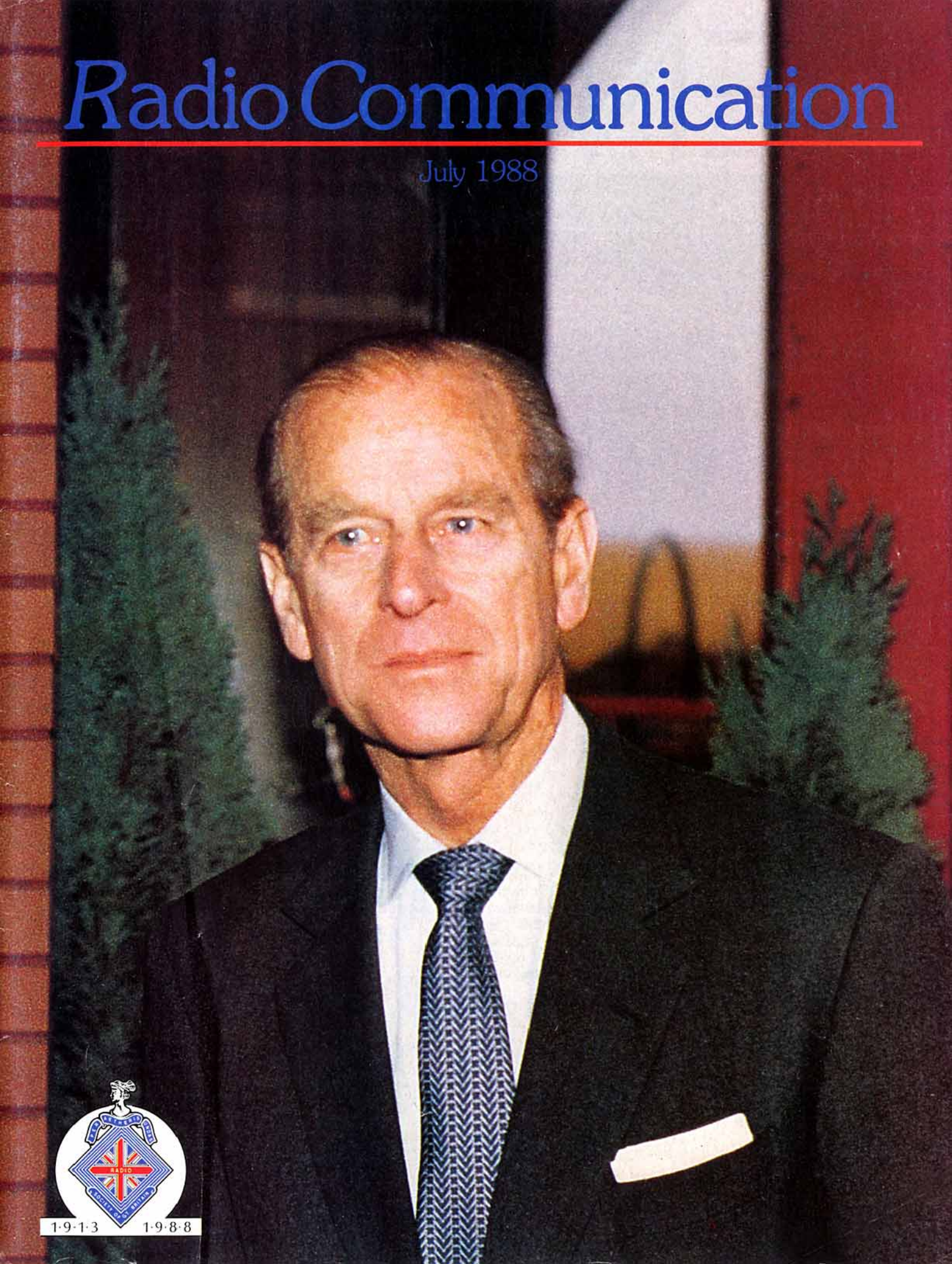
Radio Communication

July 1988



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TM-721E — Re-writing the specifications for dual band mobile radio

The TM-721E is just one model from the Kenwood complete range of amateur and professional communications products. From the TS-940S, voted by radio amateurs as the world's finest contest transceiver, to the smallest accessory power cord, the Kenwood tradition of engineering excellence and true understanding of the operating needs of the user shines through.

Recent releases to be seen at the RSGB Anniversary exhibition include the TS-680S HF transceiver which includes the 6 metre band; the TH-25E and TH-45E hand helds for 2 and 70; and the intriguing RZ-1 mobile monitor receiver which covers 500kHz to 950MHz.

For the dedicated listener, the R-5000 has captured the attention of the world's most respected reviewers, and is quietly dominating the receiver scene.

All these exciting products and a full range of accessory items can be seen on the stand of our sole UK distributor.

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Sole Appointed UK Distributor for KENWOOD Amateur Radio

JULY 1988

VOLUME 64 No 7

Radio Communication

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Tel 0707 59015
Fax 0707 45105

Business hours: 1000 to 1600

Headline News
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Incoming news for GB2RS: Tel 0707 59260

Computer contact (1,200/75 bauds)
RSGB Data Box 0707 52242
RSGB on Prestel page 8107

FRONT COVER

HRH PRINCE PHILIP, KG, PRESIDENT OF THE RADIO SOCIETY OF GREAT BRITAIN

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.

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

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

The JST-135 from J.R.C.

Japan Radio Company are big; sales turnover last year was in excess of £620 million. Not only are they big, they have been solely concerned with communications radio since 1915 and are therefore one of the world's leading companies in the field. JRC for example fit out most of the supertankers and coastal radio stations so I think there is sufficient evidence of their expertise. As a humble radio amateur, I am particularly glad that JRC find time and money to produce what must be amongst the best amateur radio equipment in the world, and as an appointed distributor in the UK, I am even more pleased to see the JST-135 arrive.

Those who know the NRD-525 receiver will recognise the family resemblance; actually the NRD-525 and JST-135 look identical, because they are clearly meant to mate together as an ultimate station. And what a transceiver the JST-135 has turned out to be. It would be impossible to list all the features which make it so outstanding, because so much of the engineering does not appear to the casual view, but take it from me, the JST-135 is destined to become a landmark in equipment design and performance.

The construction of the transceiver follows that of the NRD-525 in using individually screened and mounted plug-in vertical boards; an expensive way to build, but JRC try to build to a standard of quality, not down to a price – and it looks terrific when you peek inside.

The measures taken to ensure signal quality include using the same semiconductor devices in the transmit driver stage as those in the PA; not for simplicity but to allow them to be run in Class A. The result is exceptional linearity, improved signal quality, and of course cancellation of second harmonic distortion products. The PA itself is followed by a three section Chebyshev filter, which may not interest you particularly but it all helps the reduction of harmonic radiation, and that is certainly of interest to the station trying to operate on the frequency of your third harmonic...

If putting frequencies into memory is your pleasure, you have 200 to go at, with each memory storing frequency, mode, agc time constant, RF attenuator setting, and IF bandwidth. Should be enough for almost anyone. All mode? Certainly, with USB, LSB, CW (full and semi break-in), AM, FSK, and FM. There is even an optional ECSS unit if you want to dig out rare broadcast stations in a band full of half megawatt propaganda sources.

The receiver side (100kHz to 30MHz) has had the same dedicated attention as the transmitter, and there are some intriguing features such as the optional automatic notch system which grabs an interfering signal, throttles it at birth, and then hangs on to it whilst you tune around so that it causes no more pain and distress. (How did he do that, George?)

The first brochures we received (in Japanese) mentioned other accessories such as (GULP) a matching linear at around £7500, but there are more affordable and useful things including the NFG-230 automatic aerial tuner. So what? there are other tuners on the market. True, but this one is fully waterproof, offers virtually instantaneous tuning of a dipole or wire aerial and is meant to be mounted where tuners ought to be – at the feedpoint of the aerial system, out there in the wind and rain.

These brief comments are only a taste of what the JST-135 can do. For more complete information, why not send off £1 for our pack containing details of all the equipment we stock, and make a particular request for the JRC range, or indeed any other equipment which takes your fancy.

Assuming no great turmoil in the money markets, we are looking at £1395 for the JST-135; about the same as you might pay for the discontinued JST-125 at the moment, so even "boring waffle" (to quote another advertisement) has its happy ending.
73
John Wilson
G3PCY/5N2AAC

JST-135... £1395 inc VAT

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

send £1 for complete mail order catalogue.

Many handies make light work (you may groan!) (again)

How do you describe a group of small transceivers? Perhaps a "clutch" of handhelds? Anyway, all that aside, there is no doubt that Kenwood scored a real hit with the TH-205 and TH-215, which give you high power, handy size, performance plus, and at attractive prices. Now it's time to introduce the new baby (and I use the term advisedly), because it really is small; in fact it will fit into a shirt pocket – but it pokes out up to 5W of RF, (depending on battery pack used), has LCD frequency readout on its top face, and in this age of keypads on everything actually uses a tuning knob to cover the band in 12.5 kHz steps.

As always, I will advise you to ask for a brochure on the new TH-25E because I cannot possibly tell you all about it in this small space; about the 14 memories; the range of accessories; the auto battery saver; and so on... and about its 70cm brother the TH-45E.

Funny thing about Kenwood equipment; it always 'feels right', and this applies not only to the larger HF transceivers but even more forcibly to the TH-25E. If the Asahi camera people had not already used the phrase "Just hold a Pentax", I would have liked to have applied it to the TH-25E. Why don't you grasp one and see if you agree.

KANTRONICS

Packet radio is one of the fastest expanding areas in Amateur Radio. Access is available to national and international data, messages may be left or 'mailboxes', and of course you may conduct a QSO just like RTTY or AMTOR

KPC2 £159 inc. vat. (carr £8)
This is not just a basic TNC but more of a 'Packet Special'. Over 100 user commands are available, and operation can be on HF or VHF/UHF via its single port. Features include 3 – state squelch, multi connect, digipeat, TTL or RS232 compatible, personal mailbox – and now WEFAX is included.

KAM £265 inc. vat. (carr £8)
All the features of the KPC2 but with two independent ports for HF and VHF, allowing gateway operation. All mode operating via the HF port – Packet, AMTOR, RTTY, CW, ASCII, and now WEFAX included.

KPC4 £298 inc. vat. (carr £8)
A dual port TNC allowing simultaneous operation on two bands (if you can keep up the pace). All the features of the KPC2 plus gateway between ports.

P.S. WEFAX means you can receive those wonderful Met forecast pictures off-air.

THIS AND THAT

We cannot advertise everything we sell, because it would take the whole of this magazine to do it, which at £500 a page is a bit expensive. Instead, we send out reams of information every day, covering almost anything connected with radio. To send an interesting pack of reading, all we ask is a contribution towards postage costs, so if you clip the coupon on this page and send it to us with your £1, we will fire back all the info you want. Mention any special interests or particular rigs, and we will feature them in the pack.

We don't only lurk in Matlock; we have branches in many major cities and we try to keep all that we sell at every branch. Just ring for the address of your nearest Lowe shop, or see the front of our product list for details. In the absence of a branch, we also supply approved dealers who are of proven reputation and integrity. There are others who, for our own good reasons we prefer to avoid. So should you if you think about it, because anyone who cuts a price, and hence his operating margin, can only be cutting his service and backup. There isn't anywhere else the cut can be made. We prefer to maintain our standard of service rather than "Forty quid off, John" and no backup. The choice, of course, is yours.

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ICOM

ICOM at the N.E.C.

At this years R.S.G.B. Exhibition the full range of ICOM Amateur Radio Equipment will be on display. ICOM (UK), the official UK importer will have their fully experienced sales team ready to discuss and recommend the ICOM products to suit you.

So come on down to NEC and see why ICOM is number 1. You will find us on stand B6 alongside R.S.G.B., B.C.N.U.

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

Features:

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

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 cross-band 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 splashproof 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.

Icom (UK) Ltd.
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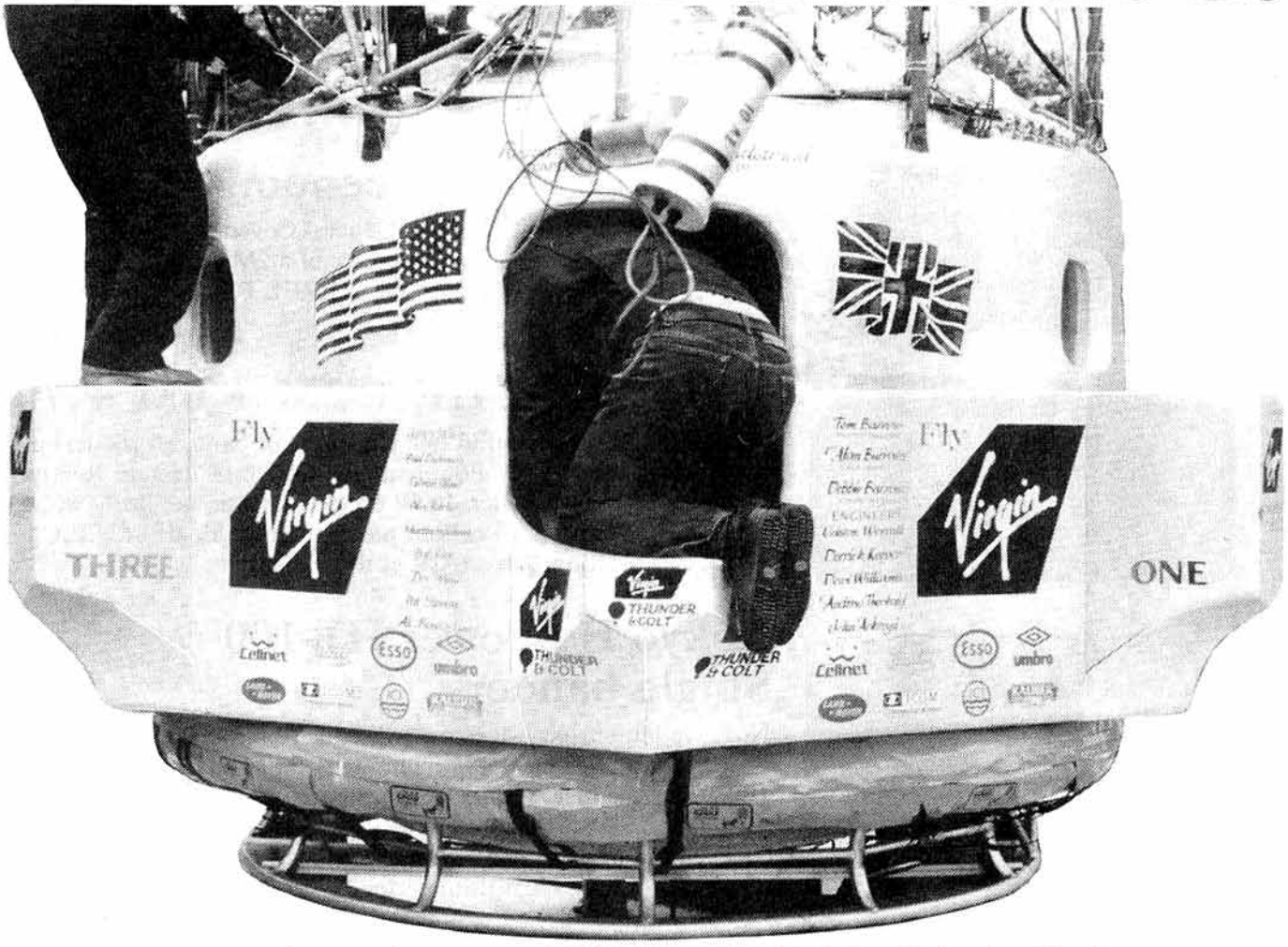
Count on us!

All Aboard at N.E.C.



Exclusive this year to ICOM stand at N.E.C. will be the Virgin Balloon Capsule "The Flyer" which was piloted by Richard Branson and Per Lindstrand who used ICOM equipment to co-ordinate the first successful crossing of the Atlantic by Hot Air Balloon.

Climb aboard the capsule and experience the conditions encountered by the two aviators. See how ICOM equipment was utilised for aeronautical communications. Do not miss the opportunity to see the "Flyer"!

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.
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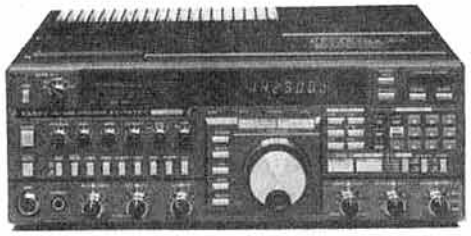

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A complete Ham station in one package. All band, all Mode, built-in auto Aerial Tuner, 240V Power-supply, General Coverage Receiver, Digital Power/SWR meter, 100W o/p (HF), Optional 2M/6/70CM modules just plug in. **Excellent part-exchange deals at N.E.C.!**
N.E.C. Exhibition Price (Ask at the show!)

Tokyo Hy-Power HT-100 Single banders

Now available from A.R.E. on an exclusive basis, the new **HT-100** series of ssb/cw transceivers. Only fractionally larger than a 2m mobile, the **HT-100** is the ideal transceiver for operating in the car or at home. Available on 80/40/20/15 or 10 metres, the **HT-100** would make an ideal QRP station or as a prime mover for transverting or driving a linear amplifier. **N.E.C. Exhibition Price £279.00**

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You must have read our AD's by now, we've sold hundreds! 2M & 70CM, full Duplex, 138-170MHz + 420-469MHz. Many additional features. Take a look at our Exhibition price . . . .
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THE RSGB

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TS440S offered with ATU & Microphone
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TH-25E New 2M Handie - Huge saving!

We won't list prices here - come to N.E.C.
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If you are not on SIX METRES yet, you certainly should be. What better way than to buy the new FT690R complete with a 15 watt output linear amplifier? And at the special N.E.C. Price!
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The KING of VHF/UHF Base stations, the FT736R has all the facilities any discerning user may need, plus the two most important features: Uncompromised receive performance and a clean transmitted signal. Our special offer available on the first 10 sets purchased during February was so popular, we have decided to re-introduce it for the N.E.C.!
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Due to A.R.E. importing direct and cutting out the middle man, we really have slashed the price of this one!
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STOP PRESS! Rumour has it that Brenda's special coffee will be available at the show!

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. . . is here again and as usual **A.R.E. Communications** will be offering **exceptional part-exchange deals.** Bring along any clean, working, Amateur Radio equipment that we can take in part-exchange or **SELL IT FOR YOU** at the show. Remember! **Bernie and Brenda** are rarely beaten on price **OR** customer service. With H.P. facilities available at NEC, you can literally walk away with your new purchase the same day! Look forward to seeing you there. 73's **Martin G4HKS.**

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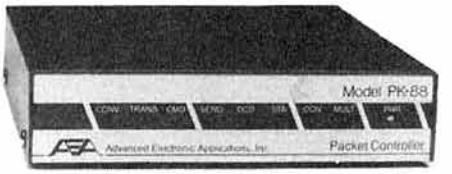

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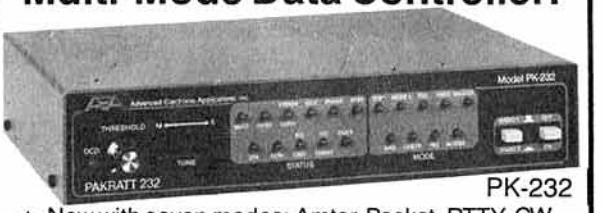

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- ★ Now with seven modes: Amtor, Packet, RTTY, CW, ASCII, Fasimile and Navtex.
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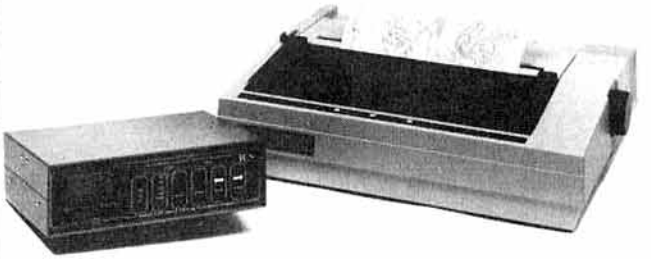

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Super Value Fascimile, RTTY and Navtex Receive System!

FAX-1 demodulator, printer, power supply, cables, ribbon and paper. Nothing more to buy. Just plug it into the audio output of your receiver and switch on to be amazed at the clarity of the weather maps. All system components are available separately.

The FAXPACK costs an amazing **£399.95** inc VAT plus £9.50 Securicor delivery.

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PK-88	Budget Packet Radio TNC	£109.95	£2.50
PK-90	Commercial Packet Radio TNC	£368.40	£4.00
2400 Baud	Internal PSK Modem for the PK-90	£129.95	£1.50
PK-232	7 mode Intelligent Terminal Unit	£269.95	£4.00
HR1	144 MHz Handheld Antenna	£14.95	£1.00
HR3	150 MHz Marine Handheld Antenna	£14.95	£1.00
HR4	440 MHz Handheld Antenna	£14.95	£1.00
ISOPOLE 144	2 Metre Base Station Vertical Antenna	£39.95	£3.00
ISOPOLE 440	70 cms Base Station Vertical Antenna	£59.95	£3.00
PC-PAKRATT	IBM-PC Software for the PK-232	£19.95	£2.50
PK-FAX	IBM-PC Facsimile Software for the PK-232	£19.95	£2.50
COMM PAKRATT	Commodore 64/120 Software for the PK-232	£59.95	£1.50
PK-232/BBC	BBC Software for the PK-232	£26.95	£1.50

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FAX OPTION	Manual, Cable, ROM for PK-232	£49.95	£2.00
NEW FIRMWARE	Upgrade for PK-232 (i)	£15.00	£1.50
FAX-1	Weather Map/RTTY/Navtex Decoder	£279.95	£4.00
FAX-1/N	As above, but with internal Navtex Receiver	£399.95	£5.00
ANT-1/N	Active Antenna for Navtex Reception	£69.00	£2.00
FAXPACK	FAX-1, SC-1200, AC Power Supply, Leads, Paper	£399.95	£9.50
SC-1200	120 cps 80 Column Printer. No NLQ	£114.94	£9.50
SC-1500	180 cps 80 Column Printer. With NLQ	£172.44	£9.50
SC-5500	180 cps 132 Column Printer. With NLQ	£229.94	£9.50
	Technical Manual: PK-232	£25.00	£2.50
	User Manual: PK-232	£15.00	£2.50
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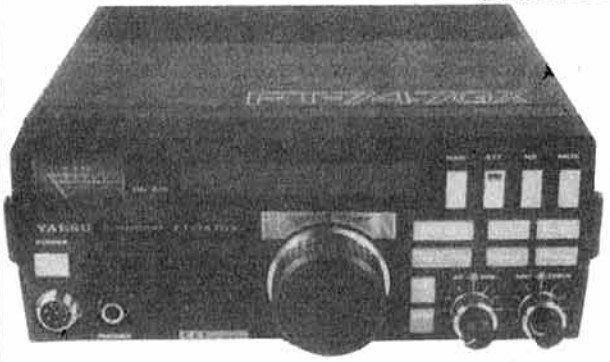

GUARANTEE REBATE? What is it? A gimmick or a real consumer benefit? It is another marketing innovation from Amcomm . . . It is simple! . . . It is real! . . . It is a consumer benefit! . . . It is a big effort by Amcomm to help both you and us where it hurts!

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HERE ARE SOME SAMPLE PRICES

FT23	*(with FNB10 N/C 28c) — 2m micro handie* ***£249***
FT747 GX	*— 100W. Compact HF Transceiver* ***£595***
FT290 MkII	*— 2m multimode portable/base* ***£385***
FT736 R	*— 25W. VHF/UHF transceiver* ***£1299***
FT767 GX	*— HF/VHF/UHF All mode TCVR* ***£1395***
FRG 9600	*— 60-950 MHz Scanner Receiver* ***£449***
FRG 8800	*— Precision Gen. Coverage RCVR* ***£575***
IC R71E	*— HF multimode Receiver* ***£739***
IC 735	*— Compact HF multimode TCVR* ***£849***
IC R7000	*— VHF/UHF Communications RCVR* ***£859***
IC μ2E	*— 2m micro handie 2.5w* ***£215***
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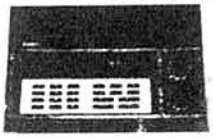

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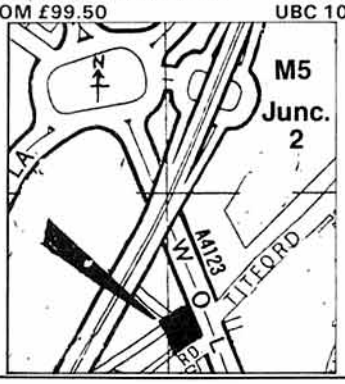

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CP4 4 band vert	149.00
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TB3MK3 Beam	315.00
TB2MK3 Beam	210.00
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HF RIG DISCOUNTS!

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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

ALINCON

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ALR22HE	As above but 45 watts	329.00
ALR72E	70cm FM mobile 25 watts	349.00
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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
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EDH10	DC to DC converter	16.95
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ALM203E Hand-held 2m FM back in stock £229!

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EX310	44.00	HP2	26.50
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RC11	62.00	LC11	9.20
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AQ2	14.38	BC50	61.00
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BP2	44.85	LC24	6.50
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The innovative memory system includes one hundred general purpose memories plus ten full duplex cross-band memories, one global call channel memory that can be recalled from any band or mode and up to four band-specific call channel memories, all of which store mode and receive and transmit frequencies independently.
In addition, fourteen vfos are provided: two general purpose plus one PMS (Programmable Memory limit Scanning) on each band, two special-purpose full duplex vfos, and up to four clarifier memories, one per band. Each of the two full duplex vfos can be selected so that its receive and transmit freqencies and modes can be displayed and tuned independently, or linked to tune synchronously in opposite directions for satellite operaiton. You can retain twelve satellite uplink/downlink modes in the special vfos and ten full duplex memories at all times.
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OPTIONAL ACCESSORIES

FEX 736/50	50MHz module	£239.00	XF455MC	600Hz CW Filter	£60.00
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FMP-1	AQS Message Processor c/w display	£189.00	MD-1B8	Desktop Microphone	£79.00
FTS-8	CTCSS Tone Squelch Unit	£45.00	MH-1B8	Hand Scanning Microphone	£21.00
FVS-1	Voice Synthesiser Unit	£33.00	FIF232Cvan	CAT/TNC Interface for Packet & CAT	£69.85
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FT736R RRP £1450 C/W 2m & 70cms

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HT-106 6m £325.00 HT-120 20m £299.00 HT-180 80m £299.00

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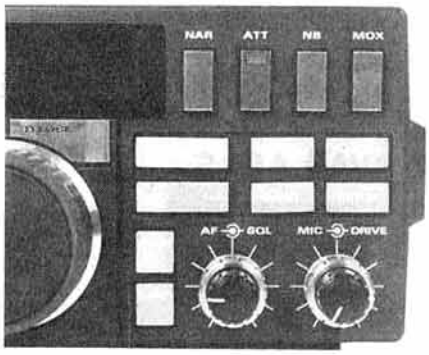
The FT-747GX is a compact SSB/CW/Am and (optionally) FM transceiver providing 100 watts of PEP output on all hf amateur bands, and general coverage reception continuously from 100kHz to 30MHz. A front panel mounted loudspeaker and clear, unobstructed display and control layout make this set a real joy to use. Convenient features include operator selectable course and fine tuning steps optimized for each mode, dual (A/B) vfos, along with twenty memory channels which store mode and skip-scan status for auto resume scanning of selectable memories. Eighteen of the memories can also store independent transmit and receive frequencies for easy recall of split-frequency operations. Wideband (6kHz) AM and narrowband (500Hz) CW IF filters are included as standard, along with a clarifier, switchable 20dB receiver attenuator and noise blanker. User programming for more advanced control by an external computer is possible through the CAT (Computer Aided Transceiver) System. The transmitter power amplifier is enclosed in its own diecast aluminium heat-sink chamber inside the transceiver, with forced-air cooling by an internal fan allowing full power FM and packet, RTTY, SSTV and AMTOR operation when used with a heavy duty power supply.



All major controls are grouped together for convenience and ease of operation

MD-1B8 Base Mic.....**£79.00**	MH-1B8 Hand Mic.....**£21.00**	FRB757 Relay Box.....**£10.50**
MMB38 Mobile Mount.....**£22.00**	FIF232C Interface.....**£75.00**	FP757HD Heavy Duty P.S.U.**£239.00**
DC3000568 FM unit.....**£39.99**	FC757AT Automatic ATU.....**£349.00**	FL7000 500W P.E.P. Linear**£1600.00**
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	TXCO 747.....**£28.95**	

FT747GX HF TRANSCEIVER RRP £659.00 inc VAT

LET THE RADIO DO THE TALKING!

FT212RH & FT712RH

NEW FROM YAESU

We are pleased to announce a new series of FM vhf and uhf mobile transceivers for the amateur. The 45/5W FT-212RH and the 35/4W FT-712RH.

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

FT212RH.....£349.00
FT712RH.....£375.00
DVS 1, voice memory unit.....£79.00
FTS12, CTCSS unit.....£60.38

FREE FINANCE . . . .

On many regular priced items SMC offers Free Finance (on invoice balances over £120) 20% down and the balance over 6 months or 50% down and the balance over a year.
You pay no more than the cash price!
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Small items. Plugs, Sockets, etc. by post £1.75
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Tens of thousands of spares and test equipment
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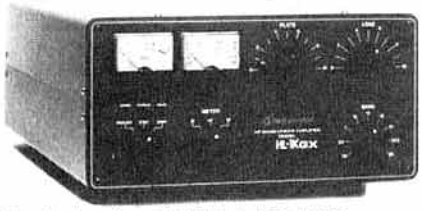
Prices & availability subject to change without prior notice

A CATALOGUE SELECTION

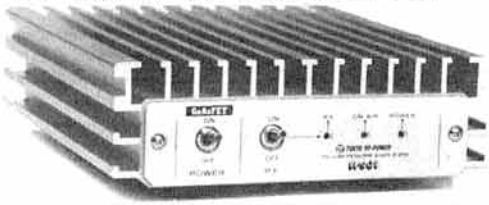
'HIGH POWER' by TOKYO HY-POWER



Introducing from TOKYO HY-POWER a range of superbly engineered, compact HF linear amplifiers. Designed to meet the exacting standards of operation on the HF amateur bands, yet remaining easy to operate and install.

General Specifications:
ALL HF BANDS INCLUDING WARC
EXCITATION POWER: 70-120W
SUPPLY: 240V AC

HL-1 KGX	HL-2K
1kW P.E.P	2kW P.E.P.
2x 4CX250B	2x 3-500Z
£945.00 inc VAT	**£1425.00** inc VAT



Also available from TOKYO HY-POWER a range of VHF/UHF linear amplifiers. All these units are constructed from a heavy duty extruded case for max heat disipation and strength allowing continued high outputs even in the harshest environments. All the linears are complete with a low noise preamp as standard (except HL30V) and need a 13.8v dc supply.

HL30V 2m 2W in/30W out	**£54.00**
HL37V 2m 3W in/35W out	**£89.00**
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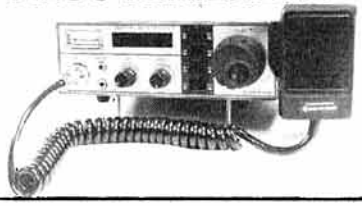
HL110V 2m 2/10W in/110W out	**£215.00**
HL20U 70cms 2W in/20W out	**£82.89**
HL60U 70cms 10W in/50W out	**£179.00**
HL66V 6m 10W in/50W out	**£119.00**

ALSO AVAILABLE HT100 SERIES TRANSCEIVERS



HT106 6m	**£325**
HT120 20m	**£299**
HT180 80m	**£299**

HP100S PSU C/W SPKR	**£99.00**
HBK100 mmB	**£9.00**
NHB100 NOISE BLANKER	**£19.95**
HCF100 CWNARR. FILTER	**£45.00**

HF BEAMS
SPECIAL SUMMER OFFER

Another 5% off our already heavily discounted price until 15th August on the following selected beams, EX14 TH5, TH7 and Jaybeam TB3.
EX14 now £426, TH5 now £545, TH7 now £635 & TB3 now £299

Antenna carriage will be waived if purchased with a matching rotator (also carriage free), so why not buy now while stocks last!

Due to the strong pound and our special purchase we can now offer for a limited period up to 15% discount on their range of antennas and 10% on their larger rotator Ham IV. Buy now whilst stocks last (from January 1st they increased their prices and if the dollar recovers prices could go up by 30% to 40%).

