOOD Amateur Radio

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RSGB Data Box 0707 52242
RSGB on Prestel page 8107

FRONT COVER

ON FRIDAY, 15 JULY, 1988, HRH PRINCE PHILIP, DUKE OF EDINBURGH, KG, PATRON OF THE RSGB, OFFICIALLY OPENED THE 75TH ANNIVERSARY CONVENTION IN THE NATIONAL EXHIBITION CENTRE, BIRMINGHAM. HE IS SEEN TOURING THE EXHIBITION: FULL STORY NEXT MONTH

ABC
MEMBER OF THE AUDIT BUREAU OF CIRCULATIONS

36,070 copies per issue average circulation in 1987

CONTENTS

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

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

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

VHF/UHF the Kenwood way

You may have noticed that for the past six months I have tended to concentrate the advertising on HF equipment, which seems a little unfair to Kenwood because their unquestioned excellence in the HF line also extends to VHF and UHF equipment and techniques.

As an example, take that sector of the market occupied by the VHF/UHF FM mobile rig. All the major manufacturers (some minor ones as well) produce FM mobile boxes, and on the face of it they all seem the same. However, they are not all brothers under the skin, and Kenwood apply their engineering skills to great effect in this most competitive area. The TM-221E and 421E are good examples of the Kenwood approach, and I have often said "How do they do it?"

Do what? Condense so much power and performance into such tiny packages. The TM-221E and TM-421E represent the sensible and well considered use of technology by Kenwood to give the user probably the best 2 metre and 70 centimetre FM mobile transceivers that it is possible to buy.

The technology in question is the use of surface mount (often called "chip") components wherever possible. These tiny things are mounted directly on the surface of a printed circuit board, minimising space and wiring. They also have a further advantage in that the use of fully automatic assembly techniques gives cost savings for the customer. These components are not simply resistors and capacitors, but include integrated circuit packages and transistors, so everything is reduced in scale.

The result in the case (pun intended) of the TM-221E and 421E is a package measuring only 140(W) x 40(H) x 179(D) mm; or if like me you use a wooden ruler dated 1941, 5.5 x 1.6 x 7 inches. In this package lies a receiver second to none (see the Chris Lorek review in HRT magazine), and a transmitter capable of 45 watts on 2m, or 35 watts on 70cm in the case of the TM-421E.

Both transceivers, in true Kenwood tradition are extremely easy to use, with all information displayed on a bright orange backlit LCD and control operations which are delightfully simple and logical. 14 memory channels are provided and each memory holds not only the frequency but also any repeater shift required, and even whether or not you require a tone burst. If you reside in the Great Wen and want to try out 12.5kHz channel spacing, it is all provided: 5, 10, 12.5, 20, and 25kHz at the touch of a button; and of course the receivers are fitted with the recommended "F" filter bandwidth to handle 12.5 and 25kHz channel spacings. Attention to detail is Kenwood's hallmark.

If you want to do things in style, you can mount the TM-221 and 421 together in a common bracket, and go even further by using the RC-10 remote controller (which really needs a full ad. of its own). The RC-10 is unique in that it looks exactly like a cellphone handset, but contains full remote control facilities for the TM-221/421E (and also incidentally the TM-721E dual band mobile).

Of course the Kenwood VHF/UHF story doesn't end with these two mobiles, and the new TH-25/45 hand held transceivers are creating a stir in the market place, let alone the TM-721E dual band mobile, the TS-711E/811E top of the range multi-mode home stations and the TR-751E/851E multi-mode mobiles.

Since it is quite difficult to cover all aspects of the equipment in a small ad. why not send off for the full Kenwood catalogue, using the coupon on the other page, and make a request for full information on any particular rig you may fancy. We will return much interesting reading for your perusal. The information is free, but the Post Office demand payment for carrying it and they no longer accept penny blacks, so if you include £1 that should cover it.

TM-221E	**£317**	TS-711E	**£898**
TM-421E	**£352**	TS-811E	**£998**
TM-721E	**£699**	TR-751E	**£599**
RC-10	**£169**	TR-851E	**£699**

LOWE ELECTRONICS LTD.

Chesterfield Road, Matlock, Derbyshire DE4 5LE Telephone 0629 580800 (4 lines)

Sole Appointed UK Distributor for KENWOOD Amateur Radio

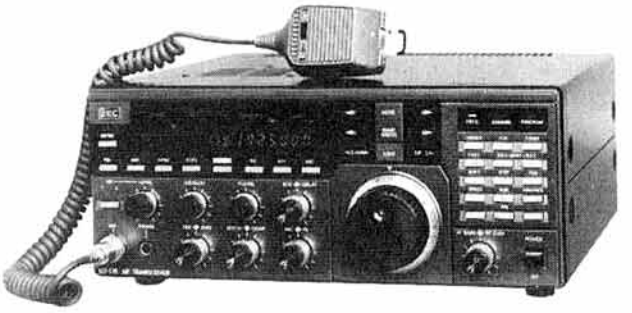
NRD-525 from JRC

The NRD-525 is a most remarkable receiver; probably the most praised, and certainly the most sought after receiver by professionals and hobbyists alike. Of course, it comes from a most remarkable company, JRC, who have been making radio communications equipment since 1915 and are now one of the world's largest manufacturers in the field.

The NRD-525 impresses by its discreet command of the incoming signal, whether it be a weak CW station, or a megawatt broadcaster – and better still the weak CW alongside a megawatt broadcaster. From 90kHz to 34MHz, in any mode, and even up to VHF and UHF with an optional converter, the NRD-525 simply dominates with sheer performance.

Why not ask us for full details of the NRD-525, and read why it has to be the receiver you would like to own one day.

NRD-525 £1098 inc VAT.



JST-135 from JRC

We waited a long time to see the JST-135 transceiver, but it was worth the wait. Whether you use the JST-135 as a complete station in its own right, or couple it to the NRD-525 to make what must surely be the ultimate HF station, you cannot fail to be impressed.

The attention given to detail design is truly exceptional, and the JRC designers have constructed the JST-135 up to the highest standards, not down to a price. Owning such a transceiver is the dream of most radio amateurs, and an orderly queue is already forming for the first deliveries.

As in the case of the NRD-525, it is totally impossible to describe this transceiver in a few short words, so I won't even try. We have prepared an information pack on these two remarkable JRC products and it is available on request.

JST-135 £1395 inc VAT.

DAIWA meters.

CN410M. . .3.5 to 150 MHz, forward 15/150 W, **reflected 5/50 W, SO239** connectors. . .**£61.72 inc vat**, carriage £1.50.

CN460M. . .140 to 450 MHz, forward 15/150 W, reflected 5/50 W, SO239 connectors. . .**£65.40 inc vat**, carriage £1.50.

NS448 with remote head. . .900 to 1300 MHz, forward 5/60 W, reflected 1.6/6.6 W, N type connections. . .**£86.60 inc vat**, carriage £2.50.

NS660P with switchable meter reading (average, normal PEP and hold PEP) and provision for optional remote head (U66V), 1.8 to 150 MHz, forward 15/150/1500 W, SO239 connectors. . .**£115.00 inc vat**, carriage £2.50.

U66V remote head, 140/525 MHz, max 300 W, N type connectors. . .**£55.27 inc vat**, carriage £1.50.

SC20 extension cable for U66V, approx 20 metres long . . . **£29.21 inc VAT**, carriage £1.50.

CN410M

NS660P

NS448

CN460M

THIS AND THAT

LOWE SHOPS

Our Head Office is at Matlock, but we have convveniently placed branches around the country. Each branch is run by a manager who is an active radio amateur and also keen to help you. He normally stocks everything in our extensive range and can demonstrate all major items of radio equipment to you. NOTE though that all mail orders and general enquiries must be sent to Head Office at Matlock. Call in to your nearest branch soon.

In Glasgow, at 4/5 Queen Margaret Rd., (off Queen Margaret Drive). Tel. 041 945 2626.

In Darlington, at 56 North Road. Tel. 0325 486121.

In Cambridge, at 162 High St., Chesterton. Tel. 0223 311230.

In Cardiff, at South Wales Carpets, Clifton St. Tel. 0222 464154.

In London, at 223 Field End Rd., Eastcote, Middx. Tel. 01 429 3256.

In Bournemouth, at 27 Gillam Rd., Northbourne. Tel. 0202 577760.

Branches are normally open from Tuesday to Saturday inclusive, with lunch breaks to suit local conditions. If in doubt, just ring us at Matlock.

LOWE ELECTRONICS LTD.

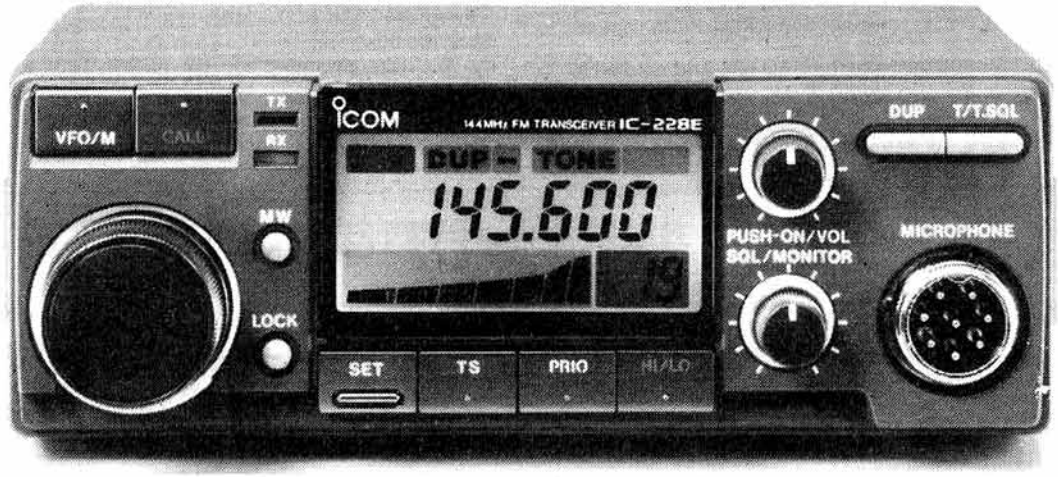
Chesterfield Road, Matlock, Derbyshire DE4 5LE
Telephone 0629 580800 (4 lines)

Name.....
Address.....
Post Code.....

FREE INFO. Don't forget £1 to cover postage. R.C.

ICOM

NEW! IC-228E
2 Meter FM Transceiver



Actual size

Features:

- **Multicolour Liquid Crystal Display.**
- **25 Watt output.**
- **20 Memory channels.**
- **Scanning.**
- **Call and priority function.**
- **Compact size.**
- **HM15 microphone supplied.**

Take a close look at this easy to use and compact VHF Mobile Transceiver. It's unique orange, red and green LCD highlights the numbers and letters for easy viewing. With a 25 watt output from a custom designed power module and a extra large heatsink, this transceiver does not get too hot under your dashboard.

Each of the 20 memory channels can store frequency, offset and direction, in fact all the information to work simplex or a repeater. The memory scan function will scan the memory channels and with the skip function miss those you choose. The program scan will scan all frequencies between two programmable limits. The call channel ensures that your favourite frequency is within easy reach, and with the priority watch the call channel or memory channels can be monitored every five seconds.

This transceiver provides you with so many features, its small compact size and simple front panel design make it a superb mobile transceiver. See the IC-228E or the IC-228H 45 watt high power version at your local ICOM dealer.

Icom (UK) Ltd.
Dept RC, Sea Street, Herne Bay, Kent CT6 8LD. Tel: 0227 363859. 24 Hour.

Count on us!

NEW! IC-32E Dual Band VHF/UHF FM handportable

Features:

- **Full cross band duplex operation.**
- **5 Watt output with IC-BP7 nicad.**
- **20 Dual band memories. • Small size.**
- **Scanning. • Power saver circuit.**
- **Compatible with ICOM accessories.**

When are ICOM going to produce a dual band handportable? This has been the most asked question about new ICOM products for a long time. The IC-32E is the answer.

This exciting new handportable offers full crossband duplex operation, and with a built in duplexer allows single antenna operation. 3 Watt output is standard but with the BP7 high power nicad pack or external 13.8v, 5 Watts can be achieved on both bands. The IC-32E comes packed with features, such as the 20 memory channels which can store both a VHF and UHF frequency in one memory and also simplex duplex condition, offset direction and frequency.

There is a choice of five scanning functions, full programmed memory, memory band and priority. The die-cast frame gives a solid construction featuring rubber gaskets for splash-proof operation. The IC-32E is supplied with VHF/UHF a dual band antenna, BP3 battery pack and wall charger. OK, when are ICOM going to produce a new dual band mobile with full cross band duplex? The IC-3210E will be the answer.

NEW! IC-2GE 2 Meter FM handportable

Features:

- **Rugged and compact. • High power option.**
- **Power saver circuit.**
- **20 memories. • Scanning.**
- **Compatible with ICOM accessories.**

What's new on 2? ICOM's latest 144MHz FM handportable. The ICOM IC-2GE fulfils the most important criteria for a handheld transceiver, it is small, rugged and easy to operate.

The 3 Watt RF output is a compromise on battery life against power output, but for those who require extra punch, the set can deliver 7 Watts when used with the BP7 or external 13.8v DC. On receive the power saver circuit reduces current drain automatically, but can be overridden for packet operation.

The 20 memory channels can store all your favourite simplex and repeater frequencies, and with the programmed scan and memory scan functions, there is no need to manually search for activity. The IC-2GE utilises most existing ICOM handheld accessories plus a new line of carrying cases. If you are expecting to be outdoors this summer or looking for your first handportable transceiver, the ICOM IC-2GE will take a lot of beating.

Helpline: Telephone us free-of-charge on 0800 521145, Mon-Fri 09.00-13.00 and 14.00-17.30. This service is strictly for obtaining information about or ordering Icom equipment. We regret this cannot be used by dealers or for repair enquiries and parts orders, thank you.
Datapost: Despatch on same day whenever possible.
Access & Barclaycard: Telephone orders taken by our mail order dept, instant credit & interest-free H.P..

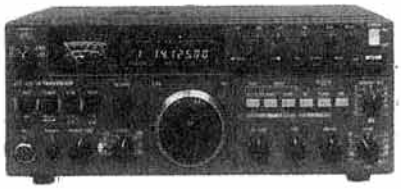
ARE COMMUNICATIONS

TS–140S + SIX METRES = TS–680S!

160m to 10m. *Including the 6 metre band.* The new **Kenwood TS-680S** Transceiver is a full feature HF multimode transceiver, with a frequency range of 1.8–56 MHz. Not only does it include the new 6m Amateur band, it also has a *general coverage receiver*, 100 watts output between 1.8 and 30 MHz and 10 watts output on 6m. All this!
And it is only the size of the *old* TS-440S!
Available now. **Price £959.00 + free MC43S** .
COMPARE PRICES WITH OTHER 'IMPORTERS'!

JST 125T from the Japan Radio Company

Now available ex-stock. **The Fabulous JST 125T transceiver.** 1.8 to 30 MHz including general coverage receiver, the JST 125T offers high performance in both operation and build quality. We are pleased to announce that the superb range of JRC equipment is now available from stock. Contact us now.
SAE for Colour leaflet.
JST 125T from £1,395.00.
Special offer during June.
Free Matching PSU worth £205.00.



The FT747GX HF "Economy" Transceiver

Fully compatible with all FT757GX accessories. The new FT747GX is a real winner! Just look at the features:

- 160–10M HF Transceiver
- General Coverage Receiver
- All Mode ★INCLUDING FM FITTED★
- 0–100W Output (25W AM Carrier)
- Computer Control Display
- Large Clear LCD Display
- Simple Operation

In stock now at only £659.00 inc. VAT

WAR ON 6 METRE PRICES!!

In time for the fantastic 6 metre openings. A.R.E. have yet again **SLASHED PRICES** on the NEW Yaesu FT690R mkII. Our massive bulk buying guarantees you the very best in prices and immediate delivery.

- A new boxed FT690R 6M Multimode Transceiver only **£349.00!!** (List £399.00).
- Or, supplied with a 15 Watt (Minimum) Linear Amplifier for only **£375.00.** (List £429.00).

A New Standard in Technology
The full Duplex Handie from Standard

A World First. Transmit on 2 metres and receive on 70cms (or visa-versa) *at exactly the same time.*
Not only is that unique from a Handie, but with the following specification and at a fraction of the size of its nearest competitor, is there really any other rig that compares?

- Dual band operation 144-146 and 430-440MHz. Full duplex.
- Receiver coverage 138-169.955 and 420-468 MHz
- Programmable step sizes 5/10/12.5/25/50KHz.
- 5 watts output on both bands (With optional CNB120).
- Dual synthesised VFO's.
- Programmable ctcss tones 67-250.3Hz (With optional CTD/N500).
- Programmable Repeater Offset on either band between 0-39.9MHz.
- Reverse Repeater facility.
- Dual Watch priority channel.
- Programmable Call Channel on both bands.
- Ten programmable memories, including repeater offset, tone squelch etc, on both bands.
- Four different scanning modes.
- Battery save facility.
- Switchable Frequency lock and TX inhibit, from keyboard.
- Switchable 20dB Attenuator.
- High or Low power control.
- Squelch defeat switch.
- Illuminated Wide Angle LCD display.
- Digital 'S' Meter/Power output display.
- Low battery Warning indicator.
- TX LED indicator.

UPGRADE NOW.
THE NEW STANDARD C-500.
Now available from stock.
£369.00 incl. VAT.

The New Yaesu FT767GX M

All HF + 2m/6m/70cm + Gen Cov. Multimode, Semi-duplex, Keyer, Tracking 2 VFO's Ten memories, Notch/IF shift, Audio peak Filter, CW filter etc, etc.
Odds are you have seen one or worked someone using one, either on HF or 2m/6m/70cm. **The new FT767GX M.** We're so impressed, all the licensed operators at A.R.E. have one! We believe we have probably supplied more **FT767GX M**'s than any other retailer. **WHY?** Our unprintable part-exchange or cash prices – that's why!
Phone now for your special A.R.E. super deal. *SAE for colour leaflet.*

Plus 2m or 6m module worth £169 fitted Free!

'NOW AVAILABLE WITH A.R.E. MODS IMPROVING SYNTHESIZER PERFORMANCE'

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THE SHOP WITH HUGE STOCKS AND THE BEST DEALS!

KENWOOD

TS940S	1995.00
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AT930	206.00
SP930	86.00
TS440S	1138.00
AT440	144.75
PS50	222.00
TS140S	862.00
AT130	140.00
TS680	985.00
PS430	173.75
SP430	40.81
AT250	366.00
MB430	15.80
FM430	48.00
TS530SP	748.00
AT230	208.50
SP230	66.50
SM220	343.50
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MC50	46.00
MC60A	88.00
MC35S	21.72
MC43S	22.20
MC55	52.60
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TS811E	998.00
SP430	40.75
TR7751E	599.00
TR8851E	699.00
MU1	30.95
VS1	32.25
TM2550	299.00
TM221ES	317.30
TM421ES	352.00
SP40	21.00
SP50	20.40
TM721E	699.00
TW4100	499.00
VS2	32.25
TH25E	258.00
TH45E	296.50
PB6	26.95
SC14	7.25
SC15	8.00
TH21E	189.00
TH41E	218.00
PB21	24.35
BC2	11.85
DC21	25.00
BC6	99.00
BT2	11.86
BT4	13.82
SC8	11.86
SC11	10.45
TH205E	215.00
TH215E	252.00
TH405E	298.85
PB2	34.20
BT5	11.85
BC8	38.80
SC12	13.80
BH4	4.60
PG2V	3.95
SMC31	29.80
SMC25	23.00
PL1	1.50
R5000	875.00
VC20	167.00
R2000	595.00
VC10	161.95
RZ1	465.00
HS6	24.35
HS5	37.50

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YAESU

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XF8.9GA	19.00
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FT73R	243.50
FBA10	9.20
FNB9	27.60
FNB10	32.20
NC27C	17.70
NC28C	17.70
NC29	57.50
PA6	18.40
CSC22	10.50
CSC27A	34.50
MMB32	13.20
FT727R(4A)	425.00
FBA5A	10.00
FNB3A	41.00
FNB4A	46.00
CSC17	10.00
CSC18	11.50
MMB11	39.00
NC11C/SMC8C	7.50
CSC1A	7.50
FT290R2	429.00
FT690R2	399.00
FT790R2	499.00
FL2025	115.00
FL6020	109.00
MH10F8	25.00
MMB31	17.50
CSC19	8.50
FT211RH	309.00
FT736RH	1450.00
FEX 736/50	239.00
XF455MC	60.00
FT212RH	349.00
FT712RH	375.00
FRG8800	639.00
FRV8800	100.00
FRV/WFM	22.50
FRA7700	49.00
FRG9600M	509.00
PA4C	21.00
YM24A	31.05
YM47	16.00
YM49	23.00
YE7A	12.50
YD148A	36.00
MD-1B8	79.00
MH12A2B	28.75
SP55	19.55
YH55	19.99
YH77	19.99
MF-1A3B	25.00
YH-1	19.99
SB2	22.00
YH2	19.95

SECOND HAND? PLEASE PHONE FOR LIST

HF AERIALS

CP5 5 band vert.	189.00
CP4 4 band vert.	149.00
CP3	49.00
MM3 Mini-Beam	325.00
TB3MK3 Beam	315.00
TB2MK3 Beam	210.00
TB1MK3 Beam	105.00

HF RIG DISCOUNTS!

The following hf transceivers are offered complete with 30 amp power supplies and can be delivered anywhere in the UK, normally within 24 hours.

TS140S	Solid state transceiver 160-10m + Gen. cov. + AC PSU	959.00
TS440S	High tech. HF rig from Kenwood + AC PSU	1229.00
FT747GX	Yaesu HF rig + Gen. cov. rx. + AC PSU	759.00
FT757GX2	Yaesu HF rig with many features + AC PSU	1069.00
IC735	Icom HF rig + gen. cov. + AC PSU	1049.00
IC751A	Icom HF rig + gen. cov. + 32 memories + AC PSU	1565.00

The AC Power supply included is the Weiz/Revex 30 Amp fully protected unit

ALINCO

NEW

A new and exciting 2M handheld from ALINCO. Highly compact and with a receive coverage of 130-170 MHz should make it a very popular rig. Full LCD display with 10 memory and power capability of 3-6 watts. The rig will include ni-cads etc, and costs £229!

ALR22E	FM mobile 25w memories/scanning etc		249.00
ALR22HE	As above but 45 watts	SPECIAL	299.00
ALR72E	70cm FM mobile 25 watts	SPECIAL	299.00
ALD24E	2m/70cm dual bander full duplex		449.00
MM1	Mobile mount for ALR22/ALR72/ALD24		10.95
MC1	Microphone-8 pin with up/down		22.95
DC1	DC lead for mobiles		5.95
ALX2E	2m micro handheld with EBP3N NiCad & charger		189.00
AD1	Screwed phone/BNC adaptor		3.85
EBP3N	NiCad pack 450 mAh		28.95
EBP2N	NiCad pack 160 mAh		23.00
EDH10	DC to DC converter		16.95
ESC5	Leatherette case and belt clip		15.00
EME2	Earphone & microphone		23.00
ALM203	2m handheld keypad entry etc		229.00
ESC3	Leatherette case and strap		15.50
EMS20	Speaker/microphone		22.00
EDC2	Cigarette charge cable		6.50

ALM203E Hand-held 2m FM back in stock £229!

ICOM

IC781	4500.00	IC290D	542.00
IC761	2459.00	IC275E	1039.00
IC751A	1465.00	IC275H	999.00
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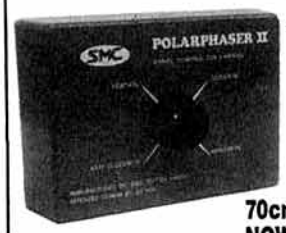

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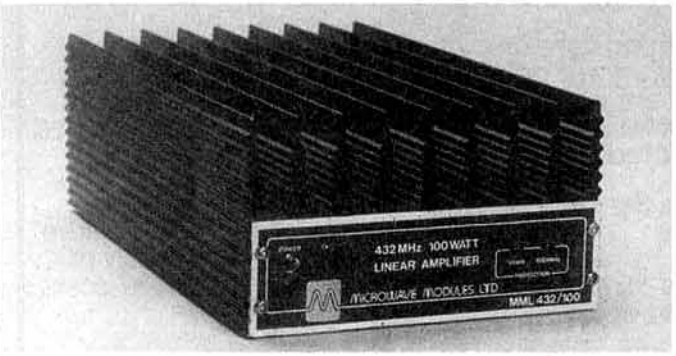

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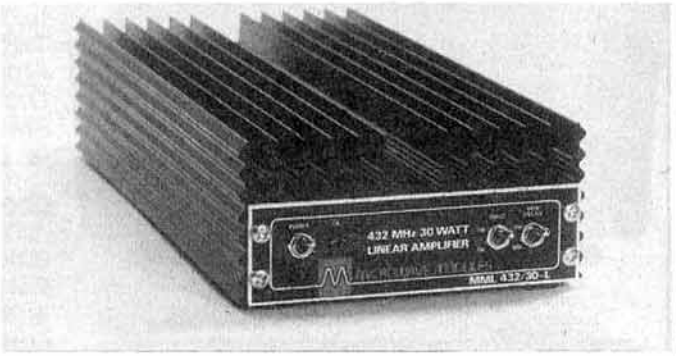

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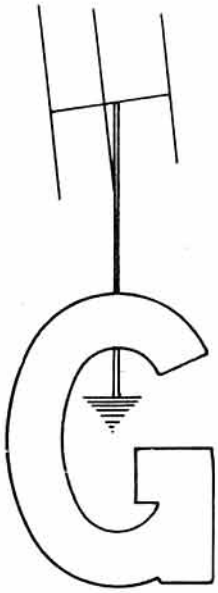

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BASIC AMATEUR RADIO – FOR BEGINNERS OF ALL AGES

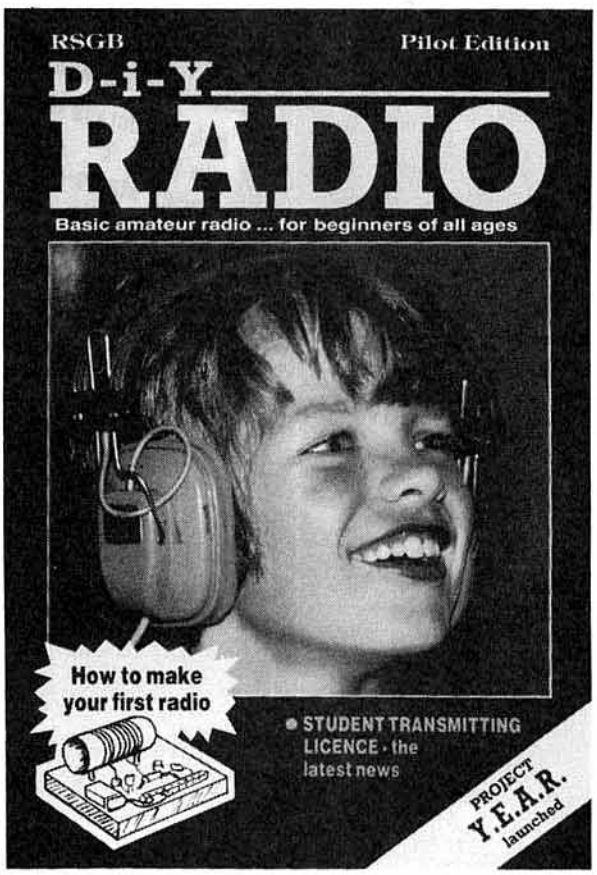
As part of the RSGB's Project YEAR, a pilot issue of a new magazine has been produced. *DIY Radio* was launched at the 75th Anniversary Convention as a magazine intended for beginners of ALL ages.

If you want to see a copy of DIY-Radio for yourself and help with our market research, a copy is available from HQ (Publications) at £1,50 post paid.

If the pilot issue of DIY-Radio proves successful the Society intends to produce this magazine monthly starting in 1989. It is intended that DIY-Radio be sent to all RSGB Associate members under the age of 18 in place of *RadCom* or to any members or groups who wish to subscribe.

The Society is looking for writers and artists interested in helping beginners into amateur radio. If you want to help and can write in plain English for the layman, write to "Project YEAR" at RSGB HQ. All constructive ideas will be welcomed.

David Evans G3OUF



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Why there's no . . . NEWS BULLETIN

This month's Bulletin is a bit different from what you might expect – oh all right then, it's a bit different from what we expected as well. We were about half-way into the August issue and the word processor was going great guns; then we received a summons from Upstairs. "The draft licence is ready and we'll need to tell the members all about it – you can get it all in the Bulletin, can't you?" Gulp – er, yes, should be able to manage.

Upshot is that most of our usual Bulletin features have been – well, dropped. And the printing schedule has gone back a week (again). We'd already allocated space in RadCom, which we've pinched for the new licence, and by dint of twisting the Editor's arm through about 720 degrees we scrounged a bit more – but it still wasn't enough to get the usual things like the club news, Helplines and what-have-you in. We're very sorry about this but it seemed to us that the new licence – which affects all of us in a fundamental way – was more important. Normal service will be resumed next month, when the Bulletin will return to its normal size.

So this month's Bulletin is a "New Licence Special Extra", which unfortunately has squeezed out all of the other news stories we had to hand. However, if all goes well there should be one other item this month – take a look at the back page and see if there's anything about the exploits of one R.F.Byrne. This gentleman has made occasional appearances in club publications in the Midlands but by patient detective work, diligent research and loadsamoney we've persuaded their creator to let them – er – enliven the pages of the Bulletin. We think R.F. Byrne's the funniest thing since the 1982 licence schedule and we hope you agree.

The new amateur radio licence

Back in September 1987 the lead story in the Bulletin was headlined "21st Century Licence – RSGB makes its proposals". In this we spelled out what we were looking for in the context of the revision of the amateur radio licence which the DTI was proposing to undertake.

Well, after something like *one thousand* man-hours of RSGB work, not to mention the hours and hours of meetings down at Waterloo Bridge House, the new licence is finalised and it'll come into effect from 1 January 1989. This Bulletin is almost entirely given over to the new licence; you'll find the complete wording of it, together with the new schedule to the licence in the following fifteen or so pages, plus a summary of the changes to the existing licence which we obtained and a note of the things we didn't achieve. We also have a point-by-point analysis of how we did in terms of the original September 1987 proposals. Next month we'll be commenting in-depth on all the things we didn't have space to discuss this month! Obviously there's a lot to say, but we thought it was important to bring you the full official text this month and save the erudite comments for later. As a matter of fact, we'll almost certainly be running a series of articles in the Bulletin which set out the rationale behind some of the changes – those will come in a couple of months when the dust has settled a bit and some of the inevitable queries have been resolved. What are the major changes?

Here's a list:

● We now have an annually renewed single-sheet licence validation document, with a separate booklet setting out the terms and conditions of the licence.

● Now only one type of licence document covering all types of licence – individual, club, reciprocal, maritime mobile, whatever.

● CEPT licence agreement adopted.

● Holders of an RAE pass slip and visiting CEPT amateurs can now operate the station under supervision

● Maritime mobile now included in standard licence.

● Restrictions on emergency operation relaxed.

● /A suffix abolished, replaced by /P.

● Identification requirements relaxed

● Speed limit for CW identification abolished.

● Logging requirements changed.

● Restrictions on recording & retransmitting of messages relaxed.

● Packet digipeating now allowed (!)

● Unattended operation allowed for packet/data modes, low-power temporary beacons from the home station and low-power links within the station for remote control, etc.

● Requirement to notify DTI of club station operators abolished.

● Restrictions on use on behalf of "social organisations" relaxed to allow use of the station in connection with non-profit-making amateur radio organisations such as clubs, rallies, etc.

● Crossband contacts now allowed with overseas stations on frequencies legally available to them but not us, eg 220MHz.

● Data & RTTY now permitted on Top Band.

● Net operation as currently practised now ratified.

● RIS close-down procedures have been clarified – see Note (m) in the licence.

Those are the main items, and obviously we'll be looking at them in more detail later on.

So let's now go through the September 1987 proposals point by point and see what changes we've managed to achieve. We'll stick to the same numbering as we used at the time. If you remember, we started with nine general proposals:

1. "To make the layout and wording of the licence clearer, more logical and easier to understand". We couldn't honestly say that we've achieved as much as we wanted in this area because the licence is a legal document which has to fit into an established DTI-type format.

2. "To group all aspects of a particular topic together in one place in the licence, which will also make future changes more straightforward". As you'll see, we've made some good progress towards this.

3. "To incorporate all the effects of past licence variations and interpretations into the main licence". Yes, it's now fully up-to-date.

4. "To bring the licence conditions into line with modern operating practices". Well, the licence no longer contains any reference to spark sending apparatus, which is an improvement, but it still isn't quite as we would wish. There isn't enough provision for unattended operation, for example.

5. "To introduce new facilities which are or will be required in the next decade or so". No, this ▶

hasn't happened. As we said above, the DTI saw the licence review as more of a tidying-up operation than a thorough revision and the final result couldn't be called forward-looking. In some ways it isn't general enough and doesn't allow for much in the way of true experimentation – certainly not as much as we pushed for.

6. "To include some explanatory material where necessary". Yes, but not as much as we would have liked.

7. "To word the licence in more general terms in order to provide sufficient flexibility to permit amateurs to carry out experimental work (and make contributions to industry and the world at large) by the development of new services and techniques". See (5) above – yes, we made some progress and the new licence is a step forward but not a giant stride.

8. "To produce a single licence document which caters for as many types of licence as possible – ie Class A, Class B, maritime, club, etc". Yes – it's now all in one document.

9. "To produce a compact licence validation document, with the terms and conditions in a separate booklet". Yes – that's precisely what we've now got.

OUR PROPOSALS

So now on to the concrete proposals. The first was a general one which suggested a change in emphasis towards what the licensee could or could not do rather than matters relating to the station itself – and to some extent we have achieved that aim.

Coming to specifics:

2. "Incorporate the ITU wording defining the amateur service. This is a broader definition which includes "intercommunication" rather than just self-training". Yes – this has been done.

3. "Provide more opportunities for amateur radio to provide assistance to the community and increased facilities for Raynet operations and exercises". Yes – achieved.

4. "Permit radio amateurs to communicate with stations in other services in any country in the event of natural emergencies in accordance with Resolution 640 of the Radio Regulations". Yes – we may now do so. This type of facility could potentially be extremely useful.

5. "Reduce the number of categories of location by combining /A and /P and only using /P". Yes – farewell to good old "stroke A", which always caused a fair amount of confusion in the past.

6. "Remove the time limit of four weeks for /P operation". Yes – you can now be "stroke P" for as long as you like (don't freeze to death on top of that mountain....).

7. "Extend the standard licence to cover operation on a vessel in UK territorial waters". Yes – hello sailor.

8. "Permit operation on public transport vehicles and vessels". Yes, the licence now no longer prohibits this, although you should check with the company concerned before going on the air.

9. "Issue the full maritime mobile licence as a letter of variation to the main licence". Actually, we did better than that – it's now included in the main licence.

10. "Allow holders of an amateur licence from any country to operate the station under supervision". We made some progress – we couldn't get "....any country" but we did get CEPT countries which have implemented its Recommendation TR61-01. Here's the list of current CEPT countries: Austria, Belgium, Cyprus, Denmark, Finland, France, Germany (FRG), Greece, Iceland, Ireland, Italy, Liechtenstein, Luxembourg, Malta, Monaco, Netherlands, Norway, Portugal, San Marino, Spain, Sweden, Switzerland, Turkey, Vatican City, Yugoslavia. Those which had implemented TR61-01 as of July 1988 were as follows; Germany (FRG), Denmark, Norway, Switzerland, Liechtenstein, Austria, Netherlands,Luxembourg, Monaco, Belgium and France. So unless there are any additions to that list between now and January, it'll be amateurs from those countries who can operate a UK Class A or B station under supervision.

11. "Allow members of the user services to operate the station under supervision during exercises as well as in the course of live incidents". Yes – they may now do so.

12. "Extend the greetings message facility currently available with GB callsigns to all licence holders". No – this was refused point-blank because it would cut across the BT/Mercury duopoly enshrined in the Telecommunications Act 1984. We're still pursuing this because it would be invaluable in several public service situations and for training purposes.

13. "Remove the clause requiring the licensee to prevent unauthorised persons from having access to the station. Preventing unauthorised operation should be sufficient". Yes – done.

14. "Permit automatic control of the station". Yes – now permitted.

15. "Include low-power unattended operation in the general licence in certain parts of certain bands, in a similar fashion to the 'low power' exemptions in a recent DTI booklet. This might cover 'cordless' link or control applications around the station in addition to conventional operation". Yes – there's provision for three types of operation along these lines but it's quite complex. This is one of the topics we'll look at in more detail next month.

16. "Permit simultaneous operation on different frequencies using the station callsign; also permit telemetry and telecommand". Yes – all are permitted, although operation on each band must still be under the direct supervision of the licensee.

17. "Remove the need to give details of the location when not at the main address". Well, for 'remove' read 'reduce' – you are now required to identify your position to an accuracy of at least 5km and the licence suggests one of five methods. These are a) the full postcode b) lat and long in degrees & minutes c) a six-figure NGR d) an IARU locator or e) an "address or other geographical description correct to 1km'.

18. "Reduce the frequency with which the callsign must be given". Yes – take a look at Section 7(1) for the full story but it's basically at the start and end of every contact or every 15 minutes.

19. "Permit identification of the station to be in any permitted mode, with no maximum speed specified for Morse identification, but require identification in either telephony or Morse at less frequent intervals". Yes – see (18) above.

20. "Permit relaying of messages received from a licensed amateur station on to another amateur station". Yes – this is permitted.

21. "Reduce the restrictions on recorded messages to cater for the storage and retransmission involved in data modes (AMTOR, MS, packet, etc)". Yes – considerable progress.

Point 22 was about logging; basically the new requirements are set out in section 6 of the licence and we mentioned some of them above. However, while some details are no longer required (such as the times of each QSO) note that it is now necessary to log power and times at which you change it. What happened here was that the RSGB wanted logging to be greatly simplified – basically recording the fact that the station was active – but the RIS wanted enough information to be logged so that it was readily available to assist them with investigations. You win some, you lose some.....

23. "Introduce a pocket-size licence validation card and have a separate booklet containing the licensing conditions". Yes – that's what we'll all now have. Strictly speaking we've got a sheet of paper rather than a card (we would have preferred something credit card-sized) but that's better than nothing.

24. "Devise a method of ensuring that all amateurs are periodically notified of current licence conditions". We're still talking about this, but basically the envelope which brings your annual licence validation document may well also contain a separate sheet of paper upon which is written the latest updates and amendments. DTI is hoping that they can do this – watch this space.

25. "Include notices in Radio Communication' in the official list of means by which the licence conditions can be varied". Well, it was worth a try.... no, they didn't agree to this!

26. "Consider issuing long-life' licences to reduce the administrative costs of renewal". No – the DTI wants to retain annual licences.

27. "Request amateurs to permit publication of at least their town or country". Again we're still talking about this – more later.

28. "Reduce ambiguity by defining the order of precedence of the licence and related documents and outlining the spirit' of the licence regulations". The DTI didn't think there was a problem here, so no change.

29. "Clarify the matter of precisely who can close the station down". Here again, the DTI wondered why we were asking for this and didn't accept that the existing clause in the licence was ambiguous. However, Section 8 has been reworded slightly. Note (m) also sets out exactly how the close-down procedure will work in practice.

30. "Include the relevant extracts from parts of the legislation which are referred to in the licence (ie Wireless Telegraphy Acts, Radio Regulations, etc). Yes – the Notes contain some references to the law, eg in the section about misleading messages.

31. "Interpret 'secret codes and ciphers' so as not to prevent the use of new modulation techniques and data modes". Yes, in a word – the new licence is much more sensible in this area.

32. "Introduce a 'Class B' Amateur Radio Certificate for holders of an RAE pass slip".

Actually we achieved something more sensible in the end – the RAE pass slip now has the force of an ARC insofar as it permits the holder to operate any UK Class A or B station under supervision.

33. "Specify power on CW by PEP in the same way as SSB". We're still talking about this – the DTI didn't want to take it as part of the licence review as such.

34. "Reduce the restrictions on data modes in secondary allocations". Yes, they're considerably reduced – take a look at the Schedule on page XXX. The restrictions on HF data and in secondary allocations in the notes to the old schedule have been relaxed quite a bit.

35. "Increase the overall power limits from 26dBW to 30dBW". As for (33) above.

36. "Permit Class B licensees to identify in CW". Yes – now permitted.

37. "To avoid confusion, specify in the licence schedule those countries with which we have a CEPT or other reciprocal agreement". Yes, partly – CEPT countries are now listed in Note (y). Countries with reciprocal agreements may be included if there's room.

38. "Specify the User Services". Yes – they're now defined in clause 12 (1)(q) as follows: "User Service' means the British Red Cross Society, the St John Ambulance Brigade, the St Andrews Ambulance Association, the County, Chief, Regional or Islands Emergency Planning Officer or any United Kingdom police force, fire or ambulance service, health authority, government department or public utility". That little lot will provide much greater scope for amateur radio to help the community, and ought to keep Raynet busy for a year or two....

39. "Specify the schedule for operation in territorial waters and also for the full /MM licence". No – you still need to look them up in the Radio Regulations but don't panic – we'll be printing them in the Bulletin shortly.

40. "Permit beacons and repeaters on 5.7GHz". Well, they're not excluded in the new licence....

ADDITIONAL BENEFITS

So there you are – those were the main points we originally put to the DTI, largely as a result of input from members, and you can see exactly how we did. Just for completeness, here's a list of the other changes we achieved which weren't outlined at the time but which were either offered to us or which we identified as Good Ideas during the meetings and discussions:

1. Abolition of the tiresome club operator's list. This responsibility for authorising operators is now delegated more directly to the licensee.

2. Use on behalf of "social organisations" relaxed

3. Net operation requirements made more realistic – you don't have to establish contact with every station in the net "singly and separately" first, assuming that you ever did or could.

4. Data/RTTY now allowed on 1.8MHz

5. Crossband on non-contiguous bands (ie 220MHz)

6. Clarification of RIS close-down procedures

7. Clarification of status of packet radio. Many of the grey areas in packet operation have been clarified, and these are as follows:

a. storage and forwarding of messages to other amateurs (digipeating)

b. automatic control of the station

c. unattended operation

d. callsign identification requirements

e. mailboxes will be administered by individual letters of variation, for several reasons; one being to allow co- ordination of the large volumes of traffic they generate.

THE ONES WE COULDN'T QUITE GET

What didn't we achieve? Well, the list of failures looks like this:

1. We couldn't obtain aeronautical mobile. Many members asked for such a facility and it seemed to us to be a most useful thing to have, especially from the point of view of experimentation. Whilst we appreciate the safety implications, other countries seem to be happy to include it in amateur licences and we'll try again.

2. We were unable to improve the national status of the amateur and amateur satellite services from the point of view of protection against interference. It is regrettable that one consequence of this is that we will perforce continue to suffer from illegal operation, interference from poorly-designed domestic equipment and the many and various forms of spectrum abuse with little hope of redress. However – looking on the bright side – legislation is in the pipeline, particularly the EEC EMC directive on immunity and emission standards.

3. There's less explanatory material included in the licence than we would have liked, basically because of cost. However, we hope to continue collating all sorts of items which are useful from an operating point of view in a new section in the front of the Call Book.

A FEW EXTRA ISSUES

There were a few other topics which we raised in the course of the review. The DTI didn't want to consider them in that context but has agreed to think about them as separate issues; these are as follows:

- An increase in power limits and equal power limits for CW and PEP. The reason for requesting these isn't a megalomaniac urge on our part to run QRO; it's just that amateurs in many other countries have much higher power limits than those in the UK and it would be nice to be able to remain competitive. In particular, many people are very interested in studying unusual VHF and UHF propagation modes – for which high power is essential. With current equipment and practice, it also seems logical that the PEP limit for SSB should apply to all modes.
- Implementation of a rapid and flexible response to requests for experimental permits of one sort or another. In the past these have taken a very long time to arrange – by which time people have often lost heart.

THAT'S THE NEW LICENCE

So that's the bare bones of the new licence – what do we think of it? Well, in a nutshell, a lot of good progress but still basically a good rationalisation of the existing situation rather than a major revision. Like the proverbial curate's egg, there are some excellent bits in it but it's frustrating that one or two important areas haven't received as much attention as we would have wished. Basically, the RSGB wanted a complete blitz on the existing licence and what amounted to its replacement by a much more forward-looking one. However, the DTI saw the review initially as a much more limited "tidying-up" exercise and set its internal time-scales accordingly; these always seemed to us to be so phenomenally short as to verge on the totally unrealistic but they wouldn't alter them and we just had to cram an enormous amount of hard graft into what felt like milliseconds. Inevitably the result is something of a compromise and we're aware that a number of issues haven't been dealt with – rest assured that we'll be pursuing them in the future.

Having said all that, we must say that we have to applaud the DTI on the detailed work which they did in 1988 to keep the Society posted on the latest changes agreed and the state of play with regard to discussions and documents.

A couple of final points. Whatever you do DON'T FORGET that the new licence doesn't come into operation until 1 January 1989 – so don't start operating in accordance with its terms and conditions until then. Specifically, the CEPT agreement DOES NOT come into force until then – so you musn't let Francois or Dieter operate the rig just yet unless they have a normal reciprocal licence.

PLEASE . . .

The final point is that we suspect there will be a lot of queries, questions and what-have-you about the new licence. Please, whatever you do, DON'T start ringing Headquarters to ask us to clarify Note Z or interpret Section 78 or whatever because if we start doing that the entire RSGB will grind to a clanking halt and the staff will have a collective nervous breakdown. If you have a query, please adopt the following procedure.

Write to us, marking your letter "Licence Query c/o LAC" in the top left-hand corner. Nothing will happen for a while because we will collate the queries and then ask the DTI for their comments. We'll then put them all together and publish the information in the Bulletin – that way everyone gets to see the same answers and we all know where we are. Please DON'T ring HQ, and for that matter we'd suggest not bombarding the DTI with telephone calls either because they almost certainly won't be able to come up with off-the-cuff answers. There's plenty of time before the new licence comes into operation – P L E A S E stick to the procedure outlined above and everyone will benefit.

INFORMATION SHEET No. 7:

"NEW AMATEUR RADIO LICENCES"

Introduction

The Department of Trade and Industry (DTI) is pleased to announce that a major review of the Amateur Radio Licence has now been completed, and the new licence will be introduced on 1 January 1989. The wide range of consultation, including with other government departments and the Radio Society of Great Britain (RSGB), that has gone into the review, highlights the DTI's continued commitment to the amateur service and its awareness of the need to keep the licence in step with current needs.

Highlights of the new licence

To detail all the changes would take up too much space and would be no substitute for studying the full text of the new licence, which by now can be expected to have been reproduced in the amateur radio press. The following are some of the highlights of the new licence:

- a new format making the licence more attractive and easier to read;
- all licensees will receive a yearly Validation Document to indicate renewal and validity of the licence;
- conformity with the requirements of European Conference of Postal and Telecommunications Administrations (CEPT) Recommendation T/R 61-01 which will enable United Kingdom amateurs to operate under their UK licence in a growing number of European countries (and, from 1 January 1989, amateurs from much of Europe will be able to operate here in the same manner);
- relaxation of restrictions on RAYNET operation;
- maritime mobile operation (previously requiring a separate licence);
- operation using digital communications (which includes packet radio operation (but mailbox operation will need a separate authority which will be available through the RSGB);
- relaxation of restrictions on message handling;
- operation, under the supervision of the licensee, by anyone who has passed the Radio Amateurs' Examination;

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- unattended operation of beacons and low power devices;
- simplification of identification requirements;
- log keeping on magnetic disc or tape;
- opening of 1.850-2.000 MHz band for radioteletype (RTTY).

When will the new licence come into effect?

Any new licences issued from 1 January 1989 will be in the new format; existing licences will be varied by Gazette Notice. All licensees should receive the new licence by the end of 1989, i.e., at the time they pay their renewal fee.

Do I need to study the new licence for the Radio Amateurs' Examination?

Yes, if you plan to sit the exam in May 1989, when the new syllabus that has been introduced by the City & Guilds of London Institute will be examined for the first time, and thereafter. However, if you sit the December 1988 exam you will be examined on the old licence conditions, but it is strongly recommended that you carefully review the new licence once you have taken the exam.

Will there be any change to the classes of licence?

The two main types of licence will remain known as the Amateur Radio Licence (A) (all bands) and the Amateur Radio Licence (B) (all bands including and above 50 MHz). These are equivalent to CEPT Licence Classes 1 and 2 respectively, which fact will be stated on the Validation Document. The Amateur (Maritime) Radio Licence will be withdrawn from 1 January 1989 since a separate licence will no longer be required for maritime mobile operation.

Why has the opportunity not been taken to introduce a Novice or Student Licence?

Although no decision has yet been made to introduce such a licence, the DTI has told the RSGB that once the review of the main licence was complete, they would give consideration to proposals for a licence category that might encourage more into amateur radio, without, of course, allowing any diminution of standards.

Further information

1. Booklets giving the full text of the terms and limitations of the new Licence, including the Schedule and the Notes, may be

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obtained on request (ask for 'Booklet BR 68') from December 1988 from the:

Radio Amateur Licensing Unit
Post Office Counters Ltd
Chetwynd House
CHESTERFIELD
Derbyshire
S49 1PF

(Tel: 0246 217555/217699)

However, it must be stressed that all licensees will automatically be sent a copy of the Booklet when they renew their licence in 1988. For students for the RAE the Booklet is also reproduced in "How to become a radio amateur", available from the above address.

2. Those wishing to operate in Europe under CEPT Recommendation T/R 61-01 after 1 January 1989 may apply to the Radio Amateur Licensing Unit (at the above address) to be issued with a new copy of the licence. You must possess the new licence (including the Validation Document) to operate as a CEPT licensee. Please note, however, that it is unnecessary to apply if your visit to Europe will be after your 1989 renewal date as at that time you will automatically be sent a copy of the new licence.

3. If you are a European (and non-UK) amateur wishing to operate in the UK under CEPT Recommendation T/R 61-01 after 1 January 1989, you must comply with Booklet BR68, a copy of which may be obtained on request from the above address. Please state whether you require it in the English, French or German language.

4. For those studying to sit the Radio Amateurs' Examination from May 1989 a new edition of the free DTI booklet, 'How to become a radio amateur', which contains the full text of the new licence and a summary of the new examination syllabus, may be obtained from the Radio Amateur Licensing Unit at the above address.

5. If any of your questions have not been answered by this Information Sheet, please write to the RSGB at:

Lambda House
Cranborne Road
POTTERS BAR
Herts
EN6 3JW

They will be happy to help you.

AUGUST 1988

JJ3ABX

VALIDATION DOCUMENT

UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND,
THE CHANNEL ISLANDS AND THE ISLE OF MAN

WIRELESS TELEGRAPHY ACT 1949

AMATEUR RADIO LICENCE (.....) CEPT EQUIVALENT LICENCE CLASS .....

(a) Licensee's Name (b) Call Sign .....

.....

(c) Mailing Address (d) Main Station Address
....
....
....
....
....

(e) Date for Renewal .....

This licence (the "Licence") granted on ..... ("Date of Issue") by the Secretary of State for Trade and Industry to the Licensee named in paragraph (a) above under section 1 of the Wireless Telegraphy Act 1949 authorises the Licensee to establish, instal and use sending and receiving apparatus for wireless telegraphy at the Station [as defined in sub-clause 1(10)] in accordance with the Terms and Limitations Booklet BR68 which is incorporated into and forms a part of this Licence.

This Licence also authorises the Licensee to operate in countries which have implemented CEPT Recommendation T/R 61-01 in accordance with clause 11 of Terms and Limitations Booklet BR68.

ISSUED ON BEHALF OF THE SECRETARY OF STATE FOR TRADE AND INDUSTRY
...../...../.....
The Validation Document is issued upon receipt of the current licence fee.

Other Countries which have implemented CEPT Recommendation T/R 61-01

(For guidance see note (y) to Terms and Limitations Booklet BR68)

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THE SCHEDULE TO TERMS AND LIMITATIONS BOOKLET BR68
(AMATEUR RADIO LICENCE (A) AND (B))

Those licensed under an Amateur Radio Licence (B) may not transmit on those bands between 1.810 and 29.700 MHz.

1	2	3	4	5	6
	Status of Allocations in the United Kingdom to:		Maximum Power:		
Frequency bands in MHz	The Amateur Service	The Amateur Satellite Service	Carrier	PEP	Permitted Types of Transmission
1.810-2.000	Available on the basis of non-interference to other services (inside or outside the United Kingdom)	(Not allocated)	9dBW	15dBW	Morse Telephony RTTY Data Facsimile SSTV
3.500-3.800	Primary. Shared with other services				Morse Telephony RTTY
7.000-7.100	Primary	Primary	20dBW	26dBW	Data
10.100-10.150	Secondary	(Not allocated)			Facsimile
14.000-14.250	Primary	Primary			SSTV
14.250-14.350					
18.068-18.168	Available on the basis of non-interference to other services. Antennas limited to horizontal polarisation, maximum gain OdB with respect to a half-wave dipole	(Not allocated)	10dBW	-	Morse, A1A only
21.000-21.450	Primary	Primary	20dBW	26dBW	Morse Telephony RTTY Data Facsimile SSTV
24.890-24.990	Available on the basis of non-interference to other services. Antennas limited to horizontal polarisation, maximum gain OdB with respect to a half-wave dipole	(Not allocated)	10dBW	-	Morse, A1A only
28.000-29.700	Primary	Primary	20dBW	26dBW	Morse Telephony RTTY Data Facsimile SSTV

1	2	3	4	5	6
	Status of Allocations in the United Kingdom to:		Maximum Power:		
Frequency bands in MHz	The Amateur Service	The Amateur Satellite Service	Carrier	PEP	Permitted Types of Transmission
50.00–51.00	Primary. Available on the basis of non-interference to other services outside the United Kingdom. Antennas limited to 20 metres above ground level, with horizontal polarisation only. No Mobile or Maritime Mobile operation		14dBW erp	20dBW erp	Morse Telephony RTTY Data Facsimile SSTV
51.00–52.00	Secondary. Available on the basis of non-interference to other services outside the United Kingdom. Antennas limited to 20 metres above ground level, with horizontal polarisation only. No Mobile or Maritime Mobile operation	(Not allocated)			
70.00–70.50	Secondary. Available on the basis of non-interference to other services outside the United Kingdom		16dBW	22dBW	
144.0–146.0	Primary	Primary	20dBW	26dBW	
430.0–431.0	Secondary. Not available for use within the area bounded by: 53°N 02°E, 55°N 02°E, 53°N 03°W and 55°N 03°W				
431.0–432.0	Secondary. Not available for use: a) within the area bounded by: 53°N 02°E, 55°N 02°E, 53°N 03°W and 55°N 03°W; b) within a 100 km radius of Charing Cross, London (51°30'30"N, 00°07'24"W)	(Not allocated)	10dBW erp	16dBW erp	Morse Telephony RTTY Data Facsimile SSTV FSTV
432.0–435.0					
435.0–438.0	Secondary	Secondary	20dBW	26dBW	
438.0–440.0		(Not allocated)			

1	2	3	4	5	6
	Status of Allocations in the United Kingdom to:		Maximum Power:		
Frequency bands in MHz	The Amateur Service	The Amateur Satellite Service	Carrier	PEP	Permitted Types of Transmission
1240-1260		(Not allocated)			
1260-1270	Secondary	Secondary Earth to Space only			
1270-1325		(Not allocated)			
2310-2400					
2400-2450	Secondary. Users must accept interference from ISM users	Secondary. Users must accept interference from ISM users			
3400-3475		(Not allocated)			
5650-5670	Secondary	Secondary. Earth to Space only			
5670-5680					
5755-5765		(Not allocated)			
5820-5830	Secondary. Users must accept interference from ISM users				Morse Telephony RTTY Data Facsimile SSTV FSTV
5830-5850		Secondary. Users must accept interference from ISM users. Space to Earth only	20dBW	26dBW	
10000-10450	Secondary	(Not allocated)			
10450-10500		Secondary			
24000-24050	Primary. Users must accept interference from ISM users	Primary. Users must accept interference from ISM users			
24050-24250	Secondary. May only be used with the written consent of the Secretary of State. Users must accept interference from ISM users	(Not allocated)			
47000-47200					
75500-76000	Primary	Primary			
142000-144000					
248000-250000					

ISM (Industrial, Scientific and Medical)

NOTES TO THE SCHEDULE

(a) Maximum Power refers to the rf power supplied to the antenna. Maximum power levels will usually be specified by carrier power. For emissions having a suppressed, variable or reduced carrier, the power will be specified by the peak envelope power (pep) under linear conditions.

(b) In the case of frequency bands above 1000 MHz, since high intensities of rf radiation may be harmful, the following safety precaution must be taken. In locations to which people have access, the power flux density on transmit must not exceed the limits recommended by the competent authorities (currently, this limit is 10 mW per square centimetre).

(c) Primary, permitted and secondary services

For the purpose of this Licence, frequency bands allocated to the Amateur Service and the Amateur Satellite Service on a primary basis cannot claim protection from Harmful Interference or Undue Interference from any other authorised services, such protection being afforded only to users whose frequencies have been registered nationally or internationally. In the United Kingdom, individual frequency assignments are not registered in the Amateur Service, except for beacons and repeaters. This applies equally to bands allocated on a secondary basis where stations of the Amateur Service and the Amateur Satellite Service are also required not to cause Harmful Interference or Undue Interference to stations of a primary or permitted service to which frequencies are already assigned or to which frequencies may be assigned at a later date.

(d) Any modulation technique (except for pulse emissions below 1000 MHz) may be used for the types of transmission specified in the sixth column of the Schedule which are defined as follows:

Morse: hand or automatically-sent international morse code

Telephony: speech, including selective calling signals

RTTY: radio teletype and AMTOR

Data: digital codes representing numbers, text, speech, images, measurements, computer programs or other information authorised by the Licence

Facsimile: transmission of fixed or graphic images

SSTV: slow scan (i.e., reduced bandwidth) television

FSTV: fast scan television.

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(e) Interpretation

(i) Carrier Power: The average power supplied to the antenna by a transmitter during one radio frequency cycle taken under the condition of no modulation.

(ii) Effective Radiated Power (erp): The product of the power supplied to the antenna and its gain in the direction of maximum radiation.

(iii) Gain of an Antenna: The ratio, usually expressed in decibels, of the power required at the input of a loss free reference antenna to the power supplied to the input of the antenna to produce, in a given direction, the same field strength or the same power flux-density at the same distance. When not otherwise specified, the gain refers to the direction of maximum radiation. The gain may be considered for a specified polarisation. The reference antenna is usually a half-wave dipole. The gain may be referred to as decibels relative to a half-wave dipole (dBd).

(iv) Mean Power: The average power supplied to the antenna by a transmitter during an interval of time which is sufficiently long relative to the lowest frequency encountered in the modulation taken under normal operating conditions.

(v) Peak Envelope Power (pep): The average power supplied to the antenna by a transmitter during one radio frequency cycle at the crest of the modulation envelope taken under normal operating conditions.

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AMATEUR RADIO LICENCE (A) OR (B)
TERMS AND LIMITATIONS BOOKLET BR68

These terms and limitations shall be read as an integral part of the Amateur Radio Licence (A) or (B).

CONDITIONS OF USE

Purpose

1. (1) The Licensee shall use the Station for the purpose of self-training in communication by wireless telegraphy, which use (without limiting the generality of the foregoing) includes technical investigations.

(2) The Licensee may use or permit the use of the Station, as part of his self-training in communication by wireless telegraphy, during any operation conducted by a User Service [defined in sub-clause 12(1)(q)] or during any exercise relating to such an operation for the purpose of sending Messages on behalf of the User Service to other licensed amateur stations.

(3) Notwithstanding sub-clauses 1(1) and 1(4)(a) of this Licence and subject to the limitations in paragraphs 2, 3, 4, 5, 6 and 8 of Resolution 640 of the International Telecommunication Union, the Licensee may use the following frequency bands to meet the needs of international disaster communications: 3.5 MHz to 3.8 MHz, 7.0 MHz to 7.1 MHz, 10.10 MHz to 10.15 MHz, 14.00 MHz to 14.35 MHz, 18.068 MHz to 18.168 MHz, 21.00 MHz to 21.45 MHz, 24.89 MHz to 24.99 MHz and 144 MHz to 146 MHz.

Messages

(4) The Licensee shall address Messages only to other licensed amateurs or the stations of licensed amateurs and shall send only:
(a) Messages relating to technical investigations or remarks of a personal character; or
(b) Signals (not encyphered) which form part of, or relate to, the transmission of Messages.

(5) "Messages" and "Signals" include communication by:
(a) telephony;
(b) morse telegraphy;
(c) visual communications (which include slow scan television (SSTV), fast scan television (FSTV) and facsimile); and
(d) digital communications (which include data, radio teletype (RTTY) and amateur teleprinting over radio (AMTOR)).

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(6) The Licensee may use codes and abbreviations for communications as long as they do not obscure the meaning of, but only facilitate, the communications.

(7) The Licensee shall not send Messages (other than initial calls) for general reception by licensed amateurs, but shall send Messages only to:
(a) individual licensed amateurs; or
(b) groups of licensed amateurs as long as communication is first established separately with at least one licensed amateur in any such group.

(8) The Licensee shall not transmit such material as music, public broadcasts or speeches.

Location

(9) Subject to clause 11, the Licensee shall operate the Station only:
(a) at the Main Station Address ("Main Station Address" means the main station address of the Licensee set forth in paragraph (d) of the Validation Document);
(b) at a Temporary Location ("Temporary Location" means a location, other than the Main Station Address, in the United Kingdom, and in a fixed position);
(c) while Mobile ("Mobile" means located in the United Kingdom in any vehicle, as a pedestrian or on any Vessel in Inland Waters); or
(d) while Maritime Mobile ("Maritime Mobile" means located on any Vessel At Sea).

(10) "Station" means the station of the Licensee at the Main Station Address, a Temporary Location or while Mobile or Maritime Mobile, as the case may be.

(11) The Licensee shall give prior written notice to the Secretary of State at the address specified in note (a) to this Booklet of any change in the Main Station Address (or mailing address, if different).

Standard Frequency Service

(12) The Licensee may use the Station for the reception of transmissions in the Standard Frequency Service (a radiocommunication service for scientific, technical and other purposes, providing the transmission of specific frequencies of stated high precision, intended for general reception).

LIMITATIONS ON USE

2. (1) Subject to other, more specific, terms in this Licence, the Licensee shall only use:

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(a) the frequency bands specified in the first column of the Schedule to this Licence subject to the limitations set out in the second and third columns of the Schedule;
(b) a power relating to such frequency bands not exceeding the maximum specified in the fourth and fifth columns of the Schedule; and
(c) the types of transmissions specified in the sixth column of the Schedule.

(2) If the Licence is an Amateur Radio Licence (B), the then Licensee:
(a) shall transmit only in the frequency bands above 30 MHz specified in the first column of the Schedule;
(b) may receive Messages on the frequency bands below 30 MHz listed in the first column of the Schedule as long as he transmits only in the bands above 30 MHz specified in the first column of the Schedule.

(3) The Licensee may receive Messages from an overseas amateur on a frequency band not specified in the first column of the Schedule as long as the Licensee transmits only in a band specified in the first column of the Schedule which is authorised under sub-clause 2(1) or (2).

Unattended Operation

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

(i) in the frequency bands including and above 70 MHz specified in the first column of the schedule (except the bands 144 MHz to 146 MHz, 430 MHz to 435 MHz, 438 MHz to 440 MHz, 1240 MHz to 1325 MHz and 24050 MHz to 24250 MHz and the sub-bands 435.0 MHz 436.60 MHz, 436.8 MHz to 438.0 MHz, 1,250 MHz to 1,270 MHz and 10300 MHz to 10400 MHz), with a maximum power of 14 dBW erp carrier or pep,

(ii) for the purpose of direction finding competitions, in the frequency bands 28.0 MHz to 29.7 MHz (when the Licensee is operating under an Amateur Radio Licence (A)) or 144 MHz to 146 MHz, with a maximum power of 14 dBW erp carrier or pep

which is capable of transmitting the call sign of the Licensee periodically (in accordance with clause 7) and capable of being switched off within two hours of a demand to close down given by a person authorised by the Secretary of State;

(b) of a low power device to control apparatus at the Main Station Address or a Temporary Location by remote control, in the frequency bands including and above 70 MHz (except the bands 144 MHz to 146 MHz, 430 MHz to 435 MHz, 438 MHz to 440 MHz, 1240 MHz to 1325 MHz and 24050 MHz to 24250 MHz and the sub-bands 435.0 MHz to 436.6 MHz, 436.8 MHz to 438.0 MHz, 10250 MHz to 10270 MHz and 10300 MHz to 10400 MHz) specified in the first column of the Schedule, with a maximum power of −20 dBW erp carrier or pep: in such a way that no electromagnetic energy capable of reception by any station or apparatus outside the curtilage of the premises in which the Station is situated is emitted from the Station; or
(c) by digital communications at the Main Station Address or at a Temporary Location notified in accordance with sub-clause 7(3)(b),
(i) in the frequency band 50 MHz, with a maximum power of 10 dBW erp carrier or pep, or

(ii) in the frequency bands including and above 144 MHz specified in the first column of the Schedule (except the bands 430 MHz to 435 MHz, 438 MHz to 440 MHz, 1240 MHz to 1325 MHz and 24050 MHz to 24250 MHz and the sub-bands 435.0 MHz to 436.6 MHz, 436.8 MHz to 438.0 MHz, 10250 MHz to 10270 MHz and 10300 MHz to 10400 MHz) with a maximum power of 14 dBW erp carrier or pep.

(5) The Licensee shall not conduct the Unattended Operation of a beacon unless he has given at least 7 days' written notice of the location (within 5 km), period of operation, frequency, power (dBW), identity of other users of wireless telegraphy who share the site and shut down procedures of the beacon to the Manager of the Radio Investigation Service office in whose district the operation is to take place. The Manager may, before the commencement of operation of the beacon, prohibit the Unattended Operation of the beacon or allow the operation on compliance with the conditions which he may specify.

(6) The Licensee is not required to log the operation of a low power device under sub-clause 2(4)(b), although he shall log the operation of the Station in accordance with clause 6.

Pulse Emissions

(7) The Licensee shall not use pulse emissions:
(a) on frequency bands below 1000 MHz;
(b) with a mean power which exceeds the carrier power; or
(c) with a peak power which exceeds the pep.

Operators

(8) The Licensee shall operate or permit the operation of the Station only under the terms and limitations of this Licence and the Station shall be operated only:
(a) by the Licensee personally (except in the case of Unattended Operations under sub-clause 2(4)); or
(b) in the presence of and under the direct supervision of the Licensee:
(i) by a person who holds a current United Kingdom Amateur Radio Licence,

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(ii) by a person who holds a Radio Amateurs' Examination Certificate issued by the City and Guilds of London Institute or an Amateur Radio Certificate issued by the Secretary of State,
(iii) by a CEPT Amateur visiting the United Kingdom who is operating in accordance with clause 10, or
(iv) by a representative of a User Service in accordance with sub-clause 1(2).

(9) The Licensee may permit any person to type the Message of the Licensee for transmission by the Licensee from the Station.

Vessels

(10) On a Vessel, the Licensee shall:
(a) instal, use or make changes to the Station only with the written permission of the Vessel's master; and
(b) observe radio silence on the advice of the Vessel's master.

(11) When on a Vessel in international waters, the Licensee shall use only those frequency bands which, in accordance with the Radio Regulations, have an allocation to the amateur service in the International Telecommunication Union (ITU) region being visited.

Aircraft

(12) The Licensee shall not establish or use the Station in any aircraft or other airborne vehicle.

OTHER REQUIREMENTS

3. (1) The Licensee shall hold:
(a) a Radio Amateurs' Examination Certificate issued by the City and Guilds of London Institute; and
(b) in the case of an Amateur Radio Licence (A), either an Amateur Radio Certificate issued by the Secretary of State or an Amateur Morse Test Pass Slip issued on behalf of the Secretary of State; or
any other qualification recognised by the Secretary of State.

(2) The Licensee shall comply with:
(a) the relevant provisions of the Telecommunication Convention and Radio Regulations unless such compliance would result in a breach of the Licence; and
(b) all relevant statutory enactments including (without limiting the generality of the foregoing) the Act, the Wireless Telegraphy Act 1967 and the Telecommunications Act 1984.

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(3) The Licensee shall:
(a) have no pecuniary interest (direct or indirect) in any operations conducted under this Licence; and
(b) except as provided by sub-clauses 1(2) and (3) and except in the case of activities on behalf of a non-profit organisation established for the furtherance of amateur radio, not use the Station for business, advertisement or propaganda purposes including (without limiting the generality of the foregoing) the sending of news or messages of, or on behalf of, or for the benefit or information of, any social, political, religious or commercial organisation.

APPARATUS

4. (1) The Licensee shall ensure that:
(a) the emitted frequency of the apparatus comprised in the Station is as stable and as free from Unwanted Emissions as the state of technical development for amateur radio apparatus reasonably permits; and
(b) whatever class of emission is in use, the bandwidth occupied by the emission is such that not more than 1% of the mean power of the transmission (not including the power contained in spurious emissions) falls outside the frequency band.

(2) Notwithstanding any other term of this Licence, the Licensee shall ensure that the apparatus comprised in the Station is designed and constructed, and maintained and used, so that its use does not cause any Undue Interference or Harmful Interference to any wireless telegraphy.

(3) If any Undue Interference or Harmful Interference to wireless telegraphy is caused by the radiation of Unwanted Emissions or field strengths from the Station, then the Licensee shall suppress the Unwanted Emissions or field strengths to the degree satisfactory to the Secretary of State.

(4) The Licensee shall conduct tests from time to time to ensure that the requirements of this clause 4 are met.

(5) The Station shall be capable of receiving Messages on the same frequencies and with the same classes of emission in use for the transmission of Messages by the Station.

RECORDED OR RETRANSMITTED MESSAGES

5. (1) The Licensee may record and retransmit Messages addressed to the Licensee from other licensed amateurs:
(a) with whom the Licensee is in direct communication; or
(b) which are intended for retransmission to a specified licensed amateur.

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(2) The Licensee may send Messages by (or as part of) the intermediate relaying of the Messages to or from other licensed amateurs.

(3) When recording and retransmitting the Message of another licensed amateur, if the Licensee also records and retransmits the call sign of the licensed amateur, then the Licensee shall transmit the call sign in such a way that the origin of the Message and the origin of the retransmission are clear.

(4) When operating under sub-clauses 5(1)(b) and (2), the Licensee is not responsible for the content of Messages sent by digital communications which did not originate at the Station when he could not reasonably be expected to review their content (and did not review their content) before relaying them.

(5) Notwithstanding sub-clauses 5(1) and (2), the Licensee shall not operate
(a) a mailbox or bulletin board (each being a facility which receives and stores Messages for or on behalf of other licensed amateurs for retransmission at a later time on the request of (and to) the intended recipient of the Message); or
(b) a telephony repeater (a facility which receives and simultaneously retransmits Messages by telephony for or on behalf of other licensed amateurs).

LOG

6. (1) Subject to sub-clause 2(6), the Licensee shall keep a permanent record (the "Log") of all wireless telegraphy transmissions at the Main Station Address and all Temporary Locations showing:
(a) dates of transmission;
(b) the times (in Coordinated Universal Time (UTC)) during each day of:
(i) the first and last transmissions from the Station (except when using automatic operations involving digital communications), or
(ii) switching the Station on and off for the purpose of enabling transmissions (when using automatic operations involving digital communications), and
changing the frequency band, class of emission or power;
(c) frequency band of transmission or, in an Unattended Operation, the specific frequency employed;
(d) class of emission;
(e) power;
(f) initial calls("CQ" calls) (whether or not they are answered);
(g) except during automatic operations involving digital communications, the call sign of licensed amateurs or licensed amateur stations with which communications have been established (not including those amateurs or stations which form part of the intermediate relay of Messages);
(h) details of tests carried out in accordance with sub-clause 4(4); and
(i) location when the station is operated at a Temporary Location.

(2) The Log shall be written in a book or maintained on a magnetic tape or disc.

(3) Where the Log is maintained:
(a) in a book, the book shall not be loose-leaf and no gaps shall be left between the entries;
(b) on a magnetic tape or disc, the tape or disc shall be used only to keep the Log.

(4) The Licensee shall keep the Log for inspection by a person authorised by the Secretary of State for at least six months from the date of the last entry whether or not this Licence has expired or been revoked.

(5) The Licensee shall record in the Log those matters required to be recorded by a person authorised by the Secretary of State for the period specified by that person.

IDENTIFICATION

7. (1) During transmissions, the Licensee shall transmit the call sign specified in paragraph (b) of the Validation Document:
(a) during initial calls ("CQ" calls);
(b) at the beginning and at the end of each period of communication with a licensed amateur and when the period of communication is longer than 15 minutes, at the end of each interval of 15 minutes;
(c) at the beginning of transmission on a new frequency (whenever the frequency of transmission is changed);
(d) by the same type of transmission that is being used for the communication;
(e) on the same carrier frequency that is being used for the communication; and
(f) by morse telegraphy or telephony at the end of each 30 minute period during which transmissions are sent from the Station (unless already transmitting in morse telegraphy or telephony).

(2) When another person is using the Station under the Licence in accordance with sub-clause 2(8)(b), the Licensee shall ensure that the call sign specified in paragraph (b) of the Validation Document is transmitted in accordance with sub-clause 7(1).

(3) At a Temporary Location, the Licensee shall:
(a) use the suffix "/P" with his call sign and give the location of the Station to an accuracy of at least 5 km by a

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generally used identifier [for guidance see note (v) to this Booklet], or
(b) give prior written notice of the location to the Manager of the Radio Investigation Service office in whose district the operation is to take place.

(4) When Mobile, the Licensee shall use the suffix "/M" and when Maritime Mobile, the suffix "/MM".

(5) When away from the Main Station Address, the Licensee shall use the appropriate Regional Secondary Locator specified in note (w) to this Booklet.

(6) When operating a low power device under sub-clause 2(4)(b), this clause 7 shall not apply to the operation of the low power device (although this clause 7 shall continue to apply to the operation of the Station).

INSPECTION AND CLOSE DOWN

8. (1) The Licensee shall permit a person authorised by the Secretary of State:
(a) to have access to the Station, and
(b) to inspect the Licence and Log and to inspect and test the apparatus of the Station
at any and all reasonable times (or when, in the opinion of the Secretary of State, an urgent situation exists, at any time) for the purpose of verifying compliance with the terms of the Licence.

(2) When, in the opinion of the Secretary of State:
(a) the Licensee is in breach of the Licence; and
(b) the breach justifies immediate restriction or close down,
the Licensee shall restrict the operation of, or close down and cease to operate, the Station (or any apparatus comprised in the Station) forthwith in accordance with the demand of a person authorised by the Secretary of State for the temporary period specified in the demand.

(3) When Maritime Mobile, the Licensee shall cease to operate the Station on the demand of the Vessel's master.

(4) For the purposes of sub-section 1(4) of the Act, this Licence may be revoked, or its terms, provisions or limitations varied, by a notice in writing of the Secretary of State served on the Licensee, or by a general notice addressed to all holders of an Amateur Radio Licence (A) or Amateur Radio Licence (B) published in the London, Edinburgh and Belfast Gazettes or broadcast nationally by the British Broadcasting Corporation.

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PERIOD OF LICENCE AND FEES DUE

9. (1) Subject to the payment of the fee in the manner indicated in sub-clause 9(2), this Licence shall continue in force from year to year unless revoked by the Secretary of State.

(2) The Licensee shall pay to the Secretary of State before the anniversary date of the Date of Issue in each year, the fee on renewal prescribed by the Regulations for the time being in force under sub-section 2(1) of the Act, and on the payment of the fee the Secretary of State will issue to the Licensee a document in the form of the title page of this Licence (the "Validation Document") which will indicate the next date for renewal.

(3) If the Licensee does not pay the fee in the manner described in sub-clause 9(2), then the Licence shall expire at the end of the day before the relevant anniversary date of the Date of Issue.

(4) The Licensee shall surrender the Validation Document to the Secretary of State forthwith upon the revocation of the Licence.

(5) Any licence, however described, which the Secretary of State has previously granted to the Licensee under the Act in respect of the Station is revoked.

(6) Sub-clauses 9(1), (2) and (3) do not apply to a temporary licence.

OPERATIONS BY CEPT AMATEURS IN ACCORDANCE WITH CEPT RECOMMENDATION T/R 61-01

10. The following additional provisions apply to licensed non-resident amateurs temporarily visiting and operating wireless telegraphy apparatus in the United Kingdom in accordance with CEPT Recommendation T/R 61-01, as enabled by statutory instrument ("CEPT Amateurs").

(1) CEPT Amateurs may operate in the United Kingdom under a CEPT equivalent licence which is:
(a) valid and in force;
(b) not temporary; and
(c) issued by an administration which
(i) has implemented CEPT Recommendation T/R 61-01, and
(ii) permits persons licensed to use amateur stations under section 1 of the Act to use such stations in its territory (with or without conditions) without making application in that behalf.

(2) CEPT Amateurs shall transmit their home call sign after:
(a) the United Kingdom call sign prefix 'G';
(b) followed by the appropriate Regional Secondary Locator (if any); and

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(c) followed by the symbol '/'
[for guidance see note (w) to this Booklet].

(3) Subject to this clause 10, CEPT Amateurs shall comply with:
(a) the terms of their CEPT equivalent licence, unless such compliance would result in a breach of the requirements of the United Kingdom;
(b) this Terms and Limitations Booklet BR68 (insofar as its terms and limitations may reasonably be applied); and
(c) the relevant provisions of CEPT Recommendation T/R 61-01.

(4) CEPT Amateurs who possess the equivalent of a CEPT Class 2 licence shall use only those frequencies above 144 MHz specified in the first column of the Schedule.

(5) CEPT Amateurs shall operate only:
(a) a mobile or a portable station (which includes a station powered from the mains electricity at a temporary fixed location such as an hotel); or
(b) the station of an amateur licensed under the Act.

OPERATIONS BY THE LICENSEE IN ACCORDANCE WITH CEPT RECOMMENDATION T/R 61-01

11. Subject to sub-clause 11(2), the Licensee may operate in countries which have implemented CEPT Recommendation T/R 61-01 in accordance with the following terms.
(1) The Licensee shall:

(a) be a temporary visitor and non-resident in the host country;
(b) operate only:
(i) a mobile or a portable station (which includes a station powered from the mains electricity at a temporary fixed location such as an hotel), or
(ii) the station of an amateur licensed by the relevant authority in the host country;
(c) comply with the requirements applicable to the use of wireless telegraphy apparatus at the location of operation in the host country;
(d) comply with this Licence unless such compliance would result in a breach of the requirements of the host country;
(e) present this Licence upon request to the relevant supervisory authorities in the host country;
(f) if he possesses an Amateur Radio Licence (B), use only those frequencies above 144 MHz authorised for use by licensed amateurs in the host country;
(g) use his home call sign after the appropriate host country call sign prefix; and
(h) comply with the relevant provisions of CEPT Recommendation T/R 61-01.

(2) If this Licence is a temporary Licence, then the Licensee shall not operate under this clause 11.

INTERPRETATION

12. (1) In this Licence, unless the context otherwise requires:
(a) words and expressions have the same meaning as they have in the Act and the words "station" and "apparatus" have the meanings ascribed to the expressions "station for wireless telegraphy" and "wireless telegraphy apparatus", respectively, in section 19 of the Act;
(b) words importing the masculine include the feminine, words in the singular include the plural and words in the plural include the singular;
(c) the expression "Coordinated Universal Time" has the same meaning as it has in the Radio Regulations [for guidance see note (s) to this Booklet];
(d) any reference to a statute in this Licence includes a reference to that statute and to any statutory instruments made under that statute as the statute or statutory instrument may be amended from time to time and to any other statute or statutory instrument that has the effect of adding to, replacing or superseding the statute or statutory instrument, whether before or after the Date of Issue;
(e) "Act" means the Wireless Telegraphy Act 1949;
(f) "At Sea" means in the Tidal Waters or territorial sea of the United Kingdom or in international waters;
(g) "CEPT" means the European Conference of Postal and Telecommunications Administrations;
(h) "Harmful Interference" means interference which endangers the functioning of a radio navigation service or of other safety services or seriously degrades, obstructs or repeatedly interrupts a radiocommunication service operating in accordance with the relevant governmental requirements;
(i) "Inland Waters" means any canal, river, lake, loch or navigation which is not Tidal Water;
(j) "Licensee" means the licensee named in paragraph (a) of the Validation Document or a CEPT Amateur [as defined in clause 10], as the case may be;
(k) "Secretary of State" means the Secretary of State for Trade and Industry;
(l) "Telecommunication Convention" and "Radio Regulations" mean the International Telecommunication Convention and the Radio Regulations thereunder and include any Convention or Regulation which may from time to time be enacted or brought into force in substitution for, in amendment of, or in addition to, the Telecommunication Convention or Radio Regulations;

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(m) "Tidal Water" means any part of the sea or a river within the ebb and flow of the tide at ordinary spring tides;
(n) "Undue Interference" means interference to wireless telegraphy which, in the opinion of the Secretary of State, goes beyond that which is appropriate or warranted in all of the circumstances;
(o) "United Kingdom" means the United Kingdom of Great Britain and Northern Ireland, the Channel Islands and the Isle of Man;
(p) "Unwanted Emissions" means spurious emissions and out-of-band emissions as defined in the Radio Regulations;
(q) "User Service" means the British Red Cross Society, the St John Ambulance Brigade, the St Andrew's Ambulance Association, the County, Chief, Regional or Islands Emergency Planning Officer or any United Kingdom police force, fire or ambulance service, health authority, government department or public utility; and
(r) "Vessel" includes a hovercraft and any other floating structure which is capable of being manned.

(2) The Licence consists of the Validation Document, Terms and Limitations Booklet BR68, the Schedule to the Booklet and the Notes to the Schedule, as any of them may be varied from time to time.

(3) References to a certificate issued by the Secretary of State include references to a certificate issued or granted by the Secretary of State for the Home Department, the Postmaster General or the Minister of Posts and Telecommunications.

(4) The headings in this Licence are for ease of reference only and shall not affect the interpretation of the Licence.

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NOTES TO TERMS AND LIMITATIONS BOOKLET BR68

(a) Remittances and correspondence should be sent to the Radio Amateur Licensing Unit, Post Office Counters Ltd, Chetwynd House, Chesterfield, Derbyshire S49 1PF, Tel: 0246 217555/217699. Do not send the Licence when making remittances.

(b) A list of Radio Investigation Service district offices (see sub-clauses 2(5) and 7(3)) may be obtained from the address given in note (a).

(c) If any message, the receipt of which is not authorised by this Licence, is received by means of the Station, neither the Licensee nor any person using the Station should make known the contents of any such message, its origin or destination, its existence or the fact of its receipt to any person except an authorised officer of Her Majesty's Government or a competent legal tribunal, or retain any copy or make any use of such message, or allow it to be reproduced, copied or made use of. It is an offence under section 5 of the Act deliberately to receive messages the receipt of which is unauthorised or (except in the special circumstances mentioned in that section of the Act) to disclose any information as to the contents, sender or addressee of any such message.

(d) It is an offence to send certain misleading messages, viz:
"Any person who -
(a) by means of wireless telegraphy, sends or attempts to send, any message which, to his knowledge, is false or misleading and is, to his knowledge, likely to prejudice the efficiency of any safety of life service or endanger the safety of any person or of any vessel, aircraft or vehicle, and, in particular, any message which, to his knowledge, falsely suggests that a vessel or aircraft is in distress or in need of assistance or is not in distress or not in need of assistance;" (underlining added) (Section 5, WT Act 1949).

(e) This Licence does not authorise the doing of any act which is an infringement of any copyright which may exist in the communication sent or received.

(f) Notwithstanding sub-clause 2(2)(a), if the Licensee holds an Amateur Radio Licence (B), then he may transmit on frequency bands below 30 MHz if he is operating under the licence of, in the presence of, and under the direct supervision of a person who holds an Amateur Radio Licence (A).

(g) References to the operation of the Station include references to the speaking into the microphone comprised in the Station.

(h) Any operation under this Licence must also comply with the "General Licence for Wireless Telegraphy Systems" issued under the Post Office Act 1969 and continued in force under the

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Telecommunications Act 1984. Copies of the General Licence are available from the Office of Telecommunications, Atlantic House, Holborn Viaduct, London EC1N 2HQ.

(i) It is an offence under the Wireless Telegraphy (Content of Transmission) Regulations 1988 to send a message, communication or other matter in whatever form that is grossly offensive or of an indecent, obscene or menacing character.

(j) If the Station is situated within 1 km of the boundary of an aerodrome, then the height of the antenna or any mast or structure supporting it must not exceed 15 m above ground level. An antenna which crosses above, or is liable to fall or to be blown on to, any overhead power wire (including electric lighting) or power apparatus must be guarded to the reasonable satisfaction of the owner of the power wire or power apparatus.

(k) This Licence does not absolve the Licensee from obtaining any necessary consent before entering on private or public property (including a public transport vehicle) with any apparatus.

(l) Sub-clause 4(2) of the Licence requires that the apparatus in the Station be so designed, constructed, maintained and used that the use of the Station does not cause any Undue Interference or Harmful Interference with any wireless telegraphy. In order to prevent interference due to close coupling of antennas, the antenna used for the Station should be sited as far as possible from any existing television or other receiving antennas. This is particularly important in the case of the installation of an indoor transmitting antenna, eg, in a loft, where transmissions may be conducted through the electricity supply wiring. In some circumstances it might not be possible to use an indoor antenna. In densely populated areas sufficient separation of the amateur equipment from surrounding transmitters, receivers and electronic equipment may not be possible to permit the amateur to operate with high power without the high probability of causing interference. Adjacent transmitters may produce intermodulation products on other frequencies and excessive field strengths may cause breakthrough even in receivers which display an adequate level of immunity to unwanted transmissions. While owners of receivers should take steps to ensure that their apparatus has a reasonable standard of immunity, in some circumstances the amateur may need to modify his transmission practice to minimise a problem to neighbours.

(m) In the event of a demand by an authorised officer to close down or restrict the operation of the Station under sub-clause 8(2), the Licensee must act in accordance with the demand immediately. He will at that time be given oral reasons for the demand and will have an opportunity to provide reasons why the demand should not be met. If the demand is affirmed, then it will be confirmed in writing to the Licensee as soon as practicable. Written reasons will be given by a Manager of the Radio Investigation Service and the Licensee will again be invited to comment. The temporary period referred to in sub-clause 8(2) will usually be 28 days, but may be a greater or lesser period as the circumstances warrant. Where appropriate and where circumstances allow the Radio Investigation Service will be available to discuss with the Licensee how a breach of Licence might be corrected, however, if the Licensee does not comply with the demand or if the breach resulting in the demand is not rectified within a reasonable period of time to the satisfaction of the Secretary of State, then revocation or variation of Licence procedures may be commenced under sub-section 1(4) of the Act or a prosecution may be initiated (depending on the circumstances of each case).

(n) Sub-section 19(5) of the Act applies for the purposes of this Licence as it applies for the purposes of the Act:

> "In considering for any of the purposes of this Act, whether, in any particular case, any interference with any wireless telegraphy caused or likely to be caused by the use of any apparatus, is or is not undue interference, regard shall be had to all the known circumstances of the case and the interference shall not be regarded as undue interference if so to regard it would unreasonably cause hardship to the person using or desiring to use the apparatus."

(o) The bandwidths of emissions should be such as to ensure the most efficient utilisation of the spectrum; in general this requires that bandwidths be kept at the lowest values which technology and the nature of the service permit. Where bandwidth-expansion techniques are used, the minimum spectral power density consistent with efficient spectrum utilisation should be employed.

(p) Under section 1 of the Act, it is an offence to use any station or apparatus otherwise than under and in accordance with a licence granted by the Secretary of State. The Licensee is responsible for ensuring that at all times persons operating under this Licence observe its terms and limitations. Breach of this provision may result in prosecution of the Licensee or operator and the revocation of this Licence.

(q) The Licence is not transferable.

(r) No Log need be kept in respect of Mobile and Maritime Mobile operations.

(s) For the purposes of the Licence, "Coordinated Universal Time" may be regarded as equivalent to Greenwich Mean Time (GMT).

(t) Codes for classes of emission

Under the Telecommunication Convention, classes of emission are designated by groups of a minimum of three characters.
The symbols used to designate classes of emission are listed in the Radio Regulations of which the following is a full list.

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FIRST SYMBOL - Type of modulation of the main carrier

N Emission of unmodulated carrier

Emission in which the main carrier is amplitude modulated (including cases where sub-carriers are angle modulated):

A Double sideband
H Single sideband, full carrier
R Single sideband, reduced or variable level carrier
J Single sideband, suppressed carrier
B Independent sidebands
C Vestigial sideband

Emission in which the main carrier is angle modulated:

F Frequency modulation
G Phase modulation

D Emission in which the main carrier is amplitude and angle modulated either simultaneously or in a pre-established sequence

Emission of pulses:

P Sequence of unmodulated pulses
A sequence of pulses:
K Modulated in amplitude
L Modulated in width/duration
M Modulated in position/phase
Q In which the carrier is angle modulated during the period of the pulse
V Which is a combination of the foregoing or is produced by other means

NB: Emissions where the main carrier is directly modulated by a signal which has been coded into quantised form (eg, pulse code modulation) should be designated by A, H, R, J, B, C, F or G as appropriate.

W Cases not covered above, in which an emission consists of the main carrier modulated, either simultaneously or in a pre-established sequence, in a combination of two or more of the following modes: amplitude, angle, pulse

X Cases not otherwise covered

NB: For the purpose of this Licence, modulation used only for short periods and for incidental purposes, such as identification or calling, may be ignored when calculating the emission designator. Double sideband emissions with reduced or suppressed carrier are included in the first character A.

SECOND SYMBOL - Nature of signal(s) modulating the main carrier

0 No modulating signal

1 A single channel containing quantised or digital information without the use of a modulating subcarrier (excluding time-division multiplex)

2 A single channel containing quantised or digital information with the use of a modulating subcarrier (excluding time-division multiplex)

3 A single channel containing analogue information

7 Two or more channels containing quantised or digital information

8 Two or more channels containing analogue information

9 Composite system with one or more channels containing quantised or digital information, together with one or more channels containing analogue information

X Cases not otherwise covered

THIRD SYMBOL - Type of information to be transmitted (in this context, the word "information" does not include information of a constant, unvarying nature such as that provided by standard frequency emissions or continuous wave or pulse radars).