			Offer Price	P&P
12AVQ	Vert. 10-15-20M	~~£78.85~~	£71.00	£3.75
14AVQ	Vert. 10-15-20-40M	~~£106.00~~	£95.00	£3.75
18AVT	Vert. 10-15-20-40-80M	~~£172.00~~	£146.00	£3.75
18V	Vert. 10-80M tapped coil	~~£48.50~~	£43.65	£4.50
TH3Jnr	3 Ele. Yagi 10-15-20M	~~£299.00~~	£254.00	£4.50
TH2MK3	2 Ele. Yagi 10-15-20M	~~£279.00~~	£249.00	£4.50
EX14	5 Ele. 10-15-20M Explorer	~~£499.00~~	£449.00	£7.50
QK710	EX14 to cover 40M	~~£499.00~~	£449.00	£6.50
TH5MK2	5 Ele. 10-15-20M T'bird	~~£649.00~~	£575.00	£7.50
TH7DXX	7 Ele. 10-15-20M T'bird	~~£765.00~~	£669.00	£7.70
103BA	3 Ele. Yagi 10M	~~£99.00~~	£89.00	£3.95
105BA	5 Ele. Yagi 10M	~~£220.00~~	£187.00	£3.95
153BA	3 Ele. Yagi 15M	~~£135.00~~	£121.00	£3.95
155BA	5 Ele. Yagi 15M	~~£338.00~~	£288.00	£5.90
203BA	3 Ele. Yagi 20M	~~£269.00~~	£233.00	£4.90
204BA	4 Ele. Yagi 20M	~~£429.00~~	£357.00	£7.30
205BA	5 Ele. Yagi 20M	~~£499.00~~	£425.00	£9.40
DB10-15A	3 Ele. Yagi 10-15M	~~£209.00~~	£199.00	£4.80
AR40	Famous Bell Type		£125.00	Free
CD45	Medium Bell Type		£219.00	Free
Ham IV	Heavy Duty Bell	~~£359.00~~	£329.00	Free
T2X	Very Heavy Duty Bell	~~£449.00~~	£399.00	Free

All prices include VAT @ 15%. Carriage extra, mainland rate show. A = £1.75, B = £1.00, C = £4.00, D = £5.00.

JAYBEAM

Want the best, then why not buy Jaybeam. High quality materials and heavy duty construction for long maintenance free life.

			£	p&p
JAYBEAM 2 METRE				
C5/2M MK2	Colinear vert. omni	4.8dBd	£90.85	A
LW5/2M	Yagi 5 element	7.8dBd	£18.69	B
LW8/2M	Yagi 8 element	9.5dBd	£23.98	B
LW10/2M	Yagi 10 element	10.5dBd	£29.04	B
LW16/2M	Yagi 16 element	13.4dBd	£42.55	C
PBM10/2M	Parabeam 10 ele	11.7dBd	£57.50	C
PBM14/2M	Parabeam 14 ele	13.7dBd	£70.15	C
Q4/2M	Quad 4 element	9.4dBd	£37.09	B
Q6/2M	Quad 6 element	10.9dBd	£48.59	B
Q8/2M	Quad 8 element	11.9dBd	£60.38	B
D5/2M	Yagi 5/5 slot	10.0dBd	£33.93	B
D8/2M	Yagi 8/8 slot	11.1dBd	46.58	B
5XY/2M	Yagi 5 ele cross	7.8dBd	£36.23	B
8XY/2M	Yagi 8 ele cross	9.5dBd	£46.00	B
10XY/2M	Yagi 10 ele cross	10.8dBd	£57.50	B
PMH2/C	2 way harness circ. polar.		£13.51	A
PMH2/2M	2 way harness 144MHz		£14.89	A
PMH4/2M	4 way harness 144MHz		£36.80	A
JAYBEAM 70 CENTIMETRES				
C8/70 MK2	Colinear vert. omni	6.1dBd	£97.75	B
D8/70	Yagi 8/8 slot	12.3dBd	£33.90	
PBM18/70	Parabeam 18 ele	13.1dBd	£41.40	B
PBM24/70	Parabeam 24 ele	15.1dBd	54.05	B
LW24/70	Yagi 24 element	14.8dBd	33.35	B
MBM28/70	Multibeam 28 ele	11.5dBd	27.60	B
MBM48/70	Multibeam 48 ele	14.0dBd	44.28	B
MBM88/70	Multibeam 88 ele	16.3dBd	61.50	B
8XY/70	Yagi 8 ele cross	10.0dBd	52.90	B
12XY/70	Yagi 12 ele cross	12.0dBd	65.55	B
PMH2/70	2 way 432MHz harness		14.09	A
PMH4/70	4 way 432MHz harness		£29.04	A
JAYBEAM HF				
MM3	Minibeam 10-15-20m		£327.75	D
VR3	Vertical 10-15-20m		£73.60	C
TB3 MK3	3 Ele Yagi 10-15-20m		316.25	D
TB2 MK2	2 Ele Yagi 10-15-20m		212.75	D
TB1 MK3	Rotary Dipole 10-15-20m		105.80	C
JAYBEAM 6M/4M				
4Y6M	4 ele 6M yagi		49.45	B

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RADIO SOCIETY OF GREAT BRITAIN

THE NATIONAL SOCIETY WHICH REPRESENTS UK RADIO AMATEURS

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

PATRON: HRH PRINCE PHILIP, DUKE OF EDINBURGH, KG

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

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Telex 265871 (MONREF G) quoting CQQ083 on first line of message. Electronic mail via Dialcom/Telecom Gold: 87:CQQ083
Telephone 0707 59015. Telefax 0707 45145

Secretary and chief executive: David Evans, G3OUF

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ANNUAL SUBSCRIPTION RATES
Once-off joining fee: £1.50
Corporate members: UK and overseas *(Radio Communication* by accelerated surface post): **£20.50**
UK associate member under 18: £6.95. Family member; £8.20
UK students over 18 and under 25: £10.45 (Applications should give applicant's age at last renewal date and include evidence of student status)
Affiliated club or society/registered group (UK): £20.50 (including *Radio Communication*): **£12.30** (excluding *Radio Communication*) (Subscriptions include VAT where applicable)
Membership application forms available from RSGB HQ

MANY HAPPY RETURNS

The Society formed by radio enthusiasts on 5 July 1913 is 75 years young this month.

Throughout its history radio amateurs have established special links through international friendships, have served the community and the nation in times of hardship, and have continued to contribute to technology and the science of radio communication.

These unique contributions in the past are widely recognised and will be celebrated at this year's National Convention. However, a successful past is no guarantee of a successful future, but it is a platform on which the future can be built.

Amateur radio in 1988 would be unrecognisable to the RSGB's founder members in 1913; amateur radio has developed and changed since then and is continuing to do so. Today policy changes at international (ITU) and national level loom over the Amateur Service. Indeed, the possible privatisation of the radio spectrum as recommended by CSPI could well mean more changes for radio amateurs.

Whatever international, Governmental and social changes are in store, one thing is certain – that with the help of its membership your Society will do its best to defend and advance the well-being of amateur radio as it had done for the last 75 years.

RSGB'S PROJECT YEAR

Project YEAR (Youth into Electronics via Amateur Radio) is an entirely new initiative to create and develop, among young people, an interest in science, engineering and electronics by introducing them to the hobby of amateur radio.

Major UK electronics-based companies report severe shortages of manpower – RSGB has conceived project YEAR to help alleviate this problem. Historically, radio amateurs have provided a resource of trained and dedicated personnel for the World of communications and HM Forces; witness The Secret Listeners.

Amateur radio encompasses not only electronics, science and engineering, but also ITU principles, languages and geography, and enables participants to enjoy a high quality of personal communications. Indeed, amateur radio is already a proven training ground for young people and is seen as a creative and disciplined form of practical preparation for their future careers.

The present entry level into the transmitting side of amateur radio has, in the late 1980's led to only a few hundred people under the age of 18 holding transmitting licences in the UK. Such a low number of young people in the hobby is well below that of some other nations and is detrimental to long term interests of the Amateur Service. One prime objective of Project YEAR will be to discuss with the membership, and then the DTI, an entirely new type of licence to encourage more beginners/students/novices to use low power equipment in specified sections of some less crowded amateur bands in order to gain experience of different modes and frequencies before taking a full A or B Class licence. The emphasis for this new licence will be on practical experience and disciplines prior to going on the air.

The Society's Training and Education Group, set up by Council to study the encouragement of far more beginners into amateur radio, will have a stand at this year's National Convention (15-17 July at the NEC). Why not come along – perhaps with a potentially interested youngster or two – and find out more about project YEAR and how you or your local Club can help?

David Evans, G3OUF

MICROWAVE MODULES LIMITED

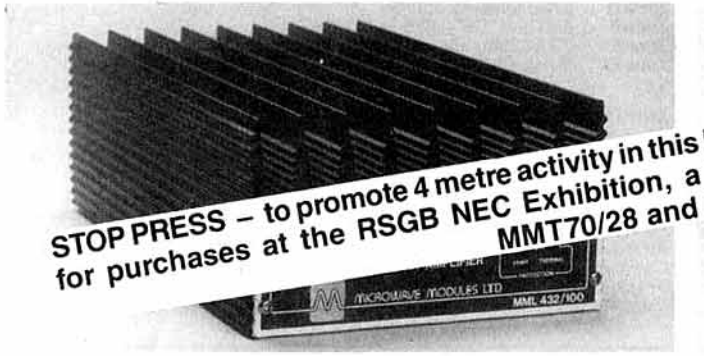
THE COMPANY. . .

MICROWAVE MODULES LIMITED is a British manufacturing Company, established over 18 years ago, and currently employs over 40 staff in its two modern factories. The Company currently manufactures on an annual basis more than £1,000,000 of radio equipment, all of which has been designed and manufactured in the UK.

AND ITS PRODUCTS. . .

The Company offers what is probably the widest range of amplifiers and transverters available from any single manufacturer. The range of amplifiers and transverters is listed below, together with the other popular items manufactured by the Company such as preamplifiers, converters and amateur TV equipment.

STOP PRESS – to promote 4 metre activity in this RSGB 75th anniversary year, we are offering, for purchases at the RSGB NEC Exhibition, a £20 discount off our 70MHz transverters, MMT70/28 and MMT70/144



MML432/100

MML432/30 L

CATALOGUE. . . A copy of our latest catalogue is available free of charge upon request.

AVAILABILITY. . . Our products are normally ex-stock, from ourselves or our dealers.

GUARANTEE. . . All products are fully guaranteed for 12 months.

PRICE LIST

		TOTAL INC VAT	POST RATE
MML114/30-LS	2m 30W Linear, 1 or 3W input	105.00	B
MML144/50-8	2m 50W Linear, 10W input	107.00	B
MML144/100-S	2m 100W Linear, 10W input	149.00	C
MML144/100-HS	2m 100W Linear, 25W input	159.00	C
MML144/100-LS	2m 100W Linear, 1 or 3W input	169.00	C
MML144/200-S	2m 200W Linear, 3 to 15W input	379.00	D
MML220/80-S	1.25m 80W Linear, 10W input	169.00	C
MML432/30-L	70cm 30W Linear, 1 or 3W input	189.00	C
MML432/50	70cm 50W Linear, 10W input	155.00	C
MML432/100	70cm 100W Linear, 10W input	389.00	D
MMC435/600	70cm ATV Converter, UHF output	38.00	A
MTV435	70cm ATC 20W Transmitter	215.00	B
MM2001	RTTY to TV Converter	199.00	B
MMS1	The Morsetalker	139.00	B
MMS2	Advanced Morse Trainer	169.00	B
MMT50/28-S	10m to 6m Transverter	295.00	B
MMT50/144	2m to 6m Transverter	295.00	B

		TOTAL INC VAT	POST RATE
MMT70/28	10m to 4m, Transverter	149.00	B
MMT70/144	2m to 4m Transverter	149.00	B
MMT144/28-R	2m Linear Transverter, 25W o/p	295.00	B
MMT144/28	2m Linear Transverter, 10W o/p	149.00	B
MMT220/28-S	220 MHz Transverter, 15W o/p	169.00	B
MMT432/28-S	70cm Linear Transverter	199.00	B
MMC50/28	6m down to 10m Converter	39.00	A
MMC144/28	2m down to 10m Converter	39.00	A
MMC432/28-S	70cm down to 10m Converter	48.00	A
MMK1691/137.5	1690 MHz WX Satellite Converter	169.00	B
MMG144V	2m RF Switched GaAsFET Preamp	39.00	A
MMG1691	1690 MHz GaAsFET Preamp	129.00	B
MMR3/25	3 dB 25 Watt Attenuator	19.00	A
MMR7/3	7 db 3 Watt Attenuator	19.00	A
MMR15/10	15 db 10 Watt Attenuator	19.00	A

Postage/Packing Charges (inc VAT): A = £2.00; B = £5.00; C = £6.00; D = £8.00

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NEWS
BULLETIN

HRH AT NEC
- full details

As we said last month, it gives us great pleasure to announce that His Royal Highness Prince Philip, Duke of Edinburgh will formally open the RSGB's 75th Anniversary Convention at the NEC.

Prince Philip will arrive at mid-day and will be greeted by local dignitaries and Society officers. He will be introduced by the Society's President and then make a formal opening address, at which it is intended that he will announce the launch of Project YEAR (see this month's editorial) and also present the Young Amateur of the Year Award.

Prince Philip will then make a tour of the display of amateur equipment through the ages in the Lucas Centre, and it is hoped that when he reaches the display of modern equipment (including a fully operational state-of-the-art packet system) he will exchange a short greetings message with Windsor Castle.

Prince Philip will make a short tour of the main exhibition before taking lunch, after which the Society will make its presentation relating to Project YEAR to various figures from industry, government and the armed forces.

His Royal Highness' arrival and opening address will be carried in a special edition of GB2RS, which will be broadcast LIVE from the NEC. This broadcast will begin at 11.45 am and will take place on 3650, 7049 and 14250 kHz SSB and 145.525 MHz FM. If you can't be there for the opening, you can at least listen to it as it happens (eat your heart out Radio 4....) There are also GB2RS broadcasts throughout the event - the schedule is as follows:-

1700 GMT (1800 BST)

80m band - 3650 kHz SSB
20m band - 14.250 MHz SSB
2m band - 145.525 MHz FM

1715 GMT (1815 BST)

40m band - 7049 kHz SSB
2m band - 145.250 MHz SSB

(Cover/above photos: Barry Iddon)

FINLAND GETTING 50 MHz
- and more news from France

It looks as though our item in last month's Bulletin concerning the imminent availability of the 50 MHz band to Finnish amateurs was right on the nose. An item in the May edition of the Finnish national society's magazine "Radio Amatoori" (ever tried finding a translator from Finnish to English at short notice? - it ain't easy....) had something to say on the subject - we've included the entire piece since it gives some insight into how other countries tackled the matter of a 50 MHz allocation;

"50 MHz band about to become available to radio amateurs"

"During the negotiations for the regulations which became effective last autumn, the 50 MHz band and the making of the band available to Finnish radio amateurs to a limited extenmt were also discussed. However, the authorities stated at the time that the time was not ripe for even limited experiments in the use of the band in questiion. On the other hand, SRAL (the Finnish national society - Ed) did not want to continue talks about this matter either as it did not want the enforcement of the new regulations to be delayed. It was agreed that the question of the 50 MHz band would be raised again later.

"Last November, around a month after the new regulations had become effective, SRAL sent a letter to the authorities proposing, amongst other things, the reconsideration of the 50 MHz band. This proposal brought results in March when the authorities announced that there were possibilities for a limited use of the band. SRAL quickly prepared a detailed proposal for a limited use of the band and the matter was discussed in

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mid-April. The results of the discussion are summarized briefly below. It must be noted that the following matters were decided in principle and there may be changes to details.

"It will be possible to grant special licenses for the 50 MHz band on a non-interference basis to holders of general or technical competence certificates. A special licence will entitle a holder to a limited use of the band. Specifically, the restriction means that amateur operations must not interfere with other operations such as TV broadcasts.

"In the negotiations, SRAL expressed the wish that the granting of the licences would begin to take place as soon as possible taking into consideration the weather conditions in spring and summer. This was agreed to but, because of limited capacity, there will be time for only 20-30 licenses to be dealt with before summer. The licenses of applicants with existing 50 MHz capability will be processed in this first batch. It must be noted that the restriction in numbers only applies to the first batch - additional licenses will be granted later on.

"The permitted frequency band is 50.00-50.45 MHz. Transmission categories are CW and SSB. The permitted power levels have not yet been decided.

"Transmission is prohibited within the service area of Channel 2 of Swedish television in the Pohjanmaa area during programme hours.

"There is every reason to thank the authorities warmly for their positive attitude and speedy action to permit the use of a new band, which is particularly interesting from the point of view of research into rpropagation. Thanks are also due to Jan, OH1ZAA, whose contribution and expertise were of major importance in the negotiations".

So that's the latest from Finland - watch this space for more details.

As of press time in mid-June, the French 50 MHz situation was that about 500 applicants had received application forms, which were then to be considered by the French broadcasting service. They would then decide the appropriate power level for a particular applicant. Eric Ludwig, F9LT (of REF) said that French stations would begin to appear legitimately on 50 MHz in July - naughty French persons heard on the band during the openings in June were more than somewhat piratical, alas. Ditto the half-a-dozen German stations appearing in June, who have now been shot - seriously, DARC says categorically that there are NO 50 MHz permits available in Germany and no licensed 50 MHz stations. Apparently it's likely to be anything up to two years before the German PTT is prepared to consider 50 MHz licensing in DL. And as for YU50MHZ....!

The REF is still leaning on the French PTT to allow them to use the bottom part of the band. No progress as we went to press, although PTT reported to be sympathetic to REF's case.

Incidentally, there were some phenomenal 50 MHz openings to the USA in early June - G8VR's column will doubtless have all the details in due course.

Still with 50 MHz, VHF Committee chairman Malcolm Appleby, G3ZNU, passed us a correction to the start date of the 50 MHz award mentioned last month. Since the band became available to all licensees on 1 June 1987, it's been decided that that'll now be the start date for the award and all contacts after then count.

50/70 MHz CONSTRUCTION CONTEST:

Another item of news from the VHF Committee is the instigation of a 50/70 MHz Construction Contest. Here's the official briefing:

"Entries are invited for a 50/70 MHz Construction Contest, the results of which will be announced before the end of 1989. Projects must be submitted to the judges on or before the date of the 1989 VHF Convention and notification of intention to submit a project will be required by 1 November 1988. The reason for these dates is that a new marking scheme has been planned and under this scheme entires will be laboratory tested, subjected to user trials and will not be judged simply by appearance.

"The aim of the contest will be to promote home construction of 50 and 70 MHz equipment, and entries will be judged on suitability for a general construction project, fitness for purpose, reliability and electrical characteristics and to a lesser degree on a performance versus cost basis.

"The contest will be divided into the three following sections:

Section 1

"Entries for this section should be a dual-band transverter or transceiver for 50 and 70 MHz. The unit may consist of a combination of two separate units, one for each band, or a single dual-band unit at the discretion of the designer.

"The power output should be not less than 10W RF. The judges will pay particular attention to the cleanliness of the transmission and will give credit for ingenuity in inducating and guarding against malfunctions.

Section 2

"In this section entries are requested for a receive-only version of that detailed for Section 1. The unit may consist of a pair of similar converters, a dual-band converter or a tunable converter or receiver covering at least 48-72 MHz, and should be designed with a view to filling the needs of Continental cross-band operators, listeners or for stand-by duty.

Section 3

"This is the open section for which any item of home-designed and home-built equipment usable at 50 and 70 MHz may be entered. Projects may vary over the whole range of amateur equipment and include for example a dual-band antenna or a piece of test equipment. Entries in this section will be judged on originality and inventiveness as well as the criteria mentioned above.

Awards

"Provided entries of a sufficiently high standard are received, the VHF Construction Trophy will be awarded to the entry scoring the highest aggregate number of marks awarded by the judges. Thus the trophy will not necessarily go to the winner of Section 1, although the greater complexity of the requirements for that section means that the maximum attainable marks will be somewhat higher in that section. Plaques will be awarded to the winners of each section.

Notification of intention to enter

"Enquiries and notification of intent to enter should be addressed to David Butler, G4ASR, Yew Tree Cottage, Lower Maescoed, Hereford HR2 OHP or to Ray Cracknell, G2AHU, 18 Green Lane Crescent, Yarpole, Leominster, Hereford & Worcester HR6 OBQ.

"In the notification of intention to enter, please state the section in which your project will be entered and include a very brief description of what it will be"

Sounds pretty good, and we'd guess there'll be some interesting projects published in RadCom in 1989-90!

VHF SNIPPETS:

Heard on the 14 MHz VHF net the other day - W5UN, he of the monster 32 x 17-element 144 MHz EME array, saying casually that he'd made a "small system improvement". He'd added another 16 Yagis, making a total of 48 - that's an 816-element antenna! Claims for working W5UN off the moon with a hand-held to RSGB HQ....

Late flash - ON1CAK and ON1CDQ going to Andorra between 17 and 30 July with 140W and 2 X 11-ele on 144 MHz. Callsign C30EAB, no freq info available at presstime (tnx G8MBI)

Didn't G1KDF do well from VP square as EI3VVN/P? Amazingly loud signals from this much sought-after location at the editorial QTH in early June and a large number of UK stations delighted to knock this elusive one off the "wanted" list. Nice one Bob.

Heard in one of the Es openings - "IT9*** from G1***, you're 5 and 9 in IO83, my QTH is near Bolton, I spell B-O-L-T-O-N in the county of Greater Manchester, and I'm running 100 watts from a Fox Tango 290 to a 9-element at 25 feet - the QTH here is about *** feet above sea level. Microphone back to you, good friend, how do you copy in these fine conditions? IT9*** on the island of Sicily from G1*** in Bolton, United Kingdom, over, over" Aggrieved voice on the side "He missed your mother's star sign, give it him again"

DON'T FORGET:

The RSGB's QSL Bureau is closed for the whole of this month. Please avoid sending any QSL cards to the bureau until August.

MORSE TESTS

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

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

COUNTY	TOWN OR LOCATION	DATE
Guernsey	St.Martins	04/08/88
Dumfries & Galloway	Stranraer	06/08/88
Cumbria	Penrith	07/08/88
Humberside	Goole	07/08/88
Somerset	Burnham-on-Sea	07/08/88
Greater Manchester	Cliofton, Manchester	08/08/88
Fife	Glenrothes	09/08/88
Derbyshire	Clay Cross	10/08/88
Tyne & Wear	Heaton, Newcastle-upon-Tyne	10/08/88
Suffolk	Ipswich	11/08/88
East Sussex	Hailsham	13/08/88
Hampshire	Winchester	13/08/88
Lincolnshire	Grantham	13/08/88
Greater London	Wood Green, London N22	17/08/88
Co.Durham	Great Lumley	17/08/88
Northamptonshire	Tiffield, Northampton	18/08/88
West Glamorgan	Port Talbot	19/08/88
Nottingahmshire	Mapperley, Nottingham	20/08/88
Surrey	Guildford	20/08/88
Cheshire	Macclesfield	20/08/88
Hereford & Worcester	Malvern	20/08/88
Staffordshire	Stafford	21/08/88
West Yorkshire	Leeds	22/08/88
Leicestershire	Wigston Magna	26/08/88
Dyfed	Carmarthen	01/09/88
Tayside	Kirriemuir, Angus	03/09/88
Shropshire	Telford Rally	04/09/88
South Glamorgan	Penarth	06/09/88
Cornwall	Liskeard	08/09/88
Isle of Wight	Binstead, Ryde	10/09/88
Mid Glamorgan	Rhydyfelin, Pontypridd	11/09/88
West Sussex	Horsham	11/09/88
Central	Stirling	13/09/88
Powys	Montgomery	16/09/88
Greater London	Wood Lane, London W12	17/09/88
Grampian	Scottish Convention, Aberdeen	17/09/88
Norfolk	Norwich	17/09/88
North Yorkshire	York	17/09/88
Buckinghamshire	Bletchley, Milton Keynes	18/09/88
Shropshire	Telford	20/09/88
Merseyside	Wavertree, Liverpool	20/09/88
Isle of Man	Onchan	20/09/88
Berkshire	Reading	21/09/88
Lincolnshire	Grimsby	23/09/88
Greater London	Wanstead, London E11	23/09/88
Surrey	Guildford	24/09/88
Kent	Tunbridge Wells	24/09/88
West Midlands	Sandwell	24/09/88

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

RSGB LOTTERY:

In the centre of this month's Radio Communication you will find a 4-page pull out giving details of the RSGB Lottery. In order to stimulate sales of lottery tickets further and possibly to swell the funds of your local club, we have decided to offer a cash prize of £100.00 for the highest sale of tickets in two categories as follows;

1) For the top selling club, group or society.

2) For the top selling individual.

When you have sold your tickets make a note of the ticket numbers and return the counterfoils to RSGB Headquarters. If you require more tickets to sell simply fill in the coupon in the centre-fold and enclose it with the counterfoils.

At the end of the lottery period you should submit a list of tickets sold by number to the Secretary at RSGB Headquarters and mark your envelope clearly in the top left corner with the total number of tickets sold.

BARBECUE & GRAND FUN JUNK SALE:

A few months ago we mentioned that there would be barbecues held on the Friday and Saturday evenings at the side of the Pendigo Lake, opposite the main entrance to the NEC. The barbecues will consist of a whole roast pig, hamburgers, baked potato, roll & butter and salad (cor what a blow-out) - all for the paltry and trifling sum of £7.50 per head on either night. In addition to the barbecue there will be live music, a bar and a 'Grand Fun Junk Sale' conducted by the ever-ebullient Ron Broadbent, G3AAJ (anyone who has been to last year's AMSAT Colloquium will know what we mean!). All proceeds from the junk sale will be put towards the Society's Project YEAR and we'd like to appeal to all individual members, clubs, societies and groups to donate any junk or bits and pieces which are no longer required and are taking up valuable space in the shack or clubroom - you know, the sort of thing that keeps turning up at every junk sale YEAR-in YEAR-out (arrrgh). If you've got anything which you want to get rid of, please bring it along with you or hand it to someone who you know will be at the NEC on Friday or Saturday. Items should be marked clearly with the name and callsign of the contributor and handed in to Ron at the AMSAT-UK stand. Any items from traders will also be very welcome and maximum publicity will be given to anyone who makes a donation for this event.

The bar will be open from 6pm until 10.30pm, food will be served between 6.30pm and 8.30pm, and the Grand Fun Junk Sale will commence at 8pm with music interspersed thoughout the evening. Tickets for the barbecues will be available from the RSGB stand in Hall 3a during the exhibition on Friday or Saturday. Some tickets may be available on the night.

1·9·1·3 1·9·8·8

DON'T FORGET
GB2RS
LIVE
FROM THE NEC
ON
3650 kHz
7049 kHz
14250 kHz
145.525 MHz
AT
1045 GMT/1145 BST

75th ANNIVERSARY SOUVENIRS:

ANNIVERSARY CALENDAR:

Since we started running the six-month series of sepia colour photographs on the covers of Radio Communication, we've had many requests from members for copies to frame and hang on the shack wall. A couple of months ago we mentioned that we intended to produce a calendar depicting the six photographs. The calendar will commence at July 1988 and end at December 1989 - in other words it will run for eighteen months. It is printed on high quality silk-finish paper suitable for framing with each sheet carrying three month's worth of dates, and when you've finished with the calendar itself you can chop that bit off the bottom and frame the print. They are now available from RSGB HQ over the counter or by post and if you're going along to the 75th Anniversary Convention at the NEC you'll be able to pick one up there but hurry, they're going like hot cakes! The price of the calendar is a mere £2.30 over the counter or £2.95 by post.

ANNIVERSARY TIES:

These navy blue ties are of a higher quality than our standard ties and carry the anniversary logo just below the knot. They are in a limited edition and are selling very fast. Be sure to get yours before they sell out! You can pick one up at the NEC or order direct from RSGB HQ. The cost, to members only, is £5.50 over the counter or £5.95 by post.

ANNIVERSARY BADGES:

These enamel badges depicting the 75th Anniversary logo will be in red, white and blue with gilt edges and a pin fastening. Again, they are in a limited edition and will look very smart on your lapel. The cost, to members only, is £1.95 over the counter or £2.10 by post.

ROWTON CRYSTAL:

In addition to the items mentioned above, we will also have a number of Rowton Crystal whisky tumblers engraved with the 75th anniversary logo. Like the other souvenir items, they will be in a very limited edition and may quickly become collectors items. They will be presentation boxed in pairs or singles and will be available initially from the RSGB stand at the NEC. The prices, for members only, are £7.95 each or £15.95 for a pair.

QSL CARDS:

For many years now, the Society has been looking at the possibility of producing QSL cards for members. The difficulty has always been the printing of callsigns onto individual cards but since many members now use 'Do-It-Yourself' cards we've decided to offer a special series of QSL cards depicting the very popular photographs used on recent covers of RadCom. As yet, we don't have a final price but they are likely to be around £2.25 per 100 for members only, over the counter (which we think you will find is very competetive if you compare prices). We hope to have the six different cards available in time for the NEC and we will be offering a special price to members who buy six packs to make up the set.

Helplines

RESISTOR COLOUR CODES:

We've had a couple of letters recently asking about resistor colour coding, especially with reference to the modern tendency towards 5 or 6 coloured bands instead of the old four (hands up the Clever Dick who said "what about body, tip, spot?").

The way the coding scheme works is as follows. On a four-band resistor, the first two bands give the two figures of the value, the third is a multiplier and the fourth shows the tolerance on the value. For a five-band resistor the first three bands give the value as three figures, the fourth band is a multiplier and the fifth band gives the tolerance. The coding on a six-band resistor is exactly the same as a five-band job but the last band gives the temperature coefficient of the component in parts per million per degree Centigrade. Brown is 100, red is 50, yellow is 25, orange is 15, blue is 10, violet is 5 and finally white is 1. The most common temperature coefficient band we've come across is red, which is 50 PPM/degree C.

We've received a couple of letters from G4PIJ and G4UZS concerning Gerald Marcuse, G2NM (seen on the cover of the February issue). Both correspondents have drawn our attention to a bench which is located in front of Bosham Church, about 3 miles west of Chichester overlooking Bosham Harbour. An inscription on the bench reads "In memory of Gerald Marcuse G2NM Pioneer of Empire Broadcasting" and also contains the RSGB logo. Neither members know who erected the bench or who maintains it but it appears that it has been in place for several years. Does anyone know of the origin of the bench? If so, do let us know. The photograph (above) shows Colin Dawson, G4UZS, seated on the bench.

CIRCUIT DIAGRAMS:

Mr J C James of Liverpool has written with the following information;

"In case it may be of interest to other members, like myself, interested in obtaining circuit diagrams for Continental equipmet, when not available from the manufacturer, I give the following firm whose name was given to me by a manufacturer in my quest for a circuit diagram for a Philips BD483A -

Schaltungsdienst Lange
Postfach 47 06 53
D-1000 Berlin 47
Federal Republic of Germany"

EMC - APPROACHES FROM THE PRESS:

We've just received the following from Harold Fenton, G8GG, Chairman of the Society's Planning Advisory Committee, on the thorny topic of how to handle possible approaches from the press following a planning application;

"If you have submitted a planning application for a new mast or aerial you may be approached by a reporter from your local newspaper asking you about the "how and why" of your application. He may have seen reference to your application in the list published by your local Council or have been alerted by some local party who wishes to stir up opposition. You may feel that your application is none of his business but you would be ill-advised to tell him so. If he has already had a story of some sort from an opposing person, a "No Comment" from you can't help whereas a full story could counter some of the odd things often 'credited' to radio amateurs. However, you may need a little time to get your thoughts straight and you could well ask him to call back a little later on "when you're not so busy".

"The Society's brochure "Planning - Advice to Members" suggests a letter could acccompany an application and explain the purpose and scope of amateur radio and why you want the mast/aerial etc. If you keep a copy of this to hand it will form a useful briefing sheet for you in this sort of case. Try to avoid technical jargon; avoid the word 'tower', 'mast' sounds less grandiose and 'aerial' less complex than 'antenna'. If you don't feel able to tackle the job yourself, someone at the local club may be able to help. However, if there is nobody to hand remember the reporter is not likely to be a fearsome individual; try to strike up a friendly relationship and to explain things carefully. Above all, don't try to bamboozle him with science, you may succeed and the resulting rubbish which appears in the local paper could do your case no good at all!"

All Good Stuff, as they say. Incidentally, here's a trick of the trade which you might like to bear in mind. If you want to give the reporter a bit of background information which you may not necessarily want him to publish, remember to state that it's "off the record" BEFORE launching into a long monologue. If you don't, you may inadvertently say something which would not be to your advantage. A good reporter should respect your 'off the record' request.

In Practice

"you're still a bit wide, old man"

You may remember that a couple of months ago we took a look at the perennial problem of wide SSB signals, with a few thoughts on how they originate and what to do about them. We had quite a few letters about this piece (nice to know that people read the Bulletin....) and also we had a note from Steve White, G3ZVW, of the Society's VHF Committee which more or less said "yes, but you didn't mention...." Now saying things like that to the Bulletin editor is decidedly a Bad Move. Before so much as drawing breath, Mr ZVW found himself persuaded to sit at his typewriter and write what amounts to a follow-up. Good way to make a living, this editing business; you just bully, threaten and intimidate people until they agree to write articles for you which you then publish to fanfares of trumpets, etc...