N No information transmitted

A Telegraphy - for aural reception

B Telegraphy - for automatic reception

C Facsimile

D Data transmission, telemetry, telecommand

E Telephony

F Television (video)

W Combination of the above

X Cases not otherwise covered

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The following examples of classes of emission and their symbols are given for the purpose of guidance only:

Telephony (speech):	
Single side band, suppressed carrier (SSB)	J3E
Frequency modulation (FM)	F3E
Phase modulation (PM)	G3E
Amplitude modulation (AM)	A3E
Morse:	
Hand sent, on/off keying of the carrier	A1A
Hand sent, on/off keying of the audio tone (FM transmitter)	F2A
Automatic reception, on/off keying of the carrier	A1B
RTTY/AMTOR:	
Direct frequency shift keying of the carrier	F1B
Frequency shift keyed audio tone (FM transmitter)	F2B
Frequency shift keyed audio tone (SSB transmitter)	J2B
Packet/Data:	
Direct frequency shift keying of the carrier	F1D
Frequency shift keyed audio tone (FM transmitter)	F2D
Frequency shift keyed audio tone (SSB transmitter)	J2D
Television:	
Vestigial sideband (AM transmitter)	C3F
Slow scan television (SSB transmitter)	J2F
Facsimile:	
Frequency shift keyed audio tone (SSB transmitter)	J2C

(u) When telephony is used, the letters of the call sign may be confirmed by the pronouncement of well-known words of which the initial letters are the same as those in the call sign. The phonetic alphabet contained in Appendix 24 of the Radio Regulations, reproduced below, should be used:

A	Alfa	J	Juliett	S	Sierra
B	Bravo	K	Kilo	T	Tango
C	Charlie	L	Lima	U	Uniform
D	Delta	M	Mike	V	Victor
E	Echo	N	November	W	Whiskey
F	Foxtrot	O	Oscar	X	X-ray
G	Golf	P	Papa	Y	Yankee
H	Hotel	Q	Quebec	Z	Zulu
I	India	R	Romeo		

(v) When the Station must be identified in accordance with sub-clause 7(3)(a), it is recommended that one of the following location identifiers be used:

(i) the full postcode,
(ii) latitude and longitude in degrees and minutes,
(iii) National Grid Reference correct to six figures,

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(iv) International Amateur Radio Union (IARU) locator, or
(v) the address or other geographical description correct to 1 km.

(w) The following Regional Secondary Locators should be used immediately after the United Kingdom prefix 'G' when identifying the Station in accordance with sub-clauses 7(5) or 10(2) of this Booklet:

D	Isle of Man
I	Northern Ireland
J	Jersey
M	Scotland
U	Guernsey
W	Wales
(No secondary locator)	England.

(x) When identifying in accordance with clause 7, please observe the following extract from article 25 of the Radio Regulations (Regulations 2071 to 2075):

"Identification signals shall wherever practicable be in one of the following forms:
(a) speech, using simple amplitude or frequency modulation;
(b) international morse code transmitted at manual speed;
(c) a telegraph code compatible with conventional printing equipment;
(d) any other form recommended by the CCIR (International Radio Consultative Committee)"

(y) CEPT member countries which have implemented CEPT Recommendation T/R 61-01 are listed in the Validation Document by abbreviation. These abbreviations are given solely for the purpose of the Validation Document and are not the country prefixes for use when identifying under sub-clause 11(1)(g). CEPT member countries are identified by abbreviations as follows:

A	Austria	M	Malta
B	Belgium	MC	Monaco
CY	Cyprus	NL	Netherlands
DK	Denmark	N	Norway
SF	Finland	P	Portugal
F	France	RSM	San Marino
D	Germany (FRG)	E	Spain
GR	Greece	S	Sweden
IS	Iceland	CH	Switzerland
IRL	Ireland	TR	Turkey
I	Italy	SCV	Vatican City
FL	Liechtenstein	YU	Yugoslavia
L	Luxembourg		

(z) CEPT Recommendation T/R 61-01 does not deal with the import or export of amateur apparatus which is subject to the relevant requirements of the countries visited.

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(aa) Amateur apparatus operating only in the frequency band 28.0 MHz to 29.7 MHz may not be imported, manufactured or assembled in the United Kingdom without specific authority. Requests for such authority should be addressed to the Department of Trade and Industry, Radio Investigation Service, Room 102, Waterloo Bridge House, Waterloo Road, London SE1 8UA. "Manufacture" includes conversion.

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RSGB LIAISON OFFICERS

Your local RLO is there to help you get the best out of amateur radio

If you have a query about:
- how do I get started in amateur radio?
- where is my nearest amateur radio club?
- where can I find an RAE course?
- who is the local expert on . . . ?
- who in RSGB do I contact about . . . ?
- . . . then please contact you local RLO

He or she will know the answer to your question or the best contact for the specialist answer. Remember your RLO may well be very local to you, and being a volunteer may be contacted during the early evening when telephone calls are cheap.

Avon (Zone D) – Shaun O'Sullivan, G8VPG, 15 Witney Close, Saltford, Bristol, BS18 3DX. Tel: 0225-873098
Bedfordshire (Zone B) – John S Smith, G4KJJ, 30 Rookery Close, St Ives, Cambridgeshire PE17 4FX. Tel: 0480-68330
Berkshire (Zone D) – Dave Chislett, G4XDU, Hilltops, 2a st Marks Road, Maidenhead, Berks SL6 6DA. Tel: 0628 25720 (work: 01-977 3252 ext 2267 or 2268)
Borders (Zone G) – Ian Wilson, GM4UPX, 30 Howdenburn Court, Jedburgh, Roxburgh, TD8 6JP. Tel: 0835-62656
Buckinghamshire (Zone D) – Ron Ray, G3NCL, Flat 4 Victoria Villas, Gladstone Road, Chesham, Bucks, HP 3AD. Tel: 0494-776420
Cambridgeshire (Zone B) – see under Bedfordshire
Central (Zone G) – B J Waddell, GM4XQJ, "Carsemount" 3 A Polmont Road, Laurieston, Falkirk FK2 9QQ.
Cheshire (Zone A) – G R Morris, GW1ATZ, 6 Kent Avenue, Shotton, Deeside, Clwyd CH5 1BE. Tel: 0244-818252
Cleveland (Zone A) – See Durham
Clwyd (Zone E) – Peter Higgs, GW41CF, Oulton, Parkside, Rossett, Wrexham, Clwydd LL12 0BP. Tel: 0244 570212
Cornwall & Isles of Scilly (Zone D) – Bert Hammett, G3VWK, "Rosehill", Ladock, Truro TR2 4PQ. Tel: 0726-882758.
Co Antrim (Zone F) – Belfast: Gordon Curry, GI6ATZ, 28 Beechill Park South, Belfast BT8 4PB. Tel: 0232-795307 Co Antrim: refer to Zone F Council Member
Co Armagh (Zone F) – Danny Campbell, GI4NKD, 109 Drumgor Park, Craigavon, Co Armagh, BT65 4AH. Tel: 0762-42620
Co Down (Zone F) – see under Co Armagh, or Co Antrim (Belfast)
Co Fermanagh (Zone F) – see under Co Armagh
Co Londonderry (Zone F) – refer to Zonal Council Member
Co Tyrone (Zone F) – see under Co Londonderry
Cumbria (Zone A) – M Gibbings, G3FDW, 5 Meadowbank Lane, Grange over Sands, Cumbria LA11 7AT. Tel: 04484 2435
Derbyshire (Zone B) – refer to Zonal Council Member
Devon (Zone D) – Dave Livsey, G4BQH, 18 Tollards Road, Countess Wear, Exeter, EX2 6JJ. Tel: 0392-79876
Dorset (Zone D) – refer to Zonal Council Member
Dumfries & Galloway (Zone G) – refer to Zonal Council Member
Durham/Cleveland (Zone A) – Malcolm Brass, G4YMB, 11 Leaholm Way, Guisborough, Cleveland TS14 8LN. Tel: 0287 38119
Dyfed (Zone E) W M David, CW4WMD, "Sirmione", Freestone Cross, Cresselly, Kilgetty, Dyfed SA68 0SX. Tel: 06467-685.
East Sussex (Zone C) – J R Harris, G4DRV, Upton, Crowborough Hill, Crowborough, E Sussex TN6 2DA.
Essex (Zone C) – E S Whitworth, G4TUO, 38 Russet Way, Hockley, Essex SS5 5PH. Tel: 0702-202129
Fife (Zone G) – Martin Hobson, GM8KPH, 17 Well Brae, Pitlochry, Perthshire, PH16 5HH. Tel: 0796-2140
Gloucestershire (Zone D) – F W Willis, G4XXA, 66 Beeches Road, Charlton Kings, Cheltenham, Glos GL53 8NQ. Tel: 0242 579094
Grampian (Zone G) – Allan Duncan, GM4ZUK, 6 Powis Terrace, Aberdeen AB2 3PN. Tel: 0224-633652
Greater London (Zone C) – North: refer to Zonal Council Member. South: Robin Sykes, G3NFV, 16 The Ridgeway, Fetcham, Leatherhead, Surrey, KT22 9AZ. Tel: 0372-372587.
Greater Manchester (Zone A) – Bob catlow, G4ARP, 137 Haven Lane, Moorside, Oldham, Lancs OL4 2QQ. Tel: 061-652 8617
Guernsey & Dependencies (Zone D) – Steven Gibbs, GU3MBS, 44 Les Prins, Vale, Guernsey. Tel: 0481-57605
Gwent (Zone E) – Peter Dombrowski, GW1NYO, 30 Hillary Road, Newbridge, Newport, Gwent NP1 5DD. Tel: 0495 246359
Gwynedd (Zone E) – T P (Pat) Vernalls, CW6IMS, 5 Min-y-Traeth, Mintfordd, Penrhyndeudreath, Gwynedd LL48 6EG. Tel: 0766 770546
Hampshire (Zone D) – Trevor Emery, G3KWU, 75 Haig Road, Bishopstoke, Eastleigh, Hants SO5 6JF. Tel: 0703-693673
Hereford & Worcester (Zone B) – Chris Pettit, G0EYO, 23 Dark Lane, Hollywood, Birmingham B47 5BS. Tel: 021-430 7267
Hertfordshire (Zone C) – Roy Charlesworth, G4UNL, 6 Curzon Avenue, Enfield, Middx EN3 4UD. Tel: 01-804 5643
Highland (Zone G) – refer to Zonal Council Member
Humberside (North Humberside: Zone A, South Humberside: Zone B) – Len D Colley, G3AGX "Micasa", 13 Ferry Road, Wawne, Hull, HV7 5XU. Tel: 0482-822276
Isle of Man (Zone A) – Colin Mathewman, GD4FWQ, "Cronk Bane", 20 Terence Avenue, Douglas, Isle of Man. Tel: 0624-22295
Isle of Wight (Zone D) – election pending – refer to Zonal Council Member
Kent (Zone C) – D Axford, G4LHU, 141 Nelson Road, Gillingham, Kent, ME7 4LT. Tel: 0634-575778
Lancashire (Zone A) – North: Tom O'Connor, G4UDM, 30 Higher Cause Way, Barrowford, Nr Nelson, Lancs BB9 8QJ. Tel: 0282 63714. South: refer to Zone A Council Member
Leicestershire (Zone B) – Alan Faint, G4TZY, 33 Fairway, Market Harborough, Leics LE16 9QL. Tel: 0858-62827
Lincolnshire (Zone B) – see under Humberside
Lothian (Zone G) – refer to Zonal Council Member
Merseyside (Zone A) – M Chappell, G0GQX, 43 Aigburth Hall Avenue, Grassendale, Liverpool, L19 9EA. Tel: 051-427 3499
Mid Glamorgan (Zone E) – Dave Phillips, GW4KQ, 54 Oaklands Road, Bridgend, Mid Glamorgan CF31 4SN. Tel: 0656-60819.
Norfolk (Zone C) – refer to Zonal Council Member
Northamptonshire (Zone B) – Ian Hopwood, G0EDT, 53 St Mary's Road, Stratford-upon-Avon, Warwickshire CV37 6XG. Tel: 0789-68863
Northumberland (Zone A) – Ian Gibbs, G4GWB, 61 The Gables, Widdrington, Morpeth, Northumberland NE61 5QZ. Tel: 0670 790090
North Yorkshire (Zone A) – NE of River Ouse: "Bob" Wilkinson, G4YKO, 8 Laughton Avenue, Scarborough, North Yorkshire YO12 5DB. Tel: 0723-352823 SW of River Ouse: refer to Zone A Council Member
Nottinghamshire (Zone B) – M J Leeson, G8GNN, 14 Woodside, Avenue, Mansfield, Notts NG18 4RH.
Orkney (Zone G) – A W Wright, GM3IBU, Crosslea, Berstane Road, Kirkwall, Orkney KW15 1SZ. Tel: 0856 3273 (office hours)
Oxfordshire (Zone D) – Neill Taylor, G4HLX, 46 Hunters Field, Stanford-in-the-vale, Faringdon, Oxon SN7 8LX. Tel: 036 77503
POWYS (Zone E) – E P Essery, GW3KFE, 287 Heol-y-Coleg, Vaynor, Newtown, Powys SY16 1AR. Tel: 0686 28958
Shetland (Zone G) – P C Weller, GM3XOQ, Heimli, Levenwick, Shetland Isles, ZE2 9HX. Tel: 09502-354
Shropshire (Zone B) – Syd Poole, G3IMP, 7 Islington Close, Newport, Shropshire, TF10 7TT. Tel: 0952-812134
Somerset (Zone D) – refer to Zonal Council Member
South Glamorgan (Zone E) – see under Mid Glamorgan
South Yorkshire (Zone A) – Ian Abel, G3ZHI, 52 Hollytree Avenue, Maltby, Rotherham, Yorks S66 8DY. Tel: 0709 814911
Staffordshire (Zone B) – see under Shropshire
Strathclyde (Zone G) – Bob Low, GM0ECU, 2 Craigie Place, Crosshouse, Ayrshire KA2 0JR. Tel: 0563 35738
Suffolk (Zone C) – see under Norfolk
Surrey (Zone C) see under Greater London (South)
Tayside (Zone G) – see under Fife
Tyne & Wear (Zone A) – E W F Malone, G4MRT, 65 Grosvenor Avenue, Newcastle-upon-Tyne NE2 2NP. Tel: 091 2810994
Warwickshire (Zone B) – see under Northamptonshire
Western Isles (Zone G) – see under Highland
West Glamorgan (Zone E) – see under Dyfed
West Midlands (Zone B) – A Bennett, G4VVM, "The Oaks", 43 School Lane, Exhall, Coventry CV7 9GE. Tel: 0203-366920
West Sussex (Zone C) – refer to Zonal Council Member
West Yorkshire (Zone A) – Martin Stokes, G3ZXZ, 20 High Street, Scapegoat Hill, Huddersfield, West Yorkshire HD7 4NJ. Tel: 0484-657669
Wiltshire (Zone D) – Ron Freeman, G4XTH, 90 Allington Way, Chippenham, Wilts SN14 0JU. Tel: 0249 650800

Zonal Council Members:
Zone A – Geoff Smith, G4AJJ, "Greenacres", Sawdon, Scarborough, North Yorkshire, YO13 9DY. Tel: 0723-85212
Zone B – John Allen, G3DOT, 4 Philip Avenue, Waltham, South Humberside DN37 0QD.
Zone C – John Greenwell, G3AEZ, Dorking, Surrey, RH4 5RW. Tel: 0306-77236
Zone D – Julian Gannaway, G3YGF, Dean Hill Barn, Dean Hill, Salisbury SP5 1HJ.
Zone E – John Case, GW4HWR, 2 Abbey Close, Tyrhiw Taffs Well, Mid Glamorgan, CF4 7RS. Tel: 0222-810368.
Zone F – Terry Barnes, GI3USS, "White Gables", 95 Crawfordsburn Road, Bangor, Co Down, BT19 1BJ. Tel: 0247-473948
Zone G – Frank Hall, GM8BZX, 45 Priory Cottages, Lunanhead, Forfar, Angus DD8 3NR. Tel: 0307-67565.

Membership Liaison Committee
Chairman: Dave Smith, G4DAX, "Red Roof", Goathland, Whitby, North Yorkshire YO22 5AN. Tel: 0947-86333

TECHNICAL TOPICS

PAT HAWKER · G3VA

TELEPHONE INTERFERENCE

In *TT* (April 1984, pp313-4), I drew attention to the then rapidly increasing problem of 'eti – elelctronic telephone interference' writing: "The trend of semiconductor development seems inevitably to result in ever more vulnerable devices and equipment: very large scale integration is being accompanied by lower operating voltages and higher-speed operation . . . more and more cmos and lsi devices are finding their way into consumer appliances of all types." This section included a report on the problems and cures reported by Mike Grierson, G3TSO for his then newly-introduced 'Statesman' telephone instrument. It was evident that at least some of the new 'electronic' telephones had been introduced or approved by British Telecom with little investigation as to their vulnerability to strong local rf fields.

However, in *TT*, December 1984, I was able to report after visiting BT's research establishment at Martlesham that: "In view of the problems of rfi on the new generation of electronic telephones, it was pleasant to find a lively recognition of emc/rfi problems and to receive some assurance that telephone designs are being made more resistant to local rf fields." BTR had, in fact, been given the task of setting up a small unit to subject new equipment to rf immunity tests before it was put on the market. For several years the BT field engineers have been curing interference to (and sometimes from) telephone apparatus. For most amateurs any remaining problem of eti can be solved with goodwill all round.

BT field engineers have been provided with 'customer service information' covering the results of laboratory and field immunity tests on the various telephone instruments now in use. The tests have been carried out between about 100kHz to around 200MHz and do show that the newer models have been much improved. While such information is intended for use only within British Telecom, it seems to me to be information which should be available to amateurs. The following is a digest of a BT csi sheet dated July 1987 that has reached me in a plain brown envelope from somebody who clearly shares this view:

Statesman, models 9001, 9003, 9040 (early production): poor immunity throughout the radio spectrum.

Statesman, models 9005, 9003 or 9101 (modified): good immunity as tested between 100kHz and 200MHz.

Statesman, model 9040 (Gen 85/35 or later): good immunity.

Statesman, model 9101AR: good immunity.

Tremolo 9701 (early production): fairly good immunity below 10MHz, poor immunity 10 to 200MHz.

Tremolo 9701 (since summer 1986): fairly good immunity 100kHz to 150MHz.

Tribune (TMC): good immunity to 10MHz; fairly good to 200MHz.

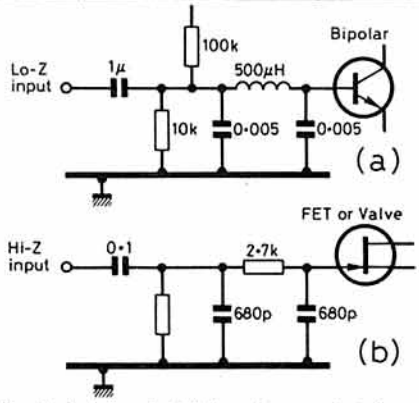


FIG 1. RF FILTERS POSITIONED CLOSE TO THE FIRST AMPLIFIER STAGE USING RF CHOKES OR RESISTORS ARE MORE SUITABLE FOR BLOCKING MF/HF ENERGY THAN FERRITE BEADS. (A) SUITABLE FOR LOW-IMPEDANCE CIRCUITS; (B) SUITABLE FOR HIGH-IMPEDANCE INPUTS.

Tribune (DFM): fairly good between 100kHz and 10MHz; poor from 10 to 200MHz.

Venue 24/24E: fairly good 100kHz to 200MHz.

Ambassador 8304/8401: fairly good immunity 100kHz to 200MHz.

Viscount (all models except 9511 Mk4/9515/9525): fairly good immunity to 10MHz, poor immunity from 10 to 200MHz.

Viscount 9511 (Mk 4) since July 1986 and 9515/9525: good immunity from 100kHz to 200MHz.

Tele 8746 with carbon microphone or MIC insert 21B: very good immunity throughout spectrum.

Note that the date of manufacture is shown on many BT telephones by an eleven digit serial number on the base: the first four digits show the year (two figures) and week (two figures).

It should be appreciated that the above information is intended only for guidance and individual apparatus may differ. Obviously, no attempt should be made to modify yourself any telephone instruments that are the property of British Telecom. Or even (at least theoretically) any connected to BT lines.

In the June *TT* (p423, Fig 7) I reproduced a diagram from the DTI booklet *How to improve television and radio reception* giving guidance on how to fit ferrite beads and rf bypass capacitors as a means of reducing direct breakthrough of rf into af amplifiers, etc. It seem worth adding some other tips from an article "How to deal with audio rfi problems" by Doug De Maw, W1FB (*QST*, May 1988, pp18-20). He emphasises that "rf energy can disrupt audio amplifiers and may render an amplified microphone useless. Simple fixes can cure these problems easily . . . it requires no special skills to install suppression components, and the art is by no means new". He points out that although the majority of problems are associated with rf entering the first stage of any af amplifier, this is not necessarily true when the rf energy enters a piece of equipment via the ac mains cord or along cables, including loudspeaker cables, that connect to external accessory units. W1FB admits that today the most difficult consumer appliance to cure of rfi problems is the video cassette recorder (the UK penetration of these devices is now almost two-thirds of all tv homes) but claims that "there is no entertainment gadget or piece of ham gear that can't be rfi-suppressed if you have the patience to tackle the job."

A hint given by W1FB is that although a ferrite bead (mounted as in the DTI illustration) can be effective at vhf as a series impedance, it offers negligible help in holding back mf/hf energy: "a single bead of 850 permeability ferrite provides only about 1μH of inductance at hf and this is of no value for hf or mf operation". He found that the microphone input of his Kenwood transceiver includes a ferrite bead near the base of the first transistor stage; he replaced this with a miniature 390μH rf choke which offers fairly high impedance to rf but is not a signal barrier at audio frequencies. With high-impedance (fet or valve) input circuits the choke can be replaced by a resistance of about 2·7k. In fact the arrangements shown in Fig 1 date back to the earliest days of bci suppression, but are no worse for that.

One of the problems with vcr installations is the untuned, wideband pre-amplifier through which the incoming tv signals pass, even when the machine is not recording. In an article "A video recorder tvi case history" (*Amateur Radio* (VK), March 1988) an Australian amateur reports effecting a cure by fitting a high-pass filter very close to the vcr antenna socket. On the other hand, W1FB found it necessary to battle with his vcr for several days before he cleaned it up; he plans to tell the story in a further *QST* article.

In *Ham Radio Today* (July 1988, p8), John Mayall, G3VPH draws attention to another telephone problem brought about by insufficient immunity to rf fields. He found that even a "sniff of rf above 10MHz" affected the memory of his 10-memory telephone (PBT-200 series). He admits to effecting a complete cure by soldering three 0·0047μF (100V) ceramic capacitors across the pins of the socket where the line cord connects to the pcb (ie across pins 1-2, 2-3 and 3-4) although, here again, as the Editor warns, BT may not take kindly to do-it-yourself modifications to 'approved' telephone apparatus connected to their network.

THE LOW-COST SPECTRUM ANALYSER COMES GOOD

Following on the previous items (*TT*, July p521 and *TT*, April pp262-3) on the low-cost spectrum analyser as described by Al Helfrick, K2BLA of Doty RFL Industries in *RF Design* (January 1988), further reports and suggestions have come from Roger Blackwell, G4PMK and Stuart Jones, GW3XYW, both of whom have successfully built instruments based on this design, with G4PMK also incorporating some ideas from K2BLA's earlier *QST* design. As noted in the July *TT*, some modifications to the basic *RF Design* have been found necessary. It also seems that the Motorola MV209 varactor is no longer available in the UK except at very high cost; G4PMK uses the readily available BB209 while GW3XYW uses a BB105B, resulting in a somewhat reduced range of 10 to 100MHz.

There have been several enquiries wondering whether anybody has produced a pcb drawing for this device. G4PMK has prepared a set of circuit diagrams and notes on his prototype which differs considerably from the *RF Design*. Since the information could not be fitted into *TT* (perhaps there is a need for a full-length article?), he offers to send his four sheets to members sending him an A4-sized stamped-addressed-envelope (Roger Blackwell, G4PMK, 57 Station Road, Scholes, Leeds LS15 4RY). He points out that despite its limitations, compared with a professional high-cost spectrum analyser, his unit has more than repaid the trouble taken to make it. Apart from such conventional uses as hf transmitter alignment he has found it useful (as a panoramic receiver) for looking for Sporadic E openings, connecting an antenna to the input socket and displaying the spectrum up to 90MHz or so. He writes in his notes:

"My prototype works well up to 90MHz or so, with a linear frequency sweep up to 80MHz. Maximum input to the analyser is −20dBm, and it will detect signals down to at least −90dBm. It has two selectable i.f bandwidths of 250 and 15kHz and a calibrated frequency sweep range of 10MHz/div to 50kHz/div. A frequency marker circuit gives one and/or 10MHz pips over the range of the instrument. Despite the comments in Helfick's *RF Design* article, the addition of the narrow i.f. bandwidth has proved very useful. Please note the *RF Design* article contained an error in the capacitor values in the NE602 second mixer stage. The values shown in my circuit diagram are correct."

The capacitor values referred to in G4PMK's notes are the ones mentioned in the July *TT*.

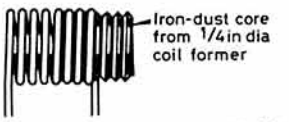


FIG 4. HOW GW3XYW CONSTRUCTED COIL L4 FOR HIS LOW-COST SPECTRUM ANALYSER BASED ON K2BLA's DESIGN. THE COIL WAS ORIGINALLY WOUND ALONG AN OLD IRON-DUST CORE. THE CORE IS THEN UNSCREWED AND CHOPPED IN HALF.

Stuart Jones, GW3XYW appears to have stuck more closely to the original design. He writes:

"Apart from a few small spurious responses which may be due to overloading the circuit works very well. I was unable to get a MV209 varactor diode and used a BB105B with slightly reduced range (10 – 100MHz). The NE602 and MC3356 devices were available from: Macro Marketing, Burnham Lane, Slough, SL1 6LN, telephone 06286-4422. The 145MHz helical resonator filters were available from Cirkit and Bonex: 2-section type 271MT1006A (145MHz, 3MHz bandwidth, 500-ohm impedance). Cirkit Stock No 17-10062, £4.20p. 3-section type ▶

Reducing rfi from computers

TT, April 1988, pp266-7, noted under the heading 'minimising rfi from digital equipment' that, unlike the USA and West Germany, the UK still has no legislation restricting electromagnetic emission from home or office computers or other digital information-technology equipment, despite the existence of British Standard BS6527 which specifies conducted noise limits on mains terminals between 150kHz and 30MHz, and radiated field strength limits from 30MHz to 1GHz. One result is that amateurs who find their weak signal reception, and sometimes even their broadcast reception, upset whenever their neighbour's children switch on their computers, tend to find themselves in a 'no-win' situation, even when the neighbours are sympathetic. Manufacturers of personal computers often express disbelief that 'their' models could be causing rfi and decline to do anything about it: yet many (if not most) of the models sold in the UK would fail both the American and German regulations. Legislation relating to BS6527 has been postponed pending the need to review the whole emc situation to comply with the European Community emc directive which, as I write, is still subject to discussion and negotiation.

The April *TT* included some American suggestions on reducing rfi by means of mains filters and the reduction of common-mode signals on the outer shield of screened cables. John Greenwell, G3AEZ draws attention to information reprinted from *Electronic Product Review* (February 1988) on the use of Citec BC-series, 1W dc/dc converter chips, together with opto-couplers, to provide isolation for RS232 and similar interfaces.

This notes that: "External cables can be particularly troublesome due to circulating common-mode currents (Fig. 2) which both radiate directly and can also raise mains-terminal noise voltages due to common impedance coupling (see April *TT*) . . .

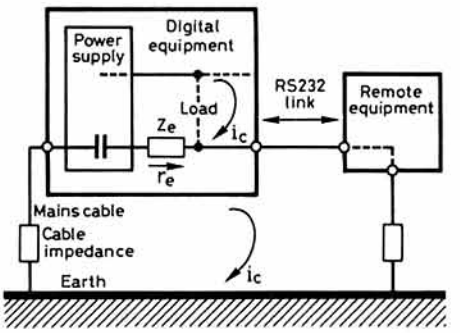


FIG 2. CIRCULATING COMMON-MODE CURRENTS IN MAINS CABLES AND INTERFACING LINKS BETWEEN DIGITAL INFORMATION-TECHNOLOGY EQUIPMENTS RESULTS IN INTERFERENCE SIGNALS BEING INJECTED INTO THE MAINS SUPPLY OR RADIATING DIRECTLY.

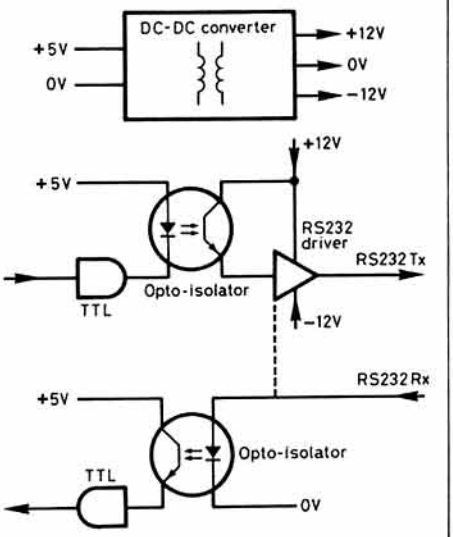


FIG 3. MEANS OF ISOLATING AN RS232 INTERFACE BY MEANS OF AN OPTO-ISOLATOR AND 1-WATT DC-DC CONVERTOR AVAILABLE IN CHIP FORM. NOTE BIASING RESISTORS, SPEED-UP COMPONENTS ETC HAVE BEEN OMITTED FOR CLARITY.

Common-mode circulating currents, and the problems they cause, can be substantially reduced by incorporating electrical isolation into equipment interfaces. Additional benefits (to the computer user) include much reduced susceptibility to externally induced noise, and the elimination of earth potential-difference hazards. RS232 and similar interfaces can be readily isolated through the use of opto-couplers for data isolation, together with isolated dc-dc conversion to power conventional line drivers and/or receivers (Fig. 3). Until recently the cost of dc-dc converters has prevented this approach being widely adopted. However, the impending legislation together with the availability of very low-cost dc-dc converters from BICC Citec now makes the isolated interface a practical reality. Designers can produce equipment which is both robust in terms of non-susceptibility to external interference, and inherently superior with respect to electromagnetic emissions arising from cable-coupled mechanisms."

While this approach is clearly directed at professional rather than the smaller personal-computer installations, the principle of electrical isolation is of general interest. The Citec BC series of devices are miniature, high-efficiency isolated dc-dc converters in dil and sil ic packages. Designed for input voltages of 5V or 12V they deliver outputs, according to type, of ±5V, 100mA; ±12V, 40mA; ±15V, 30mA with an input-to-output isolation of 500V dc. No heat sinks are required for the rated performance; switching frequency is nominally 100kHz. As noted before in *TT* ic dc-dc converters also provide a convenient means of obtaining, for example, ±12V from a single battery. Efficiency at full load is about 75-80 per cent.

272MT1006A (145MHz, 2·8 MHz bandwidth, 500Ω, Cirkit Stock No 17-10063, £4.90p.

"I used the two-section filter as in April the three-section filter was out of stock. I only found out about Bonex later. Multiturn pots were used for 'sweep width' and 'centre frequency'. The spare amplifier section of IC3 (TL084) is used to amplify further the Y-output together with a Y position (zero) control. The blanking signal was fed to a Z input on a surplus vdu that was available. For L2 I used three turns of 20swg tinned copper wire with the same diameter of 3/16-in. For L4 I used six turns of 24swg tinned copper wire with a small iron dust core, see Fig. 4. I would be interested to know if there are any alternatives to the Motorola MV209 giving the same sweep range as I have found that very high prices are being asked for this device." GW3XYW does not mention any modification to the capacitor values of the NE602 mixer.

ELEVATED RADIALS VINDICATED

TT has referred on several occasions to the sterling work done in 1980-81 by Arch Doty, K8CFU, John Frey, W3ESU and Harry Mills, K4HU (retired professional engineers) in investigating the characteristics of electrically-short vertical antennas using elevated counterpoise and insulated radials, and comparing them with those of antennas using large numbers of buried radials, as customary for mf broadcast antennas ever since the classic paper "Ground systems as a factor in antenna efficiency" by the late Dr George Brown and his RCA colleagues R F Lewis and J Epstein (*Proc IRE*, June 1937, pp753-787). The K8CFU team made literally thousands of measurements which strongly suggested that, for equal efficiency, a counterpoise comprising insulated radials elevated a few feet above ground would require fewer radial wires than the 120-150 buried radials normally mandated for US medium-wave transmitters by the FCC. Their findings were, of course, applicable to amateur antennas, particularly for 1·8, 3·5 and 7MHz, and their report was published in detail in *QST*.

A recent *IEEE Trans on Broadcasting* paper by a team comprising American university and broadcast engineers, using a 'Method of Moments' computer program, seems to bear out the measurements made by K8CFU team although no reference is made to their pioneering work. The paper concludes: "Studies of vertical monopole antennas, using the NEC-GS computer code, indicate that a radiator elevated several metres above ground and having only four elevated horizontal radials can outperform a ground-mounted antenna with 120 buried radials, over any type of soil. Field measurements are planned for the purpose of verifying these computer predictions. If the NEC output is correct, then the construction, cost and complexity of vertical monopole antenna systems can be reduced significantly. At the same time, the elevated-radial antenna provides increased groundwave field intensity while attenuating skywave radiation."

In effect, they suggest that the elevated ground-plane antenna, as widely used on hf/vhf, represents a superior approach to using a grounded monopole with an extensive system of buried radials, at frequencies down to below 1MHz.

AIR-CORED BALUN

In *Radio ZS* (March 1988, p23), ZS2LR describes an effective home-constructed "dipole insulator and air-cored balun" based on information on a commercially made balun published in *QST* (October 1980) rated at up to 4kW peak with less than 0·5dB loss. The 3-30MHz unit comprises 12 turns, 16swg wire, trifilar wound on a one-inch phenolic former.

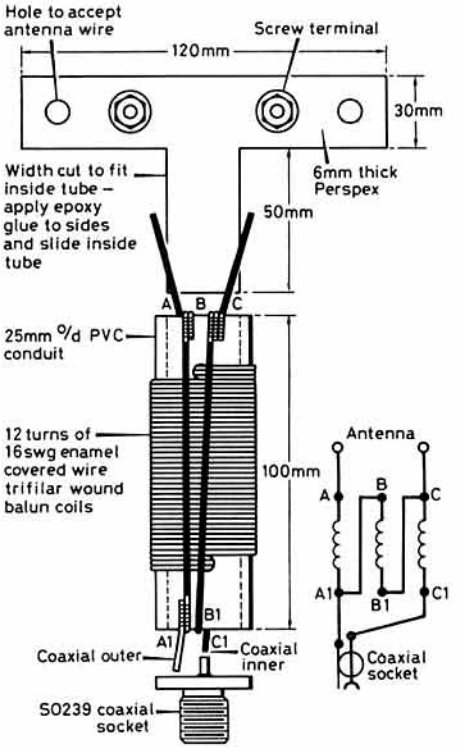


FIG 5. EXPLODED VIEW OF ZS2LR's DIPOLE-CENTRE INSULATOR AND 1:1 AIR-CORED BALUN.

For 1·8 to 7MHz, use 13 turns on a two-in former.

ZS2LR writes: "The *QST* information mentions that ferrite-cored baluns do a fine job but if overloaded or subjected to high standing wave ratios, harmonics are generated that can cause tvi. The air-cored balun cannot saturate, ring or generate harmonics. It is lightweight, causes little sag in the antenna and can be constructed from cheap and readily available materials. The losses are indeed very low. Owing to the cost, scarcity and possible problems with toroidal ferrite cores, the writer decided to construct an air-cored balun as an integral part of a dipole insulator (Fig. 5). The insulator was made of laminated perspex; tee-shaped with the vertical portion dimensioned to fit inside a piece of 25mm pvc conduit where the insulator was secured with epoxy glue. In the drawing the interconnections of the coils are shown outside the coil for reasons of clarity, but in practice are routed on the inside of the coil. Only two soldered connections are required on the balun coils, apart from the joints to the coax socket. Terminals were provided on the insulator for connection of the antenna and balun wires.

"A chassis mounting SO239 coax socket was connected at the bottom of the pvc coil former, pushed up against the former and secured. The coils were first wound, balun connections made, then the insulator secured to the former; the socket was connected and the balun connected to the insulator terminals. The balun was then wrapped with cotton gauze bandage to cover the windings and filling all gaps that might allow the ingress of rain water as well as securing the connector to the balun former. The cotton was impregnated with epoxy glue and allowed to cure. The antenna was then attached to the insulator and connected to the terminals. The feedline was plugged into the coaxial socket and terminals, and the socket sprayed with 'Tectyl' to prevent ingress of moisture and corrosion."

VOLTAGE GAIN FROM SOURCE FOLLOWER

Gordon Crayford, VE6LI in *QST* (April 1988, p45) shows how it is possible to obtain a moderate voltage-gain from a source-follower (cathode-follower) stage working into a high-impedance load, rather than the usual small voltage-loss. Such gain can be very useful when, for example, the output from a vfo source-follower buffer stage is required to drive a frequency multiplier. As shown in Fig. 6, this can be achieved by tapping the source terminal into one section of a multi-section rf choke (eg 2·5mH choke) which acts as a voltage step-up autotransformer. C1 is optional when the value of R1 represents only a small percentage of the impedance of the rfc, and its omission can sometimes improve circuit performance.

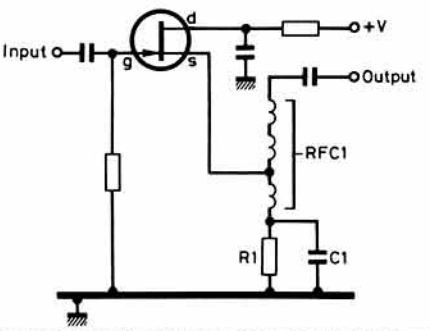


FIG 6. TAPPING INTO AN RF CHOKE TO OBTAIN VOLTAGE-GAIN FROM A SOURCE-FOLLOWER AS SUGGESTED IN QST BY VE6EI.

BATTERY LORE

Gordon Hudson, GM4SVM, draws attention to press reports that the Swedish firm of Ericsson recently had to recall some 30,000 of their 'Hotline Combi' mobile radiotelephones, following three explosions brought about by incorrect placement of a lithium battery giving rise to short-circuits. GM4SVM writes: "It might be worth reinforcing previous *TT* warnings about the care that manufacturers and users need to take to ensure safety of these cells. Lithium cells are becoming commonplace in amateur equipment, particularly for memory back-up in synthesised equipment. It also seems an opportunity to remind readers that although lithium batteries have a very long lifetime in such applications, problems can arise in some ▶

equipments if the batteries are permitted to fail or if no steps are taken to maintain voltage during their replacement (*TT*, December 1984, p1052). There are large numbers of FT290 transceivers using lithium cells for memory back-up which will soon need new batteries to be fitted. Many were purchased about five years ago and are thus reaching the end of the manufacturer's recommended life span for their factory-fitted cell."

The problem posed by the possible loss of information stored in a ram arises most seriously in equipments where the 'memory' forms a central brain, replacing manual switches and controls. The 1984 *TT* item noted that the IC751, 745, 271 and 451 transceivers fall specifically in this category, but there are many other models where the ram memory needs to be continuously powered since it forms a vital part of the basic unit. Loss of frequencies or channels stored in a memory is of little consequence since the rig can easily be reprogrammed. However, some manufacturers now suggest much longer than five years lifetime for their factory-fitted lithium batteries. GM4SVM continues:

"Also on the topic of FT290 batteries, I have encountered several cases of the nicad cells fitted to these sets overheating and melting because the incorrect size of dc plug was used to connect the set to a car or power supply. Although there are several plug sizes which will fit the socket and power the set, some are not large enough fully to engage the battery shut-off switch which is incorporated in the dc supply socket. The result is that the batteries are able to draw on the psu without any current limiting and they overheat. This is another safety area which should be considered when using rechargeable cells."

A long article 'Choosing the best battery for portable equipment' by Trudy Bell, *IEEE Spectrum*, March 1988, pp30-35 provides a useful survey of disposable (primary) and rechargeable (secondary) cells for consumer electronics, hearing aids, communications devices etc. It includes a table listing in detail the salient characteristics of seven primary cells: zinc-air, lithium-sulphur, lithium-manganese dioxide, zinc-carbon, mercuric oxide and silver oxide; and also rechargeable nickel-cadmium and lead-acid cells. Table 1 is a much cut-down version of the *Spectrum* table.

TABLE 1 – PRIMARY AND SECONDARY CELL CHARACTERSITICS
(condensed from a comprehensive table in IEEE Spectrum)

System	Nominal cell voltage	Practical Energy Density* Weight (Wh/kg)	Type	Volume (Why/1)	Typical Operating Temperature	Shelf Life (to 80% capacity
Zinc-air	1·4	310	– button –	1150	0 to 50	5-10 yrs unactivated
Lithium-sulphur dioxide	3·0	275	– cylindrical –	440	–40 to 71	5-10 yrs
Lithium-manganese dioxide	3·0	175	– coin –	505	–20 to 60	5-10 yrs
Alkaline-manganese dioxide	1·5	130	– cylindrical –	315	–20 to 54	3-4 yrs
Zinc-carbon	1·5	75	– cylindrical –	140	– 5 to 45	1-2 yrs
Mercuric-oxide	1·35 or 1·4	110	– button –	445	– 9 to 54	3-5 yrs
Silver-oxide	1·5	130	– button –	500	–20 to 54	2-3 yrs
Nickel-cadmium (rechargeable)	1·2	35	– cylindrical –	88	–40 to 45	3-6 mnths
Lead-acid (rechargeable)	2·0	30 35	– cylindrical – – flatplate –	90 80	–40 to 60 –40 to 60	6-12 mnths 6-12 mnths

*Button cells rated at the 500-1000h rate at 21°C. Cylindrical cells at 50-100h rate. Cut-off voltage 80 per cent of nominal voltage. In practice under typical conditions the capabilities can be higher.

While very large zinc-air industrial batteries have been mentioned several times in *TT*, zinc-air cells are now also manufactured as 'button' cells in diameters from 5·8 to 30·5mm, with capacities up to 1150mAh and also larger cells to 8·5Ah. Zinc-air batteries use oygen from the air as the active cathode material and have the distinction of having the highest energy density on continuous discharge of any of the primary cells including lithium. They have excellent shelf life while unactivated but once the air holes are unsealed, they need to be discharged within a few months. Zinc-air cells are thus best suited to devices used frequently with low to medium loads, such as hearing-aids, radiopagers, handhelds in regular use, etc. Zinc-air button cells can cost around twice as much as mercury cells of the same size but their much superior energy density can make them competitive for some applications. Nominal cell voltage is 1·4V.

The *Spectrum* article, however, suggests that the most significant advance in recent years has been the development of high-power lithium cells for consumer products, including their use for powering all functions of fully-automatic cameras with integral flash. Self-discharge can be as low as one per cent per year at room temperature. The multiple safety features built into these consumer lithium batteries were described in *TT* (November 1987, p834). On the safety of lithium batteries, the *Spectrum* article comments: "More than a decade ago, lithium-sulphur dioxide cells had a bad reputation for safety, because the cells are pressurised and contain materials that are toxic or flammable. High internal temperatures resulting from continuous high current drain or a short-circuit could cause them to explode. The lithium battery industry since then has devoted much research to safety, and most lithium batteries have progressed well beyond their safety probationary period. Two lithium electrochemical systems – lithium-manganese dioxide and lithium-polycarbon monofluoride – were introduced (in the USA) in the late 1970s and have an unblemished safety record. Furthermore, (American) Underwriters Laboratories has recognised many manufacturers' lithium products, and more leading equipment manufacturers are now using lithium batteries in their consumer products". Nominal voltage of lithium cells is 3V.

For high-drain applications, including handheld transceivers, nicad or sealed lead-acid batteries are usually the most economical long-

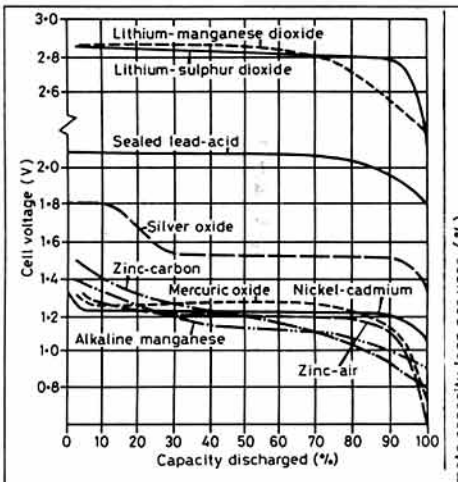


FIG 7. DISCHARGE PROFILES OF PRIMARY AND SECONDARY BATTERIES. SOME CURVES SLOPE STEADILY DOWNWARDS WITH DISCHARGE WHILE OTHERS REMAIN NEARLY FLAT FOR VIRTUALLY THE ENTIRE USABLE LIFE-SPAN OF THE BATTERY.