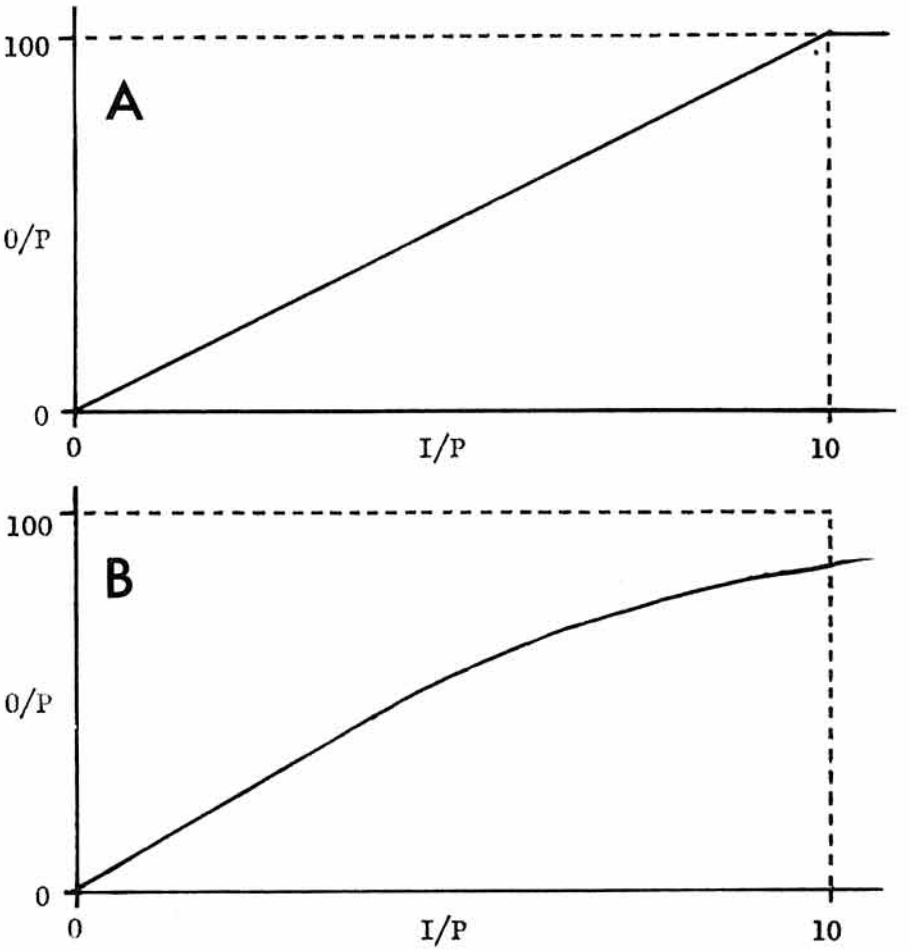
Here's Steve's words of wisdom:

> The May 1988 News Bulletin piece introduced the concept of linearity and the problems of spreading when SSB equipment is operated in a non-linear fashion. It dealt with a) the problem of how to tell another operator that his transmission sounds poor without inviting an earful of abuse and b) how to do something about it simply if you are the "offender". The article quite rightly stated that most rigs deliver more output power than the manufacturers say and that most solid-state power amplifiers need less drive, which is basically why some people splatter. The situation is compounded by the fact that good linearity and efficiency do not go hand-in-hand. Manufacturers design equipment to a specification which inevitably leads to a compromise between the two. Let's face it - if you were offered one of two 100W PAs, would you choose the one which needed a 15 amp power supply in preference to the one which required a 12 amp supply? Finally - and as stated in the previous article - your transmitter might not be very linear to start with.

What linearity is - and why you need it

> Since it is much simpler to demonstrate what linearity is than to describe it in words, take a look at Graph A. This shows the relationship between input power and output power for a mythical "perfect" 10W in and 100W out amplifier. You'll note that the relationship between input and output is a straight line right up to the point when the amplifier suddenly runs out of steam, and this means that you could call this amplifier truly "linear". Needless to say, this happy situation doesn't exist in the real world; in practice you're much more likely to end up with the situation shown in Graph B. As you can see, the line of this graph starts out as a straight line - indicating linear operation - but then it gradually starts bending, meaning that the relationship between input power and output power isn't linear any more. It's obvious that this isn't a good situation, because although the amplifier starts out being linear at low power levels it doesn't stay that way. Driving it with 10 watts won't produce a clean output - driving it with a so-called 10W rig that actually produces 12 watts will make matters even worse!
>
> How can you check whether or not your amplifier is linear? Well, one of the easiest ways of having a look at linearity - and more importantly establishing the point at which it is no longer "linear" - is to plot something called the "1dB compression point". This may sound rather grand and impossible to do without the resources of the National Physical Laboratory - actually it's dead easy. All you need is the arrangement shown in Fig 1, which basically consists of the amplifier you want to test, a variable-power RF source (many 144 MHz multimodes have a facility for varying output power on FM), a couple of power meters and a dummy load. Set it all up and then do the following -

(next page)



a) Make a note of the output power achieved for various levels of input power

b) Plot a graph of output power against input power (don't be too astonished if the result looks rather like Graph B)

c) Draw a straight line which is an extension of the straight part of the graph you've drawn

The 1 dB compression point for the amplifier is the point at which the output has fallen away by 20% compared with the straight line you extended. By way of example, look at Graph C. In the case of this amplifier the 1 dB point occurs at 5.2 watts input - at which, incidentally, the output power is 72 watts. This example was taken from real life, as we'll discuss shortly.

The VHF Committee and linearity

At both the NEC and the VHF Convention the VHF Committee provided facilities for checking the linearity of solid- state 144 MHz PAs and we invited people to bring theirs along for testing. Having plotted the input-output characteristics, we then suggested to their owners how to get the best out of them - which in some cases was rather difficult. How do you tell someone who has spent in excess of £100 that he or she has ended up with a donkey rather than a racehorse?

In our tests we used the arrangement described above - and before purist readers deluge us with letters pointing out that the ony real way of doing tests like this is with spectrum analyser and two-tone source, etc, we would say that the "1 dB compression point" method is actually a very good way of demonstrating the concept of linearity.

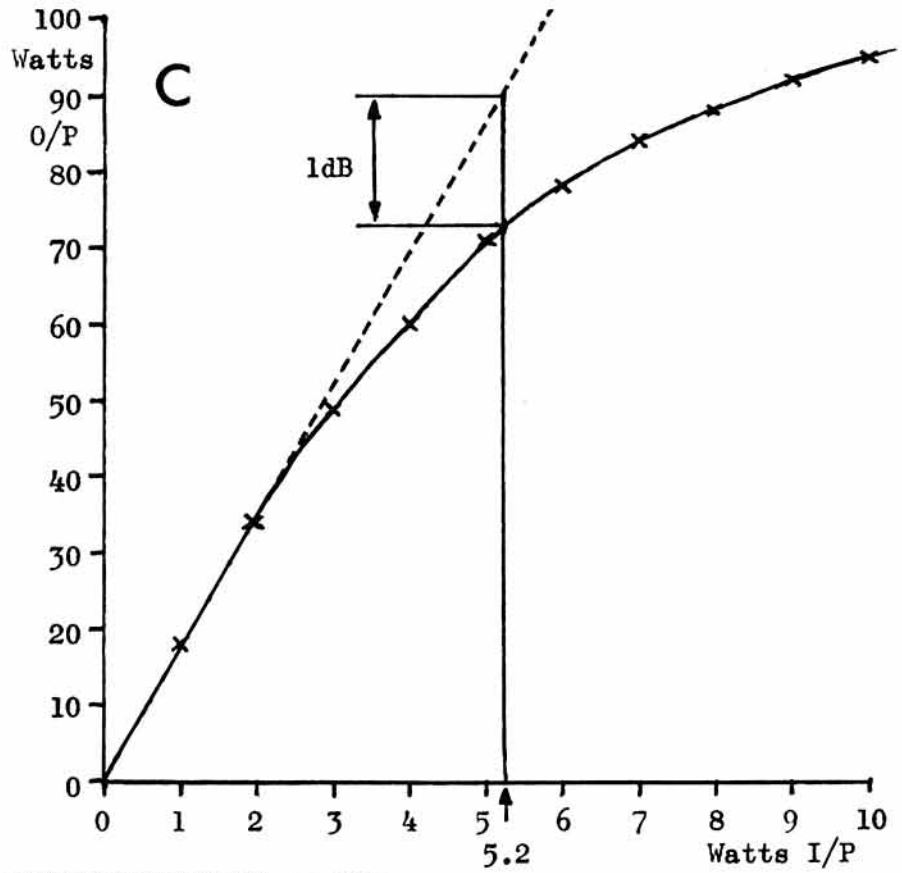
What were the results like? Of the 20 commercially-built PAs we checked which were rated at 10 watts input or less, NOT ONE conformed completely to the manufacturer's specifications! Only 4 were capable of delivering their rated output at all, and 3 were not capable of delivering more than 80% of their rated power. The average output at the manufacturer's rated input was 88%. Only ONE amplifier was within 1 dB of linearity up to its rated input - at which, incidentally, it also produced 20% LESS output than it was supposed to!

This was bad enough, but what was really worrying was linearity - or lack of it. Of the 20 amplifiers tested, the average one fell out of the "linear" category at a mere 53% of its rated output! At this fall off point, however, the average amplifier produced 71% of its rated output. In simple terms this means that a reduction of approximately 3 dB in drive level (i.e. 100% to 53%) resulted in a reduction of approximately 1 dB (88% to 71%) in output. This means that Mr Editor 'FRX was being decidedly generous in his esteemed article in May; he recommended de-rating the average solid-state PA by what amounts to 20-30% but personally I would suggest that the figure should be more like 50%. Does that sound outrageous? On the basis of our tests it isn't at all, and I make that recommendation in all seriousness. The average solid-state 100W PA ought really to be run at 50W and pro-rata.

Let me digress and tell you about two particular specimens. One was a 3W in 35W out model; this device was brought to us by a YL operator who had driven it with an FT290R and who had received complaints of splattering. We soon found out why. This so-called "3 watt input" amplifier actually required a mere 400 mW (0.4W) to drive it into non- linearity. As if that wasn't bad enough, get this. Calculations reveal that a "linear" amplifier of this type ought to produce 4.67 watts for 400 mW drive. How much did this one produce? 21 watts! To no-one's great surprise, the gain disappeared very rapidly after this point. The second example was the "amplifier" which actually gave less output for more input, although you couldn't even call it a linear attenuator.....

Having studied all the graphs we drew up, I wouldn't say that any one manufacturer's products were consistently any better or worse than any others, although I would say that there were very wide differences between different samples of identical models. This could well be down to alignment - so it might be possible to change a very bad amplifier into a not-so-bad amplifier by tweaking it. Having said that, you need the requisite test gear and some idea of what you're doing - for heaven's sake don't just delve into the thing and twiddle everything in sight to see what happens!

(cont. over)



Other pitfalls

The original Bulletin article didn't deal with a couple of things that are vitally important when it comes to linearity. One of them is contained in the equation:

RF VOX + SSB = BAD NEWS

The use of RF VOX caused serious linearity problems in some amplifiers, especially at low power levels. One particular example of this was a 3W in 30W out amplifier which actually required no less than 1W to operate its VOX! It's really much better to instal the one extra piece of wire to operate the amplifier changeover relay manually, and it's possible to do it in 99.99999% of cases. Please DON'T use the RF VOX facility unless you really have to.

The other important thing to pay attention to is the power supply for a solid-state PA. This has an enormous bearing on linearity. Even if it is fully and properly stabilised (and if it isn't you're going to be in deep trouble before you get very far) the supply voltage is absolutely critical. All our tests were conducted at 13.8V but, to mention one example, we reduced the supply to one 3W in 30W out amplifier from 13.8 to 12.0V to see what happened. The result was a drop in output from 82W to 67W for 3W input. More importantly, the 1 dB compression point fell from 1.4W to just 850 mW (0.85W). Run it like that and you'll lose friends faster than the speed of light!

DIY linearity checking

All in all, we strongly recommend that it's a Very Good Idea to check you own PA in exactly the same way as we checked those brought to us at the Conventions. This will reveal the point at which you're likely to start spreading and upsetting other band users. "Oh yes, fine", I hear you say, "we've all got a couple of Bird Thrulines with a selection of probes just sitting about the shack, no problem". Accepting that few of us can afford such luxuries, you can still sort something out. Ask all the members of your local club what kit they have access to - the odds are heavily in favour of a couple of power meters baing available, even if they're not Birds or what-have-you. It doesn't matter whether the meters you use are accurate to the last picowatt because you can make relative measurements without strictly defining the units.

We'd strongly suggest that every club ought to have an occasional "linearity checking evening", with the local technical wizard organising the proceedings. Get members who use solid-state PAs to bring them along and check them out. You might not like what you see, but I can assure you that it'll be a very rewarding experience - it'll stop the local DX barons perpetually complaining about naff signals too.....

First RSGB Data Symposium - full programme of lectures

Just before we went to press we received the lecture programme for the RSGB's first Data Symposium which will be held at Harrow School in north-west London on Friday 22 and Saturday 23 July. The full schedule is as follows;

Friday 22 July:

0845 - Registration
0945 - Opening by Mrs Joan Heathershaw, G4CHH
0955 - Chairman's briefing by Mr Ingemar Lundegard, G3GJW
1000 - "A Short History of Telegraphy" by Sam Hallas, G8EXV and Alan Hobbs, G8GOJ presented by Sam Hallas and Ingemar Lundegard.
1030 - "Overture & Beginners" by Phil Bridges, G6DLJ
1100 - BREAK
1115 - "Radio Data Services in Public Mobile Communications - an Overview" by John Pearce, C.Eng, MIEE, BScEng, ACEI, of BT Mobile Communications
1145 - "Packet Mailboxes - Who Needs Them?" by Andy Witts, G1DIL
1215 - "Commercial Aspects of Data Transmissions" by John Coll of X-ON Software Ltd.
1245 - LUNCH
1400 - "Radio Block Signalling" by L.J. Giles, Director of S&T Engineering, British Railways Board
1430 - "High Speed Linking in the Amateur Packet Network" by Ed Harland, G3VPF
1500 - "Keeping in Touch" by John Kirk, G4LPQ, VP8APQ, DA2KJ, A4XZL
1530 - BREAK
1545 - "Data Network Strategy in the UK" by Mike Dennison, G3XDV, RSGB Packet Working Group
1630 - "The Other Side of the Coin" by Gwyn Reedy, W1BEL of PAC-COMM
1700 - OPEN FORUM
1745 - Close
1830 - Syposium Dinner at the Monksdean Hotel (advance ticket holders only) for 1900

Saturday 23 July:

0845 - Registration
0955 - Chairman's Briefing
1000 - "AMPRNET" by Gareth Howell, BSc, G6KVK
1030 - "RTTY Night-Owl Theatre" by Lindsay Rohlach, G1XPB, VK3KAF
1100 - BREAK
1115 - "Packet Radio in Ireland" by Joseph Clarke, EI5CI
1145 - "Packet Systems - Which Way Now?" by Ed Harland, G3VPF
1215 - "9600 Baud Packet Radio Modem System" by James Miller, BSc, G3RUH
1245 - LUNCH
1400 - "Reconciling Legislation With Experimentation" by Mike Dennison, G3XDV
1430 - "The Packet Radio Network Configuration in DL" by Jurgen Sturhahn, DL8LE
1500 - "Amateur Satellite Communications" by Jeff Ward GO/K8KA, AMSAT-UK
1530 - BREAK
1545 - "The Application of AMTOR in the Amateur Radio Global Message Handling Network" by Peter Martinez, G3PLX, presented by Mike Dennison, G3XDV
1615 - "Packet Radio Developments in France" by Remy Jentged, F6ABJ
1645 - OPEN FORUM
1745 - Close

Just in case anyone needs to stay overnight on Saturday 23 July in order to travel home on Sunday morning, an additional 20 beds have been reserved at the Monkdean Hotel in Harrow on a first-come first-served basis. Please advise if you require a bed for the Saturday night when you arrive for registration.

see April's RadCom for full details

NEWS & VIEWS

Around the Groups

This section of the Bulletin has been expanded to include more items of interesting news from clubs, groups and societies. We are looking for the kind of news which will be of interest to other amateurs and clubs - such as special awards, DXpeditions, user groups, special interest groups, etc. In addition, we'd like to know if your club has an interesting project on the go or is doing something to encourage youngsters into amateur radio. Basically, we'd like to hear about anything which might inspire fellow amateurs and clubs to do something similar. Have a look at the items below for examples of what we have in mind.

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

The deadline for the SEPTEMBER issue is Monday 22 AUGUST, but if you can send items in earlier it would be much appreciated.

WATCH OUT FOR THESE GB75 CALLSIGNS:

GB75ER - Windsor Castle, 9-17 July
GB75AC - NEC Birmingham, 9-17 July
GB75HQ - RSGB HQ, throughout July
GB75RS - RSGB HQ, throughout 1988

All of these special 'GB75' callsigns count towards the RSGB 75 Award (see June issue for full details). In addition, there are many more GB75 callsigns active at various times during this year and, if you're not able to work one of the above stations, they will help towards the award.

GB75AC - 75 ANNIVERSARY CONVENTION:

This station will be located in the 'Terrapin' building, which is adjacent to the Pendigo lake at the National Exhibition Centre in Birmingham. Operation will be in as many bands using as many modes as possible, including packet, RTTY, AMTOR and SSTV in the appropriate sections of the bands on a 24 hour basis. The station will be open to the public during the RSGB's 75th Anniversary Convention between 15 and 17 July.

The approximate operating frequencies of GB75AC are as follows:-

3525 kHz CW
3750 kHz SSB
7025 kHz CW
7060 kHz SSB
14.025 MHz CW
14.250 MHz SSB
21.025 MHz CW
21.125 MHz CW
21.250 MHz SSB
28.025 MHz CW
28.550 MHz SSB

GB75ER - WINDSOR CASTLE:

The Burnham Beeches Radio Club will be running the special event station GB75ER adjacent to the Devil's Tower in the grounds of Windsor Castle, Berkshire, by gracious permission of Her Majesty the Queen. The station will be open to visitors from 9am until the Castle closes in the evening. Operation will be in the HF bands from 80m-10m and on 144 MHz during the daytime and early evening with the possibility of some late evening or nightime operation later in the week. In addition, there will be a packet radio mailbox active in the 2m band which will provide a regular bulletin board giving details of the operating schedules etc.

GB75HQ & GB75RS - RSGB HQ:

These two station are located at RSGB Headquarters in Potters Bar. GB75HQ will be active during this month only, whereas GB75RS is active throughout the year. Visitors to RSGB Headquarters Open Days on 19, 20 and 21 July may have the opportunity of operating GB75HQ provided that they bring their current amateur licence along with them. GB75HQ will be active on as many bands as possible and may be found on or around any of the following frequencies;

3525 kHz CW
3750 kHz SSB
7025 kHz CW
7049 kHz SSB
14.025 MHz CW
14.250 MHz SSB
21.025 MHz CW
21.250 MHz SSB
28.025 MHz CW
28.550 MHz SSB
50.550 MHz SSB
144.250 MHz SSB
145.525 MHz FM
432.250 MHz SSB

However, the exact times and modes of operation will depend on the availablity of operators.

FAMILIES AND ACTIVITIES DAY:

The RSGB 75th Anniversary 'Families and Activities Day' is Sunday 24 July and, as we went to press, we knew of only a few clubs which had an activity planned specifically for the event.

GB75GRS - GRAFTON RADIO SOCIETY:

The Grafton RS will be running the special event station GB75GRS from Parliament Hill Fields in Hampstead, north London and would like to extend an invitation to all local or visiting amateurs, shortwave listeners and their families to join them for a picnic. If you'd like to go along just take your picnic baskets anytime between 12 noon and 4pm. Amateur radio operation will commence at 11am running through to 5pm, in the HF bands from 10m to 80m and in the 2m and 6m VHF bands.

GB75ISS - IPSWICH SOUTH SCOUTS:

The Ipswich Radio Club regularly operates special events stations at the request of local organisations using the callsign GB2IRC. A friend of the Club Secretary has recently been appointed Assistant District Commissioner for Scouts for the Ipswich South District of Suffolk and he approached the club with a view to introducing his scouts to amateur radio. As this coincides with the RSGB 75th Anniversary and the launch of the Y.E.A.R. '88 project, a special effort was called for and the club decided jointly to run a weekend camp during which the scouts could complete their training for the Communicators' Badge. To ensure that each scout is able to have adequate personal tuition, the number of entrants for the badge is restricted to 25 but other scouts and members of the public will be most welcome to come along and find out more about amateur radio.

The camp will be held over the weekend of 23/24 July and will be located at the headquarters of the 1st Claydon Scout Group in Claydon, Suffolk (locator JO02NB, WAB TM14). Operation will commence on the Saturday afternoon and run to the Sunday evening, mainly in the HF bands but with some operation in the 2m band. During the daytime activity will be primarily in the

80m and 40m bands but come the evening, the higher bands will be used to good effect.

GB75LCS - LAMBETH COUNTRY SHOW:

The Crystal Palace & DARC will be running the special event station GB75LCS on 23 and 24 July at the Lambeth Country Show in Brockwell Park, Herne Hill, south-west London. As well as the station, the club will be putting on a display of amateur equipment which has seen service during the last 75 years. All are welcome to visit the station which can be found by heading towards the mansion on top of the hill.

JOTA COUNTDOWN:

Last month we mentioned that the United Kingdom Jamboree On The Air Team had compiled a very useful "Calendar of Preparations for JOTA" designed to help Scout Leaders and radio amateurs plan for this year's JOTA, which will be held over the weekend 15/16 October. Copies of the calendar can be obtained by sending a large stamped addressed envelope to:-

UK JOTA Team
The Scout Association
Programme & Training Dept.
Gilwell Park
London E4 7QW

However, if you've not yet sent off for a copy, here's what to do during August;

Scouts:

a) Write to the UK JOTA Team (at the address above), enclosing a large stamped addressed envelope and request the latest JOTA information and report forms.
b) Consider if your proposed JOTA station warrants being opened officially by a Civic or Scouting dignitary or personality etc, and make the arrangements if appropriate.

Amateurs:

a) Inform Scout Leader of the allocated callsign on confirmation from the RSGB.
b) Liaise with Scout Leader on the design of special QSL cards.

WAB NEWS:

Over 100 members attended the 1988 AGM of the Worked All Britain Awards Group at the Drayton Manor Rally on 8 May, and 36 trophies were presented for achievement at the higher stages of the award.

The first VHF Honour Roll Trophy for working 2,000 areas on 144 MHz SSB was presented to G1NUS. Dave Brooks, G4IAR, the WAB Awards Manager, reported that 1,690 awards had been issued during the previous year and, although this is a drop of 18% on the previous year, the new 50 and 70 MHz bands were well represented. There was also an encouraging increase in the number of claims from overseas. Dave paid tribute to the good work being done by GW0ECO/K5 in spreading the word in the United States. In recognition of his efforts, GW0ECO/K5 was awarded the Founders Memorial Trophy.

The West Kent Amateur Radio Society held its 40th Anniversary Dinner at the Spa Hotel in Tunbridge Wells on 9 April. The principal guest, Sir Richard Davies KCVO, CBE, C.Eng, FIEE, G2XM, President of the RSGB (left), was greeted by Mr Hugh Richards, President of the West Kent ARS (2nd left). Other guests included the Mayor, Cllr. David Kirby and Mrs Evelyn Kirby.

GB2HCC - HERSTMONCEUX CASTLE:

Herstmonceux Castle in East Sussex is the former site of the Royal Observatory and during the weekend 8-10 July the Grafton RS will be running the special event station GB2HCC at a large Arts & Crafts Fair to be held in the grounds of the castle. Operation will begin on the Friday evening until late and will recommence at 9am on Saturday running through to 4pm on Sunday in the HF bands from 10m to 80m and in the 2m and 6m VHF bands.

RAIBC NEWS:

The Radio Amateurs' Invalid and Blind Club would like to thank all those who helped out at this year's Romsey Picnic on 22 May and who gave members such a wonderful day's enjoyment. The event raised £350 for RAIBC funds.

Members of the RAIBC Committee will be in attendance at many of the rallies this summer and will be at the RSGB 75th Anniversary Convention at the NEC in force.

This year's Annual General Meeting will be held at the RSGB Mobile Rally at Woburn Abbey on 7 August and it is hoped that as many members as possible will attend since there will be a number of extremely important changes proposed to the Constitution including a discussion concerning Charity registration and the Committee elections.

GB2RNL - ROYAL NATIONAL LIFEBOATS:

This station will be active between 28 and 31 July from the Headquarters of the Royal National Lifeboats Institution in Poole, Dorset to coincide with the RNLI Open Days on 30 and 31 July.

Unfortunately the station will only be active in the HF bands and the operators send their apologies in advance to class B licensees. GB2RNL can be found on the following frequencies;

3550 kHz CW
3750 kHz SSB
7025 kHz CW
7050 kHz SSB
14.075 MHz CW
14.250 MHz SSB
21.075 MHz CW
21.250 MHz SSB
28.075 MHz CW
28.500 MHz SSB
..... all +/- QRM.

A special QSL card will be available on receipt of a stamped self-addressed envelope (overseas send a self-addressed envelope and 2 IRCs) to:-

Malcolm A Williamson, G0EGA
21 King Alfred Avenue
Bellingham
London SE6 3HT

Although the RNLI is totally funded by private donations to mauntain its fleet of lifeboats and pay for its buildings and staff, please note that the receipt of a QSL card is NOT dependent on a donation being sent. However, if you would like to make a donation to RNLI, please make cheques, postal orders or international money orders payable to "RNLI" and send them to:-

Mr Peter Holness
c/o RNLI HQ
West Quay Road
Poole
Dorset
England

In both cases, please mark your envelopes "GB2RNL".

TV75RS:

We were really pleased to hear about this one! The Radio Club Genista in France, callsign FF6KNN, has a high proportion of RSGB members and as part of our 75th Anniversary celebrations, the club has applied for and been issued with the special callsign TV75RS. The station will be located just outside Montpellier (locator JN13WO) and will be active between 11 and 17 July mainly in the 80m, 40m and 20m bands alternating between SSB and CW. Operating times will be between 0500 and 2200 hours UTC with the possibility of some operation outside those times.

The club hopes to contact as many RSGB members as possible and all contacts will receive a special QSL card.

HOLIDAYING ON THE ISLE OF WIGHT?:

Then why not visit the TWO (yes, two) Wireless Museums on the island? One has been at Arreton Manor near Robin Hill for the pat decade and has been visited by thousands of holiday-makers. Now there is a new one at Puckpool Park on the Ryde to Seaview coast road and only half an hour's walk from Ryde.

Both museums are under the direction of the Communications and Electronics Museum Trust and are open every week-day from Monday to Friday. Incidentaly, the new museum at Puckpool has free admission.

Interested? If so, further details can be obtained by telephoning the Curator, Douglas Byrne, G3KPO/GB3WM on Ryde (0983) 67665 or 616503.

THE COLOSSUS AWARD:

Dimitris, SV5ADM, has just sent us details of the Colossus Award which is run by the Rhodes Amateur Radio Club for contacting stations on the island (SV5). The rules for the award are as follows:-

1) The award will be issued to radio amateurs and shortwave listeners.
2) Each claim must be accompanied by a list of confirmed contacts or reception reports with details of callsign, band, mode and signal report.
3) Each list must be accompanied by a statement from the applicant's National Society or two radio amateurs other than the applicant certifying that the QSL cards for the contacts claimed are in the possession of the applicant. Alternatively, all QSL cards should be submitted.
4) A fee of 10 IRCs or $5.00 US will be charged per award with an additional 2 IRCs or $1.00 US for air-mail delivery regardless of the number of awards claimed.

Awards are available as follows:-

WCA - Worked Colossus Award

For confirmed contacts/swl reports on 10m, 15m and 20m bands.

or

For four confirmed contacts/swl reports on any of the five HF bands.

WSCA - 'Special' Colossus Award

For two confirmed contacts/swl reports on any band as well as one QSL card from the club station SV5JK.

WCWCA - Worked CW Colossus Award

For two confirmed contacts/swl reports for CW on any band.

SV5CA - SV5 Colossus Award

For having contacted or heard but not confirmed four stations on any one band.

All correspondence should be sent to:-

SV5ADM, Award Manager
PO Box 329
Rhodes, GR 85100
Greece

The photograph (below) shows some members of the Rhodes Amateur Radio Club with SV5ADM top right.

NEW EMC KIT & 430 MHz FILTER:

The RSGB's EMC Committee has just finished testing a new high-pass filter, type No. HPF6, made for the RSGB by AKD. This new filter has an insertion loss of around 2dB on bands IV and V and is designed to reduce breakthrough of all frequencies below 440 MHz coming down the inner of a TV set's coaxial antenna lead. It is a 6-section filter made to a tight specification and the cost by post is £14.75 for members and £17.35 for non-members including VAT and postage. The EMC Committee feels that this new filter fills a long-standing need for one which would kill all coaxial inner break-through problems in one go -

and although we accept that it's a touch on the expensive side, its use may be highly desirable in many installations. Note, however, that there is NO braid-breaking action - so if braid filtering is required a BB1 braid-breaker or ferrite rings with the appropriate number of turns through them should be used on the down-lead.

The Society will shortly be releasing a new EMC filter kit, the RFK1, with a selection of the most appropriate filters for use in reducing break-through to TV and FM radio installations. The new kit, chosen by members of the EMC Committee for exclusive supply to the RSGB, will sell at the same price as the DK1 filter kit, ie. £41.51 for members and £48.83 for non-members over the counter or £43.35 for members and £51.00 for non-members by post. It will omit six filters that are either only rarely used or which have no connection with amateur radio. This has allowed for the inclusion of two pairs of ferrite rings, the new 6-section HPF6 high-pass filter and the doubling-up of the HPF1, HPF5 and BB1 filters. Enclosed with the kit will be order forms to assist clubs with ordering filters to keep the kit replenished as well as instructions and reprints of some EMC articles.

Both the kit and the new 6-section filter should be available at the 75th Anniversary Convention in mid-July.

LINCOLN CENTURY AWARD:

Although this award originated in 1969 and some 75 awards were made, it has not been promoted for several years.

The award is open for operation on all bands by all classes of operator including shortwave listeners and may be gained through interest and perseverance rather than the need to winkle out mega-rare once-in-a-lifetime stations. A slight revision to the original rules has been made because of the advent of new bands and the changing ratio between class A and B licensees but the general format is similar to that published in 1969. The present rules are as follows;

General rules:

1) The award is available to licensed amateurs and shortwave listeners.
2) A list showing full details of the contacts made should be certified by two other licensed amateurs.
3) Contacts must be made from the same location.
4) Contacts via satellites or repeaters are not valid.
5) The award is issued for any permitted mode.
6) All bands may be used.
7) Claims for contacts above 50 MHz should be single-band.
8) The fee for the award is £1.00 Sterling or 5 IRCs.
9) The address for application is:-

The Secretary
Lincoln Shortwave Club
Pinchbeck Farmhouse
Mill Lane
Sturton-by-Stow
Lincoln LN1 2AS

Requirements:

1) Contact with Lincoln cities and counties throughout the world.
2) Classes of Award:-
   A - 500 points
   B - 400 points
   C - 300 points
   D - 200 points
   E - 100 points
3) Point values:-
   Lincoln Shortwave Club stations G5FZ or G6COL - 30 points.
   Any station in the City of Lincoln, England or any other town or city in the world with the name Lincoln - 20 points.
   Any station in the county of Lincolnshire, England or in any Lincoln County in the USA - 10 points.

TRADE TALK:

muTek RIDES AGAIN?

As befits any publication emanating from this august institution, the Bulletin's crystal ball has the lowest noise temperature of any in the business. A little weak signal fluttering away just above the noise suggests that the late and much-lamented British company muTek - originated by Chris Bartram, G4DGU, who wrote a piece about what happened to the company for the Bulletin some time ago - might just be resurrected. Sources close to muTek, as the saying goes, confirmed that "....muTek might well ride again" and that discussions were in progress, and our own sources suggest that there's a very good chance indeed of the great name being seen anew. Watch this space.....

NEW COMPANY NAME:

As from 1 May this year, the Earlestown branch of A.R.E. Communications Ltd separated from its parent company and is now known as Amateur Radio Communications Limited. The company trades at 38 Bridge Street, Earlestown, Newton-le-Willows, Merseyside and the telephone number is 09252-29881.

OSCAR 13 - LOOKING GOOD:

The newest Orbiting Satellite Carrying Amateur Radio - OSCAR 13 - was launched successfully at 1119:04.33 UCT on Wednesday 15 June from Kourou in French Guiana by an Ariane rocket. The countdown was heard by UK amateurs direct from the launch site via the AMSAT-UK net on 3780 kHz. After a few hours, at 1406 UCT, AMSAT colleagues in South Africa reported hearing the beacon signal loud and clear on 145.812 MHz, indicating that the satellite had been successfully deployed from its container. It was another four hours before the beacon was heard in the UK as the satellite came over the horizon at 100 degrees easterly to the UK.

During the next few weeks the Command Teams across the world will adjust, monitor and advise on the state of the satellite and it is important that NO attempt is made to access the satellite for any reason until the go ahead is given. If any attempt is made it could put paid to precise ranging tests and put back the operation of OSCAR 13 for many weeks or possibly cause serious and irreparable damage.

OPERATIONAL ON 18 or 24 MHz?

There appears to have been some confusion in recent months over the UK licence conditions covering access to the 18 and 24 MHz WARC bands. At present, British amateurs are restricted to CW only, 10dBW power (ie 10 Watts) and a horizontally polarised antenna with no more than 0 dB gain over a half-wave dipole.

Now as it happens, the Region 1 Band Plan shows a phone section on each band. BUT - here's the catch - this is only applicable in countries where phone operation is permitted by the licensing authority. It is anticipated that phone operation and higher power levels will be permitted at some time in 1989 when existing users complete their transfer to other frequencies. In the meantime, UK amateurs must ensure that they operate in accordance with UK licensing conditions as shown in the schedule of their licence.

RSGB ANNUAL MEETING - 1986:

The minutes of the AGM, EGM and notes from the open forum which took place on 6 December 1986 were published in the March 1987 issue of Radio Communication. A sheet detailing subsequent corrections to the minutes and notes is available on request from the Secretary's Office at RSGB Headquarters.