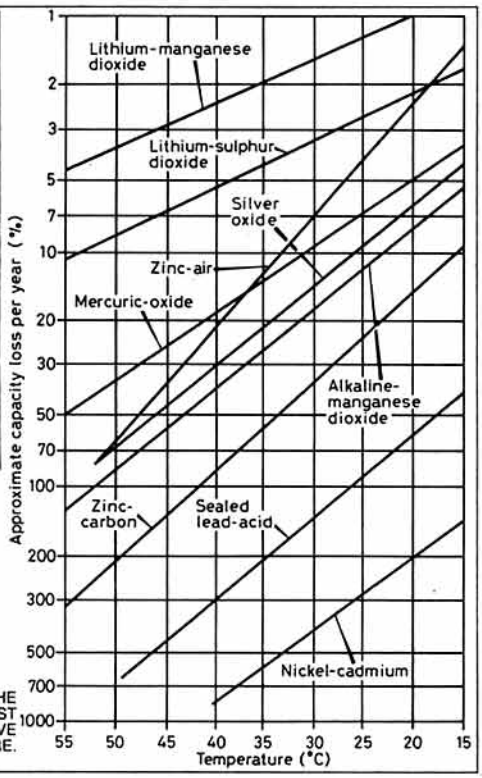


FIG 8. SHELF-LIFE OF BATTERIES INCREASES AS THE STORAGE TEMPERATURE DECREASES. MOST BATTERIES DETERIORATE RAPIDLY IF STORED ABOVE ROOM TEMPERATURE.

term solutions. Trudy Bell points out that there are now two types of sealed lead-acid cells which differ not only in construction but also in performance. The *gelled electrolyte* type, manufactured with capacities up to 50Ah, is basically similar to vehicle batteries other than the electrolyte being not a liquid but a polymeric gel. The *starved electrolyte* cell, with little or no free fluid electrolyte, is made in cylindrical form (smallest is a D cell, larger sizes designated X, J and BC) with capacities ranging from 2·5 to 30Ah. She adds:

"Soon to become a factor among portable rechargeable batteries are small secondary batteries using a lithium negative electrode. These are expected to have an energy density of the order of 100W-hrs per kilogram, good charge retention, and an acceptable cycle life. For example, the most advanced lithium secondary cell is the lithium-molybdenum disulphide system, which is manufactured in (small) AA cylinders. This cell uses a spiral-wound construction and a nonaqueous organic electrolyte. The expected advantages of the lithium rechargeable battery are its higher energy density and excellent charge retention when compared to nickel-cadmium". Whether the appearance of lithium rechargeable batteries for consumer applications will reduce their cost remains to be seen; at present rechargeable lithium cells are very costly.

A NOT SO TECHNICAL TOPIC

THE PHRASE IN THE ITU Radio Regulations *identifying radio amateurs as "duly authorised persons interested in radio technique" (see* TT, *June 1988, p421) deserves consideration, though I have no wish to appear to be moralising. It does* **not** *mean, surely, that in order to become an amateur one should be expected to have the knowledge and training of a professional radio engineer or technician – or even, initially, any real understanding of modern radio equipment. But to my mind it does imply a genuine interest in radio techniques and a willingness to learn as one goes along. It does* **not** *mean that only those who build their own equipment on the kitchen table can be considered true amateurs – useful and rewarding as a degree of home construction can be in the self-training process. It accepts that when authorised to venture on the airwaves, newcomers may have only the minimal technical knowledge required by their own national authorities. The* Radio Regulations *make no attempt to stipulate any* ***requirement*** *for a technical examination, although this is taken for granted, or to define the speeds to be achieved in the* ***obligatory*** *morse test for operation below 30MHz.*

But an "interest in radio technique" does indicate that licensed amateurs should not be content to be purely **users** *of entertainment appliances. A television licence, a cb licence and even a driving licence impose no such obligations, and nobody would criticise a viewer for having no interest in, or knowledge of, the electronics he or she switches on and off.*

There is no shame in starting amateur radio young or as a beginner with a bare minimum of technical understanding – but surely no excuse for remaining a complete technical ignoramus, year in, year out, time spent filling the spectrum with idle chatter. This does not require that we should all become experts in theory or mathematics. But one must hope that Jim Cookson, G4XWD is wrong when he suggests (June TT*) that many of us are content to remain appliance operators, openly professing no real technical interest or knowledge. The radio amateur has always been well-served with technical publications, books and periodicals, and opportunities for self-training. But books are meant for a modicum of study, and not just for propping up a wonky transceiver or looking good on a shelf.*

A NEAR-RECORD SOLAR CYCLE?

G8VR and G8KG have, in the "News & Views" columns, reported the growing body of evidence that solar cycle No 22 will peak much earlier and much higher than was being predicted only a few months ago. So far, cycle 22 has repeatedly thrown predictions (made several months in advance) out of kilter – by starting earlier than expected; by the way sunspot activity has advanced in odd fits and starts; and by confounding the strongly-held views that we were due this time for a very low maximum, several years into the 1990s. Some predictions put the maximum smoothed monthly mean sunspot number as low as 36.

In the scientific correspondence columns of *Nature* (12 May 1988), Dr Geoffrey Brown of the University College of Wales, Aberystwyth writes, under the heading "Solar cycle 22 to be one of the highest on record?": "It now seems virtually certain that the value of 12·3 for the smoothed monthly mean sunspot number for September 1986 defines the minimum of solar cycle number 21, and hence the conventional beginning of cycle 22. Since then, activity has increased unusually steeply. Because it has generally been found that rapid initial rises in sunspot activity have been followed by large maxima, there is already wide interest in the development of cycle 22 . . . The consensus seems to be that cycle 22 will peak in 1990±1. Magnetic predictions are based on a variety of techniques . . . Recent predictions have all been at the top end of the range (international sunspot number as great as 190) . . . One prediction technique which generally gave near-correct forecasts for the previous cycle makes use of experimentally-observed precursors . . . One such precursor method is based on the occurrence of so-called geomagnetic abnormal quiet days (AQDs) determined at a temperate latitude station in the preceding sunspot mimimum . . . This relationship holds good back to 1885, the earliest year for which data are available."

Using such a prediction technique leads Dr Brown to forecast, for cycle 22, a maximum sunspot number of about 175±35 and to suggest that "it seems likely that cycle 22 could be second only to cycle 19 as the largest cycle on record."

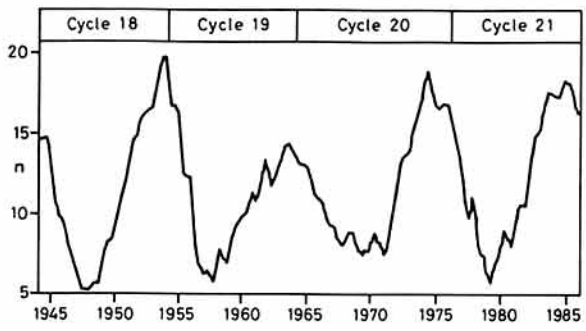


FIG 9. VARIATIONS OF THE ANNUAL NUMBER OF AQDs (GEOMAGNETIC ABNORMAL QUIET DAYS) IN SOLAR CYCLES 18 TO 21. SOME SCIENTISTS NOW SUGGEST THAT THE HEIGHT OF THE SUCCEEDING CYCLE IS INVERSELY PROPORTIONAL TO THE NUMBER OF AQDs IN THE DECLINING PERIOD OF THE PRECEDING CYCLE PUTTING CYCLE 22 UP TO NEAR-RECORD HEIGHTS.

ORIGINS OF THE 'KALLIROTRON OSCILLATOR'

In the February *TT*, Ray Howgego, G4DTC, raised the question of the correct spelling and origins of the push-pull oscillator he uses in his 'ultimate' hybrid front-end (*TT*, December 1987) and which he has found "exceptionally reliable, providing a very high output, independent of the LC ratio". In the May *TT*, I reported tracing earlier appearances of this form of oscillator in the *RSGB Bulletin* in 1953 (unnamed) and 1958 (spelt "kalitron") and also the receipt of a note from Don Nappin, G3LMS concerning a "kallirotron: an aperiodic negative resistance triode combination" developed by an L B Turner in 1920 as a means of reducing static crashes. But I had to admit failure in tracing the origins of this oscillator. Among the reference books I had checked without success was the first edition of Terman's *Radio Engineering* which did include a section on push-pull oscillators but no mention of any prefixed kali- or kalli-.

However, F R Wilson, G3ETX dipped into a later edition of Terman's classic textbook and found an added footnote referring to a paper "A low distortion audio-frequency oscillator" by Herbert J Reich (University of Illinois) in *Proc IRE*, Vol 24, November 1937. This has finally solved the mystery although, curiously enough, it shows that the oscillator is, in fact, based on the Turner 'kallirotron' circuit of 1920.

The summary of Reich's *ProcIRE* paper reads: "In the first portion of this paper, which deals with the theory of negative resistance oscillators, it is shown that for small harmonic content the form of the negative resistance characteristic in the vicinity of the operating point should be such that the average negative resistance increases with amplitude of oscillation. It is then shown that Turner's Kallirotron ▶

circuit has negative resistance characteristics of the desired form. The final part of the paper describes an audio-frequency oscillator based on Turner's circuit. The second and third harmonic content of the output may be kept below 0·2 per cent by the use of low-resistance coils and diode automatic amplitude control. Higher harmonics are negligible. At 1000Hz the frequency drift relative to a tuning fork oscillator does not exceed 0·04Hz. The frequency drift caused by a 22·5V change in anode supply voltage is 0·04Hz".

In his introductory text, Reich wrote: "No study appears to have been made of the suitability of the 'Kallirotrun' negative resistance of Turner as the basis of a negative resistance oscillator. It is the purpose of this paper to show that the characteristics of this circuit are ideal for its use in an oscillator and to describe a low distortion oscillator based upon it."

It is thus now quite clear that we owe the "Kallirotron oscillator" to Reich, 1937 and Turner, 1920 (*Radio Review*, Vol 1, p317) and that it provides a useful configuration at frequencies from af to vhf (or beyond). Since writing the above notes further information has come from Isaac Lederer, ORS87664 in Israel and this will appear hopefully next month.

LOW-LEVEL RADIATION AND HEALTH

There are some questions that just will not go away no matter how much one would wish to have once-and-for-all definitive answers. For radio amateurs, one of the most important is whether or not non-ionized electromagnetic radiation, at levels below the current official standards, constitutes a potential health hazard. In the April *TT*, I drew attention to a trenchant article by the American university scientists Foster and Pickard (*Nature*, 10 December 1987) that highlighted the need to establish guidelines for *halting* some of the protracted and inconclusive research into possible biological effects of non-ionised radiation, at the sort of levels found at reasonable distances from amateur transmitting antennas, etc. This article, as might be expected, has been bitterly attacked by a considerable number of scientists involved in bio-research into possible radiation hazards.

In *Microwave News* (January/February 1988) no less than 19 prominent workers in this field, who obviously greatly resented the idea of their research projects being 'halted', went on record with highly critical remarks about the Foster and Pickard article. The critics included Dr Ross Adey of the Veterans Administration at a hospital in California who has been very prominent in investigating possible tissue interactions with weak electromagnetic fields. He has renewed his attack on Foster and Pickard's paper in *Nature* (2 June 1988) claiming that their commentary on the risks of microwaves is "wide of the mark and unreasonably denigrates the efforts of the many who have established structural and functional substrates for essential aspects of these interactions at cellular and subcellular levels" and ignores "a wealth of findings that relate to the role of cell membranes in transdictive coupling of electrical and chemical signals from the outside to the inside of the cell; in interactions at cell surfaces between weak electromagnetic fields (elf fields and rf/microwave fields amplitude or pulse-modulated at elf) and the gamut of natural and artificial chemical molecules that stimulate cell surfaces at specific receptor sites . . . Beyond the evidence for these modulation-dependent effects further research is needed to evaluate the nature and extent of possible resonant interactions between biomolecules and millimetre microwave fields".

Jim Ballard, G0AOT, has drawn attention to a long article by Simon Best, a medical writer, on "The electropollution effect" in the *Journal of Alternative & Complementary Medicine* (May 1988). This surveys what is termed "the growing body of evidence linking high voltage power lines with cancer, especially leukaemia". This includes Dr Adey's recommendations to the US House Committee that: "There is a growing and even urgent need for early establishment of national safety standards that would govern exposure to non-ionising electromagnetic fields in the workplace, in the home and in the general environment. These standards should be regarded as interim since current epidemiological knowledge and experimental evidence remain incomplete in precisely defining mechanisms of em field interaction with body tissues and in evaluating the exact role of these em fields in human disease."

I would stress that much of the present research is centred on the em fields near 50/60Hz high-voltage power lines and rf signals pulse-modulated at very low frequencies, rather than signals radiated by mf/hf/vhf/uhf broadcast or communications transmitters. And to be fair to the Foster & Pickard article, they did write that there are many effects – "perhaps hundreds" including many associated with 50/60Hz power line electric and magnetic fields – that remain to be studied". The response to their article seems to be part of the "scientific noise" that, they claimed, risk research produces. ■

HINTS AND TIPS

Grant Dixon, G8CGK confesses to having originated the useful paper-clip component-puller praised by GW0IER (*TT*, May 1988, Fig. 11, p349). It was originally published a few years ago in one of the electronics magazine. G8CGK mentions that it can be further improved by filing the hook to resemble the tip of a screwdriver as in Fig. 10. This enables it to go under any wires which are very tight against a pcb.

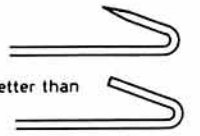


FIG 10. G8CGK POINTS OUT THAT HIS PAPER-CLIP COMPONENT-PULLER CAN BE IMPROVED BY FILING THE HOOK TO FORM A SCREWDRIVER SHAPE.

Peter Pitts, G3GYE/A4XGC finds the tune-up protection device featured several times recently in *TT* very worthwhile but comments: "Nobody has mentioned that the unwanted radiation (at balance position) is proportional to the power into the 50Ω dummy load so one can still radiate sufficient signal to interfere with local stations when used for extended measurements etc. For example at 100W output of the transmitter, rather over 1·25W is likely to be radiated." I seem to recall mentioning that this type of device comes into the 'quiet tune-up' rather than the 'silent tune-up' category required by the military. G3GYE has added another switch position to isolate the bridge when full power is required to load.

Paul Tregear, G8PQM draws the attention of constructors to the Wien Bridge Oscillator. He believes that they may have been put off by the apparent need to use a costly thermistor to stabilise the level of negative feedback. The arrangement of Fig. 11 dispenses with this item and, as a bonus, provides adjustment of the output level at source. D1 conducts at the positive peaks of the output waveform at a level set by adjustment of RV1.

Notes (1) The output frequency is equal to $1/(2\pi CR)$ where C is in farads and R in ohms. (2) The ratio R2/R1 must be only just greater than 2 to preserve good sinusoidal output form. (3) Values of C should be closely matched to ensure oscillation (positive feedback just predominates). (4) Circuit may be 'keyed' at point X.

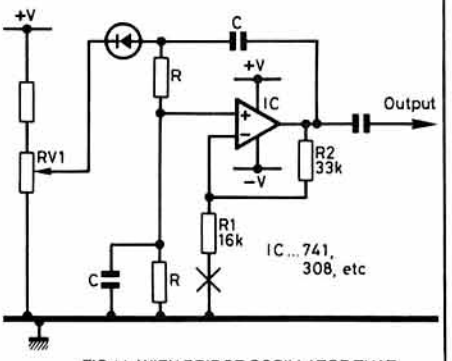


FIG 11. WIEN BRIDGE OSCILLATOR THAT DOES NOT DEPEND ON THE USE OF A THERMISTOR (G8PQM).

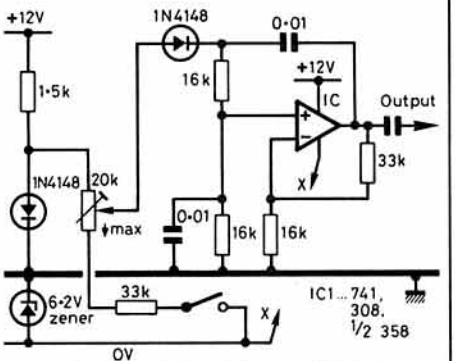
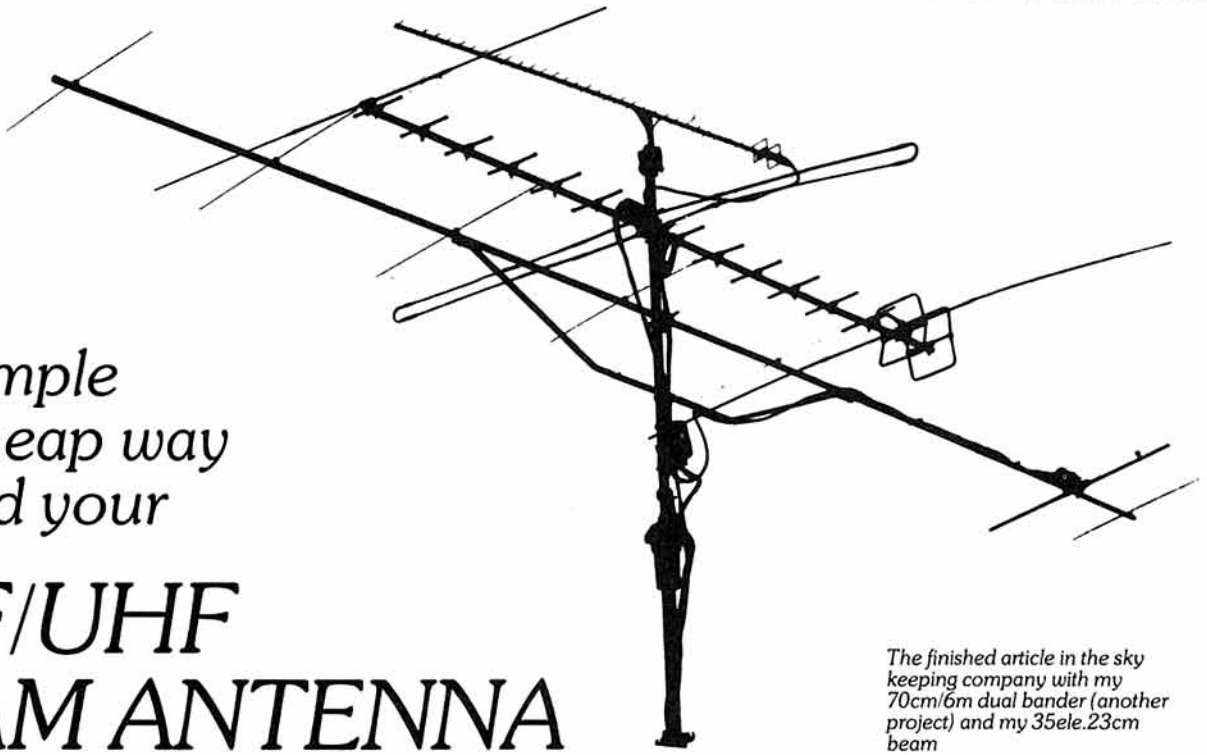


FIG 12. PRACTICAL CIRCUIT DIAGRAM OF A WIEN BRIDGE OSCILLATOR WITH SINGLE-POLARITY POWER SOURCE.

Fig. 12 shows a practical arrangement of a Wien Bridge oscillator for morse practice with a single 12V power supply. This will drive a high impedance headphone directly or a loudspeaker via an audio amplifier. Other uses suggested by G8PQM, are for a side-tone oscillator or for a two-tone signal source.

BY GW1CJJ



The finished article in the sky keeping company with my 70cm/6m dual bander (another project) and my 35ele.23cm beam

The simple and cheap way to build your

VHF/UHF BEAM ANTENNA

Having recently lost my 144MHz long yagi due to storm damage my thoughts turned to a suitable replacement. After studying all the various handbooks and articles on the subject of long Yagi design the first dilemma was which line of design thought to follow, ie constant length directors with variable spacing, logarithmic tapered directors with constant spacing or a combination of the two.

I do not propose to attempt to argue the merits of the above classes of design but would suggest the reader study the appropriate chapters in the RSGB *VHF/UHF Manual*, the *ARRL VHF Handbook* or any other of the numerous publications. Unfortunately every author has his own personal favourite design method and so the choice is not entirely clear. There is however considerable scope for personal experimentation.

The second problem encountered was a considerable difficulty in locating a supply of suitable materials, no-one in North Wales seeming to hold a stock of suitable aluminium tube. Whilst it is possible to obtain supplies from out of the area or indeed from most major rallies there is the problem and cost of transport and the inconvenience (have you tried carrying long lengths of aluminium tubing around a crowded rally? Not a recommended way of making friends). Also Murphy's Law dictates that when the materials are needed there is not rally being held within easy travelling distance for months.

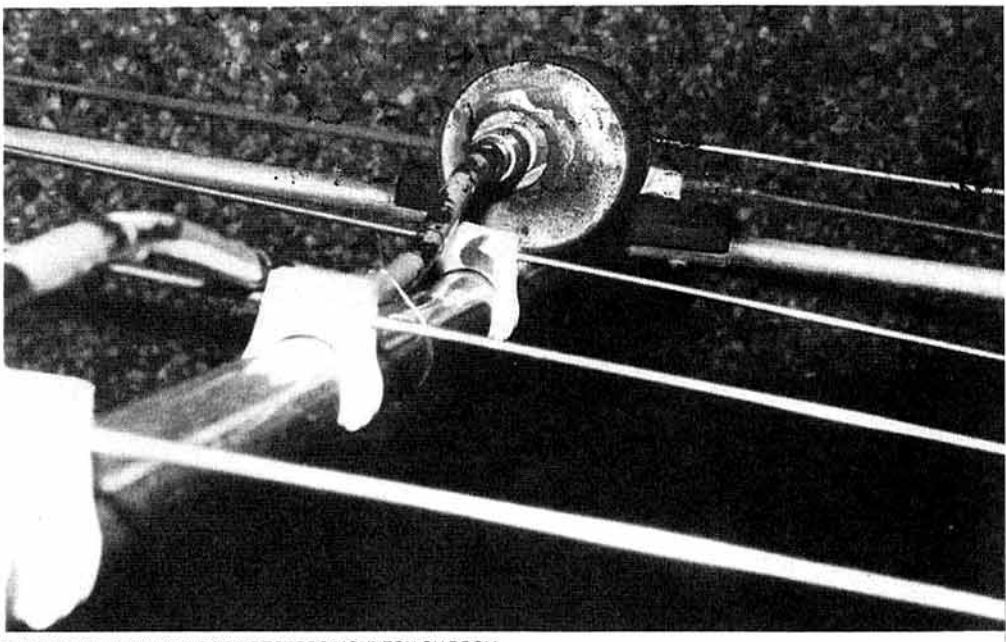
In pondering the solution to these problems I began to formulate a list of qualities that my ideal antenna should possess. The following are the factors I considered important:

1. Strong but light in weight
2. Low windage
3. Easily repairable
4. Easily adjusted to allow for experimentation in altering spacings, element lengths etc.
5. Cheap and easy to build
6. Constructed using readily available components

Having spent considerable time thinking over the solution to all these points the answer came to me suddenly while sitting in that place where all my best thinking is done . . . (the shack).

I noticed that the plastic clips which hold plumbing to walls were about the right diameter to clip over some one inch aluminium tubing I had obtained to use as a boom. The tubing was intended for supporting lightweight tv antennas and was easily obtained in 6ft lengths from a company specialising in tv antenna erection, three lengths of this joined together giving me a good usable 18ft boom. I obtained some of the pipe support clips which are easily found in plumber's suppliers or DIY shops and found that they made a good tight mechanical fit around the boom which would be strong enough to support lightweight elements.

The clips which appear to be made of a white ▶



DRIVEN ELEMENT AND FIRST DIRECTORS MOUNTON ON BOOM

coloured flexible plastic or pvc are available in several forms, I have found that the best are those with a good sized square shaped lug through which the mounting screw is meant to pass as the size of the lug gives more strength and support when drilled. The clips are intended for use with 22mm copper pipe but will stretch and make a good tight fit on one inch aluminium (15mm versions are also available). Some types of clip are a firm fit on 7/8in tubing, while others will not hold on a tubing as large as one inch so some care in choosing is necessary.

The next problem was to find materials to use for the elements. I had already decided to use a driven element which I had previously made from the remains of an old tv antenna element (these can usually be scrounged from any tv antenna erection company who are usually only too pleased to dispose of their old scrap). This included a Gamma Matching Stub formed of a length of brass welding rod and the variable capacitor mounted in a small tin can, Fig 1. Other types of matching circuit are of course suitable and indeed a folded dipole could be used, the choice is determined by the constructor's preference and the available materials. From this I had the idea of using welding rods for all the remaining elements, the advantages being that their light weight and small surface area will not impose too much strain on the mounting clip in windy weather.

I found that suitable welding rods are easily available in either brass, stainless steel or aluminium in various thicknesses up to about ⅛in and in lengths of up to one metre. (Avoid steel or copper coated steel rods as corrosion will be a problem, also brass is rather lossy at uhf and can suffer from metal fatigue if used at longer lengths). Having cut the rods to the required size the method of attaching them to the boom clips is very simple, drill a hole of a diameter very slightly smaller than the element through the lug of the clip and carefully force the element through the hole, it will be found that this makes a sufficiently strong joint to withstand any weather Fig 2. Should 'belt and braces' be required a small amount of Aryldite pressed into the mouldings of the clip around the element should render it immovable.

Mounting the element on to the boom is now simply a matter of measuring the appropriate spacings between elements and clipping the plastic pipe supports in place. When entirely happy with the position of the elements it is possible to lock these permanently in place either by drilling a small hole and screwing a small self-tapping screw through the clip into the boom or by glueing the clips into place. I have found that the clips are an adequately close fit to make it unnecessary to employ any additional fixing, my antenna having survived several high winds with no movement of the elements. However the type of plastic used in the clips is prone to degrading by the action of the ultra violet element of sunlight it thus may after some years become rather brittle, it is therefore advisable,

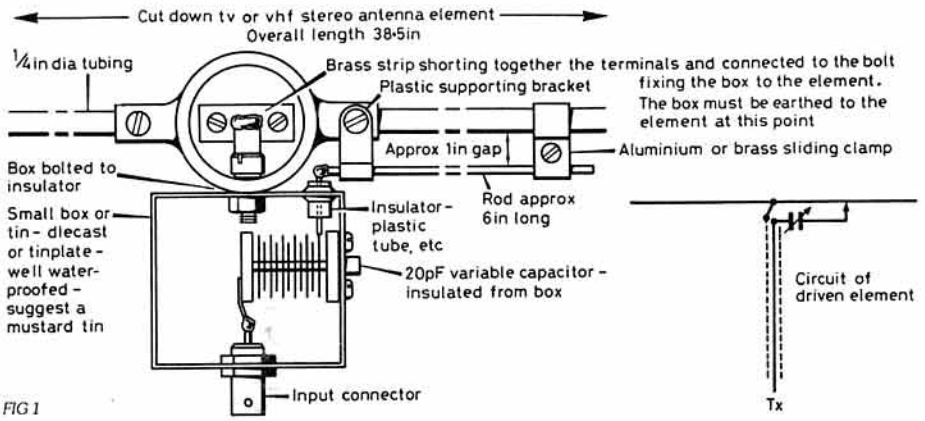
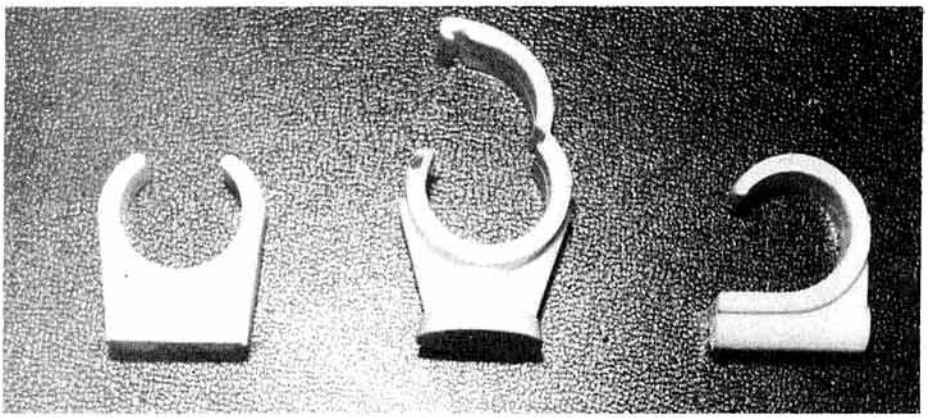


FIG 1



AN ASSORTMENT OF CLIPS OF THE TYPE USED: (A) THE CLIPS USED IN MY DESIGN; (B) A LOCKING VARIETY (THESE ARE TOO SMALL FOR 1" TUBING; (C) ANOTHER VARIATION WITH A HOLE FOR A FIXING NAIL WHICH CAN BE USED TO PUSH THE ELEMENT THROUGH WITHOUT DRILLING

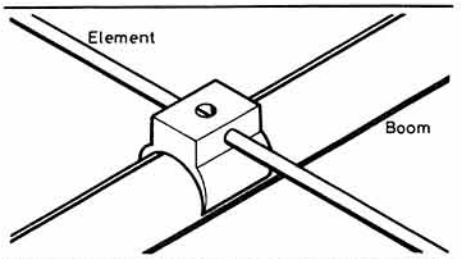


FIG 2. ELEMENT CLIPPED TO BOOM SHOWING HOW THE WELDING ROD IS SIMPLY PUSHED THROUGH A HOLE DRILLED IN THE CLIP

once the constructor is happy with the performance of the antenna and has finished all experimentation, to permanently fix the elements in place as described above. A good clean, followed by a coat of polyurethane varnish should protect it from the worst of the weather and extend its life.

The advantage of this method of construction is that the elements can be adjusted and changed in seconds, allowing for considerable experimentation. I have decided to construct a second 'family' of elements to allow change from constant length directors to variable lengths and to observe the difference in performance. Another advantage of easy dismantling is that an antenna constructed in this way could easily be taken in a car (or even a rucksack) and erected quickly for portable or contest working.

GUIDELINES

This is not intended as a step by step set of instructions to reproduce exactly the antenna I have built, but rather as a few suggestions to set fertile minds working on improvements or variations to suit the individual, however for those interested I have set out the dimensions I used in the construction of my 12 element long Yagi Table 1. These dimensions are taken from tables published in the ARRL *VHF Handbook*, however care must be taken when using published dimensions or when reproducing an existing design to make a correction to all element lengths, to compensate for the diameter of the elements and the differing element mounting method.

I have been using my antenna for some time now and have been delighted with its performance, particularly as the whole project took only a few hours to complete and cost under £10.

FIG3
Dimensions for 12 element long Yagi (constant length directors)

	Element Lengths	Spacings (inches)
Reflector	41	
		16½
Driven	38	
		7
Director 1	36¾	
		7½
2	36¾	
		7½
3	36¾	
		16
4	36¾	
		32
5	36¾	
		32
6	36¾	
		32
7	36¾	
		32
8	36¾	
		32
9	36¾	
		32
10	36¾	

LIFTING CW OUT OF THE NOISE

DESIGN FOR A CW FILTER WHICH AVOIDS THE NEED FOR HIGH-Q RESONANT CIRCUITS WHICH CAN IMPAIR INTELLIGIBILITY THROUGH RINGING. IT'S A PHASE-SHIFT CIRCUIT BASED ON 074 OPERATIONAL AMPLIFIERS

BY DAVID DAVIES, C.ENG. IERE, G4YKT

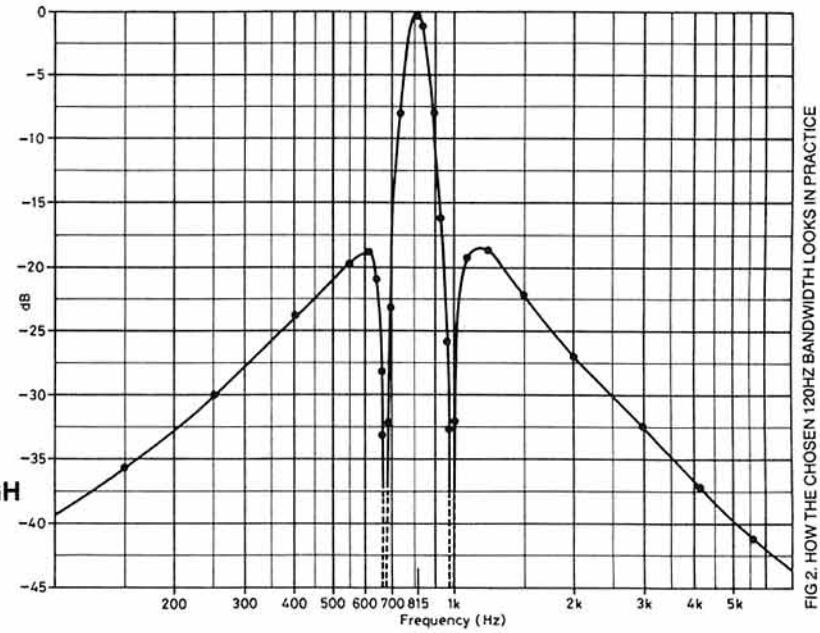


FIG 2. HOW THE CHOSEN 120HZ BANDWIDTH LOOKS IN PRACTICE

A majority of cw enthusiasts will, at one time or another, have considered audio filters as an aid to extracting weak signals from a noisy background or, as a means towards eliminating a strong interfering signal. Over the years literally dozens of designs have appeared in the amateur press offering versions of bandpass filters, notch filters, 'clippers' and 'limiters', not to mention spatial effect filters. Some of these devices can make a worthwhile contribution to reception but, in my experience, none has quite lived up to expectations. For example, narrow passband filters have a tendency to 'ring' giving a quite unnatural quality to the received signal. On the other hand, some designs can sound 'woolly' as if the signal were emanating from the bottom of a well. Then there are versions that require adjustments during reception which is, at best, inconvenient and, at worst, can mean that by the time the adjustment is optimised the contact is lost or conditions have changed.

After building a number of conventional filters of one kind or another, sometimes with disappointing results, I pursued the idea of a filter which could extract the wanted signal from a noisy background without changing its essential quality or destroying the intangible but nevertheless real, sense of contact that cw operators have with the signal environment. The objective was to avoid highly resonant elements and yet achieve a narrow steep-sided passband.

PHASE SHIFT FILTER

A block diagram of the design finally adopted is shown in Fig 1. Each of the elements IC1 to IC8 is a low Q (Q is approximately 2) unity gain passband filter centred at 815Hz. At the centre frequency each element produces a phase shift of 180°. At all other frequencies the phase shift will be greater or less than 180°. The design discriminates against frequencies which are not phase shifted precisely 180° through each element – ie everything except 815Hz.

Consider, first, an incoming signal of 815Hz. At the output of IC1 the signal will be phase shifted 180° and, after passing through IC2 a further 180° change, returned to its original phase. At the output of IC3 the signal is again 180° out of phase with the original and is identical to that at the output of IC1. Phase reversal continues on down the chain, points marked 1 3 5 and 7 (Fig 1) will show identical replicas of the incoming 815Hz signal but, 180° out of phase. At the same time, points marked 2 4 6 and 8 will show replicas in-phase with the incoming signal. At IC9 the 180° out of phase component from IC1 and the in-phase component from IC8 are additively combined via the inverting and non-inverting inputs of IC9 producing an output equal to twice the amplitude of the inputs.

A signal at 815Hz, is, therefore, passed through the filter virtually unmodified. At frequencies other than 815Hz the situation is, however, very different. For example, a signal at 700Hz will have a phase shift of some 170° through each element and the output of each element will differ from its predecessor, as indicated in Fig 1. At IC9 the inputs are again additively combined but, because of the phase difference, partial cancellation takes place. The degree of cancellation is dependant upon the relative phase difference at the inputs to IC9, when two signals are in-phase, but remembering that one will be inverted at IC9, total cancellation will take place.

In practice, total cancellation will take place when the two signals are not only in-phase but also have equal amplitudes. To accommodate minor variations in gain due to component tolerances RV2 is provided as a 'balancing' control. The capacitor, C10, preserves the DC conditions to the inputs of IC9.

The width of the passband is dependant upon the number of elements in the chain. The more elements the greater the phase change, at the end of the chain, for a given change in frequency away from 815Hz. In principle, the passband could be reduced to a few Hertz, but a reasonable compromise of some 120Hz was adopted. Fig 2 shows the overall response of the filter using eight elements; the passband is extremely steep and narrow owing to the rapidly changing phase between the outputs of IC1 and IC8 with any deviation from 815Hz. Also, total cancellation when the two contributions pass through their in-phase condition can be seen. This latter feature is helpful in eliminating an interfering signal close to the wanted station.

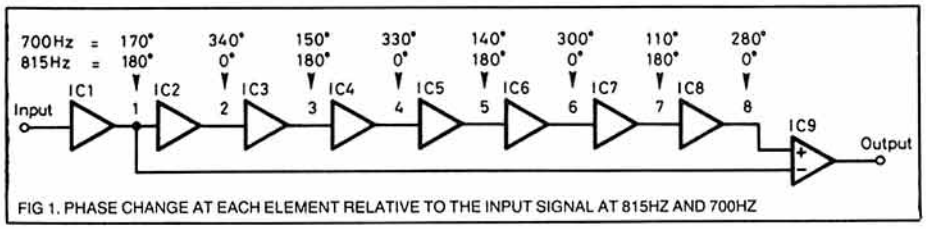
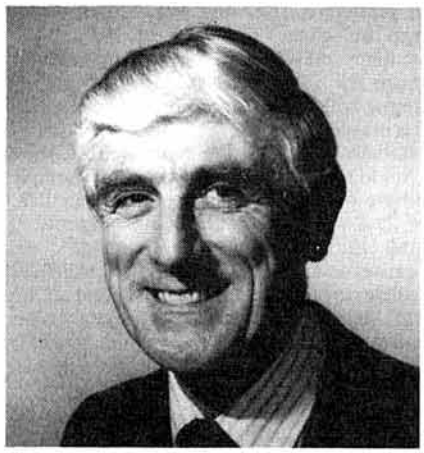


FIG 1. PHASE CHANGE AT EACH ELEMENT RELATIVE TO THE INPUT SIGNAL AT 815HZ AND 700HZ

BIOGRAPHICAL NOTE



David Davies was born in Flint in 1927. While attending Holywell Grammar School he became interested in 'wireless' and built a number of one and two valve receivers, most of the components being home made. His early career included seven years as a Marconi Marine radio officer and several years as a tv service engineer. For the past 30 he has been employed by the British Steel Corporation as a Principal Research Officer largely involved in the design and development of electronic systems for the automatic inspection of steel products using ultrasonic, eddy-current and other techniques. Having always had an interest in amateur radio he finally found time to become licensed in 1984. He admits to spending more time modifying his equipment than he does on the air.

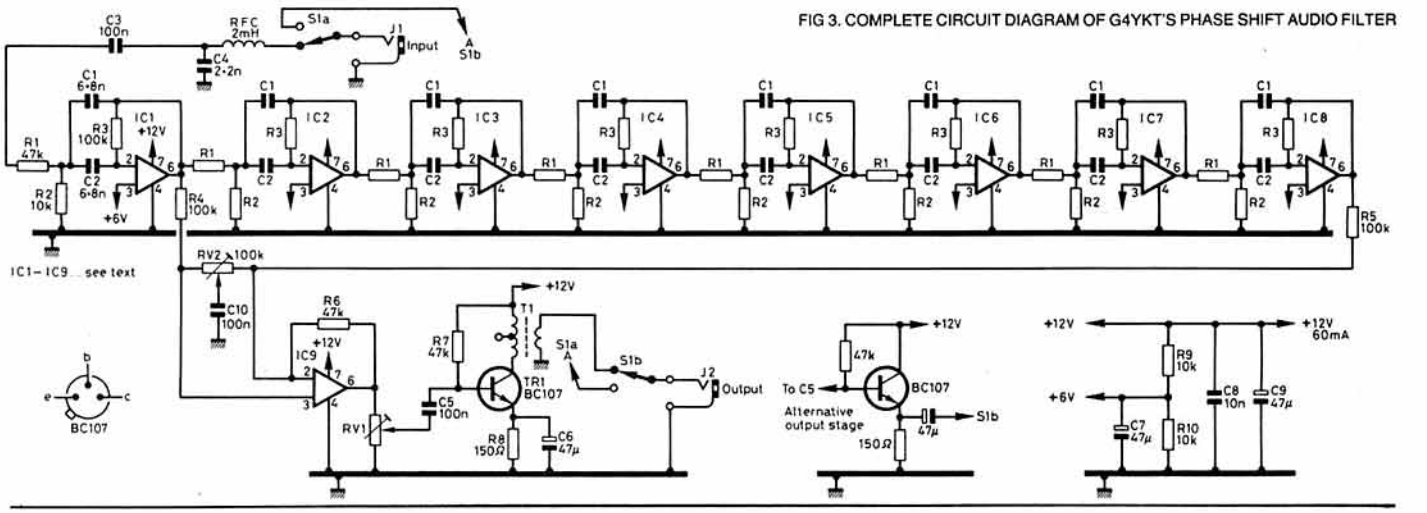


FIG 3. COMPLETE CIRCUIT DIAGRAM OF G4YKT'S PHASE SHIFT AUDIO FILTER

A centre frequency of 815Hz was chosen for two reasons. First, it lies within the optimum audible range for cw reception. Second – and this was the deciding factor – the frequency-determining components have standard easily obtainable values. Some constructors may wish to experiment with an alternative centre frequency, in which case the important parameters for each filter element are:

$$f = \frac{1}{2\pi C}\sqrt{\frac{R_1 + R_2}{R_1 R_2 R_3}}$$

$$Q = \pi R3\, C10^3$$

$$A(\text{gain}) = \frac{R_3}{2R_1}$$

$C_1 = C_2 = C$

$R = M\Omega$

$C = \mu Fd$

$f = Hz$

The first step is to choose a reasonable value for C and R3 then proceed by substitution; a once tedious process but now delightfully easy using a calculator.

The output stage is just about the simplest that could be devised to drive low impedance (8Ω) headphones. The writer has a particular preference for low impedance, 'high fidelity', headphones which have the advantage of revealing background noise and other spurious effects which are better eliminated at source rather than disguised by lesser quality headphones. However, if medium to high impedance headphones are preferred then the alternative output stage shown in Fig 3 may be used.

CONSTRUCTION

The complete circuit diagram is shown in Fig 3. It is important that the frequency determining components (R1 R2 R3 and C1 C2) in each of the filter elements are close tolerance items. In the prototype the capacitors were five per cent polystyrene types and the resistors one per cent metal film. Apart from this consideration there are no sensitive component values and the layout is not critical. The original was built on a

COMPONENT LIST

R1 (8 off)	47kΩ 1%
R2 (8 off)	10kΩ 1%
R3 (8 off)	100kΩ 1%
R4 R5	100kΩ
R6 R7	47kΩ
R8	150R
R9 R10	10kΩ
C1 C2	6·8nF Polystyrene 5% (16 off) IC1 to IC8
C3 C5 C10	100nF
C4	2·2nF disc
C6 C7	47µF
C8	10nF
C9	470µF
Op. Amps	See text
TR1	BC107
RV1 RV2	100kΩ Trimpot (linear)
T1	Miniature o/p transformer 6.6:1
RFC	2mH choke
S1	DPDT toggle switch

Misc: Metal Box, Strip Board, Jack Plugs & Sockets.

piece of strip board measuring approximately 160 by 100 millimetres using individual 741 operational amplifiers. During the development stage alternative operational amplifiers, types 071 and 081 were tried, largely to determine if there would be any difference in the audible noise. In the event, there was no difference. With regard to noise, with no input and using high fidelity headphones it is just possible to discern enough noise to decide that the filter is switched on.

The final version was built using type 074 operational amplifiers, this is the 'quad' version of the 071. However, the use of quads or singles is a matter for individual preference, as is the use of sockets or direct soldering. If the constructor is not very experienced then individual, socketed, IC's is probably the best approach. The cost difference is slight and, certainly, layout and subsequent checking would be very much easier.

If the filter is to be used in conjunction with a transmitter when strong rf fields can be expected, these, if allowed to enter the filter chain, can produce extremely unpleasant audible effects, especially if the operator is using headphones! The rf choke (RFC) and sundry by-pass capacitors help towards avoiding this situation but if strong rf fields are going to be present, then it is essential that the filter be housed in a shielded enclosure.

The miniature output transformer in the output stage was salvaged from a defunct transistor radio purchased for 10p at a car boot sale. Similar transformers can be purchased from a number of stockists, being referred to as 'output' transformers.

CHECKING

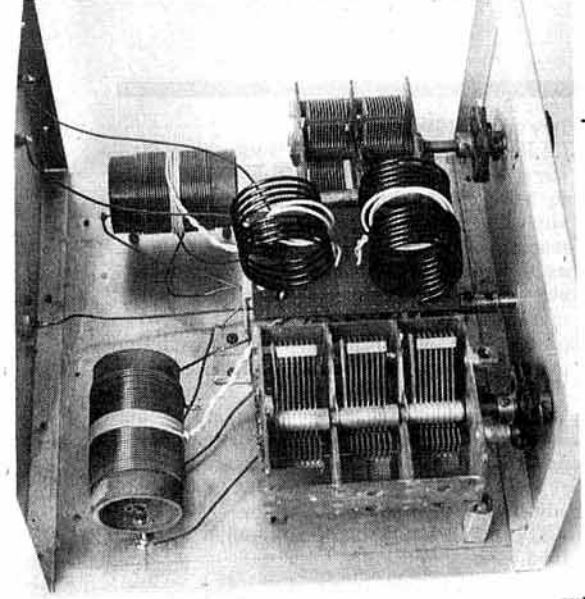
A performance check on the completed unit is best carried out using an audio oscillator and an oscilloscope. With an input of 815Hz the output of each stage is checked for 180° phase change, and the filtering action observed at other frequencies. If an oscillator and oscilloscope are not available it is suggested that the filter is built using sockets and individual operational amplifiers. Checking is then performed using the output stage as a signal tracer. For example, provide an input from the station receiver, insert IC1, and probe pin six with the input of the output stage, a slight degree of filtering should be heard. If all seems well insert IC2 and repeat the procedure, following with IC3; and so on down the chain. The gain of each stage is essentially unity, so the signal amplitude will remain the same at each stage and only the filtering will become more pronounced as each IC is inserted.

Initially, the balancing control, RV2, should be set to mid-travel. When checking is complete and the pass-band is observed to be similar to Fig 2, RV2 may be adjusted to improve the depth of the nulls. This will require a compromise, as a given setting of RV2 will not be possible to achieve total cancellation at both nulls. In my experience adjusting the balance control to give cancellation at the lower frequency null offered the best operating advantage.

In use, the preset, RV1, is adjusted so that, while listening to a carefully tuned signal, the amplitude is the same for either position of the switch S1.