NEWS & VIEWS

Events Diary

CLUB NEWS

In an attempt to reduce the number of pages previously used for Club News, we are using a more abbreviated format listing clubs alphabetically under counties and giving the date and subject of the meeting. As in GB2RS, natter nights and committee meetings are not listed. The full details of when and where clubs meet, the frequency of meetings, the contact person and telephone number will be published twice yearly in the UK Callbook and Radio Communication. However, any changes to these details or details of any new clubs, will be included in the list below. If news is received by the published deadline, it will appear in the listing. It is your responsibility to ensure that items are sent to HQ in good time, either direct or via your RLO. News items should be sent in writing, preferably typed or written legibly, and be signed by the club secretary or the person responsible for publicity.

Co ANTRIM:
* Ballymena Radio Club - 7, 3rd quarterly business meeting.

AVON:
* Bath & DARC - 6, DF hunt; 20, HF activity night.
* Bristol RSGB Group - 25, lecture "The BBC's HF Transmitting Stations" by Henry Price, BBC Eng Dept, London.
* North Bristol ARC - 8, lecture "Trip to New Zealand" by G3ECS; 9, GB75PYC at Pyramid Youth Club; 15, lecture "GB3ZZ" by by Severside TV Group; 22, 80m activity night; 29, preparation for demo station; 30, demonstration station at Filton Library.
* South Bristol ARC - 6, lecture "Visit to Indonesia" by GODRX; 13, HF activity night; 20, 2m activity night; 27, 70 cm activity night.
* Thornbury & DARC - 12, TVI night.
* Weston-super-Mare ARS - 11, annual DF hunt; 25, constructors night.

BEDFORDSHIRE:
* Shefford & DARC - 21, Club Barbecue.

CAMBRIDGESHIRE:
* Cambridge & DARC - 1, contest briefing &talk by Mike Wise GOCPX; 3, 4 VHF NFD; 8, contest review; 15-17, RSGB National Convention; 15, Informal; 22, lecture " ? "by Roger Whitehead; 29, Informal.

CHESHIRE:
* Chester & DARS - 12, Visit to BICC; 19, Barbecue.
* Ellsmere Port & DARS - CORRECTION, meets alternate Mondays.

DERBYSHIRE:
* Derby & DARC - 6, Junk sale; 13, night on the air; 20, Ambulance commmunications - Alan G8SSI; 27, Weather FAX reception techniques - Reg G8UQP.

DEVON:
* Exmoor RC - 28, DF hunt.
* Exeter ARS - 11, Construction contest.

DORSET:
* South Dorset RS - 5, DF hunt; 22, Annual Barbecue.

EAST SUSSEX:
* Brighton & DARS - 6, GB2SMR on the air; 20, Rally debriefing.
* Southdown ARS - 2, VHF NFD; 4, Barbecue, RGO social club; 10, Sussex mobile rally; 16/17, GB2SAR activity week-end; 30, Club members VHF contest.

ESSEX:
* Braintree & DARS - 4, Jim GoDJB. ATU manufacture - "A team construction project; 18, Rob G8ZHF. UHF & VHF - Contesting.
* Loughton & DARS - 1, Formal - Rainbow and dove field week-end Planning night (PROVISIONAL); 9/10, Rainbow and dove field week-end; 15, Informal, Formal - night on the air with 6 metres using club callsign G4ONP.
* Southend & DRS - 1, lecture "From head to tail" - training with guide dogs by Joe, G1SSE, and his XYL Linda; 8, lecture "Electronic facsmile and the Wefax system" by Mr R Cobbold ,G8CKW; 15, lecture "Weather and Propagation" by TV Weatherman Jim Bacon, G3YLA.

GREATER LONDON:
* Acton, Brentford & Chiswick ARC - 19, lecture "Direct Conversion Receivers & Their Problems".
* Civil Service ARS - 4, lecture "INMARSAT organisation" by Chris GOFDZ; 18, Plannning for 144Mhz Low Power Contest.
* Edgware & DARS - 14, lecture "Test Equipment"; 28, station on the air.
* Kingston & DARS - 20, Measurements and Techniques by club members.
* Southgate ARC - 28, lecture "Dr DX (computer program).
* Sutton & Cheam RS - 15, First Aid for the radio amateur (tentative).
* Wimbledon & DARS - 8, 'RAYNET' by G4SYT and G1ADW; 29, Annual Camp Organisation meeting; 30, Annual Camp.

GREATER MANCHESTER:
* Eccles & DARS - 5, lecture "ZX81 interfaces",G8KRG.
* South Manchester RC - 1, Preparation for the VHF field day and discusssion night; 8, lecture "A home brew Spectrum analyser" by Mr I. Butterworth, G4BZO; 15, Preparation for Gala Day on 16th July.
* Stockport RS - 13, lecture "Going for class A" by GOCMM; 27, lecture "Hidden stations" by Dave Hotland.

GWENT:
* Blackwood & DARS - 1, Video; 8, Inter club Quiz with members of Newport ARS.
* Meirion ARS - 7, Club foxhunt and Lecture "Wartime Clandestine radio" by Alan GW3INW.
* Newport ARS - 4, Open evening Eistedford; 8, Inter club Quiz at Blackwood; 11, Fire prevention a talk by Newport F.P.O.; 18, Free night end of club year.

HAMPSHIRE:
* Basingstoke ARC - 4, Advanced receiver techniques by G3TDR.
* Fareham & DARC - NEW SECRETARY, Bob Reeves, G8VOI.
* Hampshire RLO - 7, "Amateur Radio Awards" by Mike G3JFF; 8, PCB design using CAD; 17, Barbecue at Farley Mount; 20, Lecture "Nuclear Waste Disposal" by Chris Kaye CEGB.
* Horndean & DARC - 7, "Amateur Radio Awards" by Mike G3JFF.

HERTFORDSHIRE:
* Cheshunt & DARC - 13, Police - security in the home; 27, Portable on Baas Hill.
* Stevenage & DARS - 5, Foxhunt; 18/22, GB75JHN Special event from the John Henry Newman School.
* Verulam ARC - 12, On air; 26, DX eyeballs B.Caines G4PAY.
* Welwyn-Hatfield ARC - 18, Foxhunt.

HUMBERSIDE:
* Goole R&ES - 1, VHF NFD Kit check; 8, Log fill; 15, Visit to Goole ATV Repeater site; 22, Technical project evening; 29, Social evening (Black Swan).

KENT:
* Hilderstone RS - 30, Mobile Rally and Convention at Hilderstone college.
* SE Kent (YMCA) ARC - 2, Special event station at Dover Castle; 13, Lecture "Workings of the Kent Repeater Group GOAMZ; 27, Lecture "The work of the Kent Coast Monitors" by David harding GODQI.

LANCASHIRE:
* Central Lancs ARC - 4, Lecture "Antennas" G4YSN
* East Lancs ARC - 5, Foxhunt.
* Fylde ARS - 5, DF Foxhunt; 19, Informal meeting.
* Preston ARS - 14, "Antenna Forumn"; 28, Pre-rally meeting.
* Wyre ARS - 6, Barbecue; 13, Surplus sale; 16/17, Special event at Great Ecclestone Show; 27, Social.

LEICESTER:
* Leicester RS - 4, HF/VHF night on the air; 11, Committee meeting,HF/VHF activity night.

LINCOLNSHIRE:
* Lincoln SWC - 6, on air,activities,RAE tuition,CW practice; 13, Lecture "CD players" by Reg Coaker G6DHL; 20, on-air, activities, hamfest meeting; 27, Illustrated talk "Lincolnshire Police Underwater Search Unit" by constable D. Mears.

MERSEYSIDE:
* Liverpool & DARS - 5, Antennas and Propagation G4DKQ; 12, Open night; 19, VHF and inquest; 26, Quiz V's Ellesmere port.

MIDDLESEX:
* Edgware & DARS - 14, Informal; 28, Test equipment evening.

NORFOLK:
* Norwich ARC - 6, A 2/3 hour conducted tour around Norwich by Ken Mould G4HSR.
* Yarmouth ARC - 2/3,VHF NFD field day; 7, Quiz contest G3OEP; 14, Informal; 17, Low power field day; 21, Informal; 28, Computers in Ham Radio G3YYQ.

NORTH YORKSHIRE:
* York RC - 6, Lecture "Shock" by St John's Ambulance; 13, On the air G1-4YRC; 20, Summer DF hunt; 27, Social/Open night.

NOTTINGHAMSHIRE:
* Worksop ARS - 5, Lecture "The Sauce" by Kevin G4MDQ; 19, Lecture "A visit to China" by G3RKL; 31, Scarborough rally.

OXFORDSHIRE::
* Oxford & DARS - 24, Activities day, combined celebration of RSGB 75th anniversary and Oxford & DARS 65th anniversary. Activities include Barbecue/Picnic together with weekend of radio activities, using club callsign C5LO. Members of public welcome.

POWYS:
* South Powys ARC - 5, Demonstration of an HRO receiver.

SHROPSHIRE:
* Salop ARS - 3, foxhunt (3rd qualifier for club trophy); 14, Lecture "Aerials for small gardens" by G3BA; 28, HF Special event station on air.
* Telford & DARS - 6, Construction/Morse classes; 13, Contest planning; 20, TVI problems? G3UKV; 27, Summer Barbecue.

SOMERSET:
* Yeovil ARC - 7, Club visit to Hinkley Point; 14, Barbecue at Ham Hill; 21, Lecture "Oscillators" by G3MYM.

SOUTH GLAMORGAN:
* Barry College of FE RS - 14, Video film presentation (DX-pedition to VPS Land); 16, Coach trip to NEC Birmingham.
* BT South Wales DARC - 2, Special event station for the Coryton Charity Fete; 13, Equipment test night. Come along and get your equipment tested by the DTI.
* Cardiff RSGB Group - 10, Special event station GB75CC. To commemorate the 75 years of the RSGB and also the 75 years of the Cardiff RSGB Group.
* Rhondda ARS - 7, "Fire in the Shack!" by C. Ryalls GW1VGS.

SOUTH YORKSHIRE:
* Maltby ARS - 1, Project corner; 8, 3 short talks by 3 members; 15, Activity & on the air night; 22, Life after Amateur Radio - a look at the other hobbies; 29, Treasure hunt.

SUFFOLK:
* Felixstowe & DARS - 11, Social; 16, Minibus trip to the RSGB convention at the NEC Birmingham; 25, Lecture by Neville Pattinson G8ETN.
* Ipswich RC - 13, Report on the 1988 ESWR and arrangements for demonstration on Suffolk Constabulary on 17 July; 27, 2m DF hunt.

SURREY:
* Thames Valley ARS - 5, Howes Kits Lecture.
* Dorking & DARS - 26, Devil's Dyke portable activity VHF.

WARWICKSHIRE:
* Atherstone ARC - 11, DF hunt 2.
* Mid-Warwickshire ARS - 12, Simple antenna experiments GOGLU.
* Rugby ATS - 5, 2m DF usual rules contact G8TWH QTHR; 12, Lecture "Stereo Television" by Mr. Robinson of the BBC; 19, Activity night, members are invited to operate the club station; 26, 2m DF usual rules contact Q8TWH QTHR.
* Stratford-upon-Avon & DARC - 11, Lecture "Computing in Amateur Radio" by Clive Ousbey GOCHO, Jeremy Faulknercourt GOCDO, Charles Bottoms G4PIP; 25, Closing meeting - judging of members projects.

WEST MIDLANDS:
* Coventry ARS - 1st night on the air and Morse Tuition/Preparation for VHF NFD.
* Midlands ARS - 19, Lecture "Photography" by Tim Jebbett GOGPZ.
* Stourbridge ARS - 20, Main meeting - Visiting

Events Diary

Lecturers. G1WNZ tel: 021-444 1681.
* Wolverhampton ARS - 5, Committee meeting; 12, Junk sale; 19, Night on the air; 26, Club project.
* Wordsley RC - 21, Lecture "Evolution of Space Probes" by Simon C4YPX.

WEST SUSSEX:
* Horsham ARC - 7, PO Box 88 (USSR QSL Bureau) by Al Slater G3FXB.
* Mid-Sussex ARS - 7, Demonstration; 21/28, Marle Place Closed.

WEST YORKSHIRE:
* Halifax & DARS - Summer open forum.
* Keighley ARS - 26, Visit to Police Operations room & Museum Bradford.
* North Wakefield RC - 7, Power supplies by G4RCH; 14, On the air; 21, visit.
* Pontefract & DARS - 7, Lecture "Amateur Radio Awards" by Dave G4OSY;28, on the air night.
* Todmorden & DARS - 4, Treasure hunt for G4HYY Trophy.
* Wakefield & DRS - 5, Visit by RSGB RL073 Rick G4BLT (chairman).

WILTSHIRE:
* Chippenham & DARC - NEW SECRETARY, J Barrington G4ZUV.

DEADLINE - Items for inclusion in the SEPTEMBER issue must be sent to HQ marked "Club News - Bulletin", and be received by Wednesday 20 July latest.

MOBILE RALLIES

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

10 JULY
* Worcester & DARC Strawberry Rally - Droitwich High School. Trade stands, bring & buy, family entertainment, trips to Strawberry fields (weather permitting). Details Steve, tel: 0905-424151.
* Sussex Mobile Rally - Brighton Racecourse. Opens 10.30am, trade stands, large bring & buy, bar and restaurant. Attractions for the whole family. Details Bob G1IOS, tel: 0798-43841.

24 JULY
* McMichael 88 Rally - Haymill Centre, Burnham, nr Slough. Details Bob G0BTY.
* Anglian Mobile Rally - High Woods Sports & Leisure Centre, Severalls Lane, Colchester. *CHANGE OF DATE* Opens at 10am and features all the usual traders, bookstall, raffle, bring & buy, catering. Talk-in on S22 by G4CRA. Details G6HQI, tel: 0206-862403.

28-31 JULY
* AMSAT-UK Colloquium - University of Surrey, Guildford. (See box for details)

30 JULY
* Hilderstone Radio Rally - Hilderstone College, St.Peters Road, Broadstairs, Kent. Details David, G1YOR, tel: 0843-587170.

31 JULY
* Scarborough ARS Rally - The Spa, Scarborough. Opens at 11am, talk-in on S22, SU8 and via GB3NY. Details Ian G4UQP, tel: 0723-376847.

7 AUGUST
* RSGB MOBILE RALLY - Woburn Abbey, Bedfordshire. Traditional Mobile Rally held in large marquees. Most of the country's major equipment and component dealers, flea market, many attractions for the whole family including the Abbey and grounds, Safari Park etc. Easy access from A5 and M1. Good on-site catering, bar and snacks. No charge for rally but entrance fee charged by Woburn Abbey to cover car parking. Details RSGB HQ. Trade - Norman, G3MVV tel: 0277-225563 (daytime).

14 AUGUST
* Derby Rally - Lower Bemrose School, Derby. All the usual traders and attractions, large flea market. Monster Junk Sale from 1.30pm. Refreshments all day, talk-in on 2m FM. Details Martin, G3SZJ tel: 0332-556875.
* Flight Refuelling Hamfest '88 & Craft Fair - Merley, near Wimborne, Dorset. *CHANGE OF DATE* Opens 10am and features usual traders, bring & buy, craft fair, entertainment for the whole family, refreshments. Details John G0API, tel: 0202-691649.

21 AUGUST
* Red Rose Rally - Bolton Sports & Leisure centre, Silverwell Street, Bolton. Details David G1IOO, tel: 0204-24104, evenings.
* Newbury & DARS Amateur Car-boot Sale - Acland Hall & Recreation Field, Cold Ash, Newbury, Berks. Opens 10am, some traders indoors, refreshments, car-boot pitches available in advance or on the day, talk-in on S22 by GB4NBS. Details Mike G3VOW, tel: 0635-43048.

28 AUGUST
* Torbay ARS Rally - STC Social Club, Brixham Road, Paignton, Devon. Details G3KZJ.
* BARTG Rally - Sandowm Park Race Course, Esher, Surrey. Opens 10.30am, many trade & display stands, car-boot sale, full on-site catering, ample free car parking. Talk-in on S22 and SU22. Provides a good mix of interests for RTTY/Data enthusiasts as well as something for all amateurs. Details Peter, G8VXY tel: 021-453 2676. MBX: 219995485.

4 SEPTEMBER
* 21st Preston ARS Rally - University of Lancaster. Opens at 11am (10.30am for disabled visitors). All the usual trade stall, large bring & buy, club and repeater group stands, *RSGB bookstall*, bar, snack bar and restaurant. Lucky programme draw for colour TV. University is on the A6 road, 3 miles north of M6 junc 33. Free car parking. Details Godfrey G3DWQ on 0772-53810.
* Telford Radio Rally & Exhibition - Telford Racquet Centre. Opens at 11am (10.30am for disabled visitors) all the usual traders and attractions. Talk-in on S22 by GB75TRC. Details Martyn G3UKV tel: 0952-55416.
* 5th National Amateur Radio Car Boot Sale - The Shuttleworth Collection, Old Warden Aerodrome, nr Biggleswade, Beds. Details Tony GOCOQ.

10 SEPTEMBER
* Wight Wireless Rally - The Wireless Museum, Arreton Manor, Isle of Wight. Opens at 1pm, bring & buy surplus sale, cafeteria, Wireless Museum open, attractive gardens. Talk-in on S22 by G3IOW and via GB3IW. GB3WM on the air on 3700 kHz. Details G3KPO, tel: 0983-67665.

11 SEPTEMBER
* Lincoln Hamfest '88 - Lincolnshire Showground, 4 miles N of Lincoln on A15. Opens at 10.30am, all the usual trade stands, large bring & buy, *RSGB stand*, real ale bar, refreshments inside and outside hall, many outdoor/indoor attractions for the whole family, caravans welcome by arrangement. Talk-in on S22 by West Lincs Raynet. Details John G8VGF, tel: 0522-25760.
* Vange ARS Rally - Nicholas School, Leinster Road, Basildon. Opens 10am, usual traders and attractions. Talk-in by GB4VMR. Details Alan G4OJN, tel: 0277-624386.

17 SEPTEMBER
* Scottish Amateur Radio Convention - Aberdeen Exhibition & Conference Centre, Bridge of Don, Aberdeen. All the usual traders and attractions. Details Graham GM8FFX, tel: 0224-630526.

18 SEPTEMBER
* Bristol Radio Rally - Brunel's Great Train Shed, Temple Meads Station, Bristol. Large trade area. Details Dave G4WUB, tel: 0272-839855.
* Peterborough E&RS Rally - Wirrina Sports Stadium, Bishops Road, Peterborough. Trade stands, bring & buy, bar, cafeteria. Talk-in on S22. Details Fred G4NOG, tel: 0733-77032.

25 SEPTEMBER
* RSGB HF CONVENTION - Belfry Hotel, nr Oxford. Details RSGB.
* Harlow Mobile Rally - Harlow Sports Centre. Details G4KVR tel: 0279-22365 (daytime) or G4MIS tel: 0279-722622 (evenings).

IN BRIEF - More details later.

2 OCTOBER
* Great Lumley AR & ES Rally - Community Centre, Great Lumley, Chester-le-Street, Co.Durham.
* 4th North Wakefield RC Rally - Outwood Grange School, Potovens Lane, Outwood. Details Steve, G4RCH (QTHR).
* Welsh Amateur Radio Convention - Oakdale Community College, Blackwood, Gwent. Details B.Davies GW3KYA, tel: 0495-225825.

9 OCTOBER
* Midlands VHF Convention - *CHANGE OF DATE* Details Peter G3UBX.
* Armagh Rally - Drumsill House Hotel, Armagh. Details GI8RNX.

28/29 OCTOBER
* Leicester Amateur Radio Show - Granby Halls, Leicester. Details Frank tel: 0533-553293 daytime.

30 OCTOBER
* Carmarthen ARS Rally - Leisure Centre, Johnstown, Carmarthen. Details GW3GUE, tel: 026 783 460.

5/6 NOVEMBER
* North Wales Radio Rally - Canolfan Abercony Centre, Llandudno. Details Tony Wilkinson GW4PVU, tel: 0492-49121 or 75666.

13 NOVEMBER
* Bishop Auckland Radio Rally - The Civic Hall, Shildon, Co.Durham. *NEW VENUE* Details G4OHZ, tel: 0325-311645.
* West Kent ARS Tonbridge Rally - Angel Centre, Tonbridge. Details Nigel G4KIU, tel: 0892-515321 or 515432.
* West Manchester RC Winter Rally - Bolton Sports & Leisure centre, Silverwell Street, Bolton. Details David G1IOO, tel: 0204-24104, evenings.

20 NOVEMBER
* Bridgend & DARC Rally - Bridgend Recreation Centre, Angel Street, Bridgend, Mid-Glamorgan. Details Mike GW6XCG, tel: 0656-724041.

27 NOVEMBER
* Verulam ARC Christmas Rally - St.Albans City Hall. Details G4JKS tel: St.Albans 59318. Trade - Watford 52959.

11 DECEMBER (PROVISIONAL)
* Leeds & DARS Christmas Rally - Pudsey Civic Centre, Dawsons Corner, Pudsey, nr Leeds.

15/16/17 JULY
RSGB 75 - NATIONAL CONVENTION: National Exhibition Centre, Birmingham. Details RSGB HQ. Trade - Norman, G3MVV tel: 0277-225563
His Royal Highness, the Prince Philip, Duke of Edinburgh, will perform the official opening ceremony on Friday 15 July.
This year's event will be the largest ever and will include an exhibition of amateur radio equipment from the last 75 years. Social events will be held on Friday and Saturday evenings.
A special 75th anniversary luncheon will be held on Friday.
GB75AC (75th Anniversary Convention) will be active from 9-17 July.

18 JULY
RSGB HEADQUARTERS CLOSED FOR ONE DAY

19/20/21 JULY
RSGB 75 - HQ OPEN DAYS: Visitors welcome from 10am to 4pm each day.
Please use booking form (see April issue), or send SSAE with request giving preferred day and second choice, am or pm and number of tickets required.

22/23 JULY
RSGB 75 - DATA SYMPOSIUM: Harrow School, Harrow-on-the-Hill. 2-day symposium covering all aspects of data communication.
A full list of the lectures confirmed to date can be found elsewhere in this month's News Bulletin

24 JULY
RSGB 75 - FAMILIES' & ACTIVITIES DAY
An opportunity for all clubs, groups and societies to celebrate the RSGB's 75th anniversary in their own way.
Almost anything goes but the event should involve the whole family and, if possible, the public.
Please run an amateur radio demonstration.
A prize will be awarded for the most original idea.

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

29/30/31 JULY
RSGB 75 - AMSAT UK COLLOQUIUM: University of Surrey, Guildford. First day special technical meeting by invitation only. Last two days full lecture programme and social events for all delegates. Details Ron G3AAJ tel: 01-989 6741 (social hours please)

FULL DETAILS AND BOOKING FORM FOR ALL EVENTS WERE PUBLISHED IN THE CENTRE OF THE APRIL ISSUE

Events Diary

Details Harry G4WYD, tel: 0274-685039.

OTHER EVENTS

28 AUGUST
* Galashiels & DARS Open Day - Focus Centre, Livingston Place, Galashiels. Doors open 11am. Details John GM0AMB, tel: 0835-22686.

1989 RALLIES

29 JANUARY
* NARSA Rally - Norbreck Castle, Blackpool. Details Peter G6CGF, tel: 051-630 5790.

2 APRIL
* White Rose Rally - Leeds University. Details A.S Kessler, G4DXA, PO Box 73, Leeds, LS1 5AR.

14 MAY
* Drayton Manor Mobile Radio Rally - Drayton Manor Park, Tamworth, Staffs. Details Norman G8BHE, tel: 021-422 9787.

21 MAY
* 32nd Northern Mobile Rally - Great Yorkshire Showground, Harrogate, North Yorkshire. Details Harry G3CQQ.

GB CALLS

The list below shows **ALL** the special event stations licensed for operation during July and early August **(as at press date)**

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

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

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* *
* PLEASE NOTE *
* ALL "GB75" PREFIX CALLSIGNS *
* VALID FOR RSGB 75 AWARD *
* *
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THROUGHOUT 1988:
GB75RS - 75 (ANNIVERSARY) RADIO SOCIETY (GB): RSGB HQ, Lambda House, Potters Bar, Herts.

1 JULY:
GB75HQ - RSGB HEADQUARTERS (75th ANNIVERSARY STATION): RSGB HQ, Lambda House, Cranborne Rd, Potters Bar, Herts.
GB0CDE - COASTAL DEFENCE "E": Fort Purbrook. Details G0IVW.
GB0CDG - COASTAL DEFENCE "G": Fort Gomer. Details G0DHZ.
GB0CDN - COASTAL DEFENCE NEEDLES: Needles Battery, Isle of Wight. Grid: SZ 295 849. Details G3RJK.
GB0HWE - HERTFORDSHIRE WELL END: Herts Scouts Training Centre, nr Borehamwood. Details G3SOF.
GB0IOW - ISLE OF WIGHT: Culver Point Telegraph Station. Details G3FWE.
GB0MRL - MIRFIELD RUGBY LEAGUE: West Yorks. Details G4PHR.
GB0TFD - TABOR FUN DAY: Tabor High School, Braintree, Essex. Details G3PEN.
GB0TSF - THURSTABLE SCHOOL FETE: Tiptree, Essex. Details G0DCL.
GB1CDY - COASTAL DEFENCE "Y": St.Georges Baracks, Hants. Grid: SU 617 001. Details G1WSL.
GB1ERS - EAST READING SCOUTS: Holly Copse, Oxfordshire. Grid: SU 663 785. Details G6ZYT.
GB2ACO - AIKERNESS COTTAGE ORKNEY: Girl Guide Camp. Details GM3IBU.
GB2BSF - BICNACRE SCHOOL FETE: Bicnacre Priory, Essex. Details G4ZPE.
GB2DJ - DERBY & DISTRICT ANNIVERSARY: Elvaston Castle Country Park. Grid: SK 412 333. Details G4XPE.
GB2FOE - FIRE OVER ENGLAND: K.O.S.B. Barracks. Details G3BRA.
GB2GLR - GEOFFERY L ROBINSON: Blackwell Scouting Centre, nr Bromsgrove. Details G4TET.
GB2KHS - KESGRAVE HIGH SCHOOL: Ipswich. Details G4CXT.
GB2KSA - KINGSMOOR SPORTS ASSOCIATION: Details GW4ODN.
GB2MRC - MACCLESFIELD RADIO CLUB: Details G0IKB.
GB2NTA - NEW TOWN ANNIVERSARY: Carnival Field, Runcorn, Cheshire. Details G0EKQ.
GB2PSC - PELSALL SUMMER CARNIVAL: Pelsall Common, W.Mids. Details G4FAJ.
GB2RLS - RICHARD LANDER SCHOOL: Cornwall. Details G3YNK
GB2SAR - SOUTHDOWN AMATEUR RADIO (SOC): Hailsham Leisure Centre. Details G4MVN.
GB2SVL - SPEN VALLEY LIONS: Royds Park, W.Yorks. Details G4PHR.
GB2WYF - WEST YORKSHIRE FIRE (SERVICE): Headquarters. Details G0FOI.
GB4FPS - FOXES PEACE SCHOOLS: Higginson Park, Bucks. Grid: SU 850 862. Details G4LWA.
GB4JUL - FOURTH OF JULY (CELEBRATION): Darley ARC, Harrogate. Details G0FWG.
GB400A - 400TH ANNIVERSARY: Plymouth Hoe. Details G3VCN.
GB4WCC - WAKEFIELD CITY CHARTER: Ossett Community Centre. Details G0ISJ.
GB4WMS - WYKE MANOR SCHOOL: W.Yorks. Details G4PHR.
GB5DP - DENBY DALE PIE: Details G4JKW.
GB5HC - HORSHAM CLUB: Horsham W.Sussex. Details G3NPF.
GB6CHE - CHESHIRE (SCOUTS): Spring Farm, Warrington. Details G1NWA.
GB6DDP - DENBY DALE PIE: Withernsea, G6ZUA.
GB6JST - JUBILEE SAILING TRUST: Portsdown Hill, Portsmouth. Details G6BUL.
GB6RRR - RED ROSE RALLY: Wigan. Details G6MEZ.
GB75ASH - ASH SUMMER FAYRE: Aldershot. Details G1PXM.
GB75ATC - AIR TRAINING CORPS: ATC HQ, Deeside. Details GW4TEE.
GB75BB - BARR BEACON: Community School. Details G1LRP.
GB75CS - CHASEWATER SHOW: Chasewater Park, W.Mids. Details G0HKF.
GB75DX - "DX": Suffolk. Details G4BWP.
GB75FG - FERRIBY GALA: The Playing Fields, N.Ferriby, N.Humberside. Details G0AQP.
GB75HFR - HULL FESTIVAL RADIO: Operation Raleigh Centre, Hull. Details G3LZQ.
GB75HHC - HAYWARDS HEATH COLLEGE: W.Sussex. Details G1TCH.
GB75PCR - PLESSEY CHRISTCHURCH RADIO: Details G4GTH.
GB75VKY - Blyth ARC, Newsham Community Centre, Northumberland. Details G0ACR.
GB75WS - WILLENHALL SCOUTS: Cross Keys PH. Details G0DVD.
GB8DBY - DERBY (ELVASTON CASTLE FESTIVAL): Details G6TQC.
GB8RRS - RED ROSE SILVER: Details G1I00.

2 JULY:
GB0BSC - BOWMANDALE SCHOOL CARNIVAL: S.Humberside. Details G4TGE.
GB1BCW - BELFORD CARNIVAL WEEK: Northumberland. Details G1GIT.
GB1CDG - COASTAL DEFENCE "G": Fort Gomer. Grid: SZ 587 989. Details G6MWY.
GB1CDN - COASTAL DEFENCE "N": Grid: SZ 295 849. Details G1JGS.
GB1THS - THE HEATHLAND SCHOOL: Hounslow, Middx. Details G8ALB.
GB2BF - BULMER FESTIVAL: Bulmer Village Hall, Sudbury, Suffolk. Details G0IAG.
GB2BHA - BOOTH HALL APPEAL: Newton House Community Centre, Manchester. Details G4UYN.
GB2CLP/GB8CLP - CLEFT LIP AND PALATE: Greater Nottinghamshire Co-op Soc., Long Eaton. Details G3VJK/G1SPA.
GB2CS - CARNIVAL SLEAFORD: Boston Road Recreation Grounds, Sleaford. Details G3NHF.
GB2HSH - HEATHLAND SCHOOL HOUNSLOW: Details G8ALB.
GB2WHF - WHITTINGHAM HOSPITAL FETE: Lancs. Details G0BGK.
GB4BPM - BROMLEY PEAGENT OF MOTORING: Norman Park. Details G0CRI.
GB4BT - BRITISH TELECOM: Radio Shack, BT Coryton, Cardiff. Details GW4ZVY.
GB4KES - KING EDMUND SCHOOL: Essex. Details G4SKT.
GB4MSC - MANPOWER SERVICES COMMISSION: Tigers Rugby Club, Sheffield. Details G0EWI.
GB40YR - (GLENROTHES BIRTHDAY) 40 YEARS: Golf Tournament, Glenrothes. Details GM4ALA.
GB4PSF - PARKLAND SUMMER FAIR: County Junior School, S.Wirral. Details G4ZKG.
GB75BPW - BEXLEY POLICE WEEK: Bexleyheath Police Station, Kent.
GB75FX - FELIXSTOWE RADIO CLUB: Deben High School. Details G4YQC.
GB75JBT - JOHN BUNYAN TRICENTENARY: Elstow Church. Details G0GBI.
GB75SSF - STANCHESTER SCHOOL FETE: Yeovil. Details G4WMV.

3 JULY:
GB0CB/GB1CB - CRUSADER BOWMAN: Grid: SK 418 517. Details G0GHD/G6YAL.
GB0CHF - CHESHIRE HOME: Hovenden House, nr Holbech. Details G0HUL.
GB1CDS - COASTAL DEFENCE "S": Boundary Fort, Southwick, nr Portsmouth. Grid: SU 628 069. Details G0JEZ.
GB2ARM - ARMADA: King George V Playing Fields, Surrey.Details G3IEE.
GB4RRA - RED ROSE AWARD: Details G0FRL.
GB75COV - COVENTRY (AMATEUR RADIO SOCIETY): St.Nicholas Street, Coventry. Details G4ZMC.
GB75MAL - MALLARD ANNIVERSARY: Grid: TA 033 857. Details G4SSH.

4 JULY:
GB0CDX - COASTAL DEFENCE "X": Golden Hill Fort, Isle of Wight. Grid: SZ 339 879. Details G3RJR.
GB2BWC - BAPTIST WORLD CONFERENCE: Glasgow. Details GM4PSV.
GB2PCS - PRESTON COMPREHENSIVE SCHOOL: Monks Dale, Somerset. Details G0HDJ.
GB2RSA - ROYAL SIGNALS APPRENTICES: Army Apprentice College, N.Yorks. Details G3HKR.
GB4CGY - CIBA GEIGY: Horsham, W.Sussex. Details G4CCA.
GB6SSR - STANCHESTER SCHOOL RADIO: Stoke-sub-Hamdon. Details G6EER.
GB75BC - BEECHGROVE GARDEN: BBC, Aberdeen. Details GM4GXD.
GB75NMB - NORTHEASE MANOR BARBEQUE: Northease Manor School, e.Sussex. Details G7ATR.

5 JULY:
GB75KFM - KLEIN, FOGARTY, McMICHAEL (Three of the founders of the Society, on the official 75th Birthday of RSGB): RSGB Headquarters, Potters Bar, Herts. Call in for a piece of birthday cake.

6 JULY:
GB0SFD - SIR FRANCIS DRAKE: Saltash Sailing Club, Cornwall. Details G0ESY.
GB1SHS - SPROWSTON HIGH SCHOOL: Norwich. Details G1XYE.

7 JULY:
GB2DTS - DAGENHAM TOWN SHOW: Central Park. Details G0IAP.
GB2FFS - FIFTY FELTHAM SCOUTS: Staines RFC, Hanworth, Middx. Details G0GPT.
GB2IST - 21ST ANNIVERSARY BARRY COLLEGE OF F.E.: Barry, S.Glam. Details GW0ANA.
GB75ESA - ENGLISH SCHOOLS ATHLETICS: Yeovil Recreation Centre: Details G3NOF.

8 JULY:
GB2ASM - ASHFORD SAMARITANS MUMFORD (HOUSE): nr Ashford, Kent. Details G0ESZ.
GB2CVT - CLYDE VALLEY TOURIST: Tourist HQ, Lanark. Details GM3MTH.
GB2FS - FESTIVAL OF STAMFORD: Details G4PZB.
GB2HCC - HERSTMONCEUX CASTLE: E.Sussex. Details G0DFZ.
GB2LRS - LOUGHTON RADIO SOCIETY: Hastingwood Common, Essex. Details G3OPA.
GB2MVF - MARDEN VILLAGE FETE: Marsdem. Grid: TQ
GB2SJS - ST JOSEPHS SCHOOL: Devon. Details G4YRM.
GB4BHP - BRERETON HEATH PARK: Grid: SJ 795 653. Details G4APA.
GB6SC - STOURBRIDGE CARNIVAL: Wollaston Recreation Ground, W.Mids. Details G4YBT.
GB75BRA - BANBURY RADIO AMATEURS: Castle Gardens Car Park. Details G4DLB.
GB75DOG - GUIDE DOGS FOR THE BLIND: Folly Court, Wokingham. Details G4CCC.
GB75MKC - MILTON KEYNES CITY: Kiln Farm Club. Details G0GOF.

9 JULY:
GB75AC - 75th ANNIVERSARY CONVENTION: National Exhibition Centre, Birmingham. Details G4WMH.
GB75ER - 75th ANNIVERSARY WINDSOR CASTLE: Castle Hill Car Park, Windsor Castle, Berkshire. Details G4XDU.
GB75NEC - NATIONAL EXHIBITION CENTRE: Arden Hotel, Bickenhill, Solihull. Details G4VMP.
GB0TWS - TUNBRIDGE WELLS SCOUTS: Adamswell, Kent. Details G3LMS.
GB2FD - FIRE DAY: Standalone Farm, Herts. Details G0EVD.
GB2FG - FISKERTON GALA: Manor Paddock, Fiskerton, Linc. Details G0BEN.
GB2SMR - SUSSEX MOBILE RALLY: Brighton Race Course. Details G3WR.
GB4BFF - BECKFORD FLOWER FESTIVAL: Village Hall, nr Tewkesbury. Details G3XGW.
GB4HAS - HERTFORDSHIRE AMBULANCE SERVICE: Herts Ambulance HQ. Details G0GWW.
GB75BBC - BBC CLUB SUMMER FESTIVAL: BBC Club Sports Ground, New Malden, Surrey. Details G3KKQ.
GB75CC - CARDIFF CASTLE: Castle Street, Cardiff. Details GW4TJQ.
GB75CF - CENTENARY FAIR: St.Dunstan's College, London. Details G4OHX.
GB75CIS - CHILDREN IN SARK: Le Pavilion, Sark C.I. Details G3UTX.
GB75CMF - CLEOBURY MORTIMER FESTIVAL: Laconchilde School, nr Kidderminster. Details G4UZT.
GB75CRW - CROWBOROUGH SUMMER FAIR: Goldsmith Leisure Centre. Details G4DRV.
GB75DIS - DUNDEE CITY OF DISCOVERY: Mills Observatory, Glamis Road, Dundee. Details GM4UZP.

NEWS & VIEWS

Events Diary

GB75IPA - INTERNATIONAL POLICE ASSOCIATION: Channel Islands.
GB75LCF - LE COURT FETE: Nr Liss, Hants. Details G3CBU.
GB75NCH - NATIONAL CHILDRENS' HOME: Pembroke Pastle. Details GWODHO.
GB75PYC - PYRAMID YOUTH CLUB: Shield Rd School, Filton, Bristol. Details G4YQH.
GB75RJS - RINGWOOD JUNIOR SCHOOL: Hampshire. Details G4TMI.
GB75SNC - SOUTH NORMANTON CARNIVAL: Fredrick Gent School, Derbys. Details GOIUV.
GB75SRH - SUE RYDER HOME: King's Lynn. Details G4DCJ.

10 JULY:
GB1CDA - COASTAL DEFENCE "A": Fort Block House, Hant. Details G1SYZ.
GB2EC - EISTEDDFOD CASNEWYEDD: Tredeger House, Gwent. Details GW4IED.
GB2FYF - FIFTY YEARS FLYING: Building 528, Barry, S.Glam. Details GWOFJW.
GB5DSP - DROITWICH STRAWBERRY PICNIC: Worcestershire. Details G8TFO.
GB5ORAF - ROYAL AIR FORCE: Operations Block, Duxford, Cambs. Details G3MSU.
GB75NMC - NEW MARSKE CARNIVAL: Grid: NZ 619 202. Details G4OLK.
GB75WMT - WILLIAM & MARY TECENTENARY: Brixham, S.Devon. Details G3KDV.

11 JULY:
GB2DPS - DITCHAM PARK SCHOOL: Nr Petersfield, Hants. Details GODAE.
GB4SHQ - SCOTTISH HEADQUARTERS: Duke of Atholl's Estate, Perthshire. Details GM3OWU.
GB75DON - DON SAVAGE: Heathfield High School, Cheshire. Details G4YKI.

12 JULY:
GBOWGC - WINCHCOMBE GLOS. CUBS: Cheltenham, Glos. Details GOEVX.
GB75MH - MARLPOOL HEANOR: Drun Hill Scout Camp, Derbys. Grid: SK 375 423. Details G1GKK.
GB8EVS - EASTCOMBE VENTURE SCOUTS: Eastcome Scout HQ, Glos. Details GBAHB.

13 JULY:
GB75FYQ - FYQ (CLUB CALLSIGN): Carleton Community Centre, Yorks. Details G4KMW.

14 JULY:
GB2GES - GREAT ECCLESTON SHOW: Nr Great Eccleston. Details GOAJQ.
GB75EGS - ELMSLIE GIRLS' SCHOOL: Blackpool. Details GOGDA.
GB75PI - PIEL ISLAND: Cumbria. Grid: SD 232 638. Details G3IZD.
GB75SAT - AMSAT-UK: National Exhibition Centre, Birmingham. Details G3AAJ.

15 JULY:
GBOCDS - COASTAL DEFENCE "S": Boundary of Fort Southwick, Hants. Grid: SU 628 069. Details GOJEZ.
GB4OGP - CALLSIGN LEICESTER ARC (For NEC): Details G4OGP.
GB75NMC - NEW MARSKE CARNIVAL: Jubilee Hall Community Centre, Cleveland. Details G4OLK.
GB75NSC - NEWLANDS SPRING COMMUNITY: Primary School, Chelmsford. Details G3OBX.

16 JULY:
GBOCDC - COASTAL DEFENCE "C": Carisbrooke Castle, IOW. Grid: SZ 485 877. Details GOCWX.
GBOGKA - "GKA" PORTISHEAD RADIO: Manor Gardens, Somerset. Details G4HLN.
GBOIBM - IBM: IBM House, Havant, Hants. Details GOGFD.
GBOKVF - KINGSEY VILLAGE FETE: Tythrop, House, Bucks. Details GOFLB.
GBONKG - NORTHERN KITE GROUP: Littleton Road Playing Fields, Lancs. Details G4CEV.
GB2IPA - INTERNATIONAL POLICE ASSOCIATION: Guernsey, CI.
GB2SPG - SPRINGFIELD PLAY GROUP: Friesland School Campus, Sandiacre, Notts. Details G4OYP.
GB4CAF - CAMBOIS ANTENNA FARM: Cambois, Northumberland. Details G4NAX.
GB4PCP - PEMBREY COUNTRY PARK: Cefn Sidan, Dyfed. Details GW4XLK.
GB4SP - STAFFORDSHIRE POLICE: Police HQ, Stafford.
GB75HSF - HARTSDOWN SUMMER FAYRE: Hartsdown Secondary School, Margate. Details GOCBY.
GB75JHN - JOHN HENRY NEWMAN (SCHOOL): Hitchin Road, Herts. Details GOGTE.
GB75OYC - OCEAN YOUTH CLUB: Ponden Reservoir. Details GOBBE.
GB75TLB - TROON LIFE BOAT: Lifeboat Station. Grid: NS 308 315. Details GM4SUC.

17 JULY:
GB1CDJ - COASTAL DEFENCE "J": Round Tower, Portsmouth. Details G6MWY.
GB1CDK - COASTAL DEFENCE "K": Fort Gilkicker. Details G1BHG.
GB1CDM - COASTAL DEFENCE "M": Fort Monkton. Details G1BHG.
GB1CDQ - COASTAL DEFENCE "Q": Square Tower, Portsmouth. Details G6MWY.
GB1CDV - COASTAL DEFENCE "V": Spit Bank Fort. Details G6MWY.
GB2IRC - IPSWICH RADIO CLUB: Suffolk Constabulary HQ. Details G4IFF.
GB2YRD - YORKSHIRE RAYNET DONCASTER: Carcroft School, Doncaster. Details GOHFY.
GB4DEA - DUKE OF EDINBURGH AWARDS: Tretheras School, Nwequay, Cornwall. Details G4XGF.

18 JULY:
GB75DOR - DORKING ARS: Ashcobe School, Surrey. Details G3AEZ.
GB75TEN - 10 METER DEMO: Hamfest, Flight Fefuelling Sports Club, Wimborne, Dorset. Details G4XYX.

19 JULY:
GB75USA - UNITED STATES OF AMERICA: Harrogate, N.Yorks. Details GOFWG.
GB75WMS - WEST MOORS SCHOOL: Dorset. Details G4LXZ.

20 JULY:
GB2CR - CORNISH RALLY: Perrawell Village Hall, Cornwall. Details G4STB.
GB2NMR - NETLEY MARSH RALLY: Show Site, Hants. Details G3ABA.
GB4HVS - HUDDERFIELD VENTURE SCOUTS: Morvern, Argyll. Details GM4PMC.
GB75LCS - LAMBETH COUNTRY SHOW: Mansion House Grounds, Hernehill, London. Details GOEGA.
GB75MMR - MC MICHAEL RALLY: Haymill Centre, Slough. Details GOBTY.
GB75NMS - NETLEY MARSH STEAM (RALLY): Show Site, Hants. Details G1IPQ.
GB75SA - SAINT ANDREWS: St.Andrews CofE High School, Croydon. Details G1ZJN.
GB75WRR - WHITE ROSE RADIO: White Rose RC, Leeds. Details G4OAT.

21 JULY:
GB2CDU - COASTAL DEFENCE "U": Culver Down. Grid: SZ 627 588. Details G4RGE.

22 JULY:
GB2EIJ - ESSEX INTERNATIONAL JAMBOREE: Essex Show Ground. Details GODEC.
GB2RCC - RADIO CARAVAN CAMPING: Cherry Tree Farm. Grid: SP 557 517. Details G4EPN.
GB500 - PAISLEY 500 CENTENARY: George A Clark Town Hall, Paisley. Details GMOBLX.
GB75IBH - BISPHAM HALL INTERNATIONAL: Bispham Hall Scout Estate, nr Wigan. Details G4XMG.
GB75SCH - ST.CATHERINES HOSPICE: Grid: TQ 227 377. Details G4ZPP.

23 JULY:
GB1CDP - COASTAL DEFENCE "P": Portchester Castle: Details G6MWY.
GB2RGP - RISLEY GARDEN PARTY: Risley Hall, Derbys. Details G4OYP.
GB2TG - THOMAS GAINSBOROUGH: Suffolk. Details G3DXO.
GB4IPA - INTERNATIONAL POLICE ASSOCIATION: Guernsey, CI.
GB4OAS - OSWESTRY AGRICULTURAL SHOW: Llachrydau. Grid: SJ 219 348. Details GWODLW.
GB5RH - ROBIN HOOD: Sherwood International Scout Camp, nr Newark, Notts. Details G3TBK.
GB75ISS - IPSWICH SOUTH SCOUTS: 1st Claydon Scout Group HQ. Suffolk. Details G4IFF.

24 JULY:
GB75BC - BROMSGROVE CLUB: Avoncroft Museum of Buildings. Details G4IVJ.
GB75BD - BOSCOMBE DOWN: RAF Boscombe Down, Salisbury, Wilts. Details G4SXR.
GB75YYY - YORK YORK YORK: Tollerton, Yorks. Details G3TMN.

25 JULY:
GB1WIT - WITAN 88 SCOUT & GUIDE CAMP: Homefield School, Christchurch, Dorset. Details G6HGE.
GB2RNL - ROYAL NATIONAL LIFEBOAT: RNLI HQ, West Quay Road, Dorset. Details GOEGA.
GB2STH - ST.HELENS SHOW: Canvas City, St.Helens. Details G4WGB.
GB2WSS - WEST SUSSEX SCOUTS: South of England Showground, W.Sussex. Details G4LKW.
GB4PAD - PINDAR ACTIVITY DAYS: Pindar School, N.Yorks. Details G4VDH.
GB6AC - AIR TRAINING CORPS: Cadet Centre, Huddersfield. Details G4LED.

27 JULY:
GB2WAD - WESTON AIR DAYS: Details G4SIY.

28 JULY:
GB2SAT - AMSAT-UK: AMSAT-UK Colloquium, University of Surrey, Guildford. Details G3AAJ.
GB2SSJ - SALOP SILVER JUBILEE: Ye Olde Bucks Head, Shrewsbury. Details GOEIY.
GB4WAY - FOURWAYS DAY CENTRE: Poole, Dorset. Details GODLD.
GB75SWS - SHUSTOKE WHITACRE SHOW: Blythe Hall Estate. Grid: SP 213 903. Details G4XIQ.
GB8CSR - CELEBRATE SATELLITE RADIO: Details G6MEN.

29 JULY:
GB1CBC - CHELMSFORD BOROUGH CENTENARY: Details G8UUO.
GB2AP - ARROWE PARK: Ivy Farm, Wirral. Details G4YWD.
GB2FAA - FLEET AIR ARM: HMS Heron, Somerset. Details G3NOF.
GB2IVS - INTERNATIONAL VENTURE SCOUTS: Leicester. Details G4SJX.
GB75SR - STEAM RALLY: Ryall's Court Farm, Worcs. Grid: SO 855 415. Details GOEMS.

30 JULY:
GB1CDG - COASTAL DEFENCE "G": Fort Gomer. Grid: SZ 587 989. Details G6MWY.
GB2BHF - BULLWOOD HALL FETE: Hockley, Essex. Details G4ZPE.
GB4SW - SAMUEL WEBSTER: Fountain Head Brewery, W.Yorks. Details G4YDG.
GB4VR - VR SQUARE: Island of Hirta, Outer Hebridies. Details G4ODA.
GB6MR - MORVAL RALLY: Tamblyn's Farm, Cornwall. Grid: SX 275 570. Details G3TCJ.
GB75HRR - HILDERSTONE RADIO RALLY: Broadstairs, Kent. Details GOJIF.
GB75TTC - TELFORD TOWN CENTRE: Shopping Centre. Details GOCZD.

31 JULY:
GB1CDS - COASTAL DEFENCE "S": Boundary Fort, Southwick, Hants. Grid: SU 628 069. Details GOJEZ.

1 AUGUST:
GBOCDE - COASTAL DEFENCE "E": Fort Purbrook. Details GOIVW.
GBOCDP - COASTAL DEFENCE "P": Portchester Castle. Details GODHZ.
GBOLAP - LICHFIELD ADVENTURE PLAYGROUND: Lichfield. Details GODRA.
GBORRR - RED ROSE RALLY: Manchester. Details G3BSA.
GB2ERD - G3ERD DERBY & DARC CALL: The Council House, Derby. Details G4XPE.
GB2OSS - OLDHAM SUMMER SHOW: Alexandra Park. Grid: SD 934 042. Details C4ZEP.
GB2PG - PAUL GODLEY H.F. EVENT: Details GM3DJS.
GB4RRS - RED ROSE SILVER: Details GOFRL.
GB75ACF - ASHTON CANAL FESTIVAL: Portland Canal Basin, Lower Peak Forest Canal. Details G4ZEP.
GB75BG - BEECHGROVE GARDEN: BBC Terrace, Aberdeen. Details GM4GXD.
GB75PRA - PURBECK RALLY & AUTOJUMBLE: Ridge Farm, Nutcrack Lane, Dorset. Details G1NCG.
GB75RRA - RED ROSE AWARD: Bolton. Details GOFRL.
GB8DDP - DENBY DALE PIE: Huddersfield. Details G1MOZ.
GB8RRR - RED ROSE RALLY: Details G1100.

2 AUGUST:
GB6NVC - NICOLSON VICTORIA CROSS: Hants. Details G6LOB.
GB75BR - BINSTEAD RADIO (ARS): The Equestrian Centre, IOW. Details G3FWE.

3 AUGUST:
GB2MRI - MARCONI RATHLIN ISLAND: Mount Grand, nr Telephone Exchange. Details GI4HCN.
GB50HC - HORSHAM 50 ANNIVERSARY CELEBRATION: Horsham, W.Sussex. Details G1PER.
GB8DP - DENBY DALE PIE: Huddersfield. Details G3ABS.

4 AUGUST:
GBOCDX - COASTAL DEFENCE "X": Golden Hill Fort, IOW. Details G3RJR.
GB2CPC - CASTELL PENRHYN CASTLE: Gwynedd. Details GWOABL.
GB2TBC - TOBERMORY BI-CENTENARY: The Scout Hall, Isle of Mull. Details GM4EHB.

5 AUGUST:
GB2RCC - RADIO CARAVAN CAMPING: Tutbury Castle. Details G4EPN.
GB4RRM - RUTLAND RAILWAY MUSEUM: Oakham, Rutland, Leics. Details G3PJR.
GB6BFS - BURSTALL FLOWER SHOW: Suffolk. Details G6GAU.

6 AUGUST:
GB2DBW - DOUGLAS BADER WING: Coventry Airport. Details G4WSU.
GB75DTS - DUDLEY TOWN SHOW: Himley Hall, Dudley, W.Mids. Details G4DAR.

7 AUGUST:
GB2DCP - DEVON AND CORNWALL POLICE: Paignton Police Station.
GB2SS - SILK SHEEN: Lincs Aviation Heritage Centre, E.Kirby, Lincs. Details GOBEN.

9 AUGUST:
GB2WMB - WISBECH METAL BOX: Wisbech, Cambs. Details G4ODH.

12 AUGUST:
GBOCDS - COASTAL DEFENCE "S": Fort Southwick, Hants. Grid: SU 628 069. Details GOJEZ.
GB1BSS - BEESTON SEA SCOUTS: Guernsey, CI. Details G1WBZ.
GB2YFT - YEOVIL FESTIVAL OF TRANSPORT: Showground, Barwick Par, Somerset. Details G3CQR/G4WMV.
GB4BIF - BILLINGHAM INTERNATIONAL FOLK FESTIVAL: Billingham Community Centre, Cleveland. Details GOBKC.
GB75GDB - GUIDE DOGS FOR THE BLIND: Cleeve House, Exeter. Details G3TDW.

If you'd like to run a special event demonstration station, please contact the Membership Services Department at RSGB Headquarters for an applications form which should be returned, completed at least 28 days BEFORE the start of the event. Late applications cannot be accepted.

TECHNICAL TOPICS

PAT HAWKER · G3VA

THE EDITORIAL IN *QST* of January 1948, just over 40 years ago, was headed "single-sideband" and the opening paragraph read as follows: "Several articles in this issue of our magazine point the way to the most significant development that has ever occurred in amateur radiotelephony: carrierless single-sideband emission. After years of fearing that our receivers weren't stable enough to permit the use of sssc – as we're calling it – the adventurous appearance on the air of an experimental station with this method of emission has shown that it isn't so difficult after all, and that its merits are waiting for all of us. And so immense are these advantages that we are convinced that a speedy revolution in our equipment and our operating practices is imminent and certain."

PIONEERS OF SSB

Although *QST* soon dropped "sssc" in favour of "ssb", seldom can an editorial forecast have been so perceptive and so quickly fulfilled. Within just a few years, a.m. (often unfairly dubbed "ancient modulation") had virtually vanished from the amateur hf bands. Single-sideband, of course, was not invented in 1947 by the amateurs. The theory had been proved mathematically by Carson as early as 1922; even the first transatlantic transmission of speech in 1915 depended on tuning the high-Q long-wave antenna to maximise one set of sidebands. Point-to-point transmission with one sideband and reduced carrier was implemented in the late 1920s on vlf and in the thirties on hf (a leading exponent was Alec Reeves who later invented pulse-code-modulation, which has become the basis of digital transmission systems). But remember that in 1947 hf ssb with fully suppressed carrier was not used – not by the military, in aviation nor the maritime services. The amateurs, initially in the USA but soon world-wide, truly blazed the way for the general adoption of the sssc form of ssb.

The very first amateur contact using ssb took place on September 21, 1947 between W6YX and W6VQD. W6YX was the experimental amateur station of the Department of Electrical Engineering, Stanford University, California. Trustee for this station, and the man behind this experimental ssb project, was Dr O G ("Mike") Villard, W6QYT. His account of those historic "single-sideband operating tests" was one of the articles in *QST* of January 1948.

I was reminded of this important revolution in amateur radio by meeting W6QYT in London at the recent hf conference where he presented a paper and – in true amateur practice – demonstrated his prototype "portable unidirectional hf receiving aerial for reducing co-channel multi-hop sky-wave interference" (see later). With him, also from SRI International (the research institute associated with Stanford University), was George Hagn who presented a companion paper on "the wide-strip horizontal loop antenna (hla): an effective solution for ground-wave interference to short-wave reception." George told me an interesting story about how he had encouraged the US "Special Forces" in Vietnam in the 1960s to bypass normal military procurement procedures to acquire and use Collins KWM2 amateur-type ssb/cw transceivers. These, he had found, were able to perform better in the jungles of south-east Asia than the regulation military radios – yet another example of the way in which amateur radio has so often been shown to be in the forefront of radio communications.

I noted (*TT*, April) that Collins Radio, founded by the late Art Collins, W0CXX, developed and marketed the very first amateur hf/ssb transceivers (Model KWM1), designed primarily for hf/mobile operation. This prompted Bob Ralph, G4KSG of the Collins Owners Club to send along some information on this historically important model. G4KSG is proud to own a surviving KWM1 and knows of only two others in the UK (one of them in Lowe's display cabinet at Matlock). Only 1300 were made between 1965 and 1969, when the KWM2 was introduced. The power amplifier uses two 6146s, providing a respectable 100W pep (nominal) rf output from 175W pep input. The sideband filter comprises a Collins 455kHz mechanical filter requiring two mixers to reach signal frequency, and there are 24 valves, with the useful 6DC6 doubling as a receiver rf amplifier. Frequency range is limited to any ten 100kHz segments between 14.0 to 30.0MHz with a tunable i.f. between 3.9 to 4.0MHz. G4KSG writes: "At maximum gain, agc threshold is 1.5 µV. Antenna noise is detectable and signals are readable well below the 1.5µV level. Comparisons with modern equipment indicate that the sensitivity is marginally less, but audio is pure and noise-free."

In the 1970s, Art Collins sold his company to Rockwell International and much of the former glory of the company as a leading manufacturer in the amateur field has been subjugated to the group's work on military and aeronautical communications and information technology. But to Mike Villard, Art Collins and the Collins Radio engineers belongs much of the credit for setting the agenda for present-day amateur radio and for professional mobile hf communications.

BROADBAND FET AMPLIFIERS

The April *TT* included a progress report on the high-power devices and all-solidstate transmitters currently being developed for radio and television broadcasting. The report noted the increasing trend towards the use of mosfet rather than bipolar rf power devices and listed some of the reasons for their increasing popularity. Some engineers claim that mosfet devices will make more reliable transmitters, principally because they operate with higher supply voltages (50 to 80 volts, typically) compared with bipolars (28-32 volts for professional applications, and often only 12 to 15 volts for mobile and amateur transmitters). The higher voltage helps to ameliorate the problems caused by the very high currents in high-power bipolar transistors. The operating characteristics of mosfets tend to be less sensitive to supply voltage variations, reducing the need for complex stabilisation circuits. Greater gain at vhf/uhf is usually achieved with mosfets, although input capacitance lowers the effective input impedance. Some engineers are still convinced that bipolars score for the linearity needed for ssb (though, for this mode, really good linearity remains easier to achieve by forgetting solid-state and using valves).

An interesting approach to high-power, professional, broadband transmitters becomes possible with the marketing of a new rf n-channel, enhancement mode tmos power field-effect transistor by Motorola. This is designated type MRF151G but is also known as the Gemini package. The device is a combination of two fets within a single package (see **Fig 1**). It has been designed for broadband commercial and military communications applications using push-pull circuits in the 2 – 175MHz band; also for vhf/fm or vhf television broadcast transmitters. With a

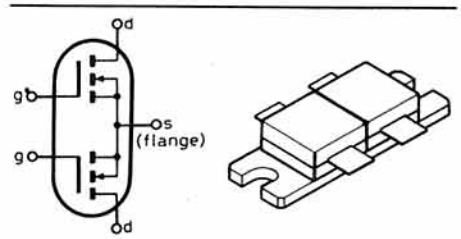


Fig 1. The Motorola MRF151G "Gemini" rf power field-effect transistor package designed for broadband push-pull amplifiers in the 2 to 175MHz frequency range

50V supply line, the MRF151G can provide 300-watts carrier output.

A 300W amplifier based on this device has been described by H O Granberg of Motorola in an article entitled: "Building push-pull, multi-octave, vhf power amplifiers" (*Microwaves & RF*, November 1987).

Reprints of this article are available from Motorola RF Semiconductor Product Marketing, 5005 East McDowell Road, Phoenix, Arizona 85036, USA, or possibly from the Motorola Literature Distribution Centre for Europe, 88 Tanners Drive, Blakelands, Milton Keynes MK145BP.

The article describes in detail a broadband amplifier (**Fig 2**) operating over the frequency range 10 to 175MHz (although it is noted that efficiency can be improved by reducing the frequency span). It notes that the recent development of high-power vhf/uhf power fets makes such amplifiers possible: "These fets have recently become available in a push-pull package configuration – commonly called the Gemini. A push-pull Gemini package is a flange-mounted transistor header capable of accommodating two individual transistors – either fets or bipolars. One of the three transistor electrodes is connected to the normally grounded flange.

"On first observation, it seems that a push-pull header would not be as advantageous as separate headers for each transistor. Separate headers provide better thermal distribution, improved circuit design and layout versatility, ▶

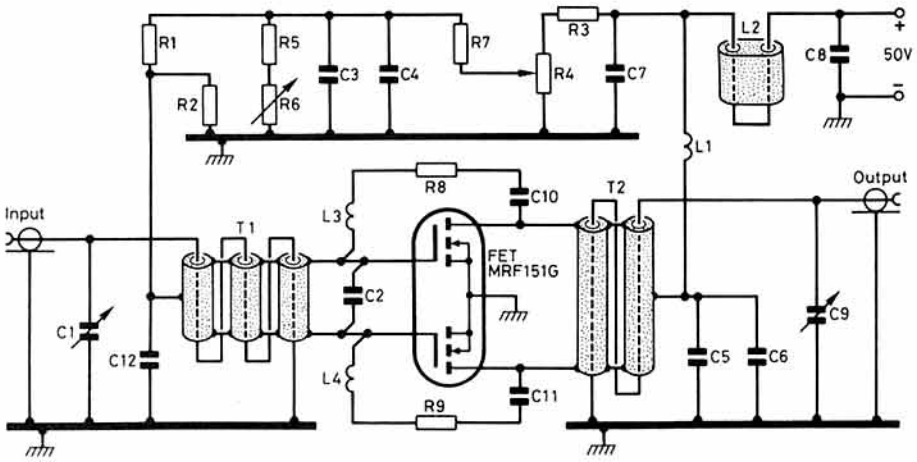


Fig 2. 300W broadband amplifier for operation in the range 10 to 175MHz as described by H O Gronberg of Motorola in "Microwaves & RF" November 1987. Heart of the amplifier is the Gemini push-pull transistor package.

R_1 = 1 kΩ–1/2W
R_2 = 1·5 kΩ–1/2W
R_3 = 1·5 kΩ–2W
R_4 = 1-kΩ trimpot
R_5 = 6·8-8·2 kΩ–1/4W (depends on FET g_{FS})
R_6 = Thermistor–10 kΩ at 25°C; 2·5 kΩ at 75°C
R_7 = 2 kΩ–1/2W
R_8, R_9 = 50Ω power resistor–EMC Technology type 5310, or KDI Pyrofilm type PPR 515-20-3
C_1, C_9 = 8–60 pF, ARCO 404 or the equivalent
C_2 = 130pF ceramic chip
C_3, C_{10}, C_{11} = 0·1µF ceramic chip
C_4, C_5, C_{12} = 1000 pF ceramic chip
C_6, C_7, = 5000 pF ceramic chip
C_8 = 0·47µF ceramic chip, or lower values in parallel to reach the value indicated
L_1 = 10 turn, AWG #16 guage enamelled wire, 5-mm inside diameter
L_2 = Ferrite beads, 1·5µH total
L_3, L_4 = Lead lengths or R_8 and R_9, 20-mm total
T_1 = 9:1 RF transformer–25Ω, 0.062-in. outside diameter, semirigid coax
T_2 = 1:4 RF transformer–25Ω, 0·090in. outside diameter, semirigid coax
FET = MRF151G
Notes: For T_1, two type 75-26 E and I Micrometals powdered iron cores are required.
For T_2, three type 100-8 E and I Micrometals powdered iron cores are required.
All chip capacitors of 5000 pF or less are ATC type 100 or equivalent.

and higher production yields. The result is lower cost-per-watt of output power. . . . But there are important advantages to the push-pull design. For example, the power gain performance of this design is difficult to duplicate in single-ended configurations because power gain is directly related to the emitter- or source-to-ground inductance. Also, in push-pull designs, the common-mode inductance is completely insignificant – mutual inductance between each emitter, or source, becomes the critical factor. This mutual inductance is much easier to control and minimize." The article describes design factors for both linear and cw operation.

It notes, however, that: "Stability is a concern with all solid-state amplifiers. It is easier to achieve with fets than bipolar transistors, mainly due to a higher ratio of feedback capacitance to input impedance. The 'half f_o oscillation' phenomenon is unknown with fets, since the nonlinear diode junctions are not present. However, at low frequencies, the fet input impedance is almost a pure capacitance with high reactance, resulting in extremely high power gain. If the fet gate is not properly terminated due to input mismatches, low-frequency instabilities may take place – especially if the frequency response of the input circuit is low enough to sustain the activity. . . . Depending on the exact conditions and device type, relatively low-level parasitic oscillations can occur. In worst-case scenarios, a latching-type condition will destroy the fet instantly."

The article describes ways in which the risk of such instabilities can be minimized, including the use of input and output magnetic cores, heatsunk to the copper heat-spreader. I do not know the retail price of single MRF151G devices but this is most unlikely to be at a level at which any amateur could contemplate lightly the possibility of devices being destroyed instantly! Do-it-yourself high-power solid-state amplifiers, whether based on bipolars or fets, demand either a high-level of up-to-date engineering skills or a willingness to duplicate very carefully a proven design without introducing any of the customary "let's hope this will do" modifications.

A more modest, medium-power fet amplifier (**Fig 3**) capable of providing an output of 50 watts pep on any amateur hf band was described by Harold Hepburn VK3AFQ in Part 7 of a series of articles entitled "Building blocks revisited" in the Australian *Amateur Radio* (December 1987 issue). VK3AFQ notes that: "To a certain extent this amplifier breaks new ground in that the active device is a power fet (Motorola MRF138) and a 28-volt supply rail is used. This shift from the conventional 12-13-volt supply and bipolar transistors has been made primarily because the industry trend is towards higher supply voltages – with a consequent easing of matching problems – and the use of fets with their reduced drive requirements, absence of thermal runaway and, not least, their improved close-in noise characteristics".

Without the signal output filter (L51, L52, C51-54), the amplifier has a power output which is substantially flat between 1·5 and 30MHz but VK3AFQ comments: "However, the total harmonic content tends to be high at the lf end of this range, falling somewhat as the frequency increases, so that the real 'flatness' is less than the above statement might imply. Because of the inherent harmonic content, the amplifier must *never* be put on air without a filter appropriate to the frequency in use."

VK3AFQ provides details of layout (including pcb), construction of the broadband output transformer, T52, as well as the construction and

TABLE 1 FILTER DATA

T51					
BAND	µH	No OF TURNS	AWG GAUGE	TOROID FORMER	C51-54 pF
160	3.76	27	26	T50/2	1500
80	2.05	20	26	T50/2	820
40	1.08	15	24	T50/2	430
30	0.75	13	24	T50/6	300
20	0.55	12	24	T50/6	220
17	0.40	10	22	T50/6	160
15	0.37	10	22	T50/6	150
12	0.30	9	22	T50/6	120
10	0.25	8	22	T50/6	100

NOTES
0.40mm enamelled wire can be used in place of 26 AWG wire.
0.50mm enamelled wire can be used in place of 24 AWG wire.
0.80mm enamelled wire can be used in place of 22 AWG wire.