CONCLUSION

This aid to cw reception offers an audio filter having a narrow steep-sided passband without noticeable ringing or other objectionable effects. The filter is capable of retrieving a signal from a noisy background when, without the filter, the signal may be virtually inaudible. □



VERSATILE SWITCHED ANTENNA FEED SYSTEM

LOUIS VARNEY, G5RV, C.ENG, MIEE, AIL, DESCRIBES HIS MULTI-ANTENNA/DUMMY LOAD SWITCH BOX

For those amateurs who use antenna and feeder systems which can be fed efficiently direct from the 50Ω output circuit of a modern transceiver without employing an ASTU (transmatch), life is simple; what you sacrifice are the versatility and low feeder losses of certain multi-band antennas fed with twin wire feeders. For those of us who are able to erect two or more antennas, it is a great advantage to be able to select any one of them, and its appropriate type of ASTU if required quickly and efficiently. Moreover, transmitter tuning-up using a suitable dummy load is a must for the conscientious operator. The switching system described in this article is simple and cheap to construct; it provides rapid selection of the DL, up to four different atennas, plus their associated feed systems. Fig. 1 shows a typical arrangement, the actual switching unit being shown within the broken line box.

If it is not required — or possible — to use as many as four different antennas with their respective feeder systems, the unwanted coaxial outlet sockets can be omitted, but if a five or six position wafer switch is used the unwanted contacts should all be connected to the first position (DL) to avoid any risk of operating the transmitter with no load connected. If, at some future time, extra antenna outlets are required it is a simple matter to add one or two coaxial sockets and rewire the existing spare switch contacts.

The inclusion of one or both of the ASTUs provides a very useful flexibility of operation. ASTU 1 is an unbalanced input to unbalanced output type suitable for use with an antenna, fed by coaxial cable, the feed-point impedance of which is, say, 75Ω at the *precise frequency* at which the antenna resonates in a given band. At that frequency, the mismatch between a 50Ω feeder and the 75Ω load presented by the antenna results in a VSWR on the feeder of 1·5:1, which is acceptable. However, at frequencies above and below its resonant frequency, although the value of the *resistive* component of the antenna feed impedance changes rather slowly, the *reactive* component (capacitative or inductive) changes rapidly. This results in increasingly higher VSWR on the feeder. Since, in this example, the mismatch is 1·5:1 at the resonant frequency of the antenna, operation at frequencies above or below that frequency may result in a total VSWR of over 2:1 which is unacceptable for modern solid-state transceivers. Because this effect is a function of the *percentage* change in frequency about the resonant frequency of the antenna, it follows that the effective operating bandwidth will be less for dipole antennas in the 1·8 and 3·5MHz bands than it is for dipoles used on the higher frequency bands. It is in order to compensate for these mismatch effects upon the transmitter that it is often advantageous to use a suitable ASTU.

It should be borne in mind, however, that although the ASTU will ensure acceptable load conditions for the transmitter, it cannot reduce the VSWR existing on the feeder caused by the mismatch condition at the antenna feed point. If this is likely to cause a VSWR of, say, 2:1 or more it is advisable to use the shortest convenient length of good quality 50Ω coax feeder if the inevitable power losses in the feeder are not to exceed, say, 1dB at the highest frequency of operation. Although the use of an ASTU will result in a further reduction of usable bandwidth for any given setting of its tuning capacitor(s), it is a simple matter to re-adjust its setting to any frequency within the band in use. In the case of antennas fed with 50Ω coax, ASTU 1 must be of the unbalanced to unbalanced type (U/U). Although this type of ASTU may also be used to feed an 'end-fed' wire antenna, which does not use a feeder, the use of such antennas is inadvisable because they are more likely to cause emc problems, in a typical amateur station, than are antennas fed by suitable feeder system. For a multi-band antenna fed with twin-wire feeder such as 75Ω twinlead, 300Ω ribbon (with 'windows') or open-wire feeder of any convenient characteristic impedance (Z_o) ASTU 2, an unbalaced (coax) input to balanced output type is required (U/B). Typical circuits of suitable types of ASTU are shown in Figs 2 and 3.

While on the subject of antenna bandwidth, it should be mentioned that the bandwidth available within a 2:1 VSWR limit will depend upon the inherent bandwidth of a wire antenna having a typical length-to-wire-diameter ratio of about 25,000 and a Q of about 15. A well designed ASTU circuit will have an *unloaded* Q value as high as 100, but when the degree of coupling to the antenna system is adjusted for optimum transfer of power, the *loaded* Q will fall to about five so that, in practice, the bandwidth of an ASTU is quite acceptable. In the case of close-spaced multi-element beam antennas, particularly close-spaced Yagi antennas, the effect of such spacing and the mutual coupling between elements will result in an antenna Q value of 50 or more even though the use of 1" diameter aluminium tube elements results in a length to diameter ratio as low as 408 in the case of a typical 14MHz beam. The inherent bandwidth of such a beam, set by the >2:1 VSWR restraint, is much less than that of a wire dipole. however, since beam antennas of this type are normally used on the higher HF bands of 14, 21 and 28MHz, their bandwidth within the 2:1 VSWR limit is usually adequate to permit direct feed by 50Ω coax.

NOTES ON THE CONSTRUCTION OF ASTU'S

Nowadays it is not always easy to find the types of variable capacitors and ceramic wafer

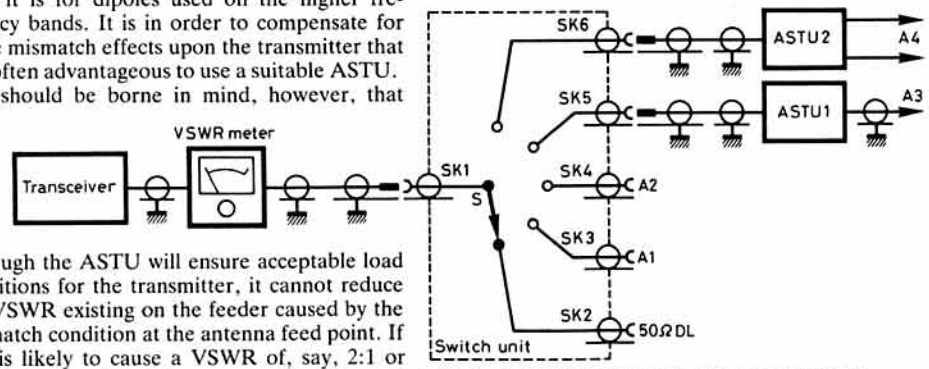


FIG 1. ARRANGEMENT OF THE HF ANTENNA SWITCHING UNIT AND ASTUs.

S	Single pole 5 position ceramic wafer switch, or Radio Spares (Qty. 1) switch assembly Stock No. 327-311 and (Qty. 1) switch wafer Stock No. 327-771 (only half of wafer is used)
50ΩDL	Carbon resistor dummy load (oil immersed or air blown for QRO)
A1	Dipole, trap dipole or GP antenna with 50Ω coax feeder.
A2	Beam antenna with 50Ω coax feeder.
A3	Any desired type fed with 50 coax feeder and presenting a reactive load with VSWR>1·5:1 on the feeder.
A4	Multi-band antenna fed with twin-wire balanced feeder.
ASTU 1	Unbalanced to unbalanced type (See Fig|2)
ASTU 2	Unbalanced to balanced type (See Fig 3)
Skl-6	Coaxial sockets.
NOTE	The switch unit may be constructed in any metal box or die-cast aluminium box of suitable size. The internal connecting leads between switch and coaxial sockets need not be coaxial cable but should be kept as short as possible and well separated one from the other.

switches required to build an ASTU, but these components can often be found at rallies and club junk sales. For QRP work, of course, receiver-type variable capacitors are suitable and can be found more easily than the transmitter type required for output powers greater than about 100W. Fortunately there are, however, at least two firms which still manufacture transmitter-type variable capacitors suitable for use in ASTUs capable of handling the maximum legal RF power output permitted in the UK. These firms advertise in various radio magazines.

Nevetheless, for the construction of an unbalanced input to balanced output ASTU that is required to cover all the HF bands from 3·5 to 28MHz it may be difficult to find a split-stator tuning capacitor which has sufficient maximum capacity per section to provide the optimum LC ratio for the 3·5MHz band. A rough rule of thumb is that 1pF of tuning capacity is required per metre of wavelength. So, for the 80 metre band an effective tuning capacity of at least 80pF is required, necessitating the use of a split-stator variable capacitor of 200pF per section. The ASTU circuit shown in Fig 3 overcomes this problem by switching the two sections of a 150 + 150pF twin-gang receiver-type variable capacitor in parallel for use on 3·5MHz (at this relatively low frequency the electrical symmetry of the tuning capacitor is less important than it is on the higher frequency bands) and switching to the split-stator mode on those bands.

In the circuit shown, feeder taps on the coils have been avoided by the use of a variable coupling capacitor C2, a twin-gang 500pF per section receiver-type with its sections connected in parallel. The construction of suitable coils is a simple matter and coil formers can be plastic pill containers of 40mm o/d or lengths of plastic tubing available in hardware shops if paxolin tubing is unavailable.

An ASTU of this type has been constructed and tested and gives excellent results on all bands from 3·5 to 28MHz (including the three WARC bands 10, 18 and 24MHz) and is suitable for RF powers up to about 100W. It will be noted that only four switched coil assemblies are required to cover this wide range of frequencies. The component layout and general appearance of the ASTU is shown in the photographs.

TUNING UP THE ASTU

The method of tuning and loading this type of ASTU is as follows:

(1) Select the DL position on the Antenna Switching Unit. Set the transceiver to the 'TUNE' or low power cw mode. Select desired frequency and tune up (if using a transceiver with a valve PA). Check VSWR into the DL.

(2) Set RANGE switch on the ASTU to the desired band.

(3) Switch the transceiver, in the RECEIVE MODE, to the ASTU and set C2 to about mid-scale. Tune C1 for maximum receiver noise level; then re-adjust C2 for further increase in noise level. Finally, re-adjust C1. The ASTU will then require only a very slight re-adjustment (if any) when the low power cw carrier is applied for adjustment of the ASTU in the TRANSMIT MODE.

(4) With the transceiver, in the TUNE, or very low power cw mode, key down, slightly re-adjust C1 and C2 (if necessary) for minimum Irev on the VSWR meter.

(5) Reduce sensitivity of the VSWR meter; then increase transmitter cw, key down, input power to the required working level and adjust sensitivity of the VSWR meter to give full-scale reading of Ifwd. Check Irev. Do this *as quickly as possible* so as to avoid damage to the transceiver PA stage transistors (or valves) and to minimise QRM on the selected frequency. With practice, the final full-power tune up operation takes only a few seconds. Log scale readings of RANGE switch and of C1 and C2 and the operating frequency. Once calibrated at the mid-band frequency of each band, the appropriate Range and C1, C2 settings can be selected rapidly. With valve PA, very slight re-adjustment of the LOAD control after final ASTU tune-up may result in a small increase of Ifwd.

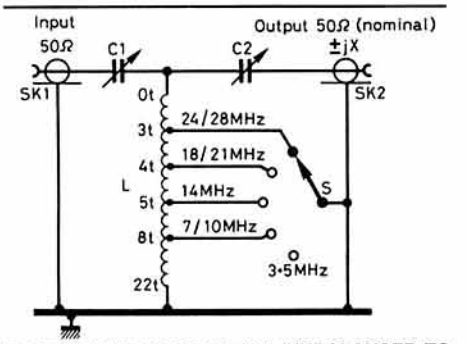


FIG 2. "T" NETWORK ASTU 1 (UNBALANCED TO UNBALANCED)

C1, C2 160 or 200pF variable. Receiver type satisfactory for output power up to 100W.

L1 Total 22t 16 or 18swg enam copper wire close-wound on 40mm o/d former. Taps, counting from top end of coil: 3·5MHz 22t (full coil); 7/10MHz 8t; 14MHz 5t; 18/21MHz 4t; 24/28MHz 3t.

Sk1,2 Coaxial sockets

S Single pole 5-way ceramic wafer switch, (1) or Radio Spares (Qty. 1) switch assembly Stock No. 327-311 and (QTY 1) switch wafer Stock No. 327-771 (only one half of wafer is used).

Note: It may be necessary to vary coil tops – One turn depending of effect of metal coilsheet and actual output load conditions.

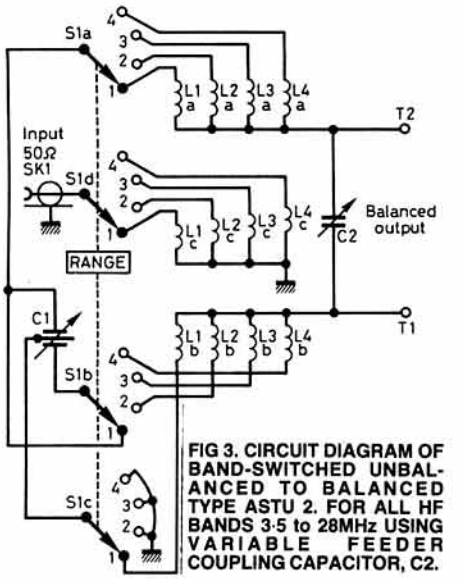


FIG 3. CIRCUIT DIAGRAM OF BAND-SWITCHED UNBALANCED TO BALANCED TYPE ASTU 2. FOR ALL HF BANDS 3·5 to 28MHz USING VARIABLE FEEDER COUPLING CAPACITOR, C2.

C1 2 section variable capacitor 2 × 150pF receiver type.

C2 2 section variable capacitor 2 × 500pF receiver type.

Range 1. 3·5MHz L1a L1b 2 × 16t enam Cu wire 16swg c/w on 40mm o/d former. 10mm gap between each half winding to accommodate 5t link coil L1c.

Range 2. 7-10MHz L2a L2b 2 × 11t enam Cu wire 16swg c/w on 40mm o/d former 10mm gap to accommodate 4t link coil L2c

Range 3. 14-18-21 MHz L3a L3b 2 × 6t enam Cu wire 14swg 40mm i/d self supporting. Turns spaced wire dia. Link coil L3c 3t, coupling adjusted for minimum VSWR.

Range 4. 24-28MHz L4a L4b 2 × 4t enam Cu wire 14swg 40mm i/d self-supporting. Turns spaced 1·5 times wire dia. Link coil L4c 3t, coupling adjusted for minimum VSWR.

S1a,b,c,d, Ceramic wafer switch 4 × SP 4 way, or Radio Spares (Qty 1) Switch assembly Stock No. 327-311 and Radio Spares (Qty 2) Switch wafer Stock No. 327-771.

So 1 Coaxial input socket.

T1 T2 Insulated output terminals (or sockets) to balanced feeder.

(NOTE 1) The above instructions assume that the transceiver frequency is set to mid-band on the 7 to 24MHz bands, inclusive. Only very slight re-adjustment of C1 will be required when operation in the lower or upper half of any of these bands is required. However, because of the limitation in the combined effective operating bandwidth of antennas and ASTU's in the 1·8 and 3·5MHz bands, as explained in the first part of this article, it will be necessary to re-adjust C1 (and perhaps C2) to obtain minimum VSWR readings when operation in the lower or upper half of the 3·5-3·8MHz band is required. Also, because the 28MHz band is so wide (28000 to 28700kHz), re-adjustment and calibration of the ASTU is recommended at 28500, 29000 and 29500kHz.

(NOTE 2) In the case of modern all solid-state transceivers, the only preliminary tuning-up (perhaps, more correctly, 'adjustment') that needs to be done on DL is, of course, the selection of the desired frequency band, setting of the VFO to the required frequency within that band and adjustment of the drive level control. However, in the case of transceivers using a *valve* PA, upon completion of the ASTU tuning and coupling capacitor adjustments, it may be necessary to slightly re-adjust both PA tuning and loading capacitors for maximum indicated RF output (as indicated by the VSWR merter forward current reading). This is because adjustment of the ASTU variable tuning and loading capacitors to obtain minimum VSWR meter reverse current reading may slightly affect the tuning and loading of the PA Pi-network output circuit. These remarks also apply to the use and adjustment of any type of ASTU (such as the T-network of Fig 2 for example) when used with a valve output PA.

(NOTE 3) When using the T-network (ASTU 1) shown in Fig 2 the general procedure for tuning and loading is as described for ASTU 2, except that the variable capacitors C1 and C2 should be adjusted approximately in step, after selecting the correct coil tap for the band in use, until the lowest Irev on the VSWR meter is obtained. Very slight individual final adjustment of C1 and C2 may be required to obtain this.

Louis Varney G5RV
November 1987

(1) "ATU or ASTU?" by Louis Varney G5RV, Radio Communication, August 1983 pp702-704.

NEWS AND VIEWS

HF

JOHN ALLAWAY G3FKM

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It is reported that a more liberal attitude to amateur radio will be seen in **China** this month. Prefixes to be used will be BG for individual operators, BW for foreigners, BT for special or commemorative stations and BY for club stations. *DX'press* says that NS7Z has the callsign BW1Z and that BY4RSA will be active late in October. *DX News Sheet* reports that log books for the JK8KS and JY8KY operations have been confiscated as the operators did not have authority to operate.

VI88XPO is the callsign of the station at the Australian World Exposition in Brisbane. It is mostly found on frequencies which end on '88' — e.g. 14,088kHz.

Dale, W4QM, is back on **Chagos** and using the callsign VQ9QM. He will be there until the end of 1988. Paul, N1AME, was hoping to be VQ9ZM by now and to be on the air until the end of September.

KC4USV is at McMurdo station, **Antarctica**, and will be there for five years.

DX News Sheet reports a station using the callsign 3X1SG working into the UK on 21MHz ssb. The operator said that he hopes to have a QSL manager later. FR0EH on **Reunion** now has the callsign FR4FA. If you need **Rwanda** try looking for 9X5AA betweeen 21,240 and 21,290kHz after 1800.

JX8KY should be active from **Jan Mayen** again by now and will be there for several months more. UW3HY/1, on **Franz Josef Land**, is said to be on 14,011kHz at around 2330 nearly every day and UA1OT frequents 14,030kHz around the same time. UA0BEZ/1 is on Heyss Is in Franz Josepf Land. OX3KD left **Greenland** early in May and has returned to being OZ1KPB.

The *DX Bulletin* reports that the DX Advisory Committee is at present considering two proposals. One is that Okino Torishima (7J) be reinstated to the dxcc list. The previous listing was removed because it was found that the reef was less than 500 miles from Ogasawara. JE2CEG, who has put forward the proposal, maintains that the separation distance should be measured from the capital of Ogasawara and not the nearest land point. W6CF is said to have also pointed out that reinstatement may be justified as the result of some separation by another country. The second proposal is to ease the endorsement rules of the rtty dxcc to be the same as those for the new single-band awards.

Lorin Knight, G2DXK, has written to say that a number of QSLs addressed to VP2VO have recently started arriving at the home of G4MR. Please note that G4MR was never the QSL manager for that station and in fact has been a silent-key for over four years. "VP2VO" would appear to be unlicensed and to have a sick sense of humour.

DXPEDITIONS

Steve, G4JVG, will be operating from the Cocos Keeling Is as VK9YC between 18 October and 1 November next. Equipment will consist of a TS440S transceiver with FL-2100B linear which will feed two log-periodic yagis for 14, 21, and 28MHz 60 and 70 feet above ground. On 7MHz a two-element delta-loop, on 3·5MHz a quarter-wave vertical and an inverted vee dipole, and on 1·8MHz a quarter wave inverted-L antenna will be used. All will be located at the water's edge on the lagoon. VK9YC will be in the CQWWDX Contest (ssb) an the end of October and the special callsign AX9YC may be used for this activity. Prior to the contest activity may be sporadic but Steve would be pleased to arrange schedules with well equipped stations on the low frequency bands which he will make every effort to keep. Please write to the address in QTH Corner before the end of September with sked requests — and if confirmation is required please enclose a sae and return postage. All activity will be on ssb and frequencies to be used are 3,640-3,650, 3,785-3,800, 7,045, 14,145, 14,195, 21,205, and 28,505kHz. Top band frequencies will depend on local conditions. QSL to the address in QTH Corner enclosing sae and return postage (one irc for Europe, two ircs for elsewhere) and donations will be appreciated. Listener reports will be confirmed but only if sent direct and with return postage. Finally — Steve wishes to thank the NCDXF for help with QSL expenses.

Jim Smith, VK9NS, has sent me copies of several documents relating to the recent HIDXA expedition to Howland Is. These make it very clear that everything was in order with the visit. One example of the considerable cost was shown by the bill for US $22,880 for the thirteen day charter of the MV "Momi". 27,500 QSOs were made during the available six days and usually three stations were on the air. Jim commented on the QSL'ing situation and says that surprisingly about 10 per cent of the direct cards received had no self addressed envelope for the card's return.

Tom Gregory, N4NW, wrote to say that he had received a licence for operation as TN4NW from the Democratic Republic of the Congo. It is dated 18 May, is for six months, and renewable. He will operate with an ICOM IC-761 from Brazzaville, initially with an all-band vertical and dipoles, but hopefully with a tri-band Yagi later. Planned operating frequencies are (cw) 25kHz up from band edges and (ssb) 3,750, 7,043, 14,125, 14,180, 21,250, and 28,490kHz. There is no authorisation for 1·8MHz and operation will be split frequency with emphasis ▶

on 14, 21, and 28MHz. Logging will be done on a pc and the software checks for duplicate QSOs on the same band which will be discouraged. QSL requests should go direct only and to AL7EL (see QTH Corner) with sae and return postage. Please write own call on the bottom front of envelopes going to AL7EL. Those with insufficient return postage will be sent out via the ARRL bureau after Tom's return to the USA in mid-1989. Donations will be gratefully accepted. (The specialised computerised logging programme used by Tom for this and other expeditions is available from WB2DND, Don Greenbaum, PO Box 79, Plymouth, MA 02364 – sase to WB2DND for details). Other snippets of African news in Tom's letter are that Duncan, 9Q5DA, was due to close down at the end of June and return to the UK – and please note that KC4NC who acts as his QSL manager will only be able to comply with requests received before the end of 1988 (the details of the 10,000 cw QSOs on the computer will be deleted then). Margie, TL8DN was expecting delivery of a tower and cubical quad very soon and she will use the same computer log system. Finally, 5N0WRE has left for Cairo and is trying to obtain operating permission from Egypt.

AMATEUR RADIO IN THAILAND

HS1AMH, international liasion officer of the Radio Amateur Society of Thailand, recently wrote an article for *Region III News*. In it he says,"Here is an updated current situation regarding amateur radio in Thailand – a situation that is changing for the better, I might add. I hope that this information helps explain the relative lack of hf activity in Thailand over the past few years (indeed, a total absence at the time of writing) and gives ground for optimism all round. New amateur radio regulations which were enacted into law on August 4th 1987 became effective at the beginning of this year.

"Salient points from these regulations are: The minimum age for applicants will be 15 years, and they should be Thai nationals. Qualified foreign residents will be able to apply to operate under reciprocal operating privileges to be set up with corresponding administrations abroad. A National Security or police clearance would be required before an amateur radio licence is issued, and would be applicants for such a licence (for hf operating) should be a member of the national amateur radio society (RAST). There are three classes — a novice class offering vhf only on 144MHz, a secondary hf class with a morse code capability and even greater technical knowledge. The Thai Post and Telegraph department is very keen on reciprocal licensing and this will be the only way by which non-Thai nationals will be able to operate. Thus RAST would greatly appreciate any help that can be provided in this direction. I understand that Spain, the USA, and Chile have already lodged requests."

Further on in his article he said, "We expect operations to resume within a few months by licensed operators. Under the regulations however operations will be at first from club stations and not private stations." Thailand will host the SEANET Convention this year from 11 to 13 November.

DXCC HONOUR ROLL

June "*QST*"gives a complete listing of DXCC Honour Roll members — now numbering some 2,800! This is more than 10 per cent of all DXCC members. UK calls listed are as follows (totals in brackets are of "all-time" countries): **(Mixed listing) 317** — G3AAE (362), G3FKM (360), G3FXB (360), G3KMA (346), G4CPC 364), GM3ITN (351), GW3AHN (362). **316** — G2FSP (353), G13IVJ (356). **315** — G3HCT (352), G3HTA (337), G3JAG (336), G3JEC (338), G3UML (339), G3NLY (339). **314** — G3RUX (330), G3ZAY (327), G5RP (341), G5UT (359), GM3BQA (337). 3B — G2DMR (334), G2FYT (349), G3GIQ (340), G3KDB (329), G3LQP (331), G3MCS (329), G3SJH (325). **312** — G3RCA (318). **310** —G3ALI (329), G3IOR (345), G4YDO (316), G13OQR (339). **309** — G3YJI (318). **308** — G2BOZ (351), G3DOG (331), G3MXJ (327), G3TOE (320).

In the **Phone** listing: **317** — G3FKM (356), GW3AHN (359). **315** — G3JEC (338), G3TJW (332), G3UML (339). **314** — G3KMA (322), G3ZBA (331), G5VT (359), GM3BQA (337). **313** — G3SJH (325), G5AFA (331), GI3IVJ (351). **312** — G3MCS (328). **311** —G3RCA (328). **310** — G3ZAY (323), G4DYO (316). **308** —G3TOE (320).

In the **CW** listing: 308 — G3KMA (312).

WELL-KNOWN DX'ER AL SLATER, G3FXB, WAS AWARDED THE CQ DX CONTEST HALL OF FAME AT THE RECENT VISALIA CONVENTION

AWARDS

Worked All Liberia

For evidence of two way communication with at least one amateur in each of the nine counties of Liberia on at least three different bands since 1 April 1964.

Work 50 Countries Award

For QSOs with at least 50 different countries since 1 April 1964.

Work 100 Countries Award

As above for at least 100 countries.

Six Counties Award

For QSOs with at least six Liberian counties on two different bands.

West African Countries Award

For QSOs with five Liberian stations on two different bands plus eight other West African countries. All since January 1st, 1962.

Work ECOWAS Countries Award

For QSOs with at least 12 member countries of the Economic Community of West African States (including Liberia) on at least three different bands since 8 May 1975. ECOWAS countries are TY, XT, D4, C5, 9G, 3X, J5, TU, EL, TZ, 5T, 5U, 5N, 6W, 9L, and 5V.

For all of the above QSLs are not needed. Send a certified list of QSO details signed by a national society awards manager or two licensed amateurs. Each award costs US $5.00 or ten ircs, and applications should be sent to Awards Manager, PO Box 987, Monrovia, Liberia.

A plea, this month, from Peter, G3XJS, who is a keen QRP cw operator. He reports increasing spread of rtty, fax, and packet radio signals down below the lower limit of their internationally recognised sub-band on 7MHz (7,035-7,045kHzg) to involve and interfere with the generally accepted QRP frequency of 7,030kHz. There is no law about this — but please try to remember! The other gathering places for low-power users are 3,560, 10,106, 14,060, 21,060, and 28,060kHz.

CONTESTS

Results of the **YL/OM Midwinter Contest** (January 9/10 1988) show **G0BIR** as over-all second in the YL SSB section with 33,444 points, followed by GM4YMM with 8,825, G4EZI with 8,272, GM0BFS with 3,281, and G0ALI with 371. In the YL-CW section **G4RKK** was ninth with 2,760 points and GM0BFS scored 680. There were no UK entrants in the OM sections!

EUROPEAN DX CONTEST

1200 13 August — 2400 14 August (cw)
1200 10 September — 2400 11 September (ssb)
1200 12 November — 2400 13 November (rtty)

3·5 to MHz. Single-operator all band or high-bands (14,21, and 28MHz only), multi-operator single-transmitter, and listener sections. Single-operator entrants may only operate for a total of 30h out of the 36h and the rest period taken in up to three parts which must be clearly marked in the log. Europeans work non-Europeans and exchange RS/T plus serial QSO number (from 001) (note that the procedure is different in the rtty section). The multiplier for Europeans is the number of non-European dxcc countries worked on each band. Non-Europeans use the WAE

countries list. Quick QSYs to other bands to work multipliers are allowed but return to the original band must be delayed for five minutes and this must be shown in the log. The multiplier total should be multiplied by factors of four on 3·5MHz, three on 7MHz, and by two on 14, 21, and 28MHz. Additional points may be obtained by exchanging 'QTC's. Rules had not been received when this was going to press but I hope to be able to supply copies to those who need them — they are quite complicated. Saes please. Official DARC log stationery is advised and a supply can be obtained by writing to WAEDC Manager, WAEDXC Committee, Postbox 1328, D-8950 Kaufbeuren, FR Germany, to whom a large sae and some ircs should be sent.

ALL ASIA DX CONTEST

0000 27 August — 2400 28 August (cw)

1.8 to 28MHz (no WARC bands). Single-operator single or multi-band and multi-operator multi-band sections. Send RST plus age (ladies send '00'). Non-Asians work Asians and QSOs count three points on 1·8MHz, two on 3·5MMHz and one on the other bands. The multiplier is the number of different Asian prefixes worked on each band. Please note that QSOs with US military stations do not count and that Minamitorishima (JD) is not in Asia. As with the previous contest no rules had arrived at the time of writing but photocopies should be available from me by the time that you read this.

IRAN

EP2FM was a little concerned by the remarks I published in January *Rad Com* concerning amateur activity in Iran. Unfortunately it seems that there may be more than one news source and as mine seemed to be connected with those at the highest level I felt that it should be reasonably accurate!

However, Abdollah has very kindly provided the following. "Properly licensed amateur activities started in Iran around 1962 and during the next 18 years a total of nearly 300 foreigners and 20 Iranians were licensed. An informal society did perform in a small way but all efforts to have an officially recognised registered body failed for many years.

I was involved since 1959. I applied for a licence in 1963, passed your RAE and finally obtained my callsign, EP2FM, in 1978, and unfortunately at this time I am still the only Iranian properly licensed in the past 20 years. Some nine years of negotiation and appeals resulted in the incorporation of 'Anjoman-e radio amateuri-e Iran (ARI)' in 1980. Founding members were: EP2JZ (Javad Zahedi), EP2CM (Djamshid Mansuri), EP2JP (Djamshid Partovi Nejad), EP2EA (Masood Adle), and EP2FM himself (Abdollah Sadjadian). This was done through the help of the administration and with approval of the Ministers for PTT. Subsequently our administration (then the Directorate General of Telecommunication) informed IARU, through ITU, that EP2JP and I were representing Iran amateur radio. The administration, ARI, and several other related governmental agencies co-operated in preparing new Amateur Radio Regulations which received cabinet approval in February 1983. ARI, with help from PTT and Amir Kabir Technical University, conducted an amateur radio course during the summer of 1983.

"On the practical side, amateur radio equipments were closed and sealed in 1982 and since then, apart from some short term special permits for my own station EP2FM, there has been no legal transmission from Iran. We have been promised a reconsideration of the situation by the administration this year."

QSL MANAGERS

My old friend Rag, LA5HE/OZ8RO, has written "LA5HE's Commandments for QSL Managers" and it makes intersting reading. It goes as follows:

1. By accepting to act as a dx-station QSL manager you are assuming the responsibility to ensure that everybody who wants a card gets it in one way or other.
2. All cards received must be checked against the log copies you receive from the dx station, and a QSL card should be made out immediately and returned, as a routine via the bureau.
3. One of the services of a national society is to provide a QSL bureau for its members. Be sure ▶

HF F-LAYER PROPAGATION PREDICTIONS FOR AUGUST 1988

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

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

Time / / GMT	28MHz 000001111122 024680246802	24MHz 000001111122 024680246802	21MHz 000001111122 024680246802	18MHz 000001111122 024680246802	14MHz 000001111122 024680246802	10MHz 000001111122 024680246802	7MHz 000001111122 024680246802	3.5MHz 000001111122 024680246802
** EUROPE								
MOSCOW	.....	.....1..	...11211242.	...334334651	213666667895	866544445689	863211112478	53.....4+
MALTA	.....	.....11.	...12221243.	...344444762	422766667897	987654445799	997321122578	++4.....24+
GIBRALTAR	.....	.....	.....22.	22221441	2..366555885	864765555799	997532222578	++52.....25+
ICELAND	.....	.....	.....	.....22.	...124333673	522555555678	777532222457	5542.....24
** ASIA								
OSAKA	.....	.....	....1111....	...122222.1.	...132123342	....1...2463	.....24.	.....
HONGKONG	.....	.....1...	...1221132..	...133235521	1...22124774	1.....2475	253	.....2.
BANGKOK	.....1..	....111.12..	...22322453.	..1224335761	2...12124786	3.....2478	1.....256	23
SINGAPORE	.....1..	...11111131.	...22322463.	..1234335762	2...12124786	3.....2578	1.....256	23
NEW DELHI	.....	...1111111..	..122332431.	..1234336631	321111124775	62.....2578	4.....257	24
TEHERAN	.....1..11..	...12211231.	..1333335641	1.3433446873	535211225798	852.....2578	73.....257	4.....24
COLOMBO	.....1..1...	...11221221.	..1334335551	1.1324446773	521..2125798	72.....2578	5.....257	2.....24
BAHRAIN	....111.12..	...22222342.	..1434446752	2134334468875	745211125798	962.....2578	73.....257	4.....24
CYPRUS	....1111121.	...22332353.	..1556556862	313766667885	767655556899	986322223689	8631....1368	+4.....35
ADEN	...11221231.	...223334531	1.1434556863	423433457886	8652..124799	973.....1588	751.....257	52.....24
** OCEANIA								
SUVA/S	.....	.....	.....11.	...11111142.	..1432123641	..142...142.	...1.....1..	.....
SUVA/L	.....2.	...1.....41	21.3.....73	22151.....74	114631...252	..241....43.	...1.....1..	.....
WELLINGTON/S	.....	.....1.....1.	...11211..3.	..2432121.52	..241...1341	...1.....11.	.....	
WELLINGTON/L	1	21.1.....23	3314.....45	34462.....64	.1342....342	..12.....11.	.....	
SYDNEY/S	.....	...22221....	..1443221..1	..1542123213	...31...2453	251	.....2.	
SYDNEY/L	1	1.....4	21.11.....26	211441....65	...32....163	...1.....14.	.....	
PERTH	.....1.....	...1221.....	..134431....	1.2354421...	41114222332.	31..1...2461	1.....255	22
HONOLULU	.....	.....	.....11.	.....1..132.	..122211341.	..342...12..	..11.....	.....
** AFRICA								
SEYCHELLES	...1122121..	...223434211	1.1434556643	313433457776	8551.1124799	962.....1588	74.....257	5.....24
MAURITIUS	...11222331.	...223445631	..1445557874	2.3434447887	7252.1124799	963.....1488	75.....257	52.....24
NAIROBI	...11233341.	...223445631	3.1444567865	623533357887	9763..124799	985.....1478	872.....257	54.....24
HARARE	....1233452.	1..233556742	3.1544567885	623643457898	977511124799	9962....1478	874.....257	55.....24
CAPETOWN	....1134431.	...13355662.	...455567861	...664446884	42.632124798	87341...1478	8851.....257	552.....24
LAGOS	....1134463.	1..132456851	31.354457985	642653336897	986631..4799	9974....1478	7851.....157	452.....24
ASCENSION Is	....1111353.	32235751	21..64346884	54..64335897	981242..2699	99641....378	8852.....157	552.....24
DAKAR	....1112253.	32344761	21.154445884	541464334797	986651..1589	99742....278	8852.....47	552.....4
LAS PALMAS	.....1.22.	....2222144.	1..154554773	31.376666896	864776555799	998643223589	88631....268	++4.....35
** S. AMERICA								
Sth SHETLAND	.....13231.	.....34463.	556861	1446883	2....2113687	74311...1457	7751.....135	452.....2
FALKLAND Is	.....12243.	344651	2....2456884	521..3446787	964312113578	99742...1247	8852.....25	552.....2
R DE JANEIRO	.....112133.	2233551	21...4454784	531.14434687	985232111379	99742.....48	7752.....27	552.....4
BUENOS AIRES	.....111133.	2232551	21.1.4454674	5313.4444587	885612111268	99741....37	7852.....15	552.....2
LIMA	.....11.	111231	1...11332354	41.132342356	863452111.26	89742.....4	6852.....1	352.....
BOGOTA	.....1.	.....1.1.121	1...12222343	31..24332246	85234211..16	89742.....3	5852.....1	252.....
** N. AMERICA								
BARBADOS	.....1.	1111231	1...13232354	41.134322366	8634421...37	89742.....15	7852.....2	452.....
JAMAICA	.....1.	121	1....1121233	3....2221235	74222211..15	78642.....2	4852.....	.52.....
BERMUDA	.....	121	1....1121243	3....3221255	74122211.136	78642.....4	5852.....1	252.....
NEW YORK	.....	.....	111122	2....1221234	6311.2121125	68532.....3	3752.....1	.42.....
MEXICO	.....	.....1.	111122	2.....221223	53111.111..2	37542.....	1552.....	.22.....
MONTREAL	.....	.....	111122	2....1221234	6211121111136	67532.....3	3652.....1	.42.....
DENVER	.....	.....	1	1.....11112	3111..111112	35531.....	.352.....	..2.....
LOS ANGELES	.....	.....	1	1111	2111...12111	14531....1...	.252.....	..2.....
VANCOUVER	.....	.....	.....	1	2.11...12111	13531....1...	.141.....	.....
FAIRBANKS	.....	.....	.....	....1.....	1.1331112211	.1342...11..	..11.....	.....

The provisional mean sunspot number for May 1988, issued by the Sunspot Index Data Centre, Brussels, was 59·7. The maximum daily sunspot number was 97 on 5 May and the minimum was 20 on 19 May. The predicted smoothed sunspot numbers for August, September and October are respectively: (classical method) 62, 64, 67 and 69; (SIDC adjusted values) 69, 72, 76 and 79.

1988 ALL BAND TABLE No 2

	1·8MHz	3·5MHz	7MHz	14MHz	21MHz	28MHz	Total
G4OBK	60	14	36	40	20	13	183
GM4ELV	–	6	20	42	38	21	137 (QRP)
G4FVK	9	6	10	22	17	2	66

The next deadline for this table – scores **to reach G3GIQ** by **9 September** please.

to maintain the membership of your IARU member national society to ensure proper receipt of QSL cards via the bureau.

4. Always make sure that your society's bureau is aware of the fact that you are handling cards for a station in a difficult part of the world to ensure smooth co-operation from all parties concerned in your own country.

5. If your national QSL bureau is not automatically accepting QSLs for, or on behalf of overseas dx stations take the actions necessary to obtain acceptance before you undertake the responsibility to act as somebody's QSL manager. This is very important as the bulk of the world's QSL cards are sent via the bureaux.

6. For a more prompt handling of QSLs many avid dxers are prepared to pay postage plus for the service of a direct QSL card by air or surface mail. If you are prepared to provide this service make sure that this information is provided by the dx station as well as given publicity in dx news sources. It's a good idea to say how many ircs are required for air/surface mail within your own continent and to the rest of the world. One irc covers surface postage anywhere. If you require self-addressed envelopes please let it be known.

7. For direct replies never demand more than needed to cover your actual costs. QSL managers are volunteers and you are expected to do the work out of dedication or pleasure. You should be prepared to accept a small loss which to some extent will be compensated for by some people sending you postage in excess of that required. However, being a QSL manager is definitely a non-profit operation.

8. Remember that being someone's QSL manager is a responsibility — not an ego trip!

—QTH CORNER—

A25/G4HZR D Saunders, 32 Richmond Court,28 Osmond Road, Hove, E. Sussex, BN3 1TD.

DJ9ZB (new QTH) F. Langner, PO Box 150, D-7637 Ettenheim, FR Germany.

KC6SI / **KC6TM** Takao Togashi, 1-4-48, Shougunno Higashi, Akita 011, Japan.

OX3KD OZ1KPB, Sonder Alle 33, DK-9460 Brovst, Denmark.

P40W WA4CMS, Steven Ewald, POB 855, Newington, Conn, 06111, USA.

T32BH F6EXV, 4 Impasse du Doyen Henri Visio, F-33400 Talence, France.

T32JA Terry Baxter, N6CW, 4639 Katherine Pl, La Mesa, Cal, 92041, USA.

TJ1DK M. Groth, Wasgaustr 49, D-6230 Frankfurt 80, FR Germany.

TN4NW AL7EL, T. Farrel, 669 McCullough Road, Stockbridge, Gr, 3028, USA.

VK9LU K3POX, Dave Miller, 7462 W. lawler Av, Niles, Ill, 80648, USA.

VK9YC S. Telenius-Lowe, "Penworth", Tokers Green Lane, Tokers Green, Reading, RG4 9EB.

VP5LJ PO Box 12, Grand Turk, Turks & Caicos Is.

VQ9QM W4QM, Dale Strieter, 928 Trinidad, Coco Beach, Fla, 32931, USA.

ZK1XV HB9DKQ, Innere Margarethenstr, 24A, CH-4051 Basel, Switzerland.

ZK1XV / **ZK3RVC** R. Crosby, Box 344, Forster 2428, NSW, Australia.

4W0EA EA5CTP, Juan Jose Valles, Apartado 440, 12080 Castellon, Spain.

9N88ITU JA8RUZ, PO Box 166, Ashikawa, Hokkaido, 070-91, Japan.

BAND REPORTS

G8KG managed to get his review to me in good time this month – which is fortunate because it makes very interesting reading.

It goes as follows: "Cycle 22 is still rising steeply. The upsurge which began in March has continued into April and May with the provisional monthly sunspot number for April reaching 88 (mean monthly solar flux 124 sfu). The daily number peaked at 148 on 16 April (daily flux 146 sfu), at that time the highest values of the cycle. Later in the month and in the first part of May values were relatively low but then began to rise to a peak of 150 sfu on 1 June.

As a consequence of all this there was a good deal of dx on the higher hf bands, with openings to JA and VK on 28MHz as late in the season as the end of May. On most days in May and early June the geomagnetic field was reasonably quiet. This not only helped provide the right conditions for dx but also meant that E-layer propagation on 28MHz ('short skip') was very much in evidence, lasting for most of the daylight hours on some days and sometimes extending upwards to much higher frequencies.

At the time of writing (3 June) the most recent prediction availale from NOAA Boulder was that based on sunspot data up to March and was for a most probable peak smoothed sunspot number of 198 in November 1989, with the 90 per cent probability range being 134-262 – in short 'a whopper!'

Thanks to the following for sending in info: G2HKU, G5JL, G3AGZ, GJ3EML, G3s GVV IGW, KSH, YRM, G4s DXW, EHQ GW4KGR, G4s MUW, NXG/M, OUT, SJG, XRV, GD4XTT, G4ZYF, G0DNV, and GD0ELY.

As always callsigns listed in italics were of stations on A1A.

3·5MHz. 0500 *VP2VI, VP9C.* **2000** JA6XMH **2100** GB0IOS (Sark), ZS1MH.

7MHz. 0100 *VU2DVF.* **0400** *YS1ECB.* **0500** *DP0BF, W6–W7, ZL7TZ.* **1800** VK9XT. **2000** A22BW, TR8JLD, 7P8DX, *9H3GP.* **2200** FH5EF, *J87CD,* S9AGD, 3D2UW, 4S7WP, 9X5AA. **2300** *FG5XC,* HP1AC, J52US, 9X5NW.

10MHz 0300 *W2,3,9, 5B4OG.* **0500** *SX1RAAG, VK4-VK5, W3–W4.* **2000** *JA.* **2200** *W1-W3.*

14MHz 0500 *KL7AF, KH6IJ,* VE6-VE7, W6-W7, *4K0DC.* **0700** AX0NE, FO5LU, KC6HA, JW0B, T32JA, ZK1s, DD, XV, ZL5BA. **0800** AH2BT, J52US, KH6, KL7TC, *VK9XT,* ZK1XB. **1800** YI0BGD. 4S7PVR. **1900** EX0KP. V85GA, 9M2RI. **2000** HL1SK, JA, V85HG, ZL4AB. **2100** C6ANU, EP2HZ, LU, OA, PY. **2200** BY6A, CE0ICD, J6LMV, ZF2ME/ZF8. **2300** *YN3EO.*

21MHz 0400 *FG5BM, W6–W7.* **0600** KH6LJ, W7EXG (Ariz), K7ICW (10W input), VE7BBD.**0700** AL7HX, BY1s PK, QH, FO5FO, JA (all day), KC6SI, KH6, KL7, KX6DC, ZK1XV,3D2MP, 3X0A. **0800** A22RA, *BY8AC,* KH2F, KH6s CD, IJ, KL7KN, VE6AMR, VE7BJN, W6XB, 9L1SB. **0900** ZK1XB, 9L1SB. **1000** AL7FQ, H44GP, *JT1KAA,* P29JB, ZL4SO, 9N1RN, 9V1WP. **1100** D44BC. **1200** FP4ED, YI1BGD, VS6VT. **1300** AX9NKG, BY4RB, EP2CXJ, KC6NI, ZL1BAD. **1400** BT0ZML, FR5DX, 4D0P. **1500** KL7XD, YB7MI,3X1SG, 8A2ITU, 9V1RH. **1600** A4XKP, V85AH. **1700** *AH6GN, KL7C, VS6VF, 9M2RI.* **1800** S9AGD, TZ6VV, 3DA0AN, 3X0AA. **1900** CI8JH, KH6/W6DMJ, S79KO, SX1RAAG, V231FA, W6–W7. **2000** KH6CG, YC6KOS. **2100** FY0ER, KL7TC, PJ6⅓KV4AD, WL7BOR. **2200** VK. **2300** VK.