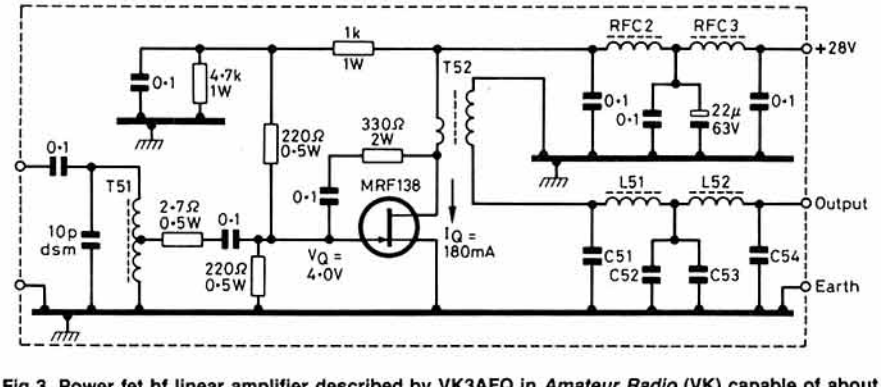
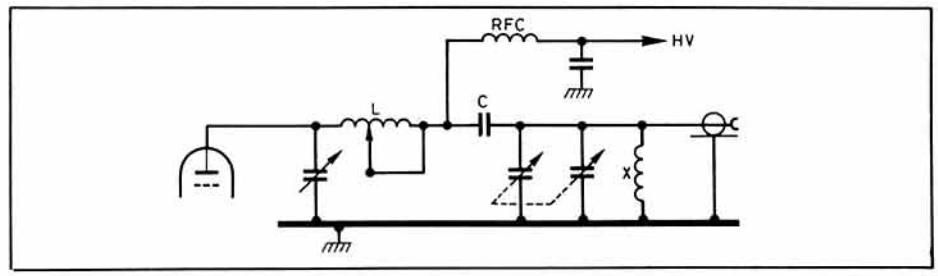


Fig 3. Power fet hf linear amplifier described by VK3AFQ in *Amateur Radio* (VK) capable of about 40W pep output. Details of the signal filter component values for bands from 1·8 to 28MHz are shown in Table 1. Notes on the amplifier: T1 7t No26 awg enamel (0.4mm) on Amidon BN 73-202 Ferrite balun core. RFC1 15uH moulded rfc. RFC2, 3 2.5t on Ferrite bead – Philips No 4312-020-36700 or Amidon FB-43-5111. M is monolithic ceramic capacitor. Details of the construction of T52 given in the orginal article

Fig 4. Arrangement used by GW3TKH to overcome the problem of rf choke resonances in a pi-network tank circuit



commissioning of the amplifier. This all appears quite straightforward but again I would emphasise that my notes are intended only to indicate the ways in which power fets are being used increasingly. Anyone attempting to duplicate either the 300W or the 50W pep (25W cw) amplifier really needs to consult the original, detailed articles. The "building block amplifier" is intended for use in conjunction with a low-power driver amplifier described in Part 6 of VK3AFQ's. In these circumstances the rf input to the driver amplifier, to achieve the 50 watts pep output from the power amplifier, is well under one milliwatt.

RF CHOKES IN PI-NETWORK TANK CIRCUITS

In the April *TT*, Peter Chadwick, G3RZP, drew attention to a possible method of overcoming the all-too-common problem of rf choke resonances on one or more hf bands – a problem made significantly more difficult to overcome by the addition of the WARC bands of 10, 18 and 24MHz. G3RZP noted the arrangement outlined by Pappenfus in his textbook on ssb of putting the rf choke at the output end of the pi-network (Fig 5, page 266, April issue) and wondered whether anybody had tried this scheme.

An answer came from Keith Winnard, GW3TKH who confirms the value of this approach and offers a further minor, but useful, modification, which removes the high dc voltage across the variable loading capacitors (formed from ganged variable capacitors of the type used for many years in broadcast receivers).

GW3TKH writes: "About two years ago, whilst finalising a QY4-400 grounded-grid amplifier (ie trying to get a quart into a pint pot), the anode rf choke in the conventional pi-network configuration would overheat or burn-out on one band or another. This was no doubt due to the much closer proximity of the screening compartment shifting the self-resonances of the choke. After some thought, it appeared that the choke specification would be less critical if designed to function at lower impedance. So a small, simple-to-make choke was knocked up and tried in the arrangement shown in **Fig 4** (basically similar to the April, Fig 5). No attempt was made to use variable diameter formers or complicated windings of the conventional high-impedance pi-network rf chokes. In practice, the simple choke has been in use ever since. The efficiency and docility on all bands from 3·5 to 28MHz equals that of the original, more spacious breadboard layout, although the amplifier is now contained safely in a small, rf-tight cabinet with its associated high-voltage power supply, making it domestically acceptable

"The position of the high-voltage, high-current coupling capacitor C was adopted in order to permit the use of a normal receiver-type ganged loading capacitor. The tuning capacitor,, the coil, and associated band-switch must be capable of withstanding the combination of high dc and rf voltages. With a high-voltage supply at 2·75kV, C is rated at 6kV."

"So, to answer G3RZP, the Pappenfus arrangement has been tried and certainly, at this station, works!"

In **Fig 4** the rf choke X is the indispensable safety precaution that prevents the high dc voltage reaching the output socket (and hence the antenna), should C fail. It needs to be of sufficient current rating to ensure that the high-voltage power supply fuse blows, rather than the choke burn out. I added this note, since realizing – too late – that no such safety choke was shown in the PL509 test amplifier (Fig 1 of the May *TT*), which was intended for operation into a dummy load rather than an antenna. But even for this application, a safety choke is advisable.

END-FEEDING AND THE ZEPP

In introducing the novel concept of an end-fed Windom (*TT*, February 1988, pp111-2) Les Moxon, G6XN, pointed out that "were it not for the problems, end-feeding would tend to be more attractive than centre feeding for non-rotatable antennas since the ends are more likely to be within reach of, or close to, the shack. In addition the centre of the element no longer has to support the weight of the feeder."

The end-fed Windom antenna provides a useful, if partial solution to this problem but is essentially confined to a specific band, for which both the capacitor and its position need to conform to the values and dimensions suggested by G6XN. Although, presumably, the antenna would function to some degree on other bands as a simple "random-length" long-wire antenna when tuned against earth or a counterpoise by means of a suitable pi-network matching unit. Alternatively, the 40m (134ft) long-wire is an effective end-fed antenna capable of working well on virtually any frequency, but is not without its problems. With an atu close to the operating position, the amount of rf floating around the shack is bound to be high. The antenna will also be susceptible to picking up electrical interference radiated from the mains, and at higher frequencies there will be pronounced nulls and lobes in directions governed by the site rather than the direction of the desired dx. Nevertheless, it is a simple, low-cost solution that has proved useful over a number of years at G3VA with the far end supported by trees.

But my first transmitting antenna, in common with many other amateurs of the day, was the then popular zepp with 66ft top and 32 or 16ft tuned feeders. This was in 1938-39. Again in 1946-47, a zepp antenna helped me achieve post-war DXCC Nr 321 worldwide, so I have always retained an interest in this type of antenna, even after it fell out of favour in the early 1950s.

The zepp, as noted in *TT*, January 1986, dates back to a German patent of 1908: **Fig 5(a)**. It was extremely popular for amateur operation in the 'twenties and 'thirties, before the availability of co-axial cable feeders, as a convenient end-fed arrangement, seemingly well suited to operation on harmonically-related bands. It was not until 1956 that serious doubts were cast on the efficiency of this form of antenna. Then, in discussing the use of baluns, Dud Charman, G6CJ (*RSGB Bulletin*, December 1955) noted that "simple connection of a resonant antenna to one side of a tuned line will not work – it is necessary to add the transformer winding in the form of the stub to tell the line it is balanced. *This is one reason why the old zepp antenna was so uncertain in its behaviour.'*

In his 1982 *HF antennas for all locations*, Les Moxon, G6XN, really put the boot in, explaining why, in his opinion "Despite its time-honoured status this (traditional form of end-fed zepp) is very uncertain in its behaviour. ▶

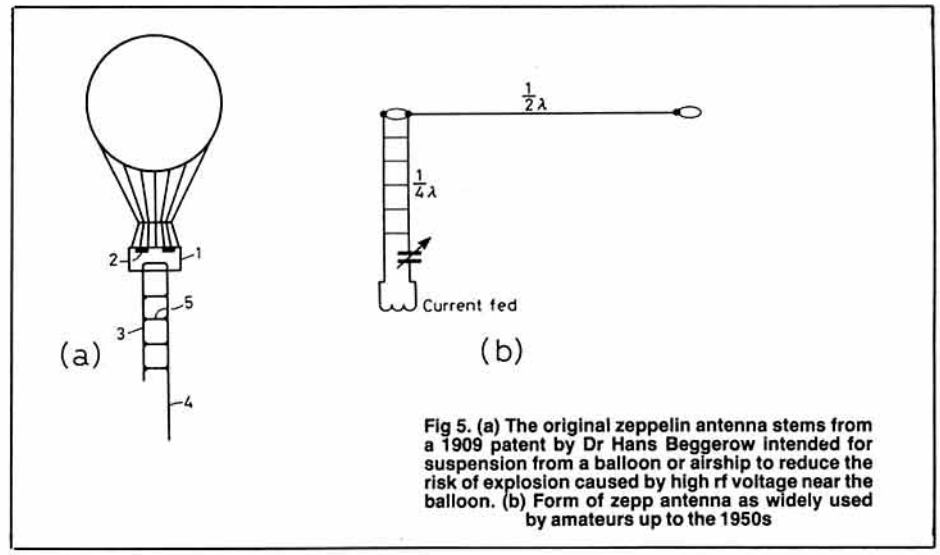


Fig 5. (a) The original zeppelin antenna stems from a 1909 patent by Dr Hans Beggerow intended for suspension from a balloon or airship to reduce the risk of explosion caused by high rf voltage near the balloon. (b) Form of zepp antenna as widely used by amateurs up to the 1950s

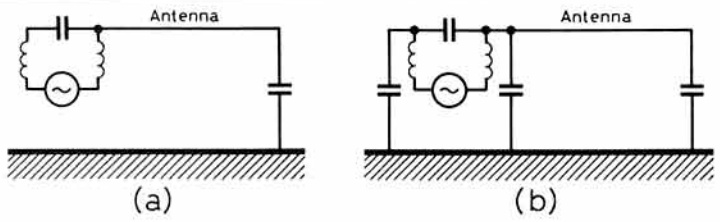


Fig 7. (a) How G6XN illustrates the problem posed by the conventional zepp arrangement. (b) Improved results without a G6CJ stub appear to be possible where the resonant feeder wires are well spaced and close to the ground: the equivalent circuit

Put bluntly it usually **does not work** and the reason is the same one that we have met before in a different guise. In going from a balanced to an unbalanced system or *vice-versa,* a balun is essential. Without one, there is no guarantee that the antenna will work better than a random length of wire. Nor, to be fair, any certainty that it will *not* work, but the zepp feed has been found particularly uncooperative in this respect." A suitable balun stub, as suggested by

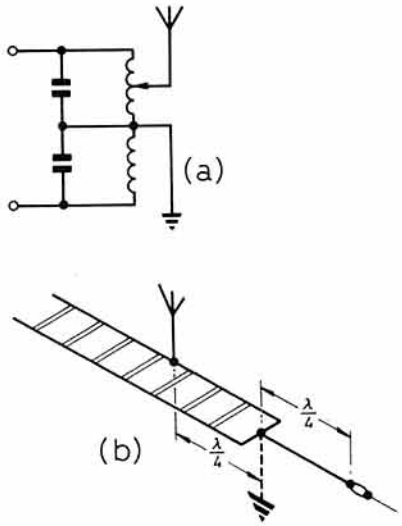


Fig 6. The unbalanced-antenna/balanced-line stub as suggested by G6CJ in 1955 together with its equivalent circuit

G6CJ, and endorsed by G6XN, is shown in **Fig 6**. However, the need to employ this stub, which may not be readily accessible, makes it more difficult to exploit efficiently the multiband properties inherent in this system.

G6XN added: "The reader may well be wondering how it is that if the zepp feed does not work it managed to avoid suspicion of its 'bona-fides' for so many years, being ousted from popularity mainly by the swing of fashion, which currently favours low-impedance coaxial lines. . . . It has, in fact, been found by the author that in two cases the balancing stub was not essential, but in each of these cases the wires were spaced about 7in (18cm) and only some 2-3ft (0·6-0·9m) from the ground. Even so the system did seem to be less critical, particularly in respect of balance in the main feeder, when the stub was in use." In this section of *HFafal* G6XN emphasised that there is an urgent need for the end-feeding of some types of antenna, particularly vertical dipoles or inverted ground-planes which are often difficult for mechanical reasons to feed anywhere other than at their base.

It is thus not surprising that G6XN took another look at zepp feeding while working on his end-fed Windom. To add to the notes in the February *TT*, G6XN wrote: "My experience is that the conventional zepp feed *sometimes* seems to work well enough. In this, and the one other case in my experience that leaves no margin for doubt, the feeders were widely spaced and close to ground so that the field at the ground produced by one conductor would not be completely cancelled by the other (ie the equivalent circuit is not as in **Fig 7(a)** but as in **Fig 7(b)**). In other words, there is capacitance from each wire to ground as well as between the wires, thus completing the circuit.

"I am sure that this is not the full story. With the dipole centre-fed, the zepp stubb (improved version) could be connected without noticeable loss, though the current flowing in them was large and there was no way it could be reduced. With a stub end-impedance possibly as high as 0.3MΩ, an out-of-balance capacitance of 0.03pF would be enough to energise it. To energise the antenna (say 5000Ω end-impedance) from the stub requires a lot more out-of-balance – but enough to cause significant feeder radiation? Even more doubtful, but it could be a useful field for further study, though I fear not by me. At my age, life is too short for tidying up all the loose ends, and one tends to have other priorities!"

Intrigued by these remarks and convinced that there is a real need for a reliable, reproducable form of multiband end-fed antenna, I temporarily lowered the long-wire antenna and replaced it with a 21MHz zepp that bore more relationship to the original zepp designs than to either of the ones suggested by G6CJ or G6XN. I used some transmitter-type 300-ohm cable with the wires spaced about 0.75in (18mm) apart as the "open" feeder, in conjunction with a pi-network matching unit which provided balanced output. I struck the exceptionally good hf conditions at the end of April and had little difficulty in making plenty of contacts, including some reasonable dx. But I soon became uncertain. Was the antenna really functioning as a half-wave element or as a random-length long-wire antenna? I soon reverted to the end-fed long-wire of which a significant proportion runs through the roof space. So there still remains a real problem to solve in developing a genuine transmission-line, end-fed antenna that can be relied upon to work every time! But how do you prove an antenna is working as a zepp rather than as an inefficient long-wire with lots of power wasted in high circulating currents?

UNIDIRECTIONAL LOOP RECEIVING ANTENNA

The two simple loop receiving antennas developed by Mike Villard and George Hagn (plus a contribution by George's 13 year old daughter!) were designed primarily to meet the

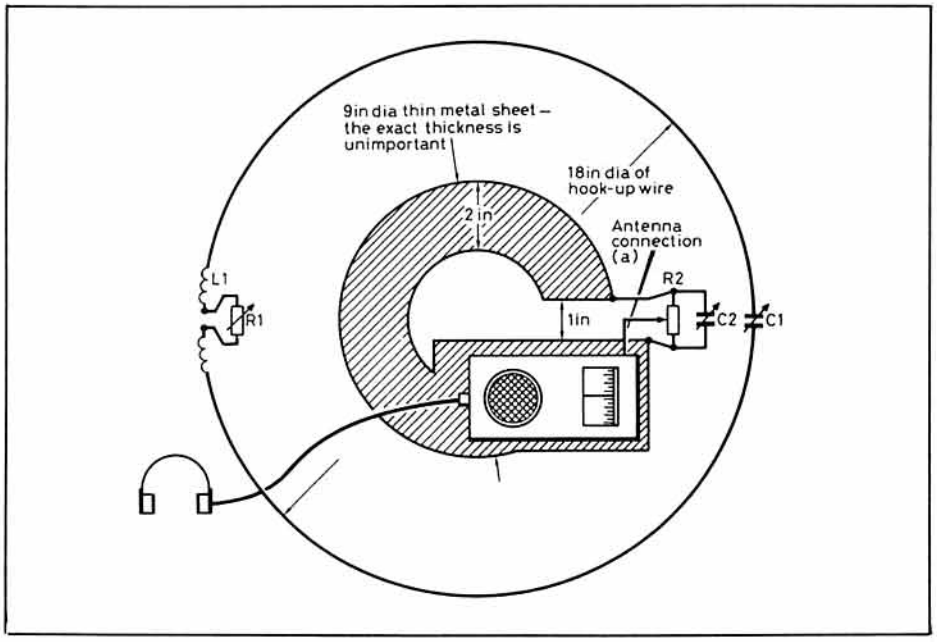


Fig 8. Wiring and layour details of the Stanford Research Institute co-planar loop antenna described by W6QYT at the IEE's hf conference. Notes: (a) antenna connection. L1 23t, 1-in diameter wood core, No 18 GA insulated wire. C1 5-20pF. C2 350 to 600pF (eg medium-wave tuning capacitor) R1 250-ohm composition resistor for Q adjustment R2 attenuator to overcome agc action during initial tuneup. Receiver Panasonic RF9, Sony ICF4901 or similar

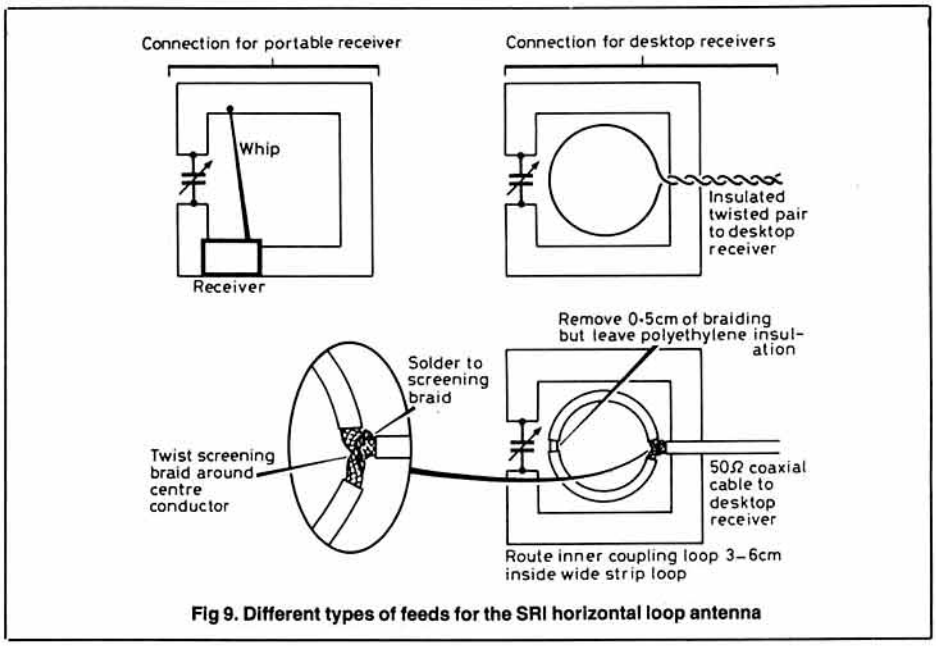


Fig 9. Different types of feeds for the SRI horizontal loop antenna

needs of those listening to high-power hf broadcast stations, particularly in areas still beset by ground-wave or sky-wave jamming.

The most novel is a co-planar twin loop (ctl) antenna which could well have useful applications for amateur-band reception or possibly for d/f hunts. It was developed to meet the following goals: (1) no active elements; (2) reasonable sensitivity (by broadcast-reception standards); (3) simplicity of construction; (4) use of commonly available materials; (5) ease of operation; and (6) satisfactory performance indoors if possible (in practice this can be achieved, although the 'direction' of signals indicated by the position of the loop may not be accurate).

The ctl comprises two loops, both loaded to resonance, with the inner loop made of a flat, foil element: see **Fig 8**. A third inner 'coupling' loop may be provided to permit a co-axial cable feed to a receiver located away from the loop.

The ctl exhibits unidirectional properties and, when correctly adjusted, shows a pronounced null on sky-wave as well as ground-wave signals. W6QYT describes this (*IEE Conference Publication No 284*, pages 141 to 144) as follows:

"In contrast with the conventional loop whose null is perpendicular to the plane of the structure, the ctl null is in the plane of the loop(s). Because of symmetry, when this is the case, both loops respond very similarly to variations in the angle of the elevation of the incoming signal over an appreciable range of angles."

W6QYT calls the inner loop, the R (receiver) loop and the outer loop is designated I (independent) loop. He explains: "To generate a unidirectional null, the side of the loops opposite to the tuning capacitors is pointed towards the distant station. When I-loop tuning is correct, current flowing in that loop generates a local H-field whose phase is opposite to that of the H-field of the incoming signal. The magnitude of this local field may be adjusted by altering the Q of the I-loop by means of a variable resistor when the Q is higher than necessary for the purpose. When the local H-field magnitude and phase are such as to cancel exactly the ambient H-field, the R-loop (located inside the I-loop and designed to respond *only* to H-fields) finds itself in a null region, or 'shadow' and the receiver registers a greatly reduced output. In this situation, the effective coupling between loops is very small. If the signal direction changes (or the direction of the loops is changed relative to the signal), the phase, and to some extent the amplitude, of current in the I-loop changes. The cancellation is then no longer complete, and the signal reappears in the output of the R-loop".

He has found that "on average, a readily-attainable front-to-back ratio for the ctl in the case of skywave signals seems to be around 20dB. This is sufficient to attenuate co-channel interference in typical situations to an extent which gives the listener the choice of two independent programmes (on the same frequency), instead of an unacceptable mixture. The antenna also rejects ground-wave interference". Results are presented of antenna patterns relating to signals from 15MHz broadcast stations.

The alternative SRI horizontal loop antenna (hla) is a very simple single-turn, resonant loop constructed of a wide strip of metal or foil and brought to resonance by means of a variable capacitor. It can be implemented in any one of several versions (see **Fig 9**). It will effectively null out ground-wave interference in much the same way as the more usual vertical-plane loop. Nulls are unlikely to be observed on incoming sky-wave signals but it could be used by amateurs to reduce local electrical interference, where this is radiated directly from information-technology, industrial, scientific or medical signals, or ground-wave signals from a nearby transmitter.

MORE ON THE LOW-COST SPECTRUM ANALYSER

The low-cost spectrum analyser for use with a general-purpose oscilloscope described by Albert Helfrick of Doty RFL Industries (and now also identified as K2BLA) in *RF Design* (January 1988) and included in *TT* (April, pp262-3) has attracted interest, with a number of readers determined to build one of these useful instruments. However, it seems possible that there may have been some errors in the original article, although I have yet to find a correction note in subsequent issues.

Roger Blackwell, G4PMK, writes: "I have so far built the rf section, and other constructors may like to note that there seems to be an error in the oscillator section of the NE602. With the capacitor values specified, it certainly does not oscillate around 155.7MHz. However, if you pick capacitors as specified in the NE602 data sheet: 22pF between pin 7 and ground; 5.6pF between pins 6 and 7, then it tunes perfectly using the specified coil. Incidentally, I use the easily available BB209 as the vco variable capacitance diode. Prospective constructors may also be interested in a more ambitious analyser which was described by the same author in *QST*, November 1985 as "An inexpensive spectrum analyser for the radio amateur" (the block diagram is shown in **Fig 10**). It has some ideas for the 'video' and sweep circuits, and a choice of i.f. bandwidths that might be applied to the simpler design described in *RF Design*."

Mike Horrocks, G8GTP, had noted the design in *RF Design* in advance of the *TT* notes but has also beeen experiencing problems, including that of finding a source of the by-no-means-common ic devices specified by the author. However, he was able to obtain them from: The Chip Shop (Semicons Ltd), 6 Bean Leach Drive, Afferton, Stockport, Cheshire (Telephone: 061-483 1989).

It would be interesting to learn if anybody has achieved entirely satisfactory results with this design, and if so, just what modifications, if any, they found necessary.

KILNER-JAR MAGNETOMETER

As G8KG has hinted, the progress of sunspot cycle 22 has clearly been proving unusually difficult for those whose task it is to predict hf propagation conditions months in advance. Several speakers at the recent IEE hf conference drew attention to the problems this poses to communicators and broadcasters attempting to rely on either published predictions or on the ▶

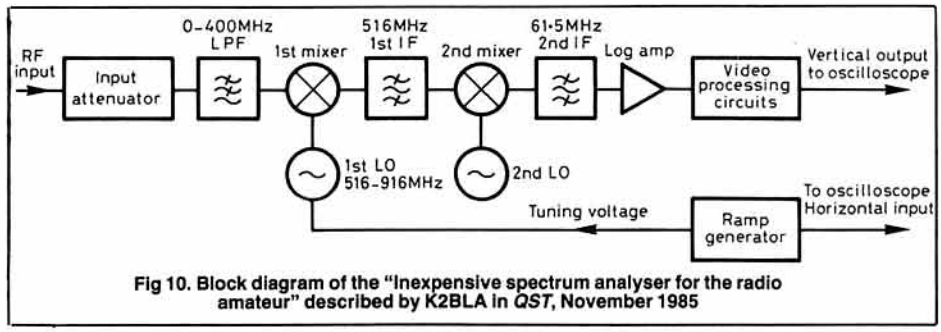


Fig 10. Block diagram of the "Inexpensive spectrum analyser for the radio amateur" described by K2BLA in *QST*, November 1985

use of computer programs such as "Minimuf" and similar alternative software. This is encouraging the professionals to make much greater use of various complex forms of "real time channel evaluation (rtce)", adaptive frequency selection and the like, as well as more use of ionospheric oblique sounders, etc. One result is that the professionals have become interested in using Sporadic E modes between about 20-30MHz.

For the radio amateur, however, it is usually a matter of regularly monitoring bands to find out what is happening that day, that time. It is then possible to predict pretty accurately what is likely to happen during the next few hours, taking into account the rotation of the Earth. One cannot help feeling that 21, 24 and 28MHz bands are often open in some directions, to some countries, far more often than the amateurs in the areas concerned (misled by published predictions?) realise! Anything that helps amateurs to become more aware of current ionospheric conditions is thus of interest.

Martin Vincent, G3UKV, was attracted to the concept of jam-jar magnetometers as do-it-yourself "A" or "K" index monitors by references in G8VR's *VHF/UHF* column of March 1987 (pp196-7), and also April 1988 (p289), where it was reported that nearly 100 readers had requested information on the home-brew jam-jar magnetometers of the type used by members of the Aurora Section of the British Astronomical Association. G3UKV writes:

"I tried the basic version using a beam of light, and its magnified reflection off a mirror glued to a bar magnet, but I found this awkward and very easily upset. I have since been passed details of a "Recording jamjar magnetometer" as described by H. R. Hatfield published in the February 1983 *Journal of the BAA* and reproduced in the form of a data sheet. It's a goer! My version differs in some details of mechanical construction but utilises the same sensor and op-amp electronics (see **Figs 11** and **12**).

"Using an old kilner jar, a plastic rod (to avoid having to drill the glass) to support the Hall-effect device (634SS2 from Maplin's or Radiospares), and ordinary cooking oil to dampen the magnet's swings, I glued the small bar magnet (about 25mm long) to the edge of a piece of perspex (instead of the lead used in the BAA design), immersed in the oil. A centre zero meter is ideal, since it can be zeroed and will indicate positive or negative magnetic-field changes. A normal meter could be used, with adjustments so that under 'quiet' field conditions, it reads centre-scale. Ideally, such an instrument is kept on all the time. For those lucky enough too own a pen-recorder, that would be even better than a meter. The small pcb/psu sits on top of the jar.

"The main application, at this time of rising solar activity in Cycle 22, is to observe changes in the earth's magnetic field, indicating the onset of a solar storm, and sometimes giving rise to radio auroras. It's a do-it-yourself 'A' or 'K' index monitor!"

Notes on the BAA data sheet relating to the electronics include:

(1) Gain is equal to R8/R3, typically 100.
(2) R6 is preset and provides coarse control.
(3) R5 is a 50 Ohm wirewound "loudspeaker volume control" and provides fine control, together with the fine setting arm.
(4) Do not make Sw1 unless output at Pin 6 is positive. Use fine setting arm and R6 and R7 to get about 2 volts-positive output to start with.
(5) When Sw1 is closed, the output is damped by C1. R8 and C1 control damping when Sw1 is open.
(6) Power supplies must be carefully regulated (by double zener-diode regulation?). The device needs less than 10mA total and batteries may be used. The voltage is not critical but must be well regulated.
(7) When setting up: (a) Measure voltage at Pin 2 of sensor. Adjust suspension until it is about +2V. (b) Adjust R6 so that −2V appears on R6 slider. (c) Then make fine adjustment.

Note also that all parts, except where indicated, should be non-ferrous. It is also observed on the data sheet that when torque is first applied to the nylon suspension, it will release itself again to some extent, and may well take several hours to settle.

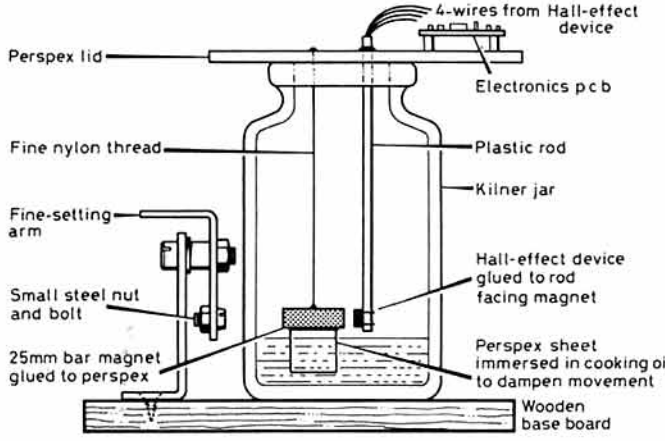


Fig 11. G3UKV's Kilner jar magnetometer based on the BAA's 1983 design by H R Hatfield

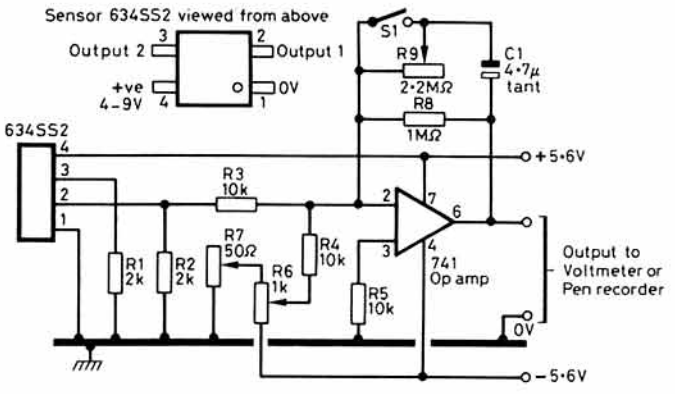


Fig 12 Electronics of the BAA magnetometer

SUNSPOT WEATHER

For many years there has been a scientific debate whether the sunspot cycle has any effect on climate – the so-called Maunder minimum of the eighteenth century is often mentioned as coinciding with a period of very cold winters.

American scientists have recently reported in *Nature* (April 28, 1988) on some results of the ACRM-1 (Active Cavity Radiometer Iradiance Monitor) satellite experiment which has provided a nearly continuous record of solar total irradiance variations since early 1980. The long-term variations have revealed a downward trend during the declining phase of solar cycle 21, a flat period between mid-1985 and mid-1987, and an upturn in late 1987. These measurements, they believe "suggest a direct correlation of luminosity and solar active region population. If the upturn continues into the active maximum of solar cycle 22, a relation between solar activity and luminosity of possible climatological significance could have been discovered."

No wonder it has always seemed that the sun shone more brightly on amateur radio during periods of sunspot maximum!

"RADIATION" DANGER TO RADIO AMATEURS?

A recent "Panorama" television programme alarmed some amateurs because of its reference to Dr Samuel Milham's study of the cause of death of 1,691 amateurs over many years in Washington state and California. A study which appears to indicate an increased risk to certain rare leukemias. This study was discussed soon after it appeared in The Lancet in *TT*, August 1985. It seems worth pointing out that Dr Milham's study has also been raised recently in the USA. *QST*, March 1985 points out that the study also suggested that radio amateurs had *fewer* deaths than the general population from certain other kinds of leukemia (it was myeloid leukemia that showed an increase over expected totals, 16 compared to 5·7). *QST* also notes that some professionals suggest there are "serious flaws" in Dr Milham's methodology and that his study "certainly did not establish a causal link between amateur radio and certain cancer incidences". In fact attention seems to have turned increasingly towards the possible hazards of 50Hz magnetic fields from electric power lines with the CEGB currently mounting an investigation – although here again many experts are convinced that the risks, if they exist, are likely to prove insignificant and not in any way to be compared to such risks as smoking. □

G0DZU'S 400-WATT HF LINEAR

PART TWO: THE POWER SUPPLY

CONTINUING THE INSTRUCTIONS FOR BUILDING A 4CX1000A LINEAR WHICH IS CAPABLE OF RUNNING A VERY COOL 400 WATTS INDEFINITELY. PART ONE APPEARED IN JUNE

BY PETER BARKER, G0DZU

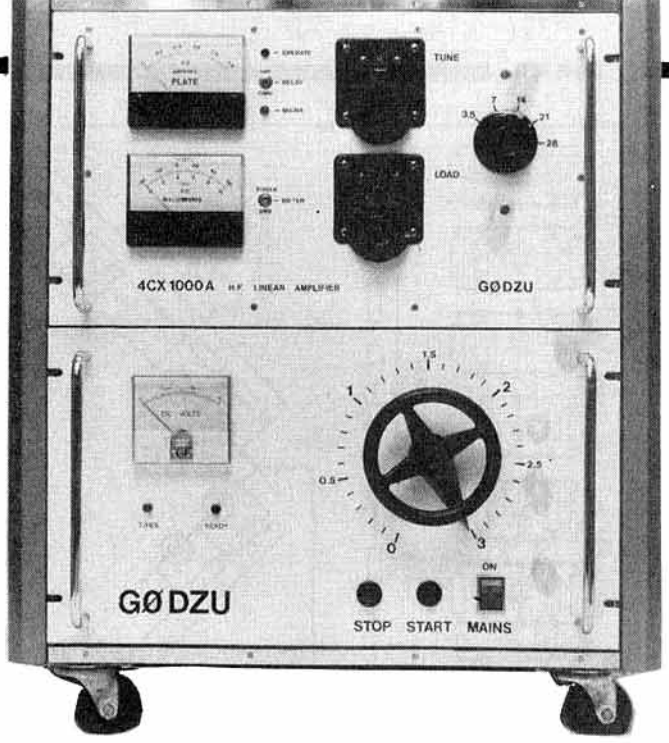
The ht power supply circuit is shown in Fig 6. Mains voltage is supplied, through a double pole switch S4 to a latching circuit RLA, S5 and S6. The purpose of the latching arrangement is to prevent power from being immediately restored should the mains be momentarily interrupted. It also prevents the power supply from functioning should the ground connection to the amplifier become disconnected which could otherwise result in high voltages appearing between the amplifier chassis and power supply chassis. S6 energises the latching relay RLA which supplies 240V mains to the amplifier through socket (F) (G) (HG) and also starts the timing sequence.

Timer A allows the valve heater to reach working temperature after approximately five minutes. Timer B is then energised and power is supplied to the transformer through resistor R15 which prevents high switch-on surges. After a further 10 seconds R15 is shorted and full mains voltage is applied to T3.

A variable supply was needed to give flexibility during amplifier testing. T3 is a variable voltage auto transformer or 'Variac' which allows adjustment of the ht from 0 to 3000V. It also provides optimum adjustment of the linear amplifier output.

T4 is the main high voltage transformer with 240V primary and 1100V + 1100V secondary. It is a modified low voltage transformer which was conservatively rated at 1·3kVA continous duty by the manufacturer. Having first established that the voltage per turn was 1·01 with 240V input, the laminations were dismantled and the secondary winding removed. There was a copper screen between the primary and secondary which was left in place. One end of the former was trimmed down to the copper screen and the primary was boxed-in using paxolin sheet and epoxy resin. This provided a uniform section to accept two rectangular bobbins of approximately one third the total width of the primary winding. The narrow bobbins eliminated the need for insulation between winding layers. The two bobbins were wound with 1100 turns each of 0·6mm (24swg) enamelled copper wire and the transformer reassembled with spacers between the secondary bobbins, leaving gaps for air circulation. The transformer was finished off by applying a liberal coat of transformer was finished off by applying a liberal coating of transformer varnish to the windings.

A high voltage bridge rectifier D20 to D51 was made from 1000V PIV diodes, series connected with voltage equalizing resistors. They were mounted between tag strips on nylon standoff insulators. Smoothing capacitors were also series connected with voltage equalizing resistors and although 1000uF 450V capacitors were used. Other combinations may be chosen as long as the final capacitance bank is at least 50uF.



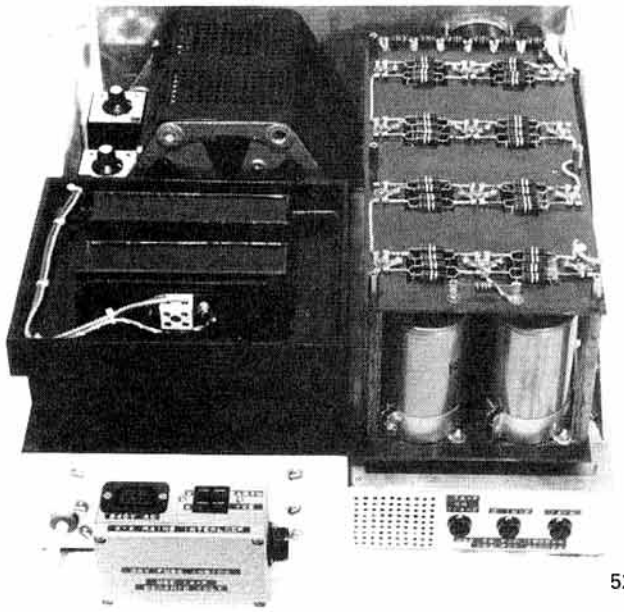
There are four resistors across each capacitor. This was a precaution to ensure that if one of the resistors became open circuit, the voltage across the electrolytic would not exceed its rated value. This may appear over cautious but having witnessed the explosion of an electrolytic capacitor I decided that it was better to be safe than sorry.

The resistor chain R48 to R54 is to enable a 300V meter, M3, to monitor 0 to 3000V. Other meters would be suitable but the movement should not be greater than 1mA FSD. Resistors R87 to R91 are an essential part of the fault protection circuit and under no circumstances should they be omitted. They serve to reduce the maximum fault current to 68A.

F6 is a ceramic sand filled cartridge fuse which is cheaper and easier to obtain than higher voltage types. It is rated at 415V ac and 10kA breaking capacity. The circuit has been fault tested using a number of these fuses from different sources and I am satisfied that it will achieve fast reliable disconnection at 3000V 68A peak current.

From a safety point of view I would not normally use a fuse outside the manufacturer's stated rating unless there was additional protection, and in this circuit there is a fuse (F5) in the primary of the ht transformer.

To prove that F5 was adequate backup protection, a link was placed across F6 and the output was shorted to ground. There was a much higher surge current than that recorded on the previous test, but none of the components were damaged. It must be emphasised that these fault tests were carried out using specialised equipment and facilities so, for safety reasons, it is not recommended that you repeat them. ▶



HT power supply showing main components

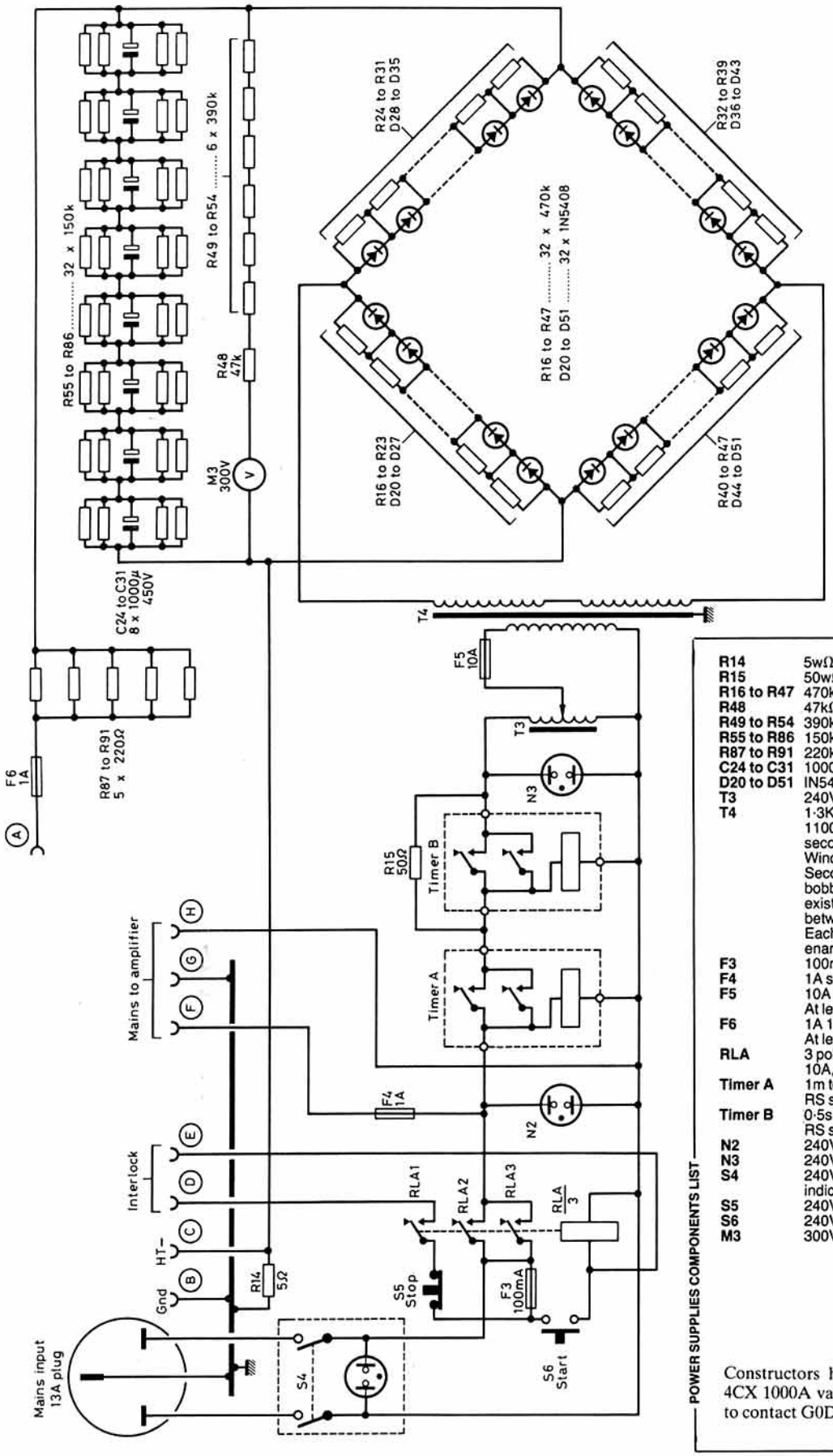
components were damaged. It must be emphasised that these fault tests were carried out using specialised equipment and facilities so, for safety reasons, it is not recommended that you repeat them.

Relay changeover circuit

A diagram for the transmit/receive changeover circuit is shown in Fig 7. RLB and RLC are coaxial relays with 24/28V coils. RLD is a 24V miniature relay with 250V, 1A contacts. It operates both coaxial relays and the standby circuit. PTT is connected to the normally open contacts on the auxiliary output of a transceiver.

Testing and setting up

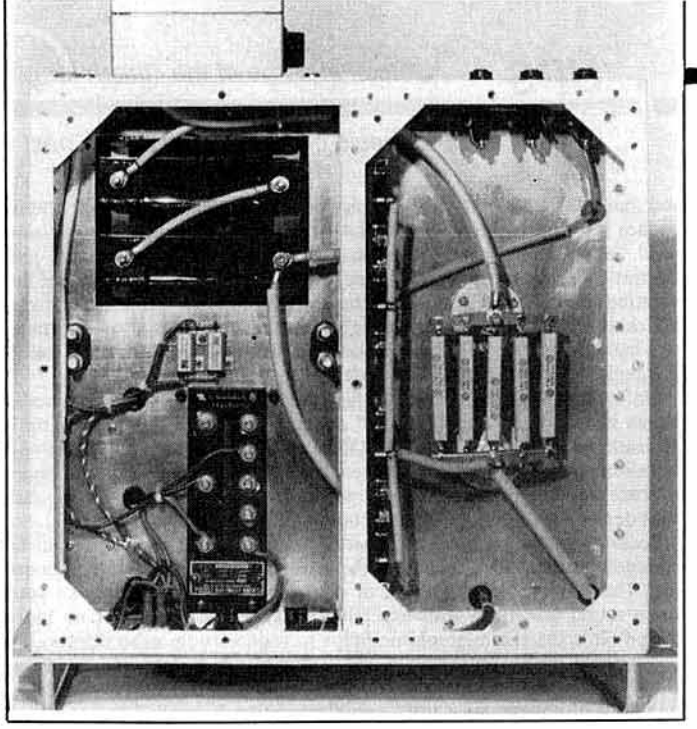
A dummy load is essential for the testing of this amplifier. You will also requre an accurate digital multirangemeter, 0-1A ammeter, 0-3000V voltmeter, two-tone audio generator, two product detectors with potential divider, oscilloscope (preferably with X and Y inputs), 100W power/swr meter, 1000W power/swr meter and a suitable multimode ssb transceiver.



POWER SUPPLIES COMPONENTS LIST

R14	5wΩ 5W wire wound
R15	50wΩ 50W wire wound
R16 to R47	470kΩ 1W
R48	47kΩ 1W
R49 to R54	390kΩ 1W
R55 to R86	150kΩ 2W
R87 to R91	220kΩ 17W wire wound
C24 to C31	1000uF 450V electrolytic
D20 to D51	IN5408
T3	240V, 8A Variac
T4	1·3KVA transformer, 240V primary 1100V + 1100V secondary. Winding details for 1V/turn transformer: Secondary – two 35mm wide fabricated bobbins, mounted side by side over existing primary with ventilation gaps between. Each bobbin contains 1100t, 0·6mm(24swg) enam copper wire – See text.
F3	100mA fast blow fuse
F4	1A slow blow fuse
F5	10A 1·25in H.R.C sand filled ceramic fuse. At least 10kA breaking capacity at 415Vac.
F6	1A 1·25 H.R.C sand filled ceramic fuse. At least 10kA breaking capacity at 415VAc.
RLA	3 pole changeover relay. 10A, 250V contacts, 240V coil
Timer A	1m to 30m time delay relay RS stock no 347-927 or similar.
Timer B	0·5s to 20s time delay relay RS stock no 349-872 or similar.
N2	240V orange neon indicator
N3	240V green neon indicator
S4	240V 13A double pole rocker switch with neon indicator.
S5	240V 1A push-to-make switch
S6	240V 1A push-to-break switch
M3	300V, 1kΩ/V moving coil meter.

Constructors having difficulty in obtaining tested 4CX 1000A valves or other components are invited to contact G0DXU direct for further information.



Under-side of the ht power supply

Before applying any supply voltages to the amplifier, connect a low level rf source to the input socket via an swr meter and apply the minimum power necessary to achieve a reliable swr reading on the 28MHz band. Adjust C32 and if necessary lengthen or shorten the coil to achieve the lowest swr reading. Next, check that the ht supply is functioning correctly with the amplifier disconnected. Short the interlock terminals (D) to (E) and set the variac T3 for zero voltage. Adjust timer A to give a five minute delay and timer B to give a 10 seconds delay. Gradually rotate the variac control to check the no-load ht voltage, noting the ht panel meter reading against an accurate 3000V voltmeter connected to the ht output.

It is worthwhile carrying out a short-circuit test. First make sure that the capacitors have fully discharged and the variac is at zero setting, then short the ht output to ground through a 0-1 A ammeter. Switch on and wait for the timers to operate then gradually rotate the variac control until the ammeter reads 0·5A and leave for a few minutes to check that no components are overheating. Without moving the variac, disconnect the ammeter to monitor the open circuit voltage, which should be less than 200V. The lower this figure, the better the regulation will be under full load conditions.

Having completed tests on the ht power supply, remove the valve from its socket, connect the amplifier and check that the bias voltage is around −150V. This will ensure that the valve will be correctly biased into an off state. The valve can now be replaced and checks can be made on the heater and screen supplies. Also, ensure that there is adequate pressure in the grid compartment by the water manometer method mentioned earlier.

When you are satisfied that all supplies are functioning correctly, set RV1 to maximum bias voltage (slider to D16) and gradually raise the ht voltage to 1500V, then connect (K) to ground. Reduce the grid bias voltage with RV1 until the ht current is about 0·25A. Raise the ht voltage to 2500V and check the screen current which should be about −6mA (this will vary depending on the valve). Reduce the grid bias voltage further until the anode current reaches 0·4A (it will be necessary to readjust the ht voltage to allow for voltage drop under load). Monitor the screen current which should be approximately −10mA. The valve will now be dissipating 1kW, so ensure that the hot air from the anode compartment is not obstructed or allowed to circulate back into the blower inlet. Remember to wait at least five minutes after placing the amplifier on standby before switching off to allow adequate cooling of the valve. The amplifier is now ready for rf tests.

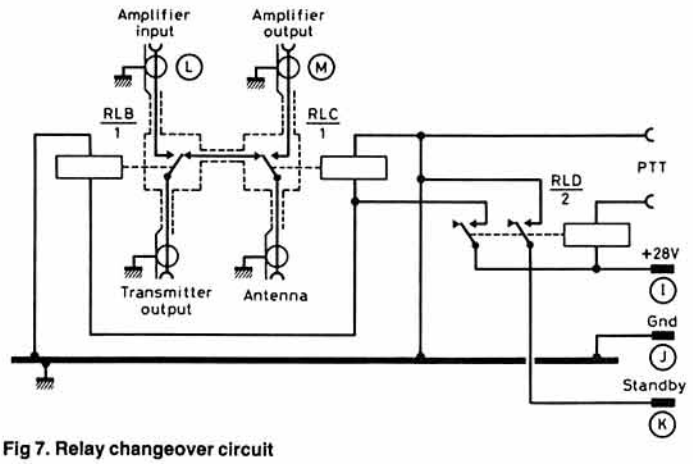


Fig 7. Relay changeover circuit

Connect the relay changeover circuit, dummy load, power attenuator (if needed) and the driver transmitter. Power meters should also be connected to the input and output of the amplifier. At this stage you should check the amplifier for parasitic oscillations. The test is carried out without rf drive and involves checking for sudden fluctuations in grid current, screen current and any indication of rf on the power meters. The valve should be running at its maximum dissipation (0·4A 2500V) and all bands need to be checked at various settings of the 'tune' and 'load' capacitors. The 4CX1000A should not require parasitic suppression. Having established that the amplifier has good stability and is completely free from parasitic problems, you can then proceed to the next stage.

Set the amplifier to 3·5MHz and the 'tune' and 'load' capacitors C11 and C12 to maximum, then adjust the ht to 2500V. Gradually increase the rf input power to 2W, observing the increase in negative screen current. Tune the amplifier until a peak is observed on the output meter. Continue to increase the input power and monitor the screen current which will continue to dip then reach a point where it reverses. Further power increase will make the screen current rise rapidly and eventually become positive. Stop when you reach zero current. Observe the power output which will probably be about 800W with 20W input. Reduce the 'Load' capacitance, re-tune then increase input power until the screen current again reaches zero. This procedure should be repeated until maximum output power is obtained. It is advisable to rest the amplifier in standby mode every few minutes to allow it to cool. You may have observed that the screen current peaks with the maximum power when tuning. During operation of the amplifier I use the screen current meter as a tuning indicator. Repeat the above testing procedure on all bands and note the 'tune' and 'load' dial readings. These may be useful later if repeat tests are necessary.

Having established that the amplifier will operate reliably at high power levels, you should now check linearity. If you own or are able to borrow an oscilloscope with separate X and Y inputs it is advisable to use this to monitor linearity with a two tone input. Connect the X channel via an envelope detector and potential divider to the amplifier input then the Y channel via a second envelope detector and potential divider to the amplifier output. An alternative method is to monitor directly the output envelope produced by a two tone input. Having used both methods I find the former to be more exacting as it is easier to assess the straightness of a line than the shape of a sine wave.

As before, start with the 3·5MHz band and after tuning the amplifier, observe the display on the oscilloscope. Assuming you use the straight line method, there should be no curves or kinks if the amplifier is tuned and functioning correctly. If the line is distorted then there are three main reasons: a steadily steepening curve indicates insufficient standing anode current. An opposite curve probably means that there is a problem with the screen or grid regulation. Flattening at the top will result if the amplifier is overdriven. If you are not familiar with the techniques of checking linearity, it is advisable to consult RSGB or ARRL handbooks and '*Single Sideband Principles and Circuits*' by E W Pasppenfus – published by the Mc Graw-Hill Book Co.

Having thoroughly checked the amplifier at high power levels you can be confident that there will be trouble free operation when it is coasting along at the full legal limit. The ideal ht voltage for normal use is 1800V. Adjust to give 400W into the dummy load with a single tone input. This will require 18W of drive (or 72W through the power attenuator). Switch to the two tone input and check the linearity. If you use an rf ammeter in series with the 50Ω dummy load, 2·0A will equate to 400W pep. This is half the current observed on the single tone test because the mean power of an undistorted two tone envelope is exactly half the peak. The standing anode current may be reduced to 200mA with negligible effect on linearity, but I would not recommend that it was reduced further as this will degrade the otherwise excellent performance of this amplifier. ■

SIDEBAND SLIP UPS

A look at some of the "taken for granted" of basic electronics to get the best from

by Eavesdropper

IMAGINE you are in your shack and decide to have a look over the 3·5MHz band to see of there are any old friends about. You may have the following thoughts while tuning round:

"Its mid-morning, so quite a few ssb nets in operation; some just exchanging 59+ reports, weather reports, and how's the xyl, and others into the really heavy stuff, like what's wrong with the world and how to put it right! Some signals very good quality, BBC and all that, while on or two leave a lot to be desired! Old Fred on 3,735kHz is a pretty chronic signal again, distorted and splattering at least plus and minus 15kHz; Harry's audio is still bad too, is sounds all hollow and boxy. Perhaps I should tell him."

A familiar scene? Most radio amateurs use commercially-made equipment of some sort, and modern "black boxes" are capable of transmitting very good quality signals. So why are there quite a few poor signals about these days? Is it that some amateurs do not know that their signals are bad, or is it that others are not willing to tell them in case they cause offence? Or maybe it is the receiver that's at fault? I do not think it unreasonable to tell our fellow enthusiasts when something is wrong. Mind you, there are ways of doing it and, if done tactfully, you generally make another useful contact and learn something about the other amateur's rig too.

There are considerable pressures on the DTI to allocate more of the radio spectrum to commercial users. Did you know that about eight per cent of the total frequency spectrum is allocated to the amateur service? That's quite a sizeable chunk and our frequencies are coveted by many. It is therefore up to us all to radiate "clean" signals, and make good and proper use of our band allocations.

Well, I hear you ask, what is the cause of these poor-quality ssb signals? It could be due to many factors, but the most likely are:

Incorrect microphone response.
Carrier insertion position wrong.
Too much microphone gain.
Rf feedback.
Tuning/matching problems.
Receiver overload.

In this article I'm going to try and cover the topics listed, with some handy hints and tips for both newcomer and oldtimer alike.

INCORRECT MICROPHONE RESPONSE

To achieve the maximum readability within the limited effective audio passband of the ssb filter in your rig, the microphone response must be correct. Most rigs have a gradual audio roll-off in the microphone amplifier below 400Hz and above 2·5kHz, but it is what happens in between that can make all the difference. Microphones can considerably modify this response to give bassy, boomy, boxy or toppy audio, the worst being the Wellington Boot sound, as if being at the end of a pipe!

For our communication purposes, ideally we want a slightly rising audio frequency response Fig 1(a) to emphasise the "highs" in our voices and maintain readability under noisy and low signal conditions. Microphones like the Heil and Shure 444 have these characteristics and give good, clear communication audio. Other dynamic microphones and electret capacitor types with a flatter response are also very suitable if the tailoring of the audio is done in the speech amplifier stages of the rig. Matching the microphone to the rig's input impedance is also important, eg a high impedance 50KΩ microphone input could result in "thin" audio lacking in body, and perhaps an undesirable "spiky" response.

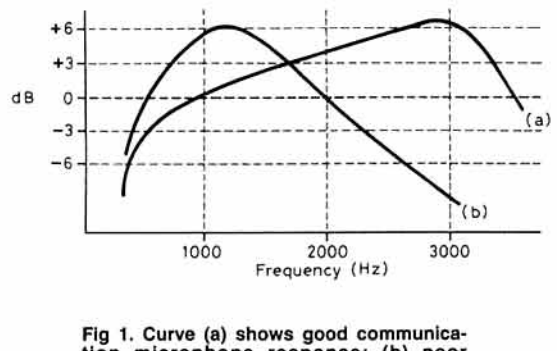


Fig 1. Curve (a) shows good communication microphone response; (b) poor response resulting from excessive top cut in the microphone preamplifier circuit

Unfortunately, some Japanese rigs have too much top cut in the audio stages which result in a "mellow" or woolly sound Fig 1(b) making it difficult to copy under even slight QRM and QRN. Removing one or two capacitors from the transmitter speech amplifier and receiver audio stages in some rigs can sometimes work wonders without any ill effects. Ask your dealer – there are approved modifications for some rigs.

Seeking reports of your transmitted audio quality on the air can be misleading because it depends on the other amateur's rig and its response too. The acoustics of the shack or operating room can also make your voice sound unnatural with excessive resonance. Speaking at no more than 4-6in from the microphone helps to reduce room echo effects, but don't crawl inside the microphone – that's just as bad and produces "heavy breathing" with excessive bass response. Our voices vary considerably of course, so a little experimentation is needed to see which microphone and speaking position suits you and gives clear audio. I find that speaking across the microphone instead of directly into it, gives the best results. If you have an audio cassette recorder, record your microphone signal and hear for yourself what you sound like. The results could be quite illuminating!

CARRIER INSERTION POSITION

Assuming your microphone is alright, how can you be sure that your transmitting filter passband alignment is correct?

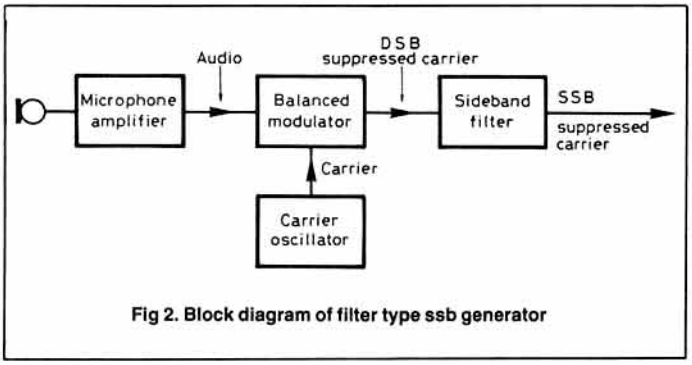


Fig 2. Block diagram of filter type ssb generator

Let's look at a block diagram (Fig 2) of ssb generation using the filter method which forms the basis of most ssb transmitters on the market today. The filter bandwidth varies slightly from rig to rig, but is usually between 2·1 and 2·7kHz wide at the 6dB down points. To obtain the best speech quality response, the carrier must be set at the correct part of the filter slope. In Fig 3 the carrier is set correctly so that the audio between 300 and 2,700Hz lies witin the filter 2,400Hz passband, but if set at a different point as in Fig 4, the audio passband could be 50 to 2,450Hz resulting in bassy audio and even poor suppression of the opposite sideband. To get the correct response, the 6dB down points (ie one quarter of the 1kHz power level) should be 300 and 3,000Hz for filters with 2·7kHz bandwidths, or 300 to 2,700Hz for 2·4kHz filters etc.

You can check the response of your rig by sweeping the passband, using an audio tone source as shown in Fig 5. Apply a low level tone of 1kHz to the microphone input and adjust the microphone gain for a power output of about a quarter of maximum (typically 25W with most transceivers) on the power meter. Vary the audio tone frequency, but keep its level constant, and plot a graph of power output against tone frequency. You will then have a graph showing the transmitter audio frequency response, similar to that shown in Fig 6, which can be used to determine the transmitter suppressed carrier position relative to the sideband filter. Check both lsb and usb responses because they are usually set independently of each other, and hence may be different.

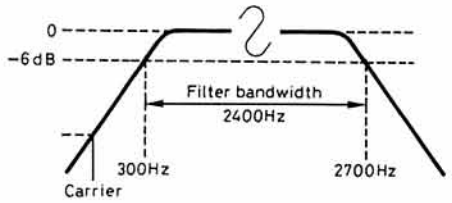


Fig 3. Correct carrier position shown gives the optimum audio response from 300 to 2,700Hz. The precise carrier position on the filter slope will depend on the filter characteristics

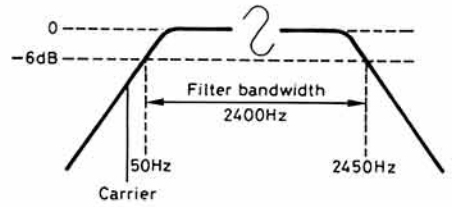


Fig 4. Badly-placed carrier restricting the audio and giving excessive bass response

Fig 5. Test arrangement for determining transmitter audio response

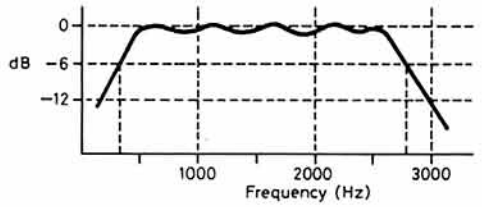


Fig 6. Good transmitter audio response from 300 to 2,800Hz. This ssb filter has a 2,500Hz bandwidth, and the ripple within the passband is typical of normal filter tolerance

If you have a detailed workshop manual or a good descriptive handbook for your rig, the location of the lsb and usb trimmers which are normally provided for adjusting the carrier position should be marked, and you can alter the settings to obtain the required audio response. Move the trimmers slightly, carefully noting their previous positions, and then plot the graph again. You will soon see if you have moved the right way and, after a few trial and error settings, you should be able to find the correct one. Avoid making the response too bassy or toppy, so misrepresenting your natural speech characteristics. If you do not feel confident to carry out these adjustments, you can still plot the response without getting inside the rig and then seek the help of a local dealer to realign the rig for you if necessary.

In the case of a transceiver, the transmitter passband response usually applies to the receiver too, so any maladjustment will affect the quality of received audio as well. Don't forget to switch out any passband tuning or i.f shift controls before evaluating any changes on the receiver. Listening to a known good-quality station will give you a good idea if you have got it right, but also check with a local who knows your voice to see if your transmitted audio sounds OK. Ask him to be critical; you *do* want to know if there is something wrong.

Having ascertained and, if necessary, corrected the transmitter response, any additional audio tailoring within the passband should be done by the speech amplifier or microphone. Clearly, the microphone response affects speech quality, but unless the transmitter passband response is correct as well, improving the microphone may have little effect.

TOO MUCH MICROPHONE GAIN

Having optimised the transmitter passband response, you don't want to spoil the characteristics by overdriving the rig. It's very impressive to see the meters waggling about wildly when you talk, but in practice the chances are that you are overdriving and producing a large number of "splatter" or intermodulation products (ips) from the final amplifier. My tip for setting the microphone gain correctly is to whistle into it, no processors in circuit please, and adjust the gain control for maximum rf output, then back it off until it *just* starts to reduce. When speaking normally into the microphone, at a distance of about 3in from your mouth, the meter will then only show a *maximum* deflection about 50 per cent of the whistle level.

This *is* the correct level because meters have ballistics, the mechanical inertia resulting in a slugging of the movement, which means they cannot respond quickly enough to peak levels. Some meters are very "slow" and others quicker, but none of them can show an instantaneous level. Peak reading meters are not really the answer either, because they have a "hold" time of several seconds, thus masking any indication of compression effects since the needle just hangs at the peak level. What is needed is a display of the instantaneous level.

An oscilloscope is ideal, but expensive, so are there any other devices that will do the job? Fortunately, yes, and the "Antennalab" by Tony Bailey, featured in *RadCom* August/September 1983, has a string of l.e.ds which indicate the rf output level. L.e.ds are instantaneous indicators, so once you have set your required peal level to a predetermined number of l.e.ds, you can see immediately if you are "going over the top". The Antennalab is quite complicated and shows the precise output power too, but there is another device, "A modulation meter for ssb" by G4BTV described in *RadCom* March 1985, if you want a simpler but just as effective peak indicator. When using a speech processor, the average rf output level will be higher so meters will indicate more, but I'll cover the pros and cons of processors later.

RF FEEDBACK

Occasionally, you hear ssb transmissions which sound alright when the operator is speaking softly, but as soon as he begins to talk it up a bit the audio becomes distorted and almost breaks into oscillation with sometimes a frequency modulation effect. This is often caused by rf getting into the microphone circuit, and hence feeding back, giving howl-round effects. Operating the rig into a dummy load will not always show these symptoms since the rf in the shack is then not sufficient to be picked up by the microphone lead, but if your antenna system or feedline presents a voltage maximum point at the shack, the rf can be quite high enough to produce nasty effects. Usually, a capacitor in parallel and a resistor in series wired at the microphone input socket does the trick and filters out the rf; see Fig 7. Typical values are 1,000pF and 4·7kΩ for low impedance (500Ω)microphones, and 100pF and 47kΩ for high impedance microphones. An rf choke of about 1mH value can be sustituted for the resistor. Make sure the capacitor is wired directly across the back of the microphone socket with short leads to chassis or the nearest rf earth in the rig.

The way the antenna system is fed can help to minimise rf in the shack. Coaxial or low impedance twin-wire feeder with a low swr doesn't generally cause any problems, but an end-fed wire or tuned feeders can produce a high rf voltage point in the shack giving rf feedback on certain bands. One way of overcoming this problem is to use a remotely-tuned matching unit at the base of the antenna system fed via coaxial cable from the shack.