24MHz 0800 *VK6AKG.* **1100** *VK6RO, W4.* **1300** *LU, 4X.* **1400** *J37AJ, KP2J, KV4AD, ZS6s, W1,2,4,8, VU2LO, 9M2FS.* **1700** *PY3TT, 5B4OG.* **1800** *EA8.* **2100** *VE1, W2,4,6.*

28MHz 0700 KH6IAA, VK6HQ, VK7SJ, 5H1HK. **0800** JA5AQC, 9X5AA. **0900** BY5RT, 9N1MC, 9V1WO. **1000** AX9NKG, BV2FA, 9Q5NW. **1100** J28EV, S9AGD, ZL4JS, *K3TW/4S7.* **1200** OD5IM, VE1BNN, 5T5NU, 9N1RN. **1300** FB5WU, ZB2AZ. **1400** VP8BGA. **1500** A71BJ, JY5HH, KP2AH, VU2MSN. **1700** J52US, TK5DM, V47NXX, *4M7A.* **1800** CP8PAX, TA3F. **2000** FG5BG, HC1OT, TI2CF, *W2KVA/VP2M, 9Q5DA.* **2100** HK, KP4, PY, TI, V31AB. **2200** HIAFDH, KA1BPD, KP2J.

Thanks also to the following for information: *Long Skip* (VE3IPR), *Lynx DX Group Bulletin* (EA2JGO), the *DX Family Newsletter* (JH1KRC), *DX'press* (PA3CXC), *CQ Magazine* (W1WY), *DXNL* (DL3RK), *Long Island DX Bulletin* (W2IYX), *DX News Sheet* (G4DYO), *The Ex-G Radio Club Bulletin* (GI3OEN/W6), and *DX Report* (VK9NS).

Closing date for receipt of material for **September** issue is **8 July** and for **October 12 August**. Dates for the remainder of 1988 are likely to be **9 September (November), 3 October (December) – note that this is very early!**

1988 28MHz COUNTRIES TABLE

G3VOF	156
G4MUW	124
G0DNV	121
G4XAH	119 (ssb)
GD0ELY	95
GD4XTT	94
G4SJG	80
G4NXG/M	76
G4JBR	50
G4DXW	42
G0FYD	38
G4OUT	34 (cw)
G4OBK	24
GM4CHX	23

10MHz COUNTRIES TABLE

All-time	1988	
G3PJT	106	36
G3SED	26	26
G4XRV	25	25
G3JJG	102	18
G4VDX	71	–
G4YWG	64	–
G4OBK	57	–
G4YSN	1	–

VHF/UHF

KEN WILLIS G8VR

6 LERRYN GARDENS, BROADSTAIRS, KENT CT10 3BH

Much of the news this month concerns the 50MHz band. While some readers may feel that too much attention is being paid to this band, there is little doubt that the decision by the Licensing Authority to allow UK amateurs to use it brought a new and exciting dimension to VHF operating in the British Isles as recent events have shown. 50MHz is a band with a great potential for inter-continental contacts beyond the scope of our other VHF/UHF bands. It complements rather than replaces 144 and 432MHz and is ideally suited to home construction.

In view of the relatively small amount of commercial equipment available for this band, *Rad Com* needs more input from those who have built their own receivers, transmitters and aerials for 50MHz operation. Meanwhile, experience has shown that on 50MHz, if you can muster a few watts into a dipole, you can make excellent dx contacts when it's open.

SOME REMARKABLE 50MHz PROPAGATION

During May I attended the North Eastern VHF Conference in Nashua, New Hampshire where I met several holders of calls well-known on 50MHz. Among them were Bob, WA1OUB, Joe W1JR, Steve W2CAP/1, Steve WA1AYS, Lew W1GXT, his wife Carol KA1DHO, and many others. My host was Bob W1XP. During the visit I was given an inkling of what a 50MHz transatlantic opening sounds like on their side of the ocean. Tape recordings made during some of the openings in the summer of 1987 showed how, on going over to receive following a CQ or QRZ, a wall of sound struck, pushing S-meters to end stop under the sheer weight of UK signals. As mentioned above, the huge migration to 50MHz by amateurs in the British Isles has taken everybody, including the Americans by surprise, not that they are complaining about the level of acivity they can now take for granted when conditions are right. Nothing quite like this has ever been experienced before, but one of the unfortunate by-products is that with so many UK stations running similar equipment and power, the QRM they create for one another at the remote end of the path is enormous. This is not all, for it must be appreciated that many of the USA stations which are heard at great strength in the UK on 50MHz are very big in terms of antennas and power. For example, a kilowatt to a six over six antenna is not regarded as an unusually large station for this band in the USA, so there is a considerable difference in erp between the received and transmitted signals when the Ws or VEs work a station in the UK which is using 10W or less to a dipole. Be this as it may, the strength of some of the UK signals I heard on the tape was incredible over the 3,000-mile-plus path. However, it would be wrong to assume that you will always be heard as well as the station you are copying.

Under these conditions, when it is very difficult to pick out an individual call with so many stations responding together, it becomes important to accentuate certain letters in your call in the hope that they will be heard above the bedlam. Adopting a laid-back attitude like "Here's G9XYZ for you Bob" is unlikely to succeed unless for some reason your signal is head and shoulders above the rest of the pack.

During the conference we theorised on whether big transatlantic openings on 50MHz would occur again this year, or were they simply a feature of the low point in the solar cycle, now gone for a decade? Views varied, but something none of us could have anticipated happened on 6 June, when possible the biggest ever such event occurred, lasting many hours.

Before this, however, UK stations had been hearing the ZD8 50MHz beacon for the first time (15 May), while on 18 May at 1939 gmt, Dave G4GLT started to copy it an incredible 599. He continued to hear it until after 2000, by which time ZD8MB had arrived home from work and began to call G4GLT. Dave copied Mike's cw for 15-20 seconds at 519 but no contact resulted. Dave said that a major solar flare was reported for 2030 hours gmt on 17 May, and since he could not copy any Spanish tv at the time he could hear ZD8MB, he wonders whether the propagation was aetually F2. In his report to the *50MHz Reporting Club* for May, Ray G2AHU lists the possible modes as TEP plus Es, normal 2-hop F2 or straight TEP without intermediate ground reflection, but suggests Es as the most probable, all things considered.

ZB2IQ came on the scene on 1 June with startling results (reported separately this month), but the real action occurred nearly a week later, on 6 June when the 50MHz band went wide open to North America and Canada. The event started quite early in some areas, G4UPS having his first QSO at 1513 gmt, and by 1700 the band was alive with end-stop signals from the USA with stations in call areas W1,2,3,4,5,8,9, VE1, and two being heard and worked by UK stations. The event went on long into the night, several transatlantic signals were still S9 until noon on 7 June. As the Ws faded out, KP4EIT in Puerto Rico was the centre of a pile-up as he worked Gs at a rate of two or three per minute. Also on the band and much in demand during this morning event was another Puerto Rican, KP4EOR and also Harry Schools, signing FP/KA3B from St. Pierre island to give a new country to many operators.

G1DPH worked 111 W stations in the event despite being limited to 7W in the early stages due to tvi. G3POI had some 66 contacts stateside, the furthest being Indiana, Illinois, Ohio, and southern states down to South Carolina. Many of the USA stations were using modest power (100W) and simple yagis, in fact G3POI worked one W3 who was running just 0·5W! Ted, G4UPS said that OX3LX was working a pile-up with the W's. Ted also worked into Illinois and heard beacond K1NFE in Connecticut.

Students of propagaiton might note that on the evening of 6 June, USA signals faded out around 1750 gmt, when the Rosemarkie beacon, GB3RMK was 599 in the south. This was the prelude to an opening in which Scottish stations were end-stop in the south with dozens of contacts being made until about 2100 gmt when this path closed and American signals began to appear again. It is doubtful whether anything like this opening has ever been encountered before. The transatlantic signals persisted at great strength for several hours, in fact some think it actually went on all night though most had to leave the scene and get to bed while activity was still high. Next day it continued unabated for a few hours before the KP4's took over from the powerful Ws and eventually faded into the noise shortly after noon local time on 7 June. There have been reports of further transatlantic signals heard on 8 and 9 June, though the propagation appears to have been brief and rather localised. If this event was due to sporadic E, I must say that I find it very difficult to accept that two or more patches of ionisation conveniently stay put in just the right places to support such long and unfading propagation over an area as wide as Georgia to Nova Scotia and Massachesetts to Illinois. If that were not sufficient excitement, on the morning of 7 June, while waiting their turn to work some LAs on the band, some G stations were startled to hear strong ssb from 9J2CR (Zambia) who, in an opening lasting just a few minutes, worked a GM and some Gs before disappearing into the noise. Don't you sometimes wonder why it is always the other chap who gets into these situations and never you? I surely do.

Bud K2YOF (New Jersey) who took part in the big transatlantic opening on 6 June said that N9CEX (Chicago) "finally made it through the curtain of W1, 2 and 3's to work a single G station. Also, the West Coast of the USA "had their own show going with JA's and KL7 being worked from as far east as Colorado". Ed Tilton, W1HDQ the respected VHF editor of the ARRL, now living in Florida, heard no 50MHz dx there. W4FX in South Carolina worked OX and heard G and GJ. W5VAE (Arizona) "could hear the furore, but not the dx stations". Bud's overall impression was that it was the best opening to date of the June/July transatlantic paths. He expresses appreciation of "the way in which UK operators spread out over the band, hopefully giving ideas to those on his side of the ocean who think their beams will only work below 50·115MHz". Rolf, DK2ZF also heard W2 and W3 stations in the main event.

EXPEDITIONS

There will be a good chance to work the Faroes this month since a group of Swedish amateurs plan to operate there during the period 11 to 20 August. The main band used will be 144MHz for which they will be equipped for eme as well as other modes, using 4 × 15 element Cue-Dee antennas and "at least 400W, probably more", to quote from their hand-out. Other bands used will be 432MHz (75W to 17 element Cue-Dee) and 14·345MHz for the VHF/EME net. They will also listen on 50MHz, transmitting on 28885KHz for crossband contacts. Callsign will ▶

be OY/SMOKAK. They regret that the moon will be at apogee during their visit so their eme signals may be weak. Non-eme skeds can be made in advance through Lasse Melin, Sollentuna, Sweden, telephone 46-8-7572063 (daytime) or 46-8-928073 evenings, or via the 14MHz net while the team is in OY. To operate from more than one square, they may be QRT on 17/18 August while they change QTH. Squares likely to be activated are WV and WW. Avid square chasers may also wish to listen for them /MM as they cross on the ferry from Bergen to Torshavn on 9 August since they will operate from the ship if at all possible. For cw meteor scatter skeds the frequency will be 144·134MHz, 2·5 minute periods, transmitting second period. Random ms/cw frequency is 144·138MHz. Those partipating will be SMO's FSK, KAK, LCB, OPC and OUG, all members of the SKONZ group.

For a long shot, if sporadic E favours the path, well-known vhf operator Walter, OE6IWG, on holiday in Greece until 25 August, will try to activate three or four squares there signing OE6IWG/SV on 144·300, QSY to 144·270MHz. IN3TWX will also be in the area, but he leaves for home early this month.

A reminder about operation from St. Kilda during first week in this month. See July VHF/UHF for details of the GB4VR operation.

Clive GW4VVX and Steve GW66TGX will be active from 1087 (XS) square from 13 to 28 August, mainly on frequency 144·222MHz, using 200W to a 13 element yagi at 30ft asl, the site being 500 feet asl near Lairg in Sutherland. This is a repeat of their successful operation last year.

SPORADIC E

Those who keep a check on the dates of 144MHz spradic E openings in the belief that they often occur on more or less the same days each summer could have been well rewarded this year. The period 4 to 7 June provided intense Es on 144MHz to Southern Spain, Italy, Malta etc, but the most exciting was on 7 June in the late afternoon when there was excellent propagation to UO5, YO and LZ1, providing some long-haul contacts and very rare squares to those lucky enough to catch it. It is strange how the curtain seems to go up on the 144MHz Es "season" during the first week in June each year. One operator on the band was heard to say that he had taken the day off work on 7 June knowing that the band would open up, and his faith brought him three UO5 contacts!

On 50MHz, of course, Es is much more prolific and almost taken for granted with so many Europeans working crossband from 28MHz. However on Friday 3 June there was much excitement during the evening when 4X4IF and his son 4X6IF on 300MHz worked several UK stations crossband 50/28MHz. These two operators are very keen to operate on 50MHz and will no doubt be much in evidence in the future. G6MEN (Shrewsbury) keeps interesting Es records by plotting on a squares map the lines between stations known to have worked during an event and noting the crossover point, this being assumed to be the ionisation area supporting the propagation. On 7 May he noted a belt of thunderstorms more or less in the region of the crossover. This type of record keeping can be of great value in helping to understand the nature of sporadic E. See also Page, 433 of *Rad Com* for June 1988 and the request by Jim Bacon for records to assist a study he is carrying out on this subject.

REPEATER NEWS

Another month with very little input from the repeater groups. However, Speyside's Newsletter number four for May 1988 commented on some strange propagation from GB3SS with stations to its north receiving strong signals which fade considerably during the day for no good reason, though one cause might be temperature changes affecting filters which were fitted recently. Users have been asked to log signal strength against date and time of day to see if any pattern emerges. This group is another which is having to keep a close control over its finances. The membership appeared to have declined, though this may be due to members having forgotten to pay annual subscriptions. The committee has set aside funds for future payment of site fees to IBA, and Moray Firth Radio Society has promised some assistance in this connection. Like everything else, repeater running and maintenance costs must be expected to rise from year to year, so increase in subscriptions must inevitably follow if service is to be maintained.

SOME POSSIBLE "FIRSTS"

Jack Hum, G5UM, sent a postcard he had received from GJ8RPP (St. Saviour) who made contact with expedition station ZB2IQ on Sunday 5 June on 70MHz. Jack thinks this may be a "first" GJ-ZB2 contact for the band and so would like to hear from any GJ who can claim an earlier contact. GJ8RRP used a four element J-Beam antenna at 18ft and a power of about 6W to make this contact.

Paul, G4IJE (Essex), who worked KP4EIT on 50MHz around 1130 gmt on 7 June on 50MHz, wonders if this was the first G-KP4 for the band.

G5UM in his capacity as VHF Awards Manager issued the first two 50MHz certificates early in June, number one to GJ4ICD and number two to G4UPS. In fact each will receive two certificates, one for squares and the other for countries worked and confirmed.

Gerald May, GW8TIX (Rhymney) was recently awarded a certificate for 432MHz but complained that he could claim far fewer squares than he had worked because of the lack of QSLs, despite having sent two or even three cards to some stations plus "quite a few IRCs" Maybe he should talk to Derek, G8TOK (Orpington) who apparently has such a fascinating technique for extracting cards from dx stations that G5UM wants him to write an article on it, submitted four claims simultaneously, a 100 squares/20 countries on 144MHz, a 144MHz Senior, and two claims for 432MHz. However some of the cards went back to 1980, so apparently it was quite a long haul collecting them all.

FROM HERE AND THERE

Barking Radio and Electronics Society will hold their 1988 144MHz contest on Sunday 14 August between 1300 and 1700 gmt. Details from M G Toms, BRS 31976, 32, Wellington Road, Rayleigh, Essex, SS6 8EZ.

Ray Perrin, VE3FN/G4DFT (Ontario) has provided a list of tv stations in Nova Scotia, New Brunswick and Newfoundland, all transmitting

VHF FROM GIBRALTAR

The Square Bashers Expedition Group operation from Gibraltar between 1 and 13 June was in every sense a classic. It was only recently that we were discussing here the fact that ZB2 had not been worked very much on 144MHz in the past, though of course Jimmy, ZB2BL has for years kept the flag flying there on 70 and 50MHz, and maintained the Gibraltar beacons which are such good propagation indicators. With EA7 and even EA8 being worked from the UK during sporadic E events, it was probable that any sustained operation from "the Rock" would result in contacts with the UK and Europe generally, and would activate a much sought-after country and square to be worked on 144MHz.

The Square Bashers are very experienced expeditioners, so when they set up their equipment with callsign ZB2IQ at Gibraltar, working in relays around the clock, it was perhaps to be expected that thing would happen, but by any standards the results achieved were outstanding. By the second day after arriving, they had already worked over 300 stations on 50MHz, most of them from UK. This total grew steadily throughout the expedition and it was of great interest to note that the path to Gib on 50 MHz was open for hours a day, with S9 signals both ways even with stations using very low power and simple dipole antennas. It was also an indication of the large number of UK stations now equipped for that band. ZB2IQ was also equipped for 70MHz, 144MHz and HF bands. More than 200 70MHz contacts were made, one of which is reported elsewhere in this feature and is probably another "first". Working Gibraltar from the UK on 144MHz is no longer a rarity since on 6 June the group caught a sporadic E opening to the UK and worked more than 100 stations, mostly in the A, Z and Y lines of squares. On another occasion when the Es favoured east-west propagation on 144MHz, they worked more than 400 stations in 94 squares in Central Europe in an event lasting four hours with prefixes YO,YU,OE,HG,Y,OK, DL,HB9,ON,F, I and SP. ZB2 is clearly in great demand as a square and country to be worked, and would be a virtual paradise for a local amateur wanting to specialise in 144MHz dx working.

Other highlights of the expedition were working OA1K and OA8AW (Peru) and hearing LU on 50MHz, and operating from another site as ZB2IQ/P on 7 June to work 11 stations transatlantic on 50MHz including W1, W4, VE1 and a "first" in the shape of ZB2IQ/FP/K3AB (St. Pierre). For these contacts an IC505, a 50W amplifier and a dipole antenna were used.

Listening to ZB2IQ on 50MHz was an object lesson in top-class operating, hearing them complete as many as three or even four contacts a minute at peak times, appearing totally unhurried and seeming to have time to spare for everyone. When they closed down and their slot on 50MHz went silent, it was like losing an old friend. Thanks for the experience, gentlemen. We hope that you'll find as exciting a spot next year.

in the band 54 and 66MHz, which may be useful as propagation indicators. For a copy of the list a sae please plus 10p in stamps for photocopy. If needed he says he can supply information for the VE2 area, further to the west. Ray plans to be in the UK during the first week of August.

G8VR was delighted to make contact with Bill Tynan, W3XO, who writes the VHF column for QST (*The World above 50MHz*) on 50MHz during the big opening on 6 June. Bill and I regularly correspond, and have met at ARRL, but this was the first time our paths had crossed on the air, so it was appropriate that it should be at VHF and not on one of those long wave bands.

If you have been working all those Ws on 50MHz you may like to know that a list of over 5,000 stateside and foreign QSL managers is available from W6GO, PO Box 700, Rio Linda, California, 95673 for the sum of $3.00 US. Irc's will be accepted at $0.40 each. The list is updated continuously, and a year's supply of 12 issues costs $30.00.

Recently licensed, G7AWH (Glos), is disappointed at the lack of RTTY activity on 144MHz. Having spent a lot of time building a ST5 terminal myself I must confess I don't hear a lot on the VHF bands and am forced to use it on 14MHz most of the time. K1NFE in Connecticut signs O6OO2.

If you hear some of those USA beacons sending a five-digit number and wonder what it is, it will probably be the town Zip-code, equivalent to our postcode.

Joe Reisert, W1JR (Chelmsford, Mass.) gave me a program which he, his son AD1C, and Chip, KR1P wrote for meteor shower peak prediction. It is on a 5·25 inch diskette suitable for an IBM compatible micro. I would be pleased to hear from anyone who could transpose this to tape or disc for use on a BBC or Spectrum, or any other commonly-used micro for that matter. Joe reminds us that in such programs, Americans consider western logitudes to be positive numbers. Joe writes a regular VHF column for the USA publication *Ham Radio Magazine*.

Ken Ellis, G5KW, sent a copy of a letter he had received from Walter, ON4ZN, who is the Belgian vhf manager. Walter said that the chance of Belgian amateurs being granted 50MHz facilities was slim, negotiations being "at a dead end" following confirmation of plans to continue using TV channels two and three in Belgium. In fact, he says, the Antwerp transmitter on Channel two, which is relatively new, is expected to continue in service at least until the mid 1990's and should the channel then become vacant, there are service organisations anxious to take over the frequency.

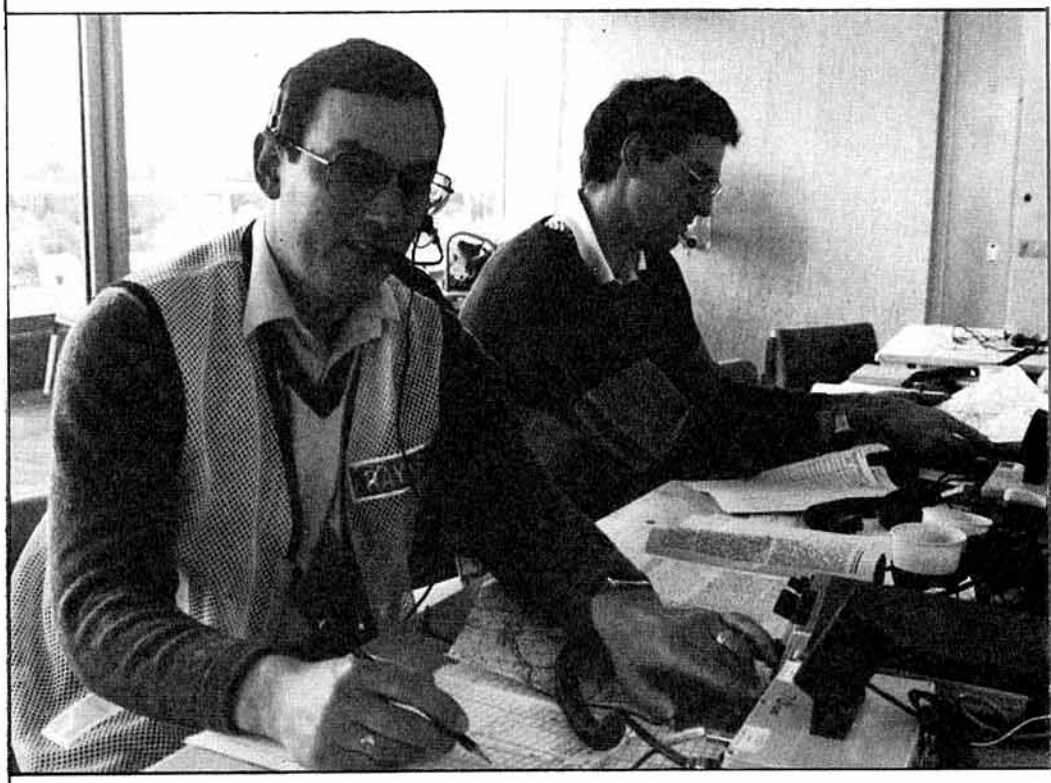
Stan Clark, G6NUO (Birmingham), is limited to loft aerials and is always ready to try a new one. His latest, a 144MHz quad "made of wood and wire" provided 36 contacts in a single session recently, and only one with a G station.

Requests for details of the G3MY speech processor have poured in since it was mentioned in May.

Derby and District ARS 144MHz contest run on 13 March was won by Ela, G6HKM (Chelmsford) in the full legal power section, and by G1NUS/P (Staffs) in the low-power group. Mike Sharp, G4XPE, has the full listing for both sections for those requiring them.

LATE EXTRA: ANOTHER MAJOR 50MHz OPENING TO THE USA ON 25 JUNE. ANALYSIS NEXT MONTH

RSGB National VHF



DAVE CHAMBERS, G4SYT AND DAVE CHAPMAN, G4PPN, MAN THE TALK-IN STATION GB2VHF

Convention 1988

This year's RSGB National VHF Convention was held on 1 May at Sandown park. Every year, it seems, this event gets reported as "the best ever", but in fact it's true – its popularity goes on increasing by leaps and bounds. As the last few years have shown, it must now surely be acknowledged to be the major event in the calendar of meetings stages in the south. The attendance this year was well above 3000, some 10 per cent up on last year which was also a record. Though the day started dull with the threat of rain, this did not deter the large crowds gathering well in advance of opening time. But the organisers wish to apologise for delays in getting people through a newly constructed entrance at Sandown; additional turnstiles will be brought into use next year.

With a large turnout virtually guaranteed, the event is obviously attractive to traders who take space at the convention. This year some 250 trade tables were booked (another record) and this resulted in an impressive array of items displayed for sale, ranging from small components to the latest in base-station equipment. The demand for components, cabinets, meters and the like, not to mention quite a few valves, suggests that home-brew is still alive and flourishing among the VHF fraternity.

As well as the trade show, RSGB was well represented by the VHF, Microwave, EMC and Propagation Studies committees, while the team manning the Headquarters stand was kept busy selling a wide range of books covering all aspects of amateur radio.

Amsat-UK, BARTG and RAIBC were also much in evidence; Amsat in particular showed some fascinating colour graphics generated by their satellite software. (The stand was further enlivened by G3AAJ's baseball cap which has become a familiar landmark at these and similar events!)

Talk-in for those coming by road was provided by the sw London Raynet Group, using callsign GB2VHF on 144 and 432MHz. This facility, under the guidance of Martin, G4HJY (Controller, SW London Raynet) and his deputy Ian, G8RWH, operated faultlessly throughout from a high-point overlooking the very crowded car parks. For 144MHz they used an IC 28E plus a collinear antenna on channel S22, and on 70cm a 7800 with Welz Diamond X50 antenna on SU 22. Their best "DX" was a caller from near Oxford. This year the talk-in facility was put to a new test when it was called on to summon medical assistance for a visitor taken ill while attending the convention.

The Six Metre and Remote Imaging groups both mounted very popular stands at the convention, and took the opportunity to hold their annual general meetings during the day. At these, Steve, G4JCC, was elected chairman of the 6 Metre Group, while Henry Neale, G3REH

CHRIS EATON, G8TFI/P, WINNER OF THE 144MHZ TROPHY CONTEST, SINGLE-OPERATOR SECTION,L RECEIVES HIS AWARD

SOUTH OF SCOTLAND VHF/UHF CONTEST GROUP WAS THE LEADING SCOTTISH STATION IN VHF NFD, AND SO WON THE TARTAN TROPHY

THE SHEPPEY WESTERN CONTEST GROUP COLLECT THE 1951 COUNCIL CUP FOR WINNING THE 430MHZ TROPHY CONTEST

was re-elected to the top spot of the RIG.

The now familiar afternoon lecture session was opened by an address from the President, Sir Richard Davies, G2XM. He admitted to being mostly active on the hf as opposed to vhf bands, though in coming to the convention he had taken advantage of the talk-in service from as far away as Esher using an elderly vhf rig. He promised to instal some vhf equipment at his home QTH soon!

He spoke of this being a special year for the RSGB, its 75th since its inception as the London Wireless Society, and said that the Society would use the occasion to gain as much publicity as possible, with a campaign to attract beginners to the hobby. He said that with licence applications slowing down considerably, there was a need to encourage young members on whom the future of the Society depends. He referred to the allocation of 50 and 70MHz facilities to UK operators as being "a credit to vhf activists within RSGB," but warned that a high level of activity on these and all other vhf bands was essential to resist the demands of other potential users. Sir Richard welcomed the approach of a new solar cycle maximum with its promise of dx, and said that the Society would be campaigning for less stringent power restrictions on 50MHz, saying that the ready compliance of operators to date with the current conditions would strengthen our case.

Finally Sir Richard outlined some new operating awards for the 50MHz band, and revealed that the VHF Committee was launching a 50/70MHz construction contest, the results to be announced towards the end of 1989 see *Rad Com* for July 1988. He then formally opened the afternoon session by presenting Society's VHF/UHF trophies to the winners (see photographs).

The lecture session covered a wide range of topics. Ray Flavell, G3LTP, spoke on "Trends in Tropo" with the sub-title "The best is yet to

G6ZR MEMORIAL TROPHY GOES TO ADDISCOMBE ARC & TATSFIELD ARTS GROUP, G4ALE/P, FOR WINNING THE 2·3GHZ CONTEST

THE PARALLEL LINES CONTEST GROUP HAVE ANOTHER WIN – THE 70MHZ TROPHY CONTEST FOR THE VHF MANAGERS TROPHY

RSGB NATIONAL VHF CONVENTION

BOB TREACHER – OUR SWL COLUMNIST – COLLECTS THE HANSEN TROPHY FOR WINNING THE VHF LISTENERS' CHAMPIONSHIP

THE VHF CONTEST COMMITTEE CUP GOES TO THE PARALLEL LINES GROUP FOR COMING TO IN THE 1·3GHZ TROPHY CONTEST

A DDOUBLE BILLING FOR THE HILLBILLIES: THEY PICKED UP THE SURREY TROPHY FOR THE OPEN SECTION OF VHF AND THE MITCHELL-MILLING TROPHY FOR THE 144MHZ TROPHY CONTEST, MULTI-OPERATOR SECTION

come". He surveyed extreme range paths, eg, over 1000km on 144MHz and over 750km on 70cm, and made the interesting observation that location was not a serious hindrance once conditions favoured long-distance propagation. He thought that a contact on 144MHz between the UK and Cape Verde Islands to establish a new record was a distinct possibility, while less likely (but not impossible) was a path between the UK and St Johns, Newfoundland, also on 144MHz.

Angus Mackenzie, G3OSS, gave a very comprehensive account of the causes of tvi and means of combatting it. Peter Chadwick, G3RZP spoke of the subject of measurements and measuring equipment for a typical amateur station, much of which most of us ought to possess but seldom do! In the microwave field, Peter day, G3PHO diuscussed portable operation, while NW Kent Beacon Group dealt with the construction of beacons. To complete a varied programme, Mike Dennison chaired a packet radio working group, while a morse test forum and a VHF Contests Committee forum were both well attended providing the expected breadth of topics and good-humoured barracking. The only adverse comment one can possibly make is that with such a wealth of information being offered, it is a pity that one cannot be in all places at once to glean it all.

Thanks are due to the many who worked hard to make this event a success. Geoff Stone, G3FZL was overall organiser, and members of VHF and Microwave committees worked hard, not just in planning roles but also in providing a 'heavy gang' to set up the stands and tables. Les Hawkyard, G5HD, marshalled the traders. Next year the event will be held at Sandown on Sunday 16 April. Additional space will be available if required, and with the continued support for this event, it will be surprising if the VHF Committee do not take advantage of it.

THE TELFORD TROPHY IS HANDED TO DALE HARVEY, G3XBY, FOR WINNING THE 50MHZ FIXED STATION CONTEST

THE ARTHUR WATTS TROPHY GOES TO THE WINNER OF THE RESTRICTED SECTION OF VHF NFD – THIS YEAR THE EAST KENT RADIO SOCIETY

DATACOMMS

IAN WADE G3NRW

DAUBENEY CLOSE, HARLINGTON, DUNSTABLE, BEDFORDSHIRE LU5 6NT

MALTA DATA COMMS IS ALIVE AND WELL. A few weeks ago I had the very real pleasure of meeting members of the Malta Amateur Radio League (MARL) at their well equipped club house on the island. Out of a total amateur population of 319 on Malta and neighbouring Gozo, some 20 or so are active on packet, mostly on 144·675MHz, with a few also on 432MHz and 14MHz. A mixture of Commodore, BBC and IBM PCs are in use, and Ray, 9H1EJ, has developed a multi port PBBS package for the PC. Links into Southern Italy on 144MHz take place via Sicily, and Ray is looking forward to links to the UK via Oscar 13 as soon as it becomes available for general use. My special thanks go to Joe, 9H1E, for organising a memorable evening, and to all the club members for their most friendly and enthusiastic welcome.

MORE ON HF PACKET

Following the piece in May's *Data Comms* about packet frequencies on 28/29MHz fm, Jim Hicks, G4XRU, has written on behalf of the 10m FM Group. He says that the group was established to study propagation and to encourage the use of the band during sunspot minima, and currently has more than 200 members throughout the UK, Europe and Australia. Many members are using converted cb sets, providing 40 10kHz channels from 29,310 to 29,700kHz. However, not all of these channels are used; satellites are allocated from 29,300 to 29,550, and 29,700 is right on the band edge. Further, the simplex calling frequency is 29,600, and repeaters use 29,520-29,580 for inputs and 29,620-29,680 for outputs.

This leaves just four channels (29,510, 29,590, 29,610 and 29,690kHz) on which to hold local and dx simplex QSOs. Jim says "we are delighted to see packet on our favourite band, especially if you stay on through the winter and help us keep the band in use, but please, please, please respect our simplex frequencies in the same way that we have respected Amsat's special interest". He suggests considering the possibility of converting cb sets onto a small number of spot frequencies lower down the band, and mentions that Tony Naylor of Spectrum Communications (telephone 0305 62250) would be interested in offering a special version of their conversion board. Finally, Jim says that he would welcome reports on 10m fm packet for inclusion in the groups' newsletter; he can be contacted at 33 Hayling Rise, Worthing, West Sussex BN13 3AL.

QRP ON 7MHz

Peter Barville, G3XJS, writes to say that he is a very keen QRP cw operator on the hf bands, and consequently conducts a lot of QSOs on and around 7,030kHz (one of the frequencies recognised internationally for QRP working, along with 3,560, 10,106, 14,060 and 28,060kHz). He and other QRP operators have become concerned recently about the increasing activity of rtty, fax and packet stations around 7,030, and QRP QSOs have been lost due to such activity, which appears to open up without regard to any existing frequency occupancy.

By its very nature, much of the activity by QRP stations will not be very strong, and may be using relatively simple equipment (some of it crystal controlled), and Peter asks data stations to take note of these frequencies and give QRPers a chance. As he says, "QRP operators are not able to muscle in on a frequency, but there are times when others appear to do just that to us!"

PACKET IN IRELAND

Gerry Lawlor, EI9FV, brings us up to date with the packet scene in EI, with news that the link between the UK and the Dublin PBBS (EI5CI) is functioning well. The Dublin digipeater EI2PKT is now officially approved, and all is running well with an old Multi 700 as prime mover, together with a Tiny 2 tnc with NET/ROM version 1.1.

The Limerick digipeater is up and running on Tountinna in the south west, at about 1500 feet asl. It has a good coverage to the west and south Galway, Limerick and also to the Midlands. It will hopefully become EI4PKT soon, but is currently using the club call EI4LRC. The Cork digipeater is not as well sited as the others, but gives coverage of the Cork area generally. It currently uses the call EI3DP, becoming EI3PKT soon. It can be accessed only through the Limerick digipeater from Dublin. Limerick and Cork are both Level 2 digipeaters at present, but will soon be upgraded to NET/ROM. Future plans may include a digipeater in West Cork for the far south west and possibly also in Galway.

NET/ROM IN FRANCE

Jean-Marc leclere, FC1DFR, says that NET/ROM has introduced in France at the beginning of the year, and the NET/ROM network operates on 144·650 and 430·650MHz. The network is independent of the Level 2 network on 144·675MHz, and there are no plans to connect the two networks together. Initial experiments to connect the NET/ROM network to the Belgian network via ON4HU were conducted successfully in February. Approximately ten digipeaters are now operational, including two NET/ROM nodes. One of these is FC1DFR-5, which is scheduled to move from Paris to Cherbourg on the French coast, to connect with the English network.

Jean-Marc would like to get in touch with hams who want to connect with the French network. He suggests that initial experiments be conducted on the 50MHz band with his PBBS (FC1DFR-1), which is a modified version of the W0RLI PBBS. His address is 2 Rue Charles Perrault, 91170 Viry-Chatillon, France.

MODIFICATIONS TO THE BSX2 TNC

THE TIME HAS COME . . .

By December, this column will have been running for three years. Three years in any job is quite long enough – particularly in the fast moving world of Data Comms – and so I have decided that the time has come to move over and let somebody else have a go. Would you like the job? If so, drop a line to the editor, saying how you would run Data Comms in future, and enclose a sample column of 1500 words (about six pages of double-spaced A4 or a disk with a PC-based wordprocessor file), so that he can check out your style. These offerings should reach him by Monday 19 September. The lucky winner will be notified in October, and will be submitting his/her first column in November, for publication in January.

Robert Stephen, G8MYX, reports that he has had problems with the popular BSX2 tnc, with occasional corruption of the battery backed ram when the unit is switched on and off. He carried out a detailed study of the reset circuit, and found that under certain conditions it may be possible for the Z80 micro to power up before the reset is applied; the exact timing depends on the actual Z80 timing characteristics, which differ slightly from manufacturer to manufacturer, and on the rise time of the power supply. By making the following minor modifications to the tnc, Robert has completely overcome the problem:

1: Remove C7 (10μF, between IC19 pin 2 and IC11 pin 9).
2: Remove IC11, cut off pin 8, and replace IC11.
3: Insert a link from IC19 pin 2 to the reset line (pin 8 of IC11 on the pcb).
4: Check that R48 is 470k; some older versions had 100k fitted.
5: Check that C45 (0·1μF) is present. This was missed off the pcb, and may be soldered between pins 1 and 3 of IC19.
6: Replace VT1 (VN10KM) with a VN10LM.

MACKET PACKET

Macket is a packet radio terminal program written by Steve Fine, WD8PUH, for the Apple Macintosh computer. According to a review in ARRL's *Gateway* newsletter, it is very easy to use, and utilises the window features of the Macintosh to the full. The Send window is for entering and editing text and commands that are queued for transmission to the tnc. The Receive window displays text that is received over the channel which the radio is monitoring. Connection windows display text that is sent to you from connected stations; in a multi-connection situation, a separate Connection window is available for each connection. The Send Log window contains all of the commands and text that were sent from the keyboard. The Communications and Status windows provide pertinent information concerning the operation ▶▶

MICROWAVES

MIKE DIXON G3PFR

"WOODSTOCK", GAZE BANK, NORLEY, WARRINGTON, CHESHIRE WA6 8LL

24GHZ GETS GOING AT LAST!

Last month I remarked that operation on the 24GHz band may have lagged behind 10GHz operation for a number of reasons and that these difficulties had now been largely overcome, including 'freeing' of the bottom 50MHz of the band by removing the need for site use pre-registration with the DTI. It seems that the use of simple wideband equipment, based on the Plessey GDHM32 oscillator/mixer and WG20 antenna feeds is, at last, beginning to happen. There were a few contacts reported last year which were summarised as a path map in a recent issue of the Newsletter. Most of the activity seemed to have taken place concurrently with the 10GHz cumulative and some 13 or so operators were active in portable mode – three broad "groups" in fact. In the north west G3NKL, G3FNQ and G4UQI were active with G3NKL and G3FNQ working last year's best dx of 127km. Another 'group', G's 0DJA, 0EDT, 1HOV, 4IAG, 4ISM, 6UDW, 8MWR, 8SWZ and 8XAF, are known to have activated the south Midlands area, managing contacts up to 87km. A few short paths are believed to have been worked on the south coast by G3JHM and others. The occurrence of such 'pockets' of activity closely parallels the pattern of development of 10GHz WB operating some years ago: there the activity similarly started in pockets and spread to fill-in some of the "holes" between the pockets. Let us hope that the same thing will happen on 24GHz.

This year's first two 10GHz cumulatives got off to a good start in the north with several operators again activating 24GHz in spare moments between 10GHz contacts! Before and during the April culmulative, G's 3PHO, PYB and G8AGN, using equipment described as being built "literally in a day", progressively increased their distances worked from 16 to 30 to 71km, the latter path from Merryton Low in N. Staffs to G3FNQ at Ashurst Beacon, near Wigan, Lancs. During the May cumulative, G8AGN/P (Merryton Low) worked G32ME/P (Telford Club station on Brown Clee) at 87km, resulting in successful claims for Intermediate Certificates numbers 3 and 4, respectively. Martyn, G3UKV, of the Telford group noted that one of his companions had "to hold the transceiver steady" to make the contact work – perhaps one of the penalties of using a 16in dish with its very narrow beamwidth! That this path is extremely reliable on 10GHz but not so easy on 24GHz points up G3PHO's Newsletter observations that "atmospheric moisture is the bugbear of this band and it is not a case of just repeating all the certain 10GHz paths as we thought it would be. A lot of interesting operating is in view". Since these contacts Barry, G8AGN, has modified a path budget program (BBC BASIC only) to allow for the additional water and water vapour losses when calculating the potential of 24GHz equipment across paths of known length. Copies of the program can be obtained from Barry (QTHR) on receipt of a blank 5·25in floppy disk and return postage.

In New Zealand Steve, G4KNZ/ZL2AZQ and his pal ZL2AQE had a 126km WB contact using simple wideband gear, signals appearing after some considerable time of trying, just before the pair packed up to go home. The moral of this story is keeping transmitting and listening for a long time and don't give up if, at first, you don't succeed!

What do I mean by simple equipment? A 12 to 16in dish with Penny feed (a la VHF/UHF Manual), a GDHM32 mixer/oscillator (5 to 7mW output), a "bog-standard" 10·7MHz IF/AF strip (usually fitted with SL560C, CA3189E and LM380N ic's), and a conventional Gunn power supply/modulator (with tone and speech facilities) slightly modified to give a Gunn bias range of about 3·9 to 5·6V ie, about half that required for the usual 10GHz device. This range appears to give a problem-free voltage pushing (tuning) range of some 30 to 40MHz within the 24·00 to 24·050GHz 'free' sub-band. Otherwise the techniques are exactly the same as on 10GHz – it really couldn't be much simpler!

In order to promote the building of much more potent narrowband equipment of the G3BNL phase-locked loop type, I now have available professionally produced pcb's and some additional information on the necessary waveguide items – QTHR for details, as given in the May Newsletter.

The G3ZME group will be available on both 10 and 24GHz from the Isle of Man (August cumulative) and Brown Clee (September).

OTHER DOINGS ON THE HIGH BANDS

Paul, G6MEN (Shrewsbury), operating as G1GHZ/P, an informal 'back-packer' contest group for whom he holds the licence, worked his first 10GHz WB 154km path in the April cumulative, from Long Mynd to G3NKL (Fair Snape, Lancs) for Distance award no. 92. Most of the Group's activities on the high bands will be from the mid-Wales 'Marcher' (border) area where there are some nice long line-of-sight paths to many areas of the midlands. This was witnessed by a log-page from the May cumulative when Paul worked seven contacts, of which five were 100km or more.

Dave, GM3WIL (Prestwick), operated portable on 10GHz from the Campsie Fells, north of Glasgow and gained his 150km+ award (no. 91) for a contact with GI8GJX/P at Agnew Hill near Larne. He asked whether this was a GM/GI first on the band. Well, although I can't recall the callsigns, I'm fairly certain that it is not — I seem to remember several years ago when Dain Evans, G3RPE, started this column, that he quoted several inter-British Isles contacts on the band, including GM/GI. Does anyone have the details of any such 'firsts'?

The extreme northwest tip of Wales (Lleyn) may soon be activated by Ralph, GW2HCJ, who has been building simple 10GHz gear – at least two sets – as a project for members of the Porth Madoc club. Ralph's comment was to the effect that he last dealt with 3cm doppler units as 'speedometers' on the Ffestiniog Railway. I know it is difficult to get going when one is working in isolation, away from the centres of activity, like this, so all the more power to such efforts!

There has recently been much comment on UK 10GHz activity being too strongly centred on WB modes rather than NB modes, with the result that much DX is being missed and the UK equipment is still in the Dark Ages, relative to the hi-tech efforts of German amateurs. Some of the reasons for this and some possible alternatives will be discussed next month, for it is apparent that there may be some very good reasons why this should be so. Not only that, but the present generation of WB equipment can, in most cases, be considerably improved with comparatively little effort and expense. And other uses can easily be envisaged for existing equipment without even needing to go to NB techniques!

Finally, a very intersting request came from Heinz Steinboeck, OE6HS, asking whether I know of any amateur in the UK who is experimenting with laser communications, either in the visible or infra-red spectrum. As I don't, I thought it as well to ask here. Any replies can be routed via me or direct to Heinz, whose address is Kloosterweisgasse 64, A 8010, GRAZ, Austria. I would like to be able to put someone in touch with Heinz who is obviously searching for a 'soul-mate'. His friend Alois, OE6AP, who is active on 10GHz, sends greetings to all UK operators on the high bands. ■

►►

of the tnc and the software.

All of the windows may be displayed, hidden, re-arranged and re-sized, and once you settle on a window configuration you like, you may save it for later recall when desired. One problem with so many windows displayed simultaneously is that you may miss something in a window that is covered by other windows. To avoid that problem, there is also an Unread Text window that lists the windows containing text that you have not seen.

Macket's parameters may be set for a variety of operating situations, and sets of parameters (eg, for hf and vhf operation) may be saved and recalled as desired. Ten macro keys, each containing up to 255 characters, can be defined to your particular requirements. Macket supports host mode operation with tncs that provide the RXBLOCK command, and the package will function in the background when you use Macintosh's Multifinder multi-tasking software. Macket is available for $39·95 from S. Fine Software, PO Box 6037, State College, PA 16801, USA. ■

SATELLITES

RON BROADBENT G3AAJ

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Now that we're able to use electronic mail for the transfer of this column from Wanstead to the new Editor of RadCom, my first offering for August was (to me quite unexpectedly), placed in the July issue! I have therefore not been able, as I write this on 3 July, to get any feedback on what you wish this satellite section of your magazine to look like. So I will repeat again – please let me have some ideas in the next few weeks on your requirements. Hot News cannot be very Hot in a monthly magazine, and therefore news will have to be on past efforts. Technical items from around the world can be printed when permission is available – hence some delay. Hints and Tips from readers on satellite subjects are, however, always welcome, and can go into the next issue as space permits.

The most important event since the last issue was the Launch of the new Phase 3c satellite. As it is now in orbit it can be called OSCAR 13. (The Thirteenth Orbiting Satellite Carrying Amateur Radio to be Designed, Built, and Launched by AMSAT Groups in the last 25 years). Oscar 13 is, as I write, sending cw, rtty, and 400-baud PSK Bulletins on two frequencies in the 144MHz band: 145.812MHz and 145.985MHz. (So too, of course, is the carrier only of that game old bird, OSCAR 10 on 145.810MHz.) Oscar 13 is not expected to be fully operational for Transponder operation until at least the first week in August 1988, and then only after official permission from the Command Stations carrying out the series of tests that will ascertain that final parameters have been completed. These tests ensure a full and useful life for this very fine satellite. Be assured that all AMSAT Groups, including AMSATUK will have up to date information as it happens right up to the official operations date. Listen to the various VHF Nets, and 80-metre Net in the UK. (3.780MHz Mon, Weds, Sundays) for latest info.

Please do not heed rumours, and if in doubt ask AMSATUK or RSGB Databox for correct information. Please do not put information on Packet that will be out of date very soon afterwards, unless you are in a position to delete from all nodes immediately the situation changes. The amount of incorrect and outdated information about satellites on BBS is staggering. Most of the continental input is at least one week old, and is never deleted by the originator. With the exception of G3RWL, GB3UP, G3JRM, and G3AAJ (in UK), input to BBS will be from persons who have themselves taken it off another BBS. Only the four callsigns quoted have direct contact with Command.

May I issue a plea to most new licensees, and especially those who are only able to resolve FM, for tolerance when you are on your multi-contact simplex QSO on 145.800 plus? The Space portion of the 144MHz band is by *international* agreement (not RSGB HQ edict) from 145.800 to 146.000MHz. It really does not give listeners any guide to your intelligence to say "I am not a member of the RSGB, so do not have to obey their rules." Please read the Schedule of your Licence. You should be aware that if you shout into your Nippon Box your bandwidth will extend into the space band, and interfere with the downlink telemetry of *two* satellites just a few kHz inside the 145.800MHz frequency that you are shouting to your mobile friends. I have yet to hear of a satellite user that interfered with an FM Repeater or FM Simplex QSO below 145.800MHz. Could we, satellite listeners, have the same consideration please?

OSCAR 13. Launched on Wednesday 15 June, 1988 at 1119 and 4 seconds UTC (just six minutes later than expected owing to a slight hitch at the Karoau launch site on the Equator). After ejection from the Arianne 4 Rocket, and a complete orbit of the earth, the first signals were heard at 1403 while over the Indian Ocean. Height was 27,000km. Telemetry signals reported loud and clear, even on the omni-directional antenna.

The first firing of the kick motor on board OSCAR 13, which put the spacecraft into it's final orbit, took place at 1857 UTC on 22 June. At that time most of the UK gang of satellite watchers had rushed home from work, or stayed away anyway, to be on the AMSAT UK net and to get the first information that the 'fingers-crossed' stage was a success. As those of us who were watching the PSK Telemetry frames from the satellite itself told of a change of state of the IHU, great shouts of joy were heard by radio and telephone to this QTH. As I write, information is at hand to say we have the second and perhaps the final firing on 6 July. Let's hope that all goes well and we get a fully operational satellite which can be used for world wide communications with very low power. (Read that again all you with 400-watt linears.) Operational Frequencies, Modes, Times and other info. in next issue.

This being the final orbit change under AMSAT command, we should see the Inclination raised to 55.8°. This will give most counties in the world the ability to use OSCAR 13 at some time during a 24-hour period. Once again, however, it will need an xtal ball to predict exactly where the satellite finally finishes up into it's orbit. The foregoing remarks are also made to advise all the people that telephoned and wrote to AMSATUK and RSGB since the launch to ask why final Kepler Elements and IHU Parameters have not been given to the world by Command Stations. The reason is simple – at this date they are all estimates, and with the best will in the world can only be so until the final orbit known. A set of such parameters have been passed around the various agencies over the last nine months, but are only of academic interest to the average user. To back up this statement it should be told that even today a new set of Keplers and an up to date set of IHU details are just coming into being. That the first 'burn' that lifted Oscar 13 to it's new orbit did not go as planned, is evidenced that moving satellites across the sky is a hairy business at the best of times. Oscar 13 was, in fact, lost for a few hours over the last week. Yes, even with the radar systems we are able to ask for help, it was lost. Only by some very clever mathematics and knowledge of the system by Amsat Groups across the world were we still able to 'retrieve' the satellite.

WHAT'S BEEN HAPPENING

For those readers that are not part of an AMSAT Group, I would recommend that you join one if the very latest information is required about all the satellites now in operation. AMSATUK in this country gives out a wealth of information and publications on *all* satellites now in orbit including some weather sats. and the MIR space station.

The Russian series. RS5 and RS7 appear to be defunct, or at least not switched on by the Russian command station. It is known that the command station equipment was removed and possibly modified to enable the RS10/11 Transponders to be efficiently operated since launch mid-1987. Anyone working or even hearing these two satellites could let this scribe know date/times. RS10/11 Transponders, so called as they are part of another non-amateur satellite, are in good health and although the interest has been in watching Oscar 13, a lot of readers have had fun and D with these equipments in the sky.

The MIR spacecraft has, as some will have seen on TV, had a change of crew. That in itself is no mean feat, but the latest I hear is that in 1989 a 'bicycle' will be sent up there with gear to enable the KVART portion of the space station to be repaired. The mind boggles. Any reader who wishes to obtain a copy of the small booklet about MIR can do so by sending a 9" x 6" stamped sae to AMSAT UK, London E12 5EQ. A copy will be sent immediately until stocks run out. If you wish to add a small donation for future satellite building this would be appreciated.

UOSAT 1 and 2 (Oscar 9 and 11). Both satellites still in orbit and giving a good account of themselves. Command station at University of Surrey is still uploading up-to-date news, Digitalker, Kepler elements and Whole orbit Data as generated by the IHU on board both satellites. The latest news of UOSAT C is that it is being built and should be launched early in the new year 1989. This will also be a scientific satellite in the amateur band and so it is hoped that an amateur transponder will be included in the package. The DCE system still continues to give good service to those who wish to send fast messages around the world, and more stations are becoming gateways for this digital system via GB3UP on 144.650MHz or even on the 50MHz path.

JAS1. This satellite launched by JAMSAT has its regular devotees such as G4CUO and friends. Mostly this satellite is on DATA mode and even though a schedule is given out by JARL for a five month period it would appear that the power budget will not stand up to the strain of too many QSO's without refurbishment of energy on the solar panels. Let's hope that the sister to this Japanese satellite has a better power system when launched in 1989/90 time frame.

OSCAR 13 became operational 20 July Mode B only at present. Inclination 56·8°, 2500km APOGEE. G3AAJ.

AMATEUR TV

MIKE SANDERS G8LES

MIKE SANDERS, 39 TELEGRAPH LANE, FOUR MARKS, ALTON, HANTS, GU34 2NJ

By way of introduction I am G8LES, Mike, perpetrator of this first ATV article which is intended to become a regular new feature in RadCom. I've been a keen ATV enthusiast for over 10 years, involved both with operating and construction.

HOW WILL YOU FEATURE IN THIS SPACE?

Quite easily – just by writing directly to me with hot news, technical information, news of events and contest results; anything, in fact, which you believe other ATV enthusiasts will be keen to read. My leaning is towards fast-scan activity, which implies that I will need to get information on slow scan TV and VHF-band exotica (bands 1 and 3) of which I would not necessarily normally hear about. If you can send me the text on a 40-track disk on BBC Wordwise, so much the better, plus an accompanying photo. Your disk will, of course, be returned. (Your ed. would like to add that any articles going direct to RSGB preferably should be in an MS-DOS environment; BBC disks can be handled, but the conversion isn't easy.)

GETTING INTO AMATEUR TV

Anyone keen to make a start in amateur tv should get straight in touch with the British Amateur Television Club (Dave Lawton, G0ANO for membership, or Ian Pawson, G8IQU for publications). On a more local basis the Home Counties Group (plug!) meets at the Beaconsfield Arms, West End Road, Southall, Middlesex, on the fourth Wednesday of each month, starting at 8pm. Contact me for more details.

ON THE BANDS

What's on and where? 144.750MHz is the tv talkback and working frequency for fast-scan television (same standards as domestic tv). For longer distances 144.170 ssb is used for international calling. Stations are asked to be sensible using these frequencies; in many cases 'pockets' of local activity can all use the same channel without problems, but more intense wafflers should find another frequency. Television signals on 70cm are am modulated and between 435.2 and 437MHz – equating to around channel 17 uhf. 23cm has much more space available for tv repeater and simplex operation, the frequencies being: repeater inputs 1249MHz, except for GB3HV, High Wycombe, which is on 1248MHz to avoid the 1 gigawatt erp Heathrow radar in-band transmissions. The repeater outputs are on 1318MHz, again excepting GB3HV which is on 1308MHz. Mode: broadband fm with 6MHz intercarrier sound. Simplex is on either 1255, French/English or 1285MHz UK only. Fm tv transmitter/receivers are required for this band. Some of the repeaters are GB3VR Brighton, GB3CT Crawley, GB3UD Stoke-on-Trent, GB3TV Dunstable, GB3ZZ Bristol, GB3UT Bath (am only), GB3VI Hastings (am only), GB3RT Rugby, GB3GV Leicester, GB3HV High Wycombe, GB3AF Durham, GB3GT Glasgow, GB3NV Nottingham and GB3PV Cambridge.

LIVING TOGETHER!

Two clash points occur with 144.750MHz, one being that a French repeater input is on the same frequency; potential UK users of this are asked to check on simplex first that the frequency is clear before transmitting. The other is spillage from packet users who are either overdriving their rigs with data and/or overdriving 'linears'. Please, users of this mode, check your signals levels more carefully in order to alleviate this problem. Since the arrival on 70cm of higher frequency repeater inputs near to the ATV operating frequency of 435MHz a certain 'aggronoyance' has occurred with ATV 15kHz sideband buzz on repeaters. The solution to this has been shown to be twofold in practice.

(1) The ATV station should transmit on 435.225 minimum and adjust the vision carrier frequency so that the repeater input lies in a sideband 'hole' (a second 70cm fm and 2m station is required for this test). (2) Most of the annoyance value can be attributed to lots of buzz usually caused by another station 'bleeping up' the repeater. The solution to this is fitting a 50Hz buzz detector to the repeater which will ensure that if there is only buzz on the input it will not repeat it. This has proven successful on the Farnham repeater (contact G4EPX for details). ATV stations are also requested to avoid transmitting during sideband contests on 70cm, to leave the band as quiet as possible.

There is a proposal afoot to place packet digipeaters on the 1240+MHz end of the band. This won't go down very well because all of the ATV repeater inputs are already licensed to use this section. An ATV fm signal occupies a plus and minus 7.5MHz spectrum so other modes need to stay clear of this spectral space.

I have already mentioned the powerful radar at Heathrow, and there are a number of these transmitters throughout the UK. They cover airways nationwide to 77,000ft, so radar eliminators may be needed on receivers, depending on your location. The frequencies they operate on vary from region to region, although 1252, 1270, 1280 and 1320 are known frequencies where radar can be seen. Another more serious pest was observed recently, notably at 10.20am, 29 June; the entire band below 1290MHz was filled with broadband data, at 30dB over noise, at a transmission rate comparable to 15.625kHz, the television scan frequency, so jamming GB3HV and probably a number of other repeater inputs. What could it be?

IN THE PUBLIC EYE

On a local note again, the Home Counties ATV Group sprung into life on 25 and 26 June. The task? To put on a public ATV and radio demonstration station in the Police marquee at the Middlesex Show in Uxbridge. Unfortunately the only pics to hand on press date were blurred Polaroids, and weren't fit for printing; you'll have to picture the scene using you imagination!

Now a certain subsection of Murphy's Law says that all demonstration sites will be positioned in the worst rf hole in the area. This one was no exception, for arrival on site at Uxbridge was down a steep hill! We've operated there before and have found that we could put on a good local demo with 'walkabout' stations, but despite a 45ft mast have had great difficulty working anyone off-site. These problems were confirmed by the Police, who had great difficulty in communicating with their local repeater from the site!

This year's solution was to utilise the top of the ski slope, which is high enough to see over most roofs and surrounding hill tops. We even contacted an ON station on the Sunday. The ski slope was set up by G8MNY using my transmitter-receiver patch/control box made specially for the show. The council threw a spanner in the works by preventing vehicular access to the top of the ski slope with a chain link fence. There were strict instructions for it not to be taken down, so we lifted it up and passed all of the equipment underneath!

The marquee was about 300 yards away, so we used a duplex 10GHz tv transmitter-receiver for communications between the site and the ski slope.

In the marquee, using GB75ATV, we put on an impressive display of monitors showing camera, computer graphics, received stations, 23cm walkabout and tape material. The received station was put up on screen with a vertical split displaying the public on the right hand side and the received station on the left. The public were interviewed by the received station, with microphone operators in turn of G6ZHC, G0HAT, G4CRJ and myself.

This all proved to be a great success after the public's initial amazement and disbelief was explained away. G4CRJ had constructed a chroma key (this substitutes another picture for any blue item), and visitors saw themselves in front of the ski slope or the received station. To everyone's great amusement, people wearing all blue clothing just had hands and head remaining visible! There was an hf station, also with slow-scan – talking to the world. Altogether we had a very successful weekend.

WHAT HAVE OTHER AMATEUR TV ENTHUSIASTS AND GROUPS BEEN UP TO?

This new column welcomes ideas and news of what's going on in the UK.
Write to G8LES now

SWL

BOB TREACHER **BRS32525**

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SPORADIC-E

No prizes for guessing the lead story this month. Yes, I shall start with the fine Es propagation experienced on VHF in early June. For once, the openings happened before the copy date, instead of just afterwards!

I have five reports from SWLs who revert mainly to the VHF bands during the summer months. With the news which follows, I very much hope that others will seriously consider getting equipped for these bands in 1989, especially 50MHz where with the increasing sunspots, the band will be open worldwide in several years to come, with Stateside openings occuring regularly. Now, I shall cover conditions on Band 1 TV (49-68MHz), 50MHz and 144MHz. I have no doubt that other articles about the fine conditions will appear in the Magazine, but I consider it worthwhile reporting what listeners with modest antenna systems, in comparison to some amateur installations, have heard.

THE 1988 TABLES

As promised last month, here are the tables. Not many entries yet, but the appearance of the tables may be the spark others need to put in an entry.

HF

Station	DXCC	28	21	14	7	3.5	1.8	Ttl
BRS8841	230	110	158	192	119	128	54	761
BRS52543	205	99	114	156	115	125	47	656
BRS1066	113	17	62	78	74	45	45	321
BRS91397	80	7	35	44	30	31	9	156
F11ATZ	78	38	47	16	15	6	–	119

VHF

Station	50	70	144	432	Total
BRS32525	46	3	61	12	122
BRS25429	15	–	50	10	75
BRS31976	–	5	45	–	50
BRS52543	–	–	43	–	43
BRS62088	–	–	11	–	11
F11ATZ	–	–	2	1	3

All scores are countries plus squares on each band.

LF CHALLENGE RESULTS

Posn	Station7	3·5	1·8	Points	
1	ONL383	141	149	129	419
2	BRS88969	163	157	77	397
3	BRS52543	129	151	76	356
4	BRS8841	120	151	123	349
5	BRS25429	134	150	58	342
6	BRS25209	102	99	58	259
7	GM3YOR/A4	96	51	85	232
8	F11ADB	53	52	0	105
9	BRS905228	14	20	7	41

Check logs from BRS32525, BRS62088.

The 1988 LF Challenge did produce a few extra logs. Everyone liked the new scoring system, which certainly provided a closer finish with not too many points between the top five.

Congratulations once again to Jean Jaques Yerganian for coming home first, but the margin was much closer this time. Arthur Miller came home in second place, with Martin Parry, Robert Small and David Whitaker taking the next three places.

ENFORCED LISTENING IN OMAN

It was interesting to receive a log from GM3YOR who has been unable to obtain a licence in the Sultanate of Oman since he arrived in October 1987. His FRG7700 picked up some fine dx on 1·8MHz, including 4 × 4, VS6, HZ1, UM8, VE 1 and UF6.

In general, conditions were poor on 7MHz. The band was very noisy with many signals which were quite weak. Signals from the Pacific in the morning were not reliable, and the later afternoon dx just did not materialise this year. 3·5MHz was quite normal with some good signals, but the more exotic dx seemed to be missing from this band too. 1·8MHz, except for VS6DO, which appeared in several logs, was also quite poot with only the more regular stations active from the Caribbean and only OH0MB/OH0 of much interest from Europe.

One entry was not in accordance with the rules of the challenge and has been rescored. It is also essential to note that reports to stations using ssb should quote an "RSS" report only, not "RST" which is for stations using morse.

I managed to fare well from Es at Band 1, seeing good pictures from Russia, Yugoslavia, Spain, Italy, Norway, Bulgaria and Iceland between 3 and 7 June. Indeed, the pictures from Italy and Spain on 4 and 5 July gave early warning that the Es which materialised on 144MHz would come from those directions. On 50MHz, good openings to CT, GM, LA and 9H1 were experienced most days to 7 June. The 5B4CY beacon was 539 at 1750 on 30 May, while the Squarebashers expedition to ZB2 (ZB2IQ) was pounding in on many occasions showing that Es propagation was available on the band even when little else could be heard. On 144MHz, my first Es of the season arrived at 1539 on 4 June with IW9ACT. Several 9H5s were also heard, plus 27 assorted 15s, 6s, 7s and 8s. New squares were I8MIB (JM88) and I6WJB (JN72). The opening lasted 2h 4m – the longest Es opening experienced. There was a further opening to Spain from 1248-1339 on 5 June, when 10 EA7s were heard, plus ZB2IQ and CT4RK. The only new square was EA7DBP in IM66.

The big news was the Es opening to Stateside on 6 June. I logged 28 Ws and one VE between 2101 and 2350 (it went on longer). Some signals were 59 on the meter and were taped to prove it! Stations in W1-4 were logged, the best being WB4RDT (FM18) and WD4CXU (FM07), although it seems that several KP4s and an FP8 were worked. An opening this early in the season bodes well for the remainder of it – we hope!

Mick Toms BRS31976 (JO01, but further east than my QTH) was unaware of the superb 50MHz conditions as his dipole had still to be erected. However, he had a field day during the 144MHz events mentioned above. The Saturday opening started at 1455 for him with IC8EGJ and finished at 1750 with IW7AQO (JN81). Stations similar to those heard at this QTH were logged, although he also heard FF1LFG/P (JN27) at 1715. On the Sunday, he again caught much the same as myself, with the opening lasting about the same time. Both openings had netted Mick 15 new squares and two new countries (9H1 and ZB2).

My XYL, Joan, took some time off from her housewife chores to log some Italians during the Saturday opening. She found three new squares.

Martin Parry BRS52543 (IO83) monitoring 144MHz logged EA6FB at 1100 on 4 June, and logged 20 Italians, 9H5L/P and a solitary EA3 between 1458 and 1740 during the big opening. On the Sunday, he caught two openings – logging five EA7s from 1319 to 1335, and a second to EA4,5 and 6 from 1447 to 1512. This opening netted one EA4 (IN80), five EA5s and EA6QB (JM08).

Last is news from Dave Whitaker BRS25429 (IO93) who missed the Sunday opening. However, he fared well enough during the Saturday logging 20 Italians (15,8 and 0 plus IT9) plus one 9H1 and EB5FSX (IM99) between 1617 and 1740.

On 50MHz he had caught his first LA's, including LA1K (JP53), some GM's and a GI. He had still to hear any CT's and had not located the ZB2. In the Stateside opening on 6 June, he logged 8 W's in W1, 2 and 3 starting at 2110 through till about 2230.

HF NEWS

All reports speak of superb conditions on the higher dx bands, with good openings on all three bands. 21MHz had been particularly good in early June to the Pacific. David Whitaker having heard ZK1XV, FO5FO and 3D2MP between 0730 and 0800, and T30BC and KC6SI (Eastern Caroline Is) at around 1115. Martin Parry also reported good 21MHz conditions, mentioning VK9N and VK9Y. On 28MHz he had heard his first station from GU (!), and XX9, 3B8 and 3B9. Colin Watson BRS46598 had found many VK's and W6's on 14MHz.

Robert Small felt that May and early June had produced the best dx conditions encounterd for many years. He reported dx available 24 hours a day. 21MHz for Robert had been wall to wall JA's for long periods, and strong stations from the Pacific on 14MHz both early in the morning and again early in the evening. FR4FA/J was new on 14MHz, but the log for that band had been full of such dx as ZK1DD, T32BH, 3XOA/A, XF1C, V21WW and ZF2ME/ZF8. many strong signals has also been heard on 28MHz, especially from the Caribbean late in the evening. QSL's from earlier jaunts on the bands had come in from KH6LW/KH7, TU4BR/5U7, KX6LJ and WS4E/C6A. With the HF bands likely to get even better as we move up the sunspot curve, we can all look forward to some fine dxing in the months to come.

FINALE

I am still in need of good photographs of swl shacks, Awards, antenna designs, indeed anything to add some pictorial interest to the column. News, views, tables scores for the October column should reach me by 15 August, with late copy by 22 August.

QRP

GEORGE DOBBS **G3RJV**

ST AIDENS VICARAGE, 498 MANCHESTER ROAD, ROCHDALE OL11 3HE

APOLOGIA PRO QRP?

Although I may be opening the stable door after the horse has won the Grand National, it may be time to suggest a little of the philosophy behing the current QRP movement. Never, since the time I first began my interest in QRP operating and building suitable equipment, has there been such interest in this aspect of our hobby. The continued and amazing growth of QRP groups worldwide, the inclusion of QRP related items in amateur radio magazines, the proliferation of QRP as a major special interest grouping within amateur radio all contrast with the view held not so long ago, that QRP was the pursuit of a few odd radio amateurs.

The recent discussion of Licence Condition Changes and the current accent on Amateur Radio and Youth with the Student Licence proposals all seem to point to fundamental concerns about amateur radio as a hobby.

The use of power on the HF bands has been a contentious issue since the time when it became possible for amateurs to produce considerable RF power within their budget and technical capacity. If we ignore hf propaganda broadcasting, most radio services appear to adopt a professional approach to the use of power and aim, or are legislated, to use only sufficient power to provide satisfactory communication. This makes sense as it reduces mutual interference and improves their frequency utilisation.

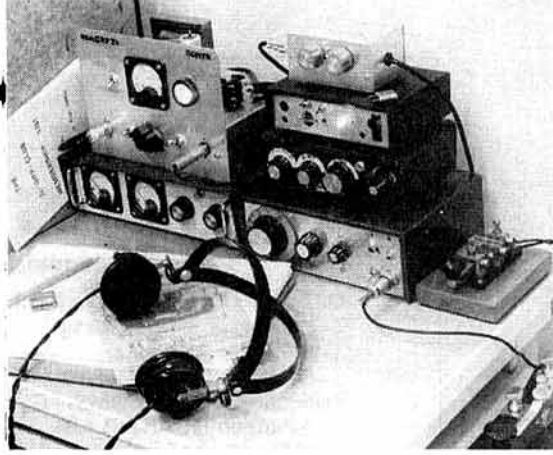
Nowadays amateur stations may even be using more power than some of their commercial counterparts to communicate over a given distance. Perhaps when amateur radio operators use comparatively low power equipment to commnicate regularly on a world-wide basis they win the respect of their commercial counterparts? Certainly mutual interference on the overcrowded amateur radio HF allocations would be reduced.

My dog-eared copy of the Amateur Radio Licence tells me that the licence is issued ". . . as part of the self-training of the licensee . . ." The whole ethos of the Amateur Radio and Youth discussion and the Student Licence proposals appears to be based upon the hobby as a means of training and education in electronics and radio communication; quite a contrast with the current state of amateur radio as a mainly "applicance user" hobby. Many radio amateurs admit to not knowing much about what goes on inside cases of their equipment and some admit to not knowing too much about the function of all the controls on the front panel.

QRP operators tend to use relatively simple equipment, often built by themselves. Our branch of the hobby naturally tends towards the constructor and the experimenter. The price of new amateur radio equipment seems very high to me, but since I do not buy it perhaps it is an ill placed comment. I do suspect that it is high for young people, students and indeed retired people. There appears to be a lack of 'no-frills' basic equipment for viable HF communication on the market and it may be that home construction is the only way that some radio amateurs can proceed.

This could be the 'Age of the Constructor'.I have been building radios for at least 30 years and it has never been cheaper or easier. Solid state construction can be done on a tea tray on the kitchen table and all packed away at the end of each session. I remember saving up to buy components but now there are bargains to be had from traders at the many radio rallies in all parts of the country, which seem to increase in number year by year. Even components bought at full cost from upmarket mail order companies are within the means of most people. Compare the prices of components now and 30 years ago with average income now and then. In the past I have saved for weeks to buy one valve and then had to build my projects in the garden shed because of their size and metal work involved.

Perhaps some of this accounts for the increased interest in QRP? Perhaps QRP can offer a doorway into the hobby for new people? Perhaps I ought to stop before I attract too much vitriol? I suspect that when an amateur radio guest is shown into someone's amateur radio shack, it does not matter how much expensive and impressive equipment is proudly displayed, if the guest sees one item of homemade equipment, that is what will catch his eye first and attract the questions.



THE "HOMEBREW CORNER" AT G0HTR: A 3·5MHz VALVE TRANSMITTER TO A CIRCUIT FROM G3SYC, A 3·5MHz DSB TRANSCEIVER, A PEAK/NOTCH FILTER, ATU AND POWER SUPPLY

FIRST STEP TRANSMITTERS

For newcomers to QRP operation without previous experience of electronic construction, building even the simplest of rigs can be a daunting task. There are now several manufacturers of kits suitable for offering the first taste of home construction. Beginning construction by using a kit has many advantages: the components are all ready to use, the kit usually includes a printed circuit board, good kits should include enough instructional material for a beginner to be able to follow and not least of all, it should work. Even some kits present problems for a beginner as they have to seek out extra components and hardware to complete the project, or require the fabrication of a case to house it.

A new 80metre (3·5 – 3·6MHz) cw QRP Transceiver Kit has appeared on the market. This kit, the DTR3 Transceiver, is complete to the last nut and bolt wire, and a screen printed steel case. As the makers say, all that is required is a pair of headphones, a key, 12 volts and the price of the kit. The transceiver is a direct conversion circuit with full vfo coverage of the band, receiver incremental tuning (RIT), and a built-in passive lc cw audio filter. The transmitter gives 1·5W of rf output with waveshaped keying and includes a sidetone.

The completed transceiver is compact and lightweight and may appeal to portable operators. The kit costs £74.25 plus £2.00 postage and details can be obtained from: Lake Electronics, 7 Middleton Close, Nuthall, Nottingham, NG16 1BX. It may be worth adding that 80 metres is the common band used for inter-QRP working by members of the G QRP Club.

For those who are even reluctant to build such a kit, a complete miniature QRP transmitter has just become available for sale. This is called the TTX 80/4 and is a crystal controlled 3·5W output cw transmitter housed in a 120 × 65 × 40mm die-cast box. The transmitter is usable in the 3·5 to 3·6MHz range, works into a 50Ω load from a multisection low pass filter. The unit has pa current controlled protection and includes a changeover switch. I have tried a prototype of this transmitter and found it well built and reliable in use.

The transmitter, or further details, is available from: Signal Designs, 112 Drift Road, Clanfield, Hants. PO8 0PE, for £33.75 plus £1.25 postage. A companion vfo, the VFO80-1 is also available at £29.25. ■

A CW PARTY

The German AGC-DL group has provided two annual QRP Contests for many years and also run Straight Key Evenings for the pleasure of those who like moving brass up and down. Their next Straight Key Party is on 1 October 1988. The rules are set out below.

AGCW – DL STRAIGHT KEY PARTY

DATE
SATURDAY 1 OCTOBER 1988
TIME
1300 – 1600 UTC
MODE
CW only
QRG
7010-7040kHz
PARTICIPANTS
Any licensed radio amateur using a straight key and SWLs.
CALL
"CQ HTP"

A = max.	10 W input =	5W output
B = max.	100 W input =	50W output
C = max.	300 W input =	150W output
D = SWL		

SERIAL NOS

RST + serial number, class, name, age (XYLs=XX)
Example: 579001/A/ULI/25, 459002/C/ILSE/XX

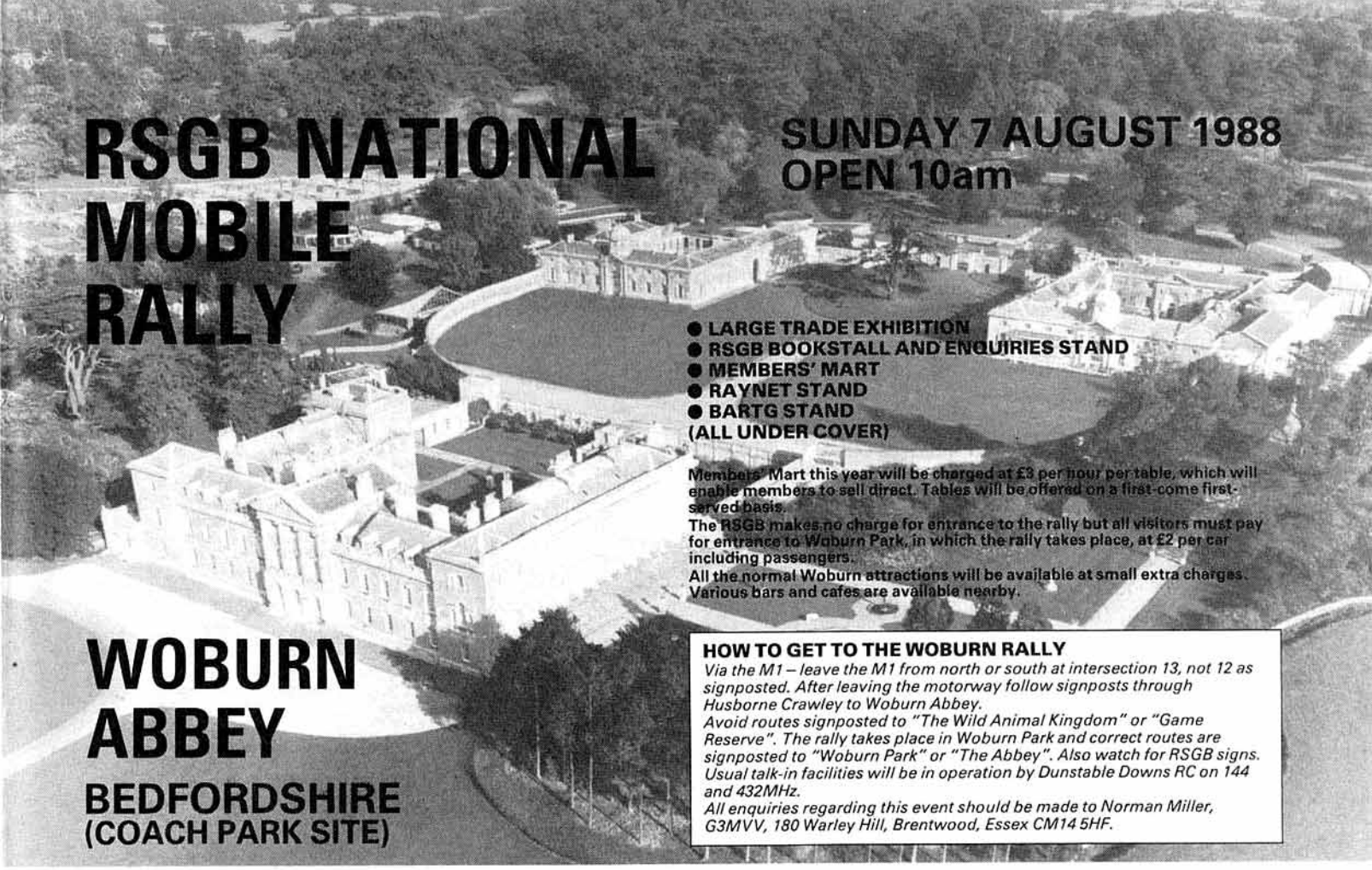
SCORING

QSO	class A with class A =	9 points
	class A with class B =	7 points
	class A with class C =	5 points
	class B with class B =	4 points
	class B with class C =	3 points
	class C with class C =	2 points

Time (UTC), band, call, serial numbers given and received, class, description on station, points calculation, declaration by OP regarding adherence to rules (no bugs, no elbugs, no keyboards).

Logs to be submitted by 31 October to: Friedrich Fabri DF1OY, Wolkerweg 11, D-800 München 70.

List of results: against SAE plus IRC.



CONTESTS CALENDAR

RSGB VHF CONTESTS

7 Aug	10GHz Cumulative (Rules in January issue)
14 Aug	1,296MHz Trophy and 2,320MHz Trophy (Rules in May issue)
14 Aug	Barking Radio and Electronics Society 144MHz
3,4 Sept	144MHz Trophy/IARU VHF and SWL (Rules in July issue)
11 Sept	10GHz Cumulative (Rules in January issue)
18 Sept	70MHz Trophy and SWL (Rules in January issue)
1,2 Oct	432MHz-24GHz/IARU UHF/SHF (Rules in January issue)
6 Oct	432MHz Cumulative (Rules in January issue)
14 Oct	1.3/2.3GHz Cumulative (Rules in January issue)
22 Oct	432MHz Cumulative
23 Oct	50MHz Trophy (Rules in January issue)
30 Oct	1.3/2.3GHz Cumulative
5,6 Nov	144MHz Cumulative
7 Nov	432MHz Cumulative
15 Nov	1.3/2.3GHz Cumulative
23 Nov	432MHz Cumulative
1 Dec	1.3/2.3GHz Cumulative
4 Dec	144MHz Fixed and AFS and SWL
9 Dec	432MHz Cumulative
11 Dec	70MHz CW
17 Dec	1.3/2.3GHz Cumulative

RSGB HF CONTESTS

7 Aug	Hopscotch (note date change) (Rules in June issue)
14 Aug	DF Qualifying Event Dartford Heath
26 Aug	Ropoco 2
Sep-Oct	28MHz Cumulative CW
3,4 Sep	SSB FD (Rules in May issue)
4 Sep	DF Qualifying Event Grimsby
20 Sep	DF National Final Colchester/Chelmsford
9 Oct	1/28MHz SSB (Rules in May issue)
16 Oct	21MHz CW (Rules in May issue)
22 Oct	DF Treble Night Event Mid-Thames
12,13 Nov	Second 1.8MHz
Nov-Dec	28MHz Cumulative Phone

OTHER CONTESTS

Jan-Dec	UBA SWL (Rules in December HF)
6 Aug	YL/OM Summer SSB Sprint
8 Aug	AGCW-DL YL-OM 80m CW Contest
13,14 Aug	European DX Contest (cw) (Details in August issue)
27,28 Aug	All Asia DX Contest (cw) (Details in August issue)
10,11 Sep	European DX Contest (ssb) (Details in August issue)
12,13 Nov	European DX Contest (rtty) (Details in August issue)

G0DZU's 400-WATT HF LINEAR

SOME VITAL CORRECTIONS TO JULY's ARTICLE DESCRIBING THE CONSTRUCTION OF THE POWER SUPPLY

Not only are we striving to improve the appearance of Radio Communication, but are particularly conscious of the necessity to maintain accuracy within the text – particularly in our technical and constructional articles. Very regrettably, however, in the rush to get July's issue out on time, several corrections which should have been made to G0DZU's article never saw the light of day.

Two were duplications of lines, which will simply have confused you rather than misled you. Others were factually more crucial.

For a start, the power supply circuit was not Fig 6. That appeared in June. At the end of the first paragraph, reference to socket HG should simply have read "H". In the components list, R14 is a 5-ohm, 5-watt wire wound, and R15 is a 50-ohm, 50-watt wirewound resistor. These were reasonably obvious. But R87 to R91 should have been shown as **220-ohm**, 17-watt wirewound resistors. S5 should be a push to break switch, and S6 a push to make switch. In other words, just switch them both round.

Please don't contact G0DXU for further information – the bottom line in the components' list should, of course, have read G0DZU.

WIND LOADING

While on that embarrassing subject of mistakes, we've only just learned of an error which crept into the article on page 254 of April's *Rad Com*. If, as in the example, the windspeed is above the range shown on Fig 3, then while it is possible to take half the value of the windspeed to get onto the graph, the corresponding PRESSURE should be multiplied by 4, and not 2 as stated, to give the required answer. This is because the relationship between windspeed and pressure is always a square law. Doubling the windspeed will ALWAYS quadruple the wind load, so in the example 156mph will give a load of 83·33 lb.

Converting from m/s to mph or from N/m^2 to lbf/ft^2 can be done as stated, though, since the relationship between metric and imperial units is a linear one.

The author, G3ZPF, thanks G4SNI for pointing this out.

CONTEST NEWS

1987 IARU REGION 1 VHF/UHF/SHF CONTEST RESULTS

The following tables have been extracted from the results supplied by the Netherlands national society, VERON. Particular congratulations go to GU4APA/P as winners of the 144MHz Multi-Operator section.

144MHz Single Operator Section

Posn	Callsign	Score
1	F6CCT	250,153
2	G8TF1/P	158,655
3	PA3CEG	149,366
7	LX2GB/P	126,785
36	G6HKM	74,054
39	G6IAT	70,855
47	G0CLP/P	64,475
82	G4NBS	47,810
179	G3COJ	29,099
223	G6HXU	23,481
262	G0EGX	19,257
286	G8KHR	16'812
335	G6HLL	13,459

Total 534 entries

144MHz Multi Operator Section

Posn	Callsign	Score
1	GU4APA/P	408,535
2	FF6KBF/P	309,568
3	GU3CKR/P	306,999
7	G4LIP/P	269,643
21	GM0CLN/P	204,400
25	GW4GFX/P	186,909
29	GD4IOM	181,781
32	GW3XBY/P	175,385
65	G4SIV	126,547
88	G4WET/P	106,101
94	GM0FRT	102,039
106	G5RS/P	95,340
111	G4LUA/P	93,934
112	G8SMR/P	93,420
125	G8EQD/P	86,369
129	G1MDG/P	84,974
131	GM4DEZ/P	83,235
133	G3WRS/P	82,526
161	G0HSF/P	72,554
182	G1DXY/P	67,025
237	G8ZKE/P	50,714
281	G8WYR	38,932
308	G3TRF/P	33,276
358	G5LO/P	19,367
Posn	**Callsign**	**Score**
365	G4ADM	17,734
366	G1CSR	17,302

Total 415 entries

144MHz SWL Section

Posn	Callsign	Score
1	NL8722	55,871
2	I2.3089	35.638
3	BRS32525	32,008

432MHz Single Operator Section

Posn	Callsign	Score
1	F6CTT	97,439
2	PE1ALA	85,901
3	PA0EZ	56,303
31	G6IAT	21,939
50	G1LSB	18,172
122	G6YLW	8,886
129	G6DER	8,189
136	G1GEY	7,759
139	G1KDF	7,565
150	G4FOH	6,749
167	G6CSY/P	5,645
169	G4PMK	5,524
195	G8ZQB	3,693
203	G8JXV	3,401

Total 263 entries

432MHz Multi Operator Section

Posn	Callsign	Score
1	PE0MAR/P	133,192
2	DL0UKW/P	119,357
3	PA0GUS/P	108,308
5	G4CLA/P	91,381
12	G8ROU	71,452
13	G4MRS/P	70,582
25	G4PUB/P	57,434
36	G8ZHP	45,971
43	G4HRY/P	40,774
46	G4HGU/P	37,692
51	G3FVA/P	34,636
Posn	**Callsign**	**Score**
113	G4ITF/P	12,494

Total 170 entries

432MHz SWL Section

Posn	Callsign	Score
1	NL8722	33,025
5	BRS28198	3,760
6	BRS31976	1,973

Total 6 entries

1·3GHz Single Operator Section

Posn	Callsign	Score
1	PA0EZ	22,639
2	DK1VC	22,635
3	DL6NAQ/P	19,672
72	G4PMK	3,465
79	G6DER	3,198
88	G1KDF	2,788
93	G8ZQB	2,565
138	G6CSY/P	1,143

Total 171 entries

1·3GHz Multi Operator Section

Posn	Callsign	Score
1	PA0GUS/P	27,437
2	PE0MAR/P	24,671
3	DL5GBG/P	24,418
5	G4LIP/P	23,358
6	G4ALE/P	22,691
7	G4FRE/P	22,675
16	G4DDN/P	15,391
26	G4JKN/P	11,898
30	G8OHM/P	10,520
36	G3UHF/P	8,536
37	G8VOI/P	7,896

Total 97 entries

2·3HGz Single Operator Section

Posn	Callsign	Score
1	PA0EZ	4,838
2	DK1VC	4,274
3	PE1ALA	3,969
14	G6DER	1,850
53	G4PMK	194
59	G8ZQB	58

Total 63 entries

2.3GHz Multi Operator Section

Posn	Callsign	Score
1	PE0MAR/P	8,210
2	G4ALE/P	6,689
3	G4CBW/P	6,269
6	G3OHM/P	3,190
7	G4BRK/P	2,909
10	G4DDK/P	2,715
17	G8VOI/P	1,748

Total 32 entries

3·4GHz Single Operator Section

Posn	Callsign	Score
1	PA0EZ	1,966
2	PA2HJS	863
14	G6DER	146
18	G4PMK	27

Total 18 entries

5·7GHz Single Operator Section

Posn	Callsign	Score
1	DJ5AP/P	583
2	DL3NQ	488

Total 5 entries

3·4HGz Multi Operator Section

Posn	Callsign	Score
1	PE0MAR/P	1,345
2	PA0GUS/P	968
3	G4JAR/P	934
5	G4CBW/P	763

Total 10 entries

5·7GHz Multi Operator Section

Posn	Callsign	Score
1	DJ7FJ/P	390
2	DL0DR	338
6	G4EZP/P	7

Total 7 entries

10GHz Single Operator Section

Posn	Callsign	Score
1	DL1RQ/P	2,699
2	I4BER/4	2,514
3	I6ZAU/6	2,329

Total 49 entries

10GHz Multi Operator Section

Posn	Callsign	Score
1	DJ7FJ/P	2,772
2	IW4ASY/4	1,719
8	G4EZP/P	449

Total 18 entries

24HGz Single Operator Section

Posn	Callsign	Score
1	**HB9BAT/P**	**140**
2	**HB9BAP/P**	**124**

Total 5 entries

24HGz Multi Operator Section

Posn	Callsign	Score
1	DJ7FJ/P	75
2	PA0PLY	29
4	G4EZP/P	7

Total 5 entries

48GHz Single Operator Section

Posn	Callsign	Score
1	HB9MIN/P	15

Total 1 entry

48GHz Multi Operator Section

Posn	Callsign	Score
1	HB9MKS/P	15

Total 1 entry

Overall UHF Single Operator Section

Posn	Callsign	Score
1	PA0EZ	267,138
2	PE1ALA	178,861
3	DK1VC	155,915
48	G6DER	45,599
108	G4PMK	25,329
120	G6IAT	21,939
124	G1KDF	21,270
144	G1LSB	18,172
150	G8ZQB	17,098
197	G6CSY/P	11,360
231	G6YLW	8,886
247	G1GEY	7,759
260	G4FOH	6,749
303	G8JXV	3,401

Total 373 entries

Overall UHF Multi Operator Section

Posn	Callsign	Score
1	PE0MAR/P	372,627
2	PA0GUS/P	316,743
3	Parallel Lines CG	286,121
4	HADRABS/TARTS	265,719
5	Sheppey Western CG	213,917
10	Martlesham/Bracknell	174,687
28	Exmoor RC	97,182
29	South Birmingham RS	93,374
37	South Manchester RC	77,316
40	Fareham & DARC	69,454

Total 195 entries

70MHz FIXED CONTEST – APRIL 1988

The entry to this contest was at about the same level as in previous years, but several 70MHz regulars were noted by participants as being absent.

This may have been due to holiday weekend commitments, and having two contests on such a weekend did not go down well with many participants or XYL's. Suggestions to reduce the time duration in such a case were noted.

The QSO's made by leading stations were slightly up due to G6-8 stations who were on, but did not enter.

Weather conditions did not warrant comment but bad conditions were described as flat, moderate to average, with higher noise levels reported in some areas, both man made and solar for long periods.

Lack of entries in JO-Field and activity in the south east was commented upon, the exception being G2DHV. Thanks for your support. Maybe last October's gale damage to antennas still exists.

Variations in log keeping standards relating to the recording of serialised county multipliers on a separate check list (rule 14) cost several stations points. Received cw report errors also lost points and best dx. The adjudicator would also like to point out rule three and use of latest issue of cover sheet, 427-86 obtainable from the RSGB. Modifying earlier 427 forms can cause errors, subsequent loss of points or disqualification.

Congratulations and certificates go to the following. G3UKV – winner of the single operator section G4ULS as runner-up, and G4RFR (FLIGHT REFUELLING) ARS overall multioperator winners of the other station section.

G8HHI

SINGLE OPERATOR FIXED STATION SECTION

Posn	Callsign	Pts	Mult	QSO's	Loc	Pwr	Best DX	KM
1	G3UKV	15240	40	68	82RR	100W	GM0FRT	482
2	G4ULS	9792	34	63	82TI	100W	GM0FRT	523
3	G4AFJ	7140	34	47	92HO	60W	GM4HAM	390
4	G3VIP	7020	30	37	93XN	100W	GM0FRT	411
5	G4BVY	6603	31	43	82TD	80W	GM4HAM	425
6	GM4HAM	5054	19	21	85JW	80W	G4RFR	580
7	G6DER	4238	26	29	93GN	10W	GM4HAM	391
8	GW4HBK	4224	24	31	81KP	40W	G3VIP	298
9	G0EHV	4055	22	24	94FW	40W	G4RFR	464
10	G3NKS	3825	25	34	81XU	120W	G0EHV	344
11	GM0FRT	3536	16	15	87WB	80W	G4RFR	699
12	G4AHN	3234	22	31	91OE	30W	G4KUX	386
13	G4FOH	2180	20	21	92XI	40W	G4KUX	280
14	G8PNN	1326	14	23	95EF	60W	G4RFR	495
15	GW4ALG	1168	16	15	81PP	30W	G3JOC	293
16	G3BPM	700	10	12	80OW	40W	G3EKP	311
17	G2DHV	174	6	7	01BK	25W	G3UKV	220

G4ZFQ disqualified (no cover sheet).
Checklog from G1UNN acknowledged with thanks.

ALL OTHER FIXED STATIONS SECTION

Posn	Callsign	Pts	Mult	QSO's	Loc	Pwr 22dBW	Best DX	KM
1	G4RFR	27270	45	78	90AS	158W	GM0FRT	699
2	G6APZ	18834	43	83	93DC	158W	GM4HAM	329
3	G4KUX	17442	36	51	94BO	60W	G6XM	454
4	G4MGR	15498	41	53	83KH	130W	GM0FRT	421
5	G4SIV	13680	38	70	92TR	140W	G3RPD	330
6	G4LNV	10584	36	52	91MK	150W	GM0FRT	523
7	G7APD	8610	35	59	92JI	50W	GM4HAM	419

South Manchester Quad Night DF Results

This year's event attracted a record number of entries with 17 teams assembling at the start, on a very wet and soggy night.

Signals were received from three of the transmitters, an approximate bearing being given on the fourth. The majority of teams headed towards the "A" and "B" transmitters as their first choices.

Station A – G3FVA/P was located in a small wood approximately 5 miles South West of the start. The operators were hidden in a ditch underneath a layer of logs and brambles. The site was very "popular", with all but one team finding the transmitter. Some spent a considerable time on site due to the misleading radiation pattern of the aerial.

Station B – G0CAR/P was only 2 miles west of the start in a small wood which was not obvious when studying the map! A circular aerial had competitors tramping in rings around the transmitter. An assortment of holes, brambles etc added to their "enjoyment".

Station C – G3UHF/P some 13 miles distant to the east had been sited in an area of scrub, with odd bushes and lots of mud. The operators had been able to run an aerial under power lines to the top of a very muddy hill. By the condition of some teams at supper, they had slid down the hill back to their cars!

Station D – G3ZDM/P situated some ten miles N.E. of the start, was placed near the river Tame. This made competitors unsure of which side to search and some, of course, chose the wrong side and had a considerable detour to make! After an early mishap with the transmitter, the operators were able to continue with the stand-by rig (this also involved them in carrying a 60AH battery from their car!). Again the area was populated with odd trees and bushes, the transmitter being located in an extremely wet area with access via a plank!

The South Manchester club would like to thank all who took part, especially the operators and caterers! We look forward to 1989.

			Time of Arrival			
Posn	Name	Club	Stn A	Stn B	Stn C	Stn D
1	B Bristow	Mid-Thames	2203	2240	2042	2317
2	A Simmons	Mid-Thames	2033	2123	2326	2215
3	G Whenham	Coventry	2043	2148	2301	
4	A Malbon	Mid-Thames	2101	2145	2323	
5	C McKenzie	S Manchester	2053	2156	2325	
6	C Metcalfe	Mid-Thames	2052	2159	2341	
7	A Collett	Dartford Heath	2215	2158		2350
8	C Wells	S Manchester	2120	2259	2358	
9	D Yorke	S Manchester	2340	2359	2145	
10	J Drakeley	Slade	2228	2147		
11	T Gage	Mid-Thames			2058	2257
12	T Hopkins	S Manchester	21.03	2312		
13	D Newman	Northampton	2313		2357	
14	I Morrison	S Manchester	2117	2319		
15	M Ellis	S Manchester	2102	2320		
16	T Hewitt	S Manchester	2107			2336
17	D Bolton	S Manchester	2311	2359		

LOW POWER CONTEST RESULTS

The number of entries was down this year due in the main to the Rule 8 change. This alteration was designed to encourage the true QRPer and in this respect I think it was successful. Conditions on 3·5MHz ranged from good to 'sheer misery' for G3KZR. 7MHz however was very lively with many strong continentals being worked. Ironically this year saw four overseas entrants, when Rule 3 stated that the contest was only open to RSGB members in the British Isles. The HFCC has agreed to accept their logs as check logs, however, I have included their claimed scores for comparison.

Equipment used by entrants, Section (a) G3JKS-TS120v to dipoles at 40ft. G4OGB-TS830m (2SC 1969 P.A.) to 264ft Zepp at 48ft. Section (b). This section saw the use of some amazing home-brew equipment including G30EP's 6 transistor transceiver which cost less than £10 to construct. G3PDL used a home-brew transceiver/keyer comprising 44ics and 84 transistors with a pair of 2N3553s in the output stage giving 3W to a trap dipole at 85ft and a 200ft centre-fed long wire at 40ft. G3UFY's equipment was entirely home-brew. Rx: solid state single conversion for 3·5 and 7MHz cw sub-bands only, FET front end/mixer, bi-polar IF strip with 2X half-lattice Xtal filters. RX PSU: 13·8V regulated at 3A. TX: EF91 vfo,. EF91 cathode follower, EF184 buffer/doubler, TT11PA. TX PSU: 8 valve laboratory type. Power meter: broadband directional wattmeter – G3SJX design. To complete the set up, Steve's ATU, stereocoder, Bug and CQ sender were also home-made. Antennas used – 180ft Marconi (80 & 40) and sloping dipole for 40m.

The standard of log keeping was good although one station did manage to work two duplicates in 40 contacts. The most common error was the interpretation of the power run by GW3YDX which ranged from 10 watts to 100 watts when in fact it was 100 milliwatts!

Congratulations to Peter G3PDL who will receive the 1930 Committee Cup.

G4JKS

			Section A Total	3·5MHz		7MHz	
Posn	Call	Power	Pts	QSOs	Pts	QSOs	Pts
1	G3JKS*	9	907	11	165	51	742
2	G4OGB*	5	793	36	527	19	266
			Section B Total	**3·5MHz**		**7MHz**	
Posn	**Call**	**Power**	**Pts**	**QSOs**	**Pts**	**QSOs**	**Pts**
1	G3PDL*	3	1440	56	827	43	613
2	G3UFY*	3	1287	46	660	44	627
3	G4ARI*	3	1014	34	490	40	524
4	G2HLU	3	909	33	495	28	414
5	G3VYI	3	882	26	370	37	512
6	G3VTT	3	849	34	484	27	365
7	G4KLQ	2	775	27	395	26	380
8	G3VIP	3	766	24	345	31	421
9	G4SXE	3	755	29	419	25	336
10	G4ETJ	3	718	32	477	38	241
11	G4CFS	3	585	42	585	—	—
12	G3JKY	3	567	22	290	20	277
13	G4JJN	3	461	20	281	12	180
14	G0BBL	3	402	29	402	—	—
15	G3KZR	1	372	2	30	24	342
16	G3CWL	3	322	25	322	—	—
17	G4ZME	3	321	15	219	7	102
18	GW3SB	2	267	12	180	6	87
19	G30EP	1	60	—	—	4	60
20	G4PVB	3	50	4	30	2	20

Check logs received with thanks from G3LDT adn G4UOL.
Overseas check logs ON4CW 935, ON4XG 515, DF2UZ 380, DL6SF 240.
*Certificate winners.

OXFORD DF QUALIFYING EVENT – RESULTS

No fewer than 25 teams turned up for the first RSGB DF Qualifying Event of 1988, run as usual on the Oxford map. As so frequently seems to happen on this event, the day was bright and sunny, which made concealment in the sparse cover even more difficult. The organiser, G3JLE, was at the start on the west end of Shot over Plain to welcome the competitors. Adequate if not overwhelming signals were heard from both transmitters.

Station A, G3UJO/P, had opted, as usual, for an aquatic location, on the south bank of the stripling Thames above Rushey Lock and very close to the western edge of the map some 25kM from the start. In the absence of better cover the operator had tunnelled into a clump of dead (but still vicious) bramble, with just

38ft of antenna wire woven into an adjacent shrub. The earth connection however, was excellent – always important on 1·8MHz, and one of the reasons why G3UJO/P is so often found near water.

Station B, G4MDF/P, was 17km north of the start, in woodland beside an old Roman trackway. His antenna consisted of over 1,000 feet of fine enamelled copper wire, contorted into a curious shape which produced confusing directional effects at close quarters. It is always good sport to switch on the transmitter when a competitor is nearby and watch him run *away* from the station!

Of the 25 competitors taking part only three failed to find both transmitters. The tea, recriminations and tall tales happened at 'The Rock of Gibraltar' where we were all pleased to welcome G6AGE, Eric, who also managed to be at the start on Shotover Hill.

It is to be noted that the time between the 2nd, 3rd and 4th competitors was measured in seconds and this order was agreed by them in spite of the frenzied activity at the time! An enjoyable, if masochistic, afternoon was appreciated by all who took part and perhaps augurs well for this season.

Pos	Name	Club	Time of arrival Stn A	Stn B
1	C Wells	S. Manchester	1557	1427
2	P Larbalestier	Colchester	1603	1437
3	M Hawkins	Chelmsford	1603	1442
4	C Metcalfe	Mid-Thames	1603	1446
5	P Lisle	Mid-Thames	1603	1438
6	G Whenham	Coventry	1446	1604
7	A Collett	Dartford Heath	1454	1605
8	A Williams	Chelmsford	1448	1606
9	D Holland	S. Manchester	1455	1607
10	D Brocks	Chelmsford	1447	1608
11	T Gage	Mid-Thames	1507	1610
12	C Plummer	Mid-Thames	1503	1611
13	B Bristow	Mid-Thames	1508	1626
14	A Simmons	Mid-Thames	1512	1627
15	I Butson	Colchester	1514	1627
16	M Standen	Mid-Thames	1442	–
17	G Foster	Stratford	1505	–
18	B Poole	Mid-Thames	1508	–
19	K Chan	S. Manchester	–	1510
20	A Judd	Mid-Thames	1512	–
21	D Newman	Northampton	1515	–
22	A Mead	RSGB	1529	–
23	A Malbon	RSGB	–	1547
24	R Kelly	RSGB	1557	–
25	G Nichols	Banbury	1557	–

C Wells and P Larbalestier qualify for the National Final in September

MARCONI MEMORIAL 144MHz CW CONTEST RESULTS 1987

The following results have been extracted from tables recently supplied by the Italian society, ARI.

Multi-Operator Section

Pos	Callsign	Points	QSOs	Locator
1	DK8ZB/P	237,306	520	JO40XL
2	OK1JKT/P	176,976	418	JO60OK
3	F6HPP	173,618	422	JN19PG
7	G3XBY	124,817	259	IO92DG
18	GM0FRT	87,234	119	IO87WB
34	G4WAD/A	73,636	176	IO82XC
60	GW4MGR/P	49,723	126	IO83JA
75	G4AGQ	42,916	106	IO91OF
81	G4BLX	38,621	118	IO90WV
87	G4UZN	37,348	77	IO93FU
88	G4OUT	37,072	101	IO92AT
102	G3ISL	32,839	39	IO94SH
105	G4ZVS	30,614	99	IO92BK
127	G4CWH/P	24,864	81	JO02AA
145	G4XEN	22,579	85	IO92PH
150	G0CLP/P	21,736	66	IO84KD
167	G4HVC	19,020	69	IO93QA
168	G3SCZ	18,776	70	IO91KI
172	G4ARI	18,570	76	IO92IQ
178	G4OBK	17,623	30	IO83RQ
181	G4SND	17,273	58	IO82UI
184	G3EDD/A	16,902	27	IO70MN
188	G3JJZ	16,594	70	JO01AJ
194	G3BOC	15,.368	35	IO82LT
206	G3VIP	14,180	37	IO93XN
223	G4XPE	11,930	49	IO92GU
236	G3WRJ	10,616	43	IO91UX
245	G0HEE	9,953	34	IO93GI
262	G0HGA	8,396	41	IO91VV
264	G2DHV	8,307	30	JO01BK
288	G0ATR	6,712	35	IO92KP
327	G4BZP/P	683	5	IO84KF

336 entries

Multi-Operator Section

Posn	Callsign	Points	QSOs	Locator
1	OK1KEI	276,449	551	JO70UR
2	OK1KTL/P	238,996	535	JO60LJ
3	DL/I4BXN	208,316	495	JN59OP
14	G4NUT	133,687	290	IO91OW
69	G4RGK/P	65,279	182	IO91OO
124	G5RS/P	27,183	94	IO91PC
135	G4RFR	19,297	67	IO90AS
143	G0HAS	16,187	56	IO91BN
147	G0CWC	12,002	59	IO92AL

159 Entries

144MHz CW AND MARCONI MEMORIAL CONTEST RULES

There will be two subsections in this contest:
Sub-section 1: 1400-1400gmt 5/6 November 1988
Sub-section 2: 0800-1400gmt 6 November 1988

The general rules published in "Contest News", *Rad Com* January 1988, will apply. There will be two sections, section S for single Operator Stations, and Section M for multi-operator stations. Scoring will be at 1pt/km to allow logs to be forwarded for the Marconi Memorial contest. All entries and check logs to: VHF Contests Committee, c/o G M C Stone, G3FZL, 11 Liphook Crescent, Forest Hill, London SE23 3BN.

144MHz FIXED, AFFILIATED SOCIETIES, AND SWL CONTEST RULES

The rules for this year AFS inter-club competition are similar to last year. The contest will continue to be open to individual entries, both single and multi-operator, as before, and in addition a new swl section has been added. Affiliated Societies are encouraged to enter as many stations and teams as they can. Individual station scores and overall team results will be separately tabulated, and certificates will be awarded to the leading stations and team in each RSGB Zone.

1 Date: 4 December 1988
2 Time: 0900-1700gmt
3 Teams. A society entering one team will have its placing determined by the aggregate scores of the five highest scoring stations in its team. A society may enter more than one team, in which case the aggregate scores of the five highest scoring stations will be placed in team "A", the next five highest scoring stations in team "B", etc.
4 Eligible entrants. Operators entering on behalf of an affiliated society must be a member of that society, but need not be a member of the RSGB. Other individual entrants must be RSGB members. All stations representing a society must be operated within 50km of the normal society meeting place. No station may represent more than one society. In the case of a society with national coverage eg, RNARS each team may define a different meeting place, but this should be a place of recognised significance, eg a naval base. For all purposes other than the indication of affiliation, each such entry shall be regarded as entirely separate. No operator shall use more than one callsign during the contest period.
5 Sections. There will be separate single and multi-operator sections for tabulating station scores. There will also be a listener section. A team may consist of both single and multi-operator stations.
6 Entries. Each individual entry shall conform to the general rules. Each log must be accompanied by a 427-86 cover sheet, and must show the RSGB Zone that the station operated from RSGB zones are defined on page 899 of the December 1987 issue of *Rad Com*. All entries from one society are to be sent in one package to the adjudicator. Packages underpaid and bearing postage due stamps will be returned to the sender. All entries must be postmarked no later than **31 December 1988**. Each package must include a declaration signed by an officer of the society that each entrant is a member of that society, and the normal meeting place address must be given. A note stating the number of teams representing the society, and their scores, should also be included.
7 Awards. Certificates will be awarded to the following:
The leading single operator station in each RSGB zone.
The leading multi-operator station in each RSGB zone.
The leading affiliated society team in each RSGB zone.
The leading listener station.
8 General Rules. The following general rules, published in *"Contest News", Rad Com* January 1988, will apply: 1, 3, 5, 6, 8, 9, 12, 13, 15-23.
9 Adjudicator. All entries and check logs to: VHF Contests Committee, c/o J H Quarmby G3XDY, 12 Chestnut Close, Rushmere St Andrew, Ipswich IP5 7ED.
NB Although the contest includes an inter club element, entries from individual single or multi-operator stations are encouraged.

DF QUALIFYING EVENT – DARTFORD HEATH

Date: 14 August 1988.
Map: O.S. Sheet 177 1:50,000 series, East London.
Assembly: 1300 BST for start at 1320 BST.
Location: The Cricket Ground, Dartford Heath, just south of the A2, ngr 526725.
Competitors requiring tea should notify Mr C Merry, 19 Faesten Way, Bexley, Kent, DA5 2JB. Tel. 0322-523729 not later than 6 August.

DF QUALIFYING EVENT –GRIMSBY

Date: 4 September 1988.
Map: O.S. Sheet 113 1:50000 series, Grimsby.
Assembly: 1300 bst for start at 1320 bst.
Location: Ciba Geigy Sports Field, Pyewipe, Grimsby, ngr 247113.
Competitors requiring tea should notify Mr J Reynolds, 6 Fairfield Court, Cleethorpes, DN35 0QW. Tel. 0472 814662 not later than 28 August.

1·3/2·3GHz CUMULATIVE CONTEST RULES

1930-2200gmt 14 October 1988
2030-2300gmt 30 October, 15 November, 1, 17 December 1988

The general rules published in the "Contest News", *Rad Com* January 1988 will apply. There will be two sections, section F for Single Operator Fixed stations, and section O for all other stations. An overall table (Rule 10) will be published. As last year, the adjudicator will normalise the scores in each session to that of the leading station in that session, and each entrant's three best scores will then be combined to determine the overall placing. This will mean that scores in a session with exceptionally good conditions will not outweigh scores in other sessions held under normal conditions. Entrants should therefore send logs for every session for which they are active.

All entries and check logs to: VHF Contests Committee, c/o J Pilags, G8HHI, 43 Bartons Drive, Yateley, Camberley, Surrey, GU17 7DW.

50MHz TROPHY CONTEST

1000-1700gmt 23 October 1988

The general rules published in the "Contest News", *Rad Com* January 1988 will apply. There will be two sections, section F for Single Operator Fixed Stations, and section O for other stations. County and Country multipliers will be used in accordance with general rule 14. Radial ring scoring will be used for all contacts up to 650km, and all contacts over this distance will score 25 points each.

The station with the highest overall score will receive the Telford Trophy.

All entries and chek logs to: VHF Contests Committee, c/o D J C Bushell, G4WAD, Tanglewood, Bridge Street, Lower Moor, Pershore, Worcs.

432MHZ CUMULATIVE CONTEST RULES

1930-2200gmt 6, 22 October 1988
2030-2300gmt 7, 23 November, 9 December 1988

The general rules published in the "Contest News", *Rad Com* January 1988 will apply. There will be two sections, section F for Single Operator Fixed stations, and section O for all other stations. As last year, the adjudicator will normalise the scores in each session to that of the leading station in that session, and each entrant's three best scores will then be combined to determine the overall placing. This will mean that scores in a session with exceptionally good conditions will not outweigh scores in other sessions held under normal conditions. Entrants should therefore send logs for every session for which they are active.

All entries and check logs to: VHF Contests Committee, c/o T Melvin GM8MJV, 2 Dudley Avenue South, Edinburgh, EH6 4PJ.

Members' Ads

The Conditions of Acceptance are published below the Member's Ad form circulated with every issue of *Radio Communication*.

The current rate is £2.30 for 40 words or less: advertisements containing more than 40 words will cost an additional £2.30 for every additional 40 or less words. Each advertisement must be accompanied by the correct remittance, either as a cheque or postal order made payable to Radio Society of Great Britain.

FOR SALE . . . .

SINCLAIR QL COMPUTER 128k, steel cased, 18" Hitachi colour monitor. QTerm terminal emulator and bundled software. Centronics interface, box of microdrive cartridges, £160. Chris. Tel: (Stansted) 0279-813023.

ICOM 1050 cb CONVERTED 10m fm £35. 17-ele yagi 70cms "N" connector, boom splits in half £15. Codar PR30 RF preselector, perfect £12, 2m mobile antenna 7/8 lambda £10. G4SAI, QTHR. Tel; 0707-330419.

SAVE OVER £250 off present list price. Trio R2000 rx with integral vhf converter. 100KHz-30MHz, 119-180MHz. Perfect condx. All modes 10 memories scanning and two clocks with timer, £500. G3ADZ QTHR. Tel; 0788-815222.

Yaesu Ft480R 2m 10W multimode txvr including 5/8 wave colinear ground plane and JaybeaM LW82m BEAM £280. G4ZKE QTHR 01-644 1461.

WPO SPEECH PROCESSOR with Electret mic insert and mike socket, £14. PW Severn 40m HB QRP tcvr £25. Howes sidetone/practice oscillator £6. Portasol Oryx gas soldering iron, £8. Tandy straight key £2.50. Postage extra. 021-777-6086. G4GIG, QTHR.

TR2500 HANDHELD, spk/mic, 240v charger, mobile mount/psu/charger, case, flexiwhip, £135. Top band conversion kit for FT77 (unused) £15. MuTek 2m preamp SLNA144S £15. 13.8v 20a psu, fully metered and protected. £40. G4UVO, QTHR. 0462-674437.

YAESU FT102 AM/FM BOARD immaculate £525. Kenpro 600RC rotor hardly used, £100. SEM atu with easy tune £40. Accumast 42' lattice mast £100. SWR meter £5. 2m vertical £10. G0CTC, Formby (Liverpool) 76669. QTHR.

TS120V + DRAE 4a psu £290. MMT1296 £195. G6KOA, QTHR. Birmingham 021-458-1941.

CUSHCRAFT AV3 20-15-10M vertical some UR67 £30. SEM z-match 160-10m, £25. KW Atlanta with psu, external vfo, vox unit, working last time I tried it, £30. Oil filled Dentron 1kw continuous dummy load, £10. G4LZG, QTHR. Rainham, Kent (0634) 360440.

HF LINEAR homebrew G2DAF using 2x813 valves plus spare 6U4GT valves, in cabinet, £80 ono. G0GKL, QTHR. Tel: Hastings (0424) 444376 (evenings).

YAESU FT726R 2m, 70cm, hf modules plus satellite board and SP102 speaker. Mint condx all boxes and manuals, £825. MML144/100S 2m 100w linear £85. G0HHM, QTHR. Tel: (05436) 76741.

YAESU FT290R, muTek front end, nicads, soft case and speaker mic. Boxed and in good condx £240. G6JRI, QTHR. York (0904) 416589.

CLEARING OUT. 23cm and 13cm amplifiers for 2C39. £40 each. Tel: 0262-674337. G3ZTR, QTHR.

DX QTH. Japan on 100w and quarter wave vertical, two acres. Detached bungalow, three bedrooms 1979. D/G solid c/h outbuilding OPP for 4-bed bungalow. FPP ten caravan site residential. Stairwaddie Croft, Stromness. Details 0856-2216. GM0HPY. Contents? make an offer.

TRIO TR9130 multimode 2m mint condx boxed with 5/8 mag mount whip £355. G1CJP, QTHR. Tel: 0457-63969.

DEC PDP8/F WITH PAPER TAPE reader/punch. Core memory many programs, spare boards, teletype KSR33 all in 19" rack. Plus PDP11/05 chassis with some boards good psu. Buyer collects. Its bulky. £150 the lot. Tel: 0380-828100 (after 1800hrs or QTHR, G4RQL.

RTTY TERMINAL (PNP Communications) MF2DX tx/rx 170, 425, 850MHz shift, bar-tune indicator, mains operated, instructions, £49. G3BMK C64 tx/rx SOFTWARE RTTY, £7. CW £5. Instructions G3HKH, QTHR. Tel: 0932-47112.

WAVE METER 1191A with charts and xtal. £15. Buyer collects. G3USZ, QTHR. Tel; Upminster 23699.

FT290R Mk1, muTek f/e nicads, charger, mobile mount, £250. MM 144/200S 200w SS linear, £275. Howes HC280 2m-80m tsvtr £40. G3MEW, QTHR. Tel: (Portsmouth) 0705-820315.

IC551 IN NEW CONDX with orig pkg IS again for sale due to time wasters for £495. No offers or further time wasters please!! Tel; 0905-620041 (evenings or weekends).

TEN-TEC CORSAIR 2 9-band tcvr 1.8KHz 500Hz filters mic, HD psu, manuals, boxes, new Feb 88. Cost £1400, sensible offers only. 20 QSO absolutely mint condx. Going QRT new Yaesu FP757GX switching psu unused £50. FC102 atu, faulty metering, offers, GW4RLP, not QTHR. 0286-5264.

ICOM MICRO-2E, full t/rx 139-174MHz, soft case, BP23, charger, boxed, as new, £150. WANTED: Sony ICF2001. Lockwood, G3XLL, QTHR. Tel; Mellis 596.

MOTOROLA CD100 vhf repeater, high band fm £100. Uhf base, £100. Jaybeam 2m 8xy brand new, boxed £28. G4AJE. Tel: 0354-740441 (Cambs).

TRIO TR751E £375. RS LCD frequency meter 10-200MHz c/w 600MHz prescaler £85. LSG17 sig/gen £40. AG-202A audio generator £35. Kenwood mc/60 table/mic £30. AR202 scanner, £375. All in vgc with boxes. Tel: Ron (G6DYD) 01-463-9300.

TRIO 9130 2M multimode as new. Boxed with handbook and mobile bracket, hardly used. £350. G6VEX. Tel: 021-378-2927.

R71E ICOM. Fitted fm, 10 months' old, mint condx all documents, diagrams, handbook, invoice, dust cover, orig pkg. £600. GW8IQC, QTHR Newport, Gwent. Tel: 0633-894708.

KENWOOD R820 hf receiver, ssb 2.4KHz, vbt P'selector attn, 10,20,30,40db IF shift, RIT MONI Var NB cal triple conv notch. AM filter 12v 1.5a or mains immac, no mods. Digital, 2 manuals. Any test. Superb performance. 160-10 incl 4 sw bands. G3RHM, QTHR. Tel: 01-423-2329, £295.

TRIO 9000 2M MULTIMODE used base station only, £250. Yaesu FT208R 70cms handheld. YM24A speaker/mic, NC9C battery charger, PA3 car adaptor, chgr leather case, 2 aerials, not used mobile, £155. Howes speech processor £5. G4GPX, QTHR. Tel: Lancing 753893.

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FT290 INC NICADS and charger £250.Boxed Heatherlite head set as new £17, spk/mic £15, rubber duck £3. IC202 £110. G4PYB, QTHR.

2M LINEAR AMPLIFIER Mirage model B1016, 10w input gives 160w output. Built in low noise preamp as standard. Immac condx, very little use, with full instructions, box, packing, etc., as new. £155ono. Matt, G4YGF, QTHR. Tel; (Washington) 091-4173483 (after 8pm).

WIRELESS WORLD 1960-82 complete, 1956, 59, 63/4 parts £15. HS-MX1 flexible mic unused, £10. 300ohm tubular feeder, 75ohm distribution cable, transformers, valves, SAE with your needs. Tel: 0256-58921. G3CBU, QTHR.

TWIN CO-AXIAL cable 2.75ohms, similar RG-59 interesting applications, particularly for TV1 problems £1 per metre postpaid. G3FNJ, QTHR.

YEASU FT480R 2m multimode tcvr c/w instruction manual. Ex order, £285. G3RDG, QTHR. Tel: 01-455-8831.

ICOM IC-02AT handheld/mobile tcvr, operatable frequency 140MHz-149.995MHz without specifications guaranteed, inc manual, 2m antenna, guttermount and Heatherlite mic, £195ono. Buyer inspects/collects desirable if poss. Tel: 0924-361357. (G4ROS).

VERSATOWER SYSTEM STANDARD ground post 'P' series 2-stage with strong arm electric winch. Also Kenpro horizontal rotor model KR600RC , £450. Will sell separately. Tel: (Bridport) 0308-24120. (evenings/weekends).

ICOM 271E MUTEK front end. HM12 & SM6 base mic, boxed, mint condx, £620ono. PS15 power supply, mint condx £100ono. Trio R1000 Gen/cov rcvr. SP100 speaker ex condx, boxed £220ono. G0FKS. Tel: (Southend) 0702-343452 (evenings).

FP707 PSU 20a good condx. Choice of two, one boxed £110, the other unboxed in good condx £60. Tel: Mike, RS90834, evenings only, Combe Martin 2876 (buyer collects).

YAESU FT690 Mk2 plus FL6020 linear. Three months' use, £300 no offers. G1INK, Steve. Tel: (Malvern) 0886-32343.

100w MICROWAVE modules, linear, amp/preamp. As new give away price at £90only. Tel: Chris, Deeside, Clywd 822798.

KENWOOD TS430S with mic £475 vibroplex paddle key £50, MC85 deluxe desk mic, vgc £75. G0JCM. Tel Shorne 3797.

DAIWA MULTITORQUE rotator. c/w CR4 controller, pole mounting adaptor and 30m of cable. £185. Trio TR2600 2m portable. c/w boom mic headset, carrying case and two nicad packs. £175. GW3YKZ, QTHR. Tel: 0633-858314.

YAESU FL2100Z amp, manual and box, £525. AT230 atu £130. Hansen FS500H 2kW PEP meter, £50. C-scope TR950D metal detector, unused, £30. Eric G0CGL, QTHR, or Kevin, 0202-24848.

ICOM IC02E little use, as new, unmarked, in orig box with instruction book, charger, case, £195. Trio base station 711E, also as new and unmarked little use, mint, manual, box etc. Torquay 844471.

FIVE-ELEMENT crossed yagi 2m £8.50. Cushcraft five-band vertical £50. Jaybeam ground plane £3. 100w linear amp 2m solid state 12v DC £50. 25m heavy duty coax, £6.50. All ono. G4WLI, QTHR. Tel: 051-327-4280.

EDDYSTONE 640 hf rx 1.8-30MHz, Eddystone S meter and mounting blocks £40. Pye PF1 pocketphones tx/rx xtaled RB6 with manual £15. G3OGP, QTHR. Tel: 040-372-2275.

KENWOOD TM401A 70cm mobile tcvr, c/w mobile mount & mic, also 3x5/8 colinear b/stn, aerial £260. GW3WSU, QTHR. Tel: 04468-261.

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FT101E, Hansen FS500H, atu, dummy load, Shure 444, two new 6JS6C. All for £350. Thandar frequency meter PFM200A £50. G4IVW, QTHR. Tel: (Newmarket) 0638-669743.

HEATHERLITE 2m Explorer vhf linear amp. 4CX350A valve. 500w PEP ssb, 357w PEP cw, and fm. Preamp fitted. Serviced by Heatherlite Products, £450. G6JFJ, QTHR. Tel: (Hull) 0482-853276.

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ICOM IC490E 70cm multimode, Yaesu FT290R Mkl with case and nicads, Yaesu FT709R 70cm handheld with case. Offers are invited for the above equipment which is in mint condx. with boxes and instructions. Tel: Tony, G6HPQ (Southend) 0702-351936.

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FT200, some new valves, mic faulty, £170. AQ620 minibeam, dx regularly worked (Hong Kong, Africa, VK/ZL), £85.Tornado 5/8 wave cb/10m groundplane, £25. Both vgc. G4FHR, QTHR. Tel: 025125-3282.

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STILL REQUIRED; ARRL handbook 1929 or earlier - a good price paid. Also needed; metal valve type 6A8, must be new with labels complete. Have Eddystone six-pin coils, exchange for four-pin equiv. G4IMT, BH Litherland, QTHR. Tel; 0225-891254.

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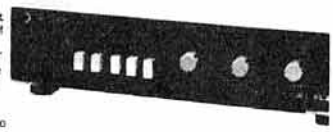

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ORDER FROM: RSGB Publications (Sales), Lambda House, Cranborne Road, Potters Bar, Herts EN6 3JE

The new edition of Amateur Radio Awards to be published mid-September, gives details of major radio amateur awards throughout the world. Each award is listed in an easy to understand format giving all the information on how to achieve the award. An innovation for this edition is the provision of checklists so that the amateur can keep a record of progress. This book is essential reading for the avid award hunter and the dx chaser alike.

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QSL CARD ON 14MHZ

Sir – the April 88 issue of *Rad Com* shows the fax of a QSL card "showing the high quality that can be achieved on a very crowded band (141MHz)". Apparently the card took seven minutes to transmit.

No wonder 14MHz is so crowded if people are sending QSL cards in this way!

I Buffham, G3TMA

THANK YOU

Sir – Thanks as ever for *Rad Com* and, indeed, "Helplines" in my search for the book "Instruments of Darkness". Well, the response was overwhelming and very successful.

Bless you ALL, now I can read and reflect at leisure.

R Williams, RS6072

PS I cannot possibly reply to each and everyone.

STUDENT LICENCE AND ALL THAT

Sir – Reading with dismay the "Students Licence" editorial in the April *Rad Com* I was forced to conclude that the RSGB is really only interested in quantities of Radio Amateurs rather than in quality, regardless of the completely unconvincing expressions to the contrary. Come on Council, what are you playing at?

David Evans' piece raises more questions than it answers, viz –

1 "It is not intended that students would use the popular HF and VHF bands that are already overcrowded". So where exactly do they go after the student phase is complete?

2 "Encouraging more newcomers ... is considered essential" Why? The bands are, as has been said, overcrowded. Some uncharitable people have even been heard to say that the real concern has more to do with safeguarding the revenue base of the society rather than with other considerations.

3 If there is concern that the RAE is not closely enough related to "on the air" practice why is it not possible to speak nicely to the City and Guilds Institute and have appropriate additions to the syllabus included?

Arguments, as advanced, about preserving the "status quo" of amateur radio simply do not hold water. If status quo was desirable there would be no WARC bands, satellites or packet radio. Make up your mind. Do you want status quo or not? If you want it then stay with the present licensing. The truth I expect is that the RSGB doesn't really know where to go on this issue. There seems to be a need to introduce this change in order to "progress", whatever that means. Please don't cancel out the credit gained from the sterling work on 50MHz licensing by progressing this student licence business.

If there is a desire to give a new impetus to amateur radio in this country what about a proper kilowatt licence on an "incentive licensing" basis as in the USA, where access to parts of the hf bands is keyed to operating and technical expertise? If the RSGB wishes to advance the worth of amateur radio in this country, why not give people something to strive for?

There is already an easy way into personal radio communication called CB. There is already a half way house to the full licence which is the class B. If the society is bent on a course of devaluing the hobby by reducing entry qualifications, why not go the whole way like marine radio and let everybody operate equipment provided that it is "type approved". Then we can all be Cber's together.

Careful, RSGB, by advancing silly ideas like the student licence even people like myself with over 20 years membership of the society will begin to wonder if continuing support is money well spent.

R Stone GW3YDX

Sir – I am very pleased to see that progress is being made towards a student licence. I run a school radio society each week of the term and have seen the frustration on the pupils' faces after they have been attending the society for some weeks. We do let them have a go if our special event call is in use, but find that even that is not quite enough to satisfy the desire to use a mic.

I have another problem, however, that may not have been apparent before; my local college of further education will not accept pupils for the RAE evening class unless they are in their last year at school! I had quite a struggle last September to try to get a 13 year old on the RAE evening course – but failed even after an inverview with the vice-principal. There are, of course, other courses but that's not the point – the college is on the same site as our school and in the same education authority.

C S Williamson, G4IEB

PUBLIC ENEMY

Sir – I suspect that to many users of 144MHz ssb (and to some extent 432MHz), the callsign G4MVR was a familiar one a year or two ago. Please allow me to explain, through the pages of *Rad Com*, why it is unlikely to be heard again.

In October 1986, I moved house. After getting a grudging "all-clear" from my next-door neighbour, I put my aluminium mast with the 11 ele HAG on top, fixed to the back of the house. Soon after starting using 50W on 144MHz, this neighbour told me I was interfering with their son's portable b/w tv. I succeeded in largely (but not totally) curing the af breakthrough being suffered. Soon after, a man from across the street came to complain, together with someone from further down the road. He was getting sound breakthrough on a new tv, and said his video wouldn't work. I showed him how to operate his video and repaired his own soldering on the aerial lead, and the video was fine. He said the breakthrough wasn't too bad, and he would live with it. Another neighbour then came and shouted at me saying I was coming through on their brand new (rented) tv and their telephone.

Soon after this the council enforcement officer paid me a visit, saying a complaint had been made about my mast, and I would need permission to retain it. I applied – and the council received several strongly-worded letters of complaint including a 13-signature petition, alleging interference to tv, video, radio, hifi, telephone, and computer, being unsightly, dangerous and "an anti-social hobby in an area of high density housing" – amongst other things. The council were unable to decide on the matter, and (partly at my suggestion) called in the RIS. They eventually came, giving me a clean bill of health. At the next meeting, the council approved my plans. End of story? Oh no!

My neighbours "action committee" have pledged "outright warfare" if I should use the equipment again. To avoid damage to my property and even possible assault – I have closed down. The local press have had a field day, with smear stories including quotes from some neighbours, with many wrong facts, putting me in a very bad light. I am now very definitely public enemy no. 1. I would move house but can't afford to. Apart from a little low power fm this means the end of G4MVR.

There is a sad irony in this: how come a hobby which is supposed to unite people can cause such bitter division? Most of the problems have been due to emc deficiencies, many of which I have substantiated. One brand new tv picked me up on just 2W! I am told hf is often as bad as vhf. I can't see our hobby continuing in built-up areas unless something is done soon to **require** immunity to be built into domestic gadgetry of all kinds. The total lack of emc awareness at the moment is killing our hobby and making us social lepers.

Eventually, I hope I can move out of this place, with its awful stigma, and begin a new life elsewhere. One thing is certain – amateur radio will not be coming with me. It will remain here, buried on the spot where it was struck down.

V Reynolds G4MVR

The callsign G4MVR was indeed a familiar one in the 144MHz pile-ups some years ago, and it is indeed most regrettable that matters have come to such a pass. We have passed Vaughan's letter to the EMC Committee, and we can only add that the society is only too aware of the unsatisfactory EMC situation in the UK and continues to draw the matter to the DTI's attention. For a number of reasons, however, progress continues to be rather slow.

SUBS AGAIN

Sir – Re Mr P Chadwick, G3RZP, suggestion in April Rad Com that subs are again too low, he may be fortunate to have a well-paid job or pension. Not so for a lot of members; in my case it represents 40 per cent of one week's money. If it were to rise to the level hinted, I for one would have to make the obvious decision. Before comments, I neither smoke nor drink, and the newest equipment in my shack has been there for the past 25 years. If G3RZP wants a society comprised of wealthy people only I suggest he starts his own. Leave the RSGB alone and allow it to keep its efficiency to keep the sub down, so not taking it out of the range of an increasing number of people.

C D Higgins, G3NRQ

Point taken – its just that we have to smile when people who'll quite happily splash out on several thousands of pounds worth of black box, linear, antenna, etc proceed to claim that they can't afford the RSGB sub. . . .

QSL OR QSO

Sir – I wish to correct statements made in the article by G5UM on page 291 of *Rad Com* April 1988. He is no doubt correct when he says that QSLs for repeater contacts do not count for awards, but very wrong when he states that repeater contacts are not QSO. The signal "QSO?" means "can you communicate with 'x' station direct **or by relay through another station**" and the signal "QSL" is used – or a card sent – to acknowledge receipt whether direct **or** by relay.

J Wilshaw, G3MPX

PRIDE IN THE LICENCE

Sir – not long ago the RAE was a written test of three hours' duration, no break between Part one and Part two, the answers had to be in your head and these were written on a blank sheet of paper. Failure in any part meant simply you had a complete failure, and as you were not told which part you failed in, the whole RAE had to be studied again. Finally, cw had to be learned and, when both tests were passed, a licence could be obtained, but cw only could be used for the first year of operating. Later on the cw-only period was abolished.

Later Class B licences were issued, and you only had to pass the RAE for a Class B. Frequencies of 144MHz were allowed and cw could not be used at all. Multiple choice answers came on the scene, which was great for the person who knew his stuff but found it hard to put his answers in writing. Also you were informed which part was a failure which meant only this part need be studied and sat again. Later Class B holders were allowed the use of cw on 144MHz, then they were allowed the use of cw on hf under supervision.

Now there is talk of a student's licence, but I'm not sure whether any tests are required or if they just need the OK from the RSGB or some radio club. It looks like the DTI will soon have nothing to do with ham licences. Why could not some authority just abolish all exams and allow a licence to be bought at the Post Office for, say £15, assuming of course that no regulations or conditions had to be obeyed. This could simplify the whole situation. However, if this was done my licence would be absolutely worthless along with many more I have helped to obtain, not to mention every other ham in Britain.

There is an easy licence which can be bought; it's called CB and costs £1 (no exams needed). However, a class of nineteen CB people that I had the privilege to teach the RAE to must have thought that ham radio was not beyond them because eighteen now passed and one only failed part one, all at first attempts. This group had their own thriving radio club. Normal people with interest can pass the exams, I hope the authorities including the RSGB will not cheapen our licences, because we hams are proud of our achievement whether we are class A or B.

I will be very surprised if this does not express the majority view – for the sake of ham radio I hope I am right.

W Johnson, G4CNK

THERE YOU ARE AGAIN!

Sir – In your comment on the letter by John Allison, RS91114 in the April *Rad Com*, you refer to "the current NATO phonetic alphabet". It was not NATO; it was developed after the war by the International Civil Aviation Organisation (ICAO).

Several years ago, when I was RS46478 and a new swl, you ran a series of letters on this subject, and the same comment spurred me to write to you. The letter wasn't published; I think you had had enough by then!

With the great expansion of Civil Aviation after the 1939/45 war, control of air traffic was essential, and developments in radio telephone meant that radio officers were on their way out. Mistakes in spoken communications between pilots and air traffic controllers could lead to disaster.

The Able, Baker, Charlie phonetic alphabet was widely used by the Allied Air Forces, but it was

....word....►

the last ... word

essentially Anglo-Saxon in character. The civil avaiation representatives of the member states, meeting in ICAO, agreed that an international phonetic alphabet should be developed, capable of being recognised and pronounced successfully by all nationalities. Language experts, of different nationalities, were engaged, and briefed to produce such an alphabet.

In due course it emerged, and after examination it was agreed to put it into operation for an extended trial period. Subsequentially the world's airlines coordinated the reports from their pilots and submitted these to ICAO, as did the air traffic control authorities in respect of their controllers.

In general, it had stood up well to the test, though several changes were made. For example, if memory serves me well,"November" was "Nectar" in the original, but the latter had led to confusion with other letters. With the changes, it was adopted as a Standard, and has been used succesfully ever since.

So I echo John Allison's words: "Please use it, folks." The amount of effort which went into getting this International agreement makes it unlikely that it will be changed; indeed, despite the occasional problems we may have in amateur radio, due to our persistence in trying to read unreadable signals, there seems no need for a change. I confess that on the rare occasions when a station is having difficulty with my callsign I may introduce "Germany Zero America Pacific Zanzibar", but only after persevering with the "proper" alphabet.

E L Killip G0APZ

Oops – for NATO rad ICAO! Is Mr Killip right, thought, when he says ". . . there seems no need for a change", or has the Editor just got a bee in his bonnet? We still think that Oscar, Sierra and Foxtrot – to name but three – get confused. . . .

WEATHER CORROSION IN THE EMR-400 ANTENNA ROTATOR

I wonder if any fellow radio amateurs have experienced problems with the EMR-400 Antenna Rotator. I bought mine from A.R.E. Communications Ltd. at the North West Rally in August 1984 at a cost of £89. The unit was sealed and I did not open it before erecting it on my mast attached to the chimney stack at about 40 feet.

After about three years of use the rotator stuck and on taking it down for examination I discovered (to my horror) that the ballbearings, and in fact all the inside of the rotator body, was badly corroded as a result of weather getting into the housing. There were no seals on the unit and no evidence of grease.

I wrote to A.R.E. Communications Limited because I thought I might have had a faulty unit. The Managing Director replied, however, and assured me that "they do of course withstand weather conditions if erected correctly" – how can you install it incorrectly? He also said that he could "catigorically (sic!) state that we have never had a complaint of corrosion on the interior of this unit from any other user." Brief enquiries from local amateurs suggest this may not be true, and I would be very interested to hear from anyone who has experienced a similar problem with this unit.

T. Crimlisk, G0BLW

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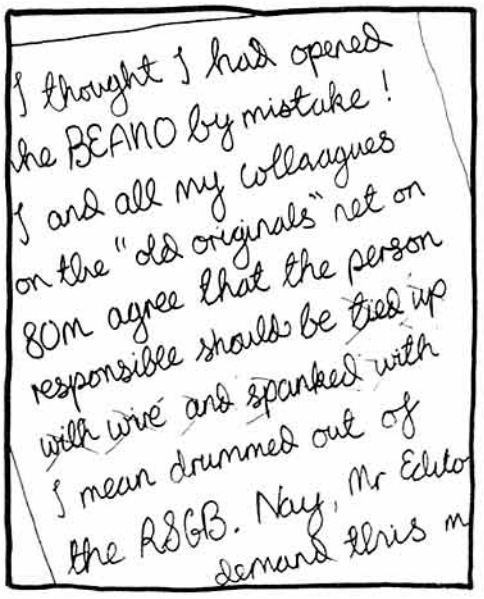

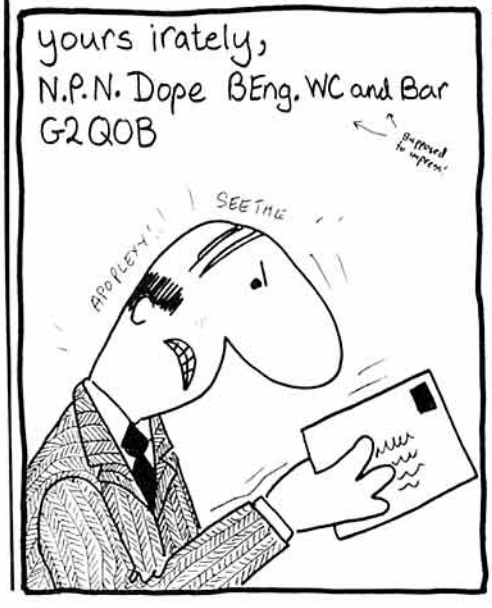

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And my FT-747GX is loaded with other features. The receiver works from 100kHz straight through 30MHz, and it's a fantastic shortwave broadcast receiver. I can use all twenty memories for that alone! Plus it's got dual VFOs. A noise blanker. Split frequency operation for the pile-ups. And scanning up the band helps me check out openings as they happen.

I just put in the optional crystal oven, and next month I'm going to pick up the FM board.

And with the money I saved when I bought my FT-747GX, I got a second ten-metre antenna for satellite work on the high end of the band. I use my personal computer to tell me what satellites are going by, and the computer even sets the frequencies on the radio for me.

Now my friends are getting FT-747GX rigs, too. I knew they'd figure out my secret weapon sooner or later. But now I'm setting the pace!

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