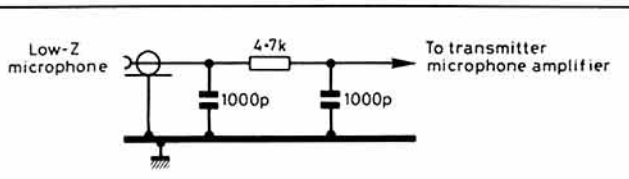


Fig 7. RF filter for low impedance microphone inputs

Every installation is different of course, but good earthing of all equipment in the shack by as short a lead as possible will make sure that any stray rf goes to earth and does not cause problems. Earth leads from individual pieces of equipment should be separate leads to a main earth point, not a looped earth wire from one piece of equipment to another. It is not recommended that you use the mains earth since this often takes a long route back to a good rf earth and can also induce rf into the mains supply and cause hi-fi or television interference. Peter Chadwick's article "The Killing Ground", *RadCom* June 1987, shows the safe way to earth your shack.

If you are using coaxial cable to feed the antenna, make sure the coaxial outer is connected at the shack end to a good thick (low inductance) direct lead to earth. A balun is recommended at the antenna end of the coaxial cable to prevent rf coming back up the feedline on the braid. The swr on the coaxial cable should be as low as possible to obtain maximum power transfer, and this will also help to prevent rf getting into parts where it is not wanted.

TUNING/MATCHING PROBLEMS

It is important to remember that linearity is essential for ssb amplification. Transmitter power amplifiers will only give their best linearity and output when properly matched to the load, whether by coaxial cable to a matching unit or antenna, or even to a high-power linear amplifier. Mismatching as a result of incorrect tuning can lead to amplifier instability and parasitic oscillations at the peaks of output, producing a rasping or splashing type of spurious signal heard over several kilohertz, causing interference to other band users. These problems apply equally to valve and semiconductor (solidstate) power amplifiers. A solidstate p.a should "see" the correct load, normally 50Ω, otherwise linearity and the efficiency of the ouput filters will be impaired.

Valve linears should be tuned with C2 (the loading capacitor) meshed as little as possible without reducing the output. Failure to do so can lead to high intermodulation products (ips) causing the splatter we should all avoid. So when in doubt, load heavily. The needles may not waggle as much, but your signal will be better, and everyone will be grateful.

In spite of higher voltage supplies of 24V or even 50V on the final amplifier transistors of some solidstate rigs, the linearity of a well-designed valve p.a remains better. For example, the Trio TS830S has a very clean output signal with low intermodulation when operated correctly, see [1]. In the case of high power (400W p.e.p) linears, the valve type is still more cost effective than solidstate devices, and also better in terms of intermodulation products. No doubt this will change with the development of better devices over the coming years, but the cost of a good solidstate p.a may still be higher than valves.

To return to matching matters, in my opinion there is a lot of mumbo-jumbo spoken about swr and the necessity to get it down to exactly 1:1. At hf, and with most coaxial cable used at hf by radio amateurs, a figure of 1:1·25 or less is adequate for satisfactory operation and good transmitter power transfer to the antenna. However, most solidstate transceivers have protection circuits which begin to reduce the power output if the swr exceeds about 1:1·25. To keep them happy and perhaps satisfy your own desire for an swr meter that shows "zero" reflected power, some form of antenna matching unit (amu) is useful. I don't like the term atu, because the device doesn't tune the antenna, it merely provides a match from your rig to the impedance presented by the whole antenna system. Several circuits have been given in the magazines over the years, but the coaxial line "flattener" shown in Fig 8 is as good as any if your hf beam doesn't give an acceptable swr. If calibrated dials and switch positions are used for the capacitor and inductor settings, it is an easy matter to reset them once the optimum position has been found. A matching unit also adds another stage of filtering to attenuate any transmitted harmonics, and prevent receiver blocking by reducing strong broadcast signals a few 100kHz away, eg medium wave signals when working 1·8MHz. There are many forms of amu but the types described in [2] and [3] are probably the most useful ones I know.

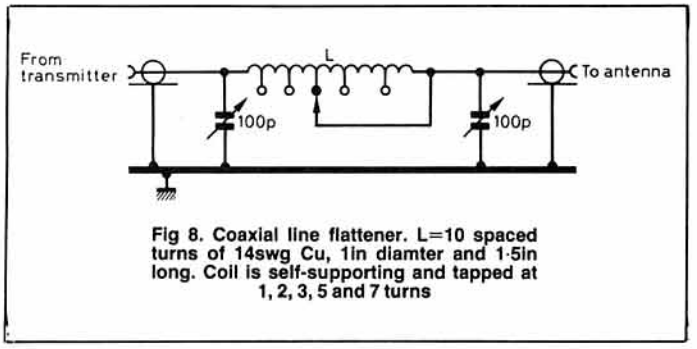


Fig 8. Coaxial line flattener. L=10 spaced turns of 14swg Cu, 1in diamter and 1·5in long. Coil is self-supporting and tapped at 1, 2, 3, 5 and 7 turns

RECEIVER OVERLOAD

If you live close to another radio amateur and operate on the same band at the same time as he does, you may run into reception difficulties. His signal is bound to be very strong and this may cause overload, cross-modulation, and other intermodulation effects in your receiver. These ips, sounding like extra signals, splatter, birdies and random whistles, are generated within the receiver because it is working in the non-linear part of its signal-handling capability. The subject is too complex to go into detail here, but I recommend you read some of the excellent articles which explain the problems, see [4] and [5].

However, one point is worth a mention and is easily tested on your receiver. These ips generally go down by 6dB or more when the signal input is reduced by 3dB. So, if you have a switchable antenna input antennuator, putting it in circuit should result in a noticeable reduction of the QRM, perhaps enabling you to hear the wanted signal. On the hf bands up to 21MHz there is usually plenty of gain in the receiver anyway, so losing a bit of signal doesn't matter too much. Try it and see. Many transceivers have a separate receiver input so a homemade 20dB attenuator (Fig 9) can be inserted without getting inside the rig or being in the transmit path.

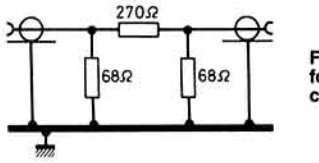


Fig 9. Receiver type 20dB attenuator for 50Ω coaxial cable. All resistors carbon film type, 0·25W, 5 per cent tolerance

Incidentally, don't assume that even if you have the very latest rig with the best specification yet known that it is necessarily immune to overload problems. I know of an amateur who has an immaculate TS940S and yet suffered "birdies" all over the hf bands from a local 1kW mf broadcast station about half a mile away. He could cure the problem by switching in 10dB on the receiver attenuator, but that extra gain was needed above 20MHz. His antenna system consisted of a G5RV fed with twin-feeder connected directly to coaxial cable, and investigation revealed that the system was picking up volts of rf from the mf station. Even the TS940S couldn't cope with this situation! The cure was simply a 1:1 balun inserted between the twin-feeder and the coaxial cable. HF signals still passed through unaffected, but the mf signals were now way down and effectively ignored by the receiver. So, as I mentioned earlier, a properly-matched antenna system can benefit your receiver too. ■

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RECIPE FOR LONGER LIFE

KEEP THE HEATERS UNDER PROPER CONTROL

BY
JOHN NELSON
GW4FRX
&
MELVIN NOAKES
G4JZQ

COMPONENTS YOU WILL NEED

R1 56k	C1 47 µF 10V tant
R2 39k	C2 47 µF 10V tant
R3 150k	C3 3n9 100V ceramic
R4 1k	C4 47 µF 10V tant
R5 390R	C5 10n 63V ceramic/polycarb
R6 820R	C6 2µ2 10V tant
R7 4k7	C7 100n 63V ceramic
R8 100k	8 100µF 25V
R9 2k2	C9 100 µF 10V
R10 10k	C10 100n 63V ceramic
R11 3k3	C11 10n 63V ceramic
R12 4k7	C12 10n 63V ceramic
R13 1k	C13 2µ2 10V tant
R14 100k	C14 4µ7 35V tant
R15 1k	
R16 33k	TR1 SMM70N05
R17 15k	TR2 VPO808M
R18 51k	TR3 ZV0106A
R19 27k	
R20 1k	IC1 CA3130
R21 560R	IC2 TL072
R22 1k2 (see text)	
R23 220k	D1 BZX79C3V9
R24 820k	D2-7 1N418
R25 680R	
R26 22k	D8 BZX79C3V9
R27 47k	D9 1N4148
	D10 BZX79C12
RV1 10k multiturn	D11 1N4148
RV2 2300k multiturn	D12 BZX79C15
RV3 10k multiturn	D13 1N4148
	D14 BZX79C4V7

This article is by way of a companion to the authors' "A power supply and control system for tetrode amplifiers" which appeared in the December 1987/January 1988 editions of Radio Communication. It discusses a stabilised 6V 6A dc supply intended for the heaters of tetrodes in the 4CX350/250 family, although the principle has other applications where a very low input/output voltage differential is required.

DESIGN CONSIDERATIONS

The first obvious point is why one might go to the trouble of designing and building a stabilised heater supply at all. Normal practice in the thermionic era was simply to connect an appropriate low-voltage transformer winding to the valve heater, supplying the latter with whatever ac voltage was specified by the manufacturer in his literature. The 4CX-series tetrodes were and are no exceptions to this principle, and in both professional and amateur service their 6V heaters are normally fed either from a 6V transformer secondary or one of the much more common 6·3V variety with the addition of a suitable low-value series resistor.

Several factors led to the decision to develop the present circuit. The first was the requirement stated in the 4CX family data sheets stipulating that the heater voltage should be held to within 5 per cent of the 6V rating to ensure long life and consistency of performance. Taken literally, this specification is in fact impossible to meet if the valve heaters are supplied directly from a transformer connected to the UK mains electricity supply, since the Central Electricity Generating Board (CGEB) is obliged by statute to maintain voltage and frequency only to within 6 per cent. It must be admitted, however, that the practical implications of this are probably minimal. The second was a set of measurements made on the regulation of apparently adequate generators during portable contest operation. At two particular stations the combined line and load regulation was around 14 per cent and 16 per cent respectively, and – to judge from comments made by other contest operators – it is suspected that poor voltage regulation may be common at large portable stations. The measured figures are, of course, considerably outside the 5 per cent specification. The third was a move of QTH on the part of one of the authors from London to the middle of nowhere in Wales; regulation of the incoming mains was found to be decidedly sub-standard, probably as a result of the rather remote site being fed over a long run of overhead cable, and more like 10 per cent than the statutory 6 per cent. It appears from discussions with amateurs in various parts of the UK that this situation is not uncommon in rural areas. The fourth was the lack of space in a power supply then under construction for an extra 6V transformer with the appropriate current rating, whereas there was a spare 6·3V 8A winding available on the screen supply transformer. The fifth was simply an irrational fit of impatience displayed by one of the authors when faced with the prospect of fiddling about with lengths of wire and resistors in order to reduce 6·3V to 6V at the requisite current: there had to be a better way to go about the job than that! More importantly, however, the sixth and final factor was a set of life test data on a large sample of 4CX250B valves which became available to one of the authors and a consequent discussion with two professional users and the valve manufacturers themselves.

From these it became apparent that a dramatic increase in the usable life of small 4CX tetrodes could be obtained if the following procedure was adopted. The valve was run for the first 100h of use with precisely 6V dc on its heater, to allow the emission to stabilise. It would then be run under cw conditions at full power whilst the heater voltage was reduced in 0·1V increments. At some point a marked drop in output power (or, if two-tone drive was used, a very pronounced deterioration in intermodulation performance) would be observed. If the heater voltage was then increased by 0·2V from that point, that would correspond to the optimum heater voltage for the valve in that class of service; with the 4CX250B at frequencies between 120 and 300MHz the optimum voltage at maximum ratings would usually be around 5·7V, and between 300 and 500MHz about 5·5V. Maintaining that voltage accurately and stably would lead to approximately a threefold increase in life. The implication for amateur use is that one valve or pair of valves installed from new would probably last longer than the owner . . . . .

A further factor of importance when considering valve heater supplies is the considerable surge current at initial switch-on. Like the filament of a lamp bulb, the heater of a thermionic valve has considerably less resistance when it is cold than when it has reached normal operating temperature. If the source impedance of the heater supply is very low, the initial current flowing in the heater at switch-on will be several times its normal running value. The resultant thermal cycling and overload places considerable stresses on the heater. To obtain some idea of the magnitude of the problem, the heater of a 4CX250B was fed for test purposes from a suitably metered 6V 30A dc supply. At switch-on the initial surge current took the supply into current limiting; the current being drawn was still 11A five seconds after switch-on. No further quantitative data is available, but it is a reasonable inference that valve life must be considerably shortened by this treatment. Many 6V transformer secondaries are quite able to supply very high peak currents for a short time, and this is probably a good reason not to use a heater transformer which is rated at much more than the required current if one is using a conventional heater supply. Perhaps one rather unfortunate corollary is that heater transformers should themselves run hot! For many of its small triodes and tetrodes (although not, as it happens, the 4CX250 family) Varian-Eimac recommends that a separate heater transformer which will saturate and limit the switch-on surge should be used; however, this is unlikely to be easy to ▶

achieve in amateur service since it demands a specially-wound transformer.

It follows from the above that some form of controlled soft-start system is a sensible addition to a 4CX heater supply, and no doubt this assertion is valid for valves other than those in the 4CX series. It is simple to incorporate suitable circuitry into a regulator system such as the one described here. Having considered all the factors outlined above (discounting neurotic aversions to low-value resistors) it was decided to develop a suitable design.

CIRCUIT CONSIDERATIONS AND DESCRIPTION

The heater current of a 4CX250B or R is specified as 2·6A at 6V, and the corresponding figure for a 4CX350A is 2·9A. For a two-valve amplifier, this implies in round numbers a total heater current of some 6A at 6V. On the basis that a suitably rated 6·3V secondary winding is available for use in the heater supply, the design task comes down to deriving a 6V 6A stabilised dc supply from it. The main difficulty is that when a 6·3V ac source is rectified and smoothed and presented with a 6A load, the trough of the ouput ripple voltage of the smoothed supply will only be of the order of 200mV above 6V as a result of voltage drop in the rectifier – which will be significant at 6A, although less so if Schottky devices are used.

In the final design the value of output voltage was to be finely adjustable so as to permit use of the procedure outlined above for extending valve life. Optional remote sensing was to be incorporated, as was overvoltage and overcurrent protection and a soft-start system.

There is, of course, nothing intrinsically very difficult about low-voltage high-current regulators. For a 6A load the simplest approach might seem to be the use of a three- or four-terminal packaged device; indeed 10A variable low-voltage regulators in a TO3 package (such as the National Semiconductor LM196 family) can easily be obtained, requiring only the addition of a few external components to produce a very stable and well-protected supply. However, these devices require a considerable differential between input and output voltage. In the case of the LM196 the figure varies between 1·8 and 2V according to its internal temperature, making it impossible to use in the present application; devices similar to the LM196 appear to require even more input-output voltage differential. It will be remembered that one of the design criteria was to be able to use an existing 6·3V ac supply for the regulator input since this is by far the most common value of heater winding found on British transformers but, as stated earlier, when rectified and smoothed the resulting dc output will only be of the order of 6·2V at the trough of the ripple. The packaged regulator is therefore not suitable for further consideration.

Conventional low-voltage high-current regulators with discrete components tend to use a series-pass configuration with a suitably rated bipolar transistor and associated driver circuitry, perhaps using either a 723-type regulator or an operational amplifier. However, the design requirement for very low input-output differential immediately rules out the use of a bipolar transistor as the pass element. Although a bipolar transistor is usually thought of as having low $V_{ce(sat)}$, most high-current bipolar transistors will have rather more than 200mV across them at saturation when passing 6A. Even with paralleled devices, which might be used in order to handle the required current with transistors having low $V_{ce(sat)}$, it is impossible to go below this finite limit; paralleling bipolar transistors will not permit any lower voltage drop than the $V_{ce(sat)}$ of the best device. Paralleling also implies voltage drop across the emitter ballasting resistors which are always required with paralleled bipolar devices in order to ensure current sharing. There is also the problem of second breakdown to be considered, together with the need to provide sufficient base drive.

A switching regulator configuration is possible and indeed one was used at GW4FRX for some time; it proved to be very reliable and stable, although the component count was rather high and some inductors involved were rather difficult to make and did not prove easily repeatable when the circuit was tried by other interested parties. However, the appearance on the market of a new generation of power fets capable of handling very high currents makes the job rather more simple. There is no parameter corresponding to $V_{ce\ (sat)}$ associated with a field-effect transistor; for PSU pass transistor purposes the approximate fet cognate is $R_{DS(on)}$, which is simply a statement of the minimum resistance of the device when fully turned on. Modern power fets such as those used in the present design have $R_{DS(on)}$ figures in the low tens of milliohms. Equally, fets can be paralleled with equanimity to achieve whatever level of $R_{DS(on)}$ is felt to be necessary, with no need for ballast resistors and no danger of second breakdown; this means that devices found at rallies at very low prices can simply be paralled to achieve the required figure. The only constraint is their quite high input capacitance and any driver circuitry for power fets must take account of this. Also, the majority of low $R_{DS(on)}$ devices available at present are n-channel which, as will be seen, means that this particular design has a negative output voltage. All in all, a low $R_{DS(on)}$ power fet driven from suitable circuitry can form a very good low-differential regulator. Fig 1 shows the circuit of the final design evolved to meet the requirements outlined in this article.

In essence the circuit consists of an operational amplifier, IC1, in which a sample of the output voltage from the unit is compared with a reference voltage derived from a 3V9 Zener diode D1. The sample voltage at the non-inverting input is in fact slightly variable by means of RV1, which forms the fine output voltage control. The output voltage from IC1 is taken to the gate of TR1, which is the normal

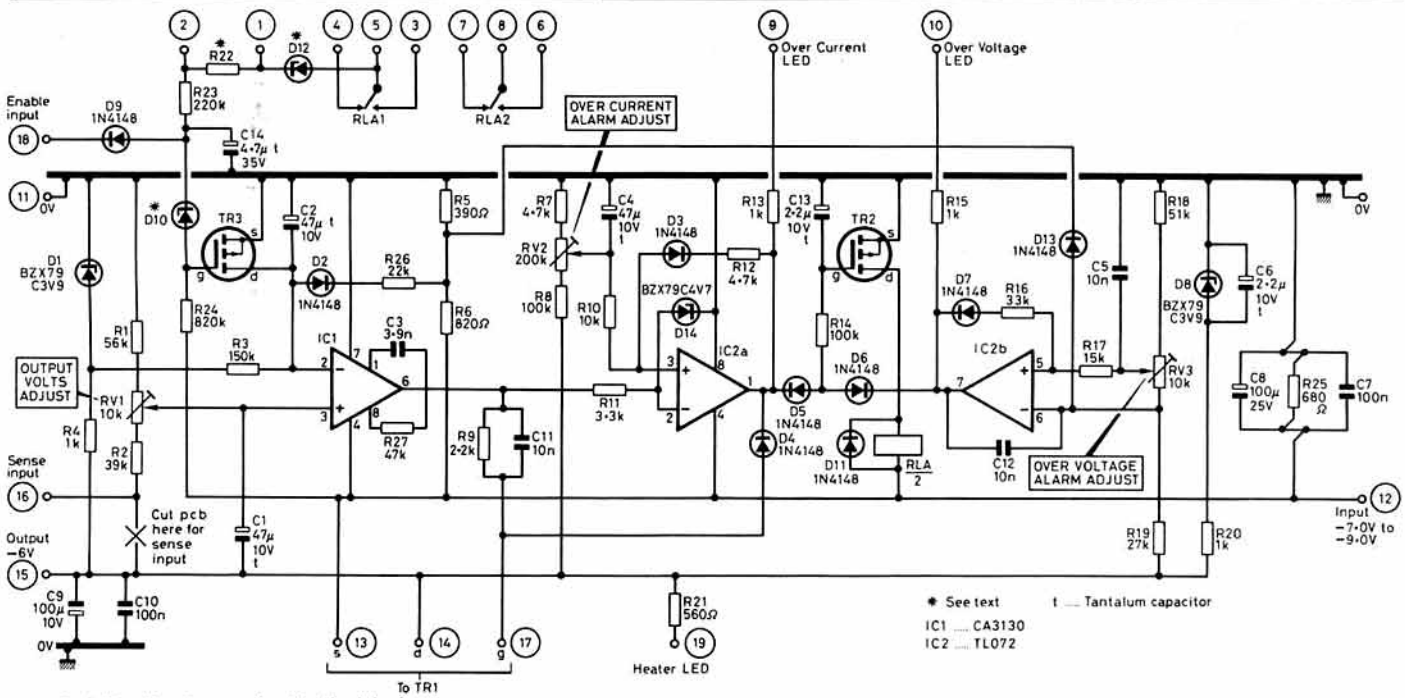

Fig 1. Stabilised heater supply – the final design

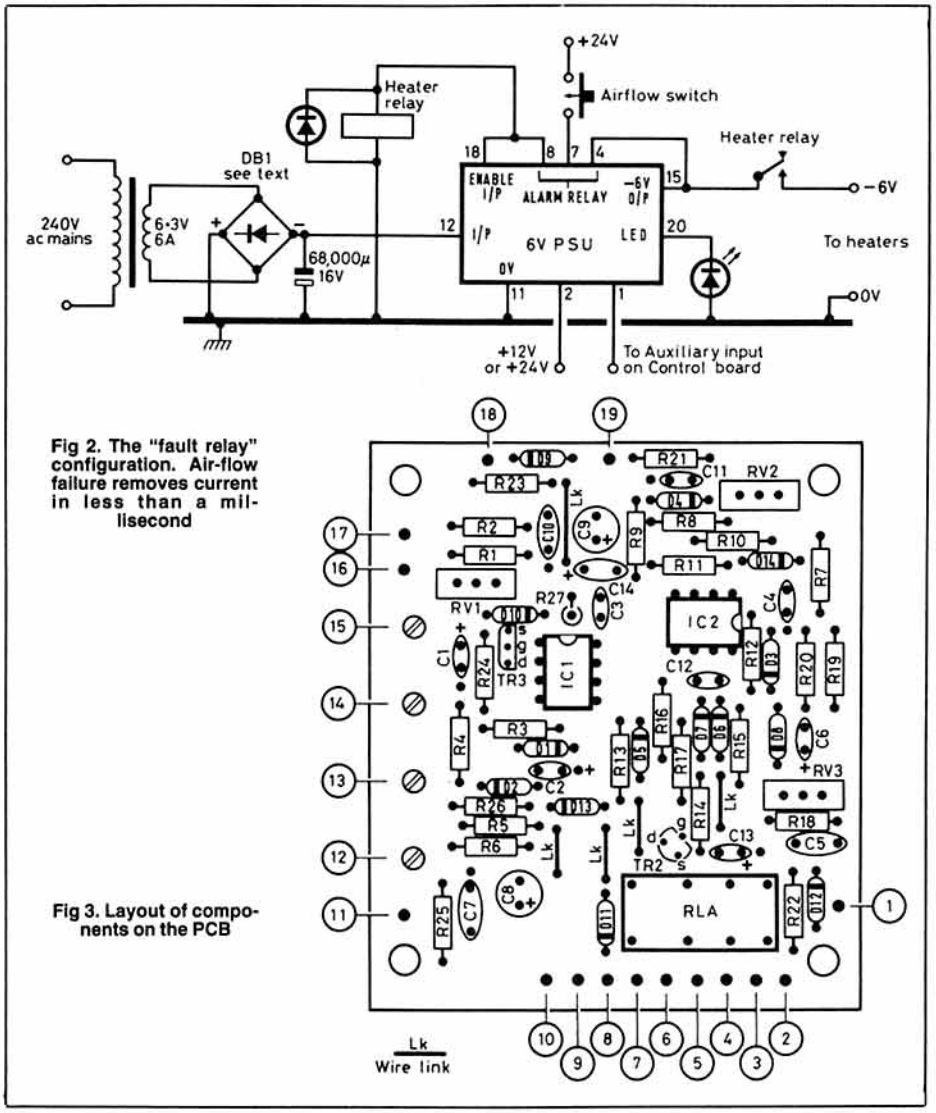

Fig 2. The "fault relay" configuration. Air-flow failure removes current in less than a millisecond

Fig 3. Layout of components on the PCB

pass transistor. Note that the output of the unit is in fact −6V, with the positive side of the supply being at 0V (earth). The reason for this is the high turn-on voltage of the fet, which for an n-channel device implies that the gate must be some 4V positive with respect to the drain (output). Since there is only 6V available, the supply is, as it were, turned upside-down so that the fet can be driven from the existing rails; the valve heater is not, of course, sensitive to polarity. A CMOS CA3130 op-amp was used because of its ability to produce an output swing which is virtually that of the supply rails.

Since the reference Zener D1 is fed from the stabilised output of the unit and has only a very small negative temperature coefficient, both long- and short-term output voltage stability of this supply is very good. In the prototypes, an initial 6·00V output at switch-on reduces to 5·99V after about one hour and is stable thereafter; in fact the measurement might well be more a reflection on the accuracy of the DVMS used for the tests than the performance of the design. Mounting one of the prototypes in a die-cast box and warming the latter to about 40° produced a measured decrease to 5·98V output.

Because the reference voltage is derived from the output voltage – which is obviously not present when the unit is initially powered or when the regulator is not enabled by the airflow switch – some form of start-up circuit is required. This is formed by D2, R5 and R6, which at initial switch-on provide some 2V at the inverting input of IC1 and enable the regulator to start. When the reference voltage is fully established, D2 becomes reverse-biased and isolates the unregulated "start" voltage from the regulator circuitry.

IC2 is a dual op-amp which is used for overvoltage and overcurrent detection. IC2b compares the output voltage with a reference voltage derived from the 3V9 Zener diode D8; a separate reference is used since if a common reference source was shared with the regulator and the reference failed, an overvoltage condition might not be detected. An output overvoltage fault drives a warning l.e.d and also operates the "fault relay" RL1 via the diode OR-gate D5 and D6 and fet TR2. This relay can be connected to external circuitry as required; typically it should operate the main heater control relay (i.e. that controlled from the airflow switch or operated manually in order to power the heaters, as shown in Fig 2) so as to remove the heater voltage from the valve. The regulator circuitry itself is directly interfaced with the heater control relay by means of TR3. The intention here is to ensure that the relay never switches high current, either at switch-on or – as a result of a fault condition – when the supply is switched off by TR3 before the relay opens. The amplifier airflow switch (if fitted) enables the heater relay via contacts on RL1 and is also tied to the regulator circuitry. A detected failure of cooling air turns off the heater supply in less than a millisecond, leaving the heater relay to catch up as described above.

Overcurrent protection is provided in a slightly unusual way in this unit. The most common technique for power supply overcurrent sensing is to monitor the voltage developed across a resistor in series with the output of the supply from which the current is taken and apply the increase in voltage associated with an overcurrent condition to suitable circuitry. This inevitably implies a voltage drop across the sensing resistor, which would not be acceptable in the present design. Instead, the gate voltage of the pass fet is compared in IC2a with a sample of the supply output. If the gate voltage increases past a pre-determined point, the output of the op-amp operates TR2 and RL1 as before and illuminates an "overcurrent" l.e.d. IC2a's output also switches off the pass transistor via D4 to prevent potential damage. C4 disables the trip until the correct voltage has been established after switch-on. This method of current sensing is not especially precise but since all that is really required is for the system to be able to discriminate between about 6A and a dead short-circuit, it is adequate for the job. Since it does not actually work by sensing overcurrent, however, it might be better to treat it simply as an "overload trip".

SELECTION OF COMPONENTS

As discussed, IC1 is a CMOS CA3130. IC2 is a TL072 fet op-amp. TR2 can be virtually any P-channel fet capable of handling the operating current of RL1; a VP0808M was used in the prototypes. The relay itself is a small two-pole changeover type similar to those used in the power supply and control system described in the previous article. They are usually known as "BT Type 47" and are available from various sources. TR3 can be almost any small-signal P-channel fet; a ZVP0106A was used in the prototypes. D1 and D2 should be of good quality and pedigree, since they establish the output voltage of the supply and the overvoltage setting stability. They should preferably be of the same type so that their temperature coefficients are similar. All diodes are small-signal types such as the 1N4148, BAW62, BAV21, etc. RV1, RV2 and RV3 are all small multiturn variable resistors. Tantalum capacitors **must** be used where shown.

There are various options for the pass fet TR1. The input-output differential capability of the supply will be largely set by the value of $R_{DS(on)}$ of the chosen device, and some 20 or 30mΩ is desirable. This can be achieved by a single fet such as the Siliconix SMM70N05, which has a specified $R_{DS(on)}$ of 0.018Ω or 18mΩ, although the current cost of this component is about £6. In passing, it is interesting to note that this order of resistance is less than that measured for some switches and relays in the "on state"! It may be more economical to parallel two devices; the BUZ11, IRFZ30 and SMP60N05 have all been tried in pairs in the ▶

present design and work well. New Siliconix BUZ11s were seen on sale at the 1987 NEC Convention for 50p each, which implies that a very good pass element for this unit could be obtained for £1. However, virtually any n-channel device or devices capable of handling the required current should work and there is plenty of scope for experimentation. Remember that power Fets have two great advantages in this application; they can be placed in parallel without the need for ballast resistors or other special precautions and extremely small values of gate current are required to drive them. The only precautions which **must** be observed relate to handling. Power fets are very static-sensitive and all the normal precautions for handling such components must be taken. IC1 should also be handled with care. For that matter, the devices used in the prototypes for both TR2 and TR3 are not gate-protected and should be carefully handled to avoid static damage.

It is important to give some thought to the transformer, rectifier and reservoir capacitor which will ultimately be used with the unit as well as to the electronic components associated with the regulator itself. The current rating of the transformer will obviously have to be adequate for the valves to be used. Furthermore, supplying a rectifier/reservoir capacitor/regulator combination is rather harder on the transformer than simply supplying a valve heater directly and a factor of safety is desirable. In round numbers, for a pair of valves demanding 6A it would be wise to choose a transformer with a rating of perhaps 8 or 9A for use with this circuit. However, it is fair to say that many ex-military or commercial transformers are considerably underrated (the famous "Admiralty rating" syndrome) and – for example – one of the prototypes was used with a surplus Parmeko 6·3V 5A transformer to supply a pair of 4CX250Rs for a considerable time with no ill-effects.

The rectifier is the next item to consider. Many packaged silicon bridge rectifiers are available, and for preference a 25A component such as the Mullard BY261, General Instrument KPBC25 or International Rectifier 26MB series should be used. Whatever device is chosen, it should be bolted to a substantial heatsink (preferably the main chassis of the power supply) and a good grade of heatsink compound should be used. Unfortunately, conventional silicon bridge rectifiers will inevitably drop well in excess of 1V across them at 6A; in this circuit one volt is precious! Schottky rectifiers will do rather better, but having spent many hours combing supplier's catalogues it can confidently be stated that no manufacturer appears to produce packaged Schottky high-current bridge rectifiers (*hint*). Silicon rectifiers can be used with a 6·3V transformer provided that a reasonably high value of reservoir capacitance is used, as discussed shortly. Four BYV20 Schottky rectifiers connected in a bridge configuration are currently in use for the present GW4FRX 144MHz amplifier heater supply and work well, although they are of course more tiresome to mount and wire than a single packaged bridge.

The reservoir capacitor is an important component in this design. Normally, of course, the use of an active regulator circuit implies that considerably less reservoir and smoothing capacitance can be used to achieve a particular level of output ripple. However, in the present circuit it is important to provide enough capacitance to keep the trough of the input ripple voltage above the input threshold of the regulator during the worst case of low mains voltage and full load. Calculating on the basis of an imaginary transformer with 5 per cent regulation producing 6·3V at the required current for 240V input and then assuming a worst case of 220V input, full load current and 2V drop in the rectifier and associated wiring, the minimum value of reservoir capacitor which theoretically ought to be used is about 50,000μF. The nearest preferred value is 68,000μF, and a working voltage of 16V would be appropriate. The ripple current rating of the capacitor must also be adequate and should be at least 10A for reliability. In practice, large "computer-grade" components with screw terminals such as those frequently seen on offer at rallies should do the job very well; many of these have their ripple current ratings marked on them. Remember, however, that surplus electrolytic capacitors should always be reformed prior to use.

Finally, all wiring carrying the full input and output currents should be substantial; the authors used 30/0·25mm (1·5mm^2) in the prototypes.

CONSTRUCTION

Construction of the supply is quite conventional; pin numbers mentioned in the text refer to those on the circuit diagram and also on the pcb. The drive circuitry is built on a small printed circuit board, which is available from Melvyn Noakes; the board layout is shown in Fig 3. Probably the only non-obvious point to make is that the high-current connections (ie input, output and TR1 source and drain, pins 12, 13, 14 and 15) are made by soldering 6BA nuts to the pads on the pcb where shown on the drawing and making the connections themselves via solder tags and 6BA screws. IC sockets are recommended for IC1 and IC2. TR2 and TR3 should be the last items soldered in, since their associated components will then provide some protection against static.

Note that the value of certain components depends on supply rails used elsewhere in the amplifier control unit. If a 24V heater relay is used, R22 should become 2K7, D10 should be a 20V device and D12 should also be a 24V device. If the supply is to be used for some other purpose, all components associated with the supply enabling and interfacing functions to the main control unit can be omitted. These are D9, D10, D12; R 22, R23, R24; C14; and TR3. The additional +12 or +24V supply on pin 2 is not then required.

Note also that TR1 does not require a particularly large heatsink because although it may be passing 6A there is a very little voltage across it if a 6·3V secondary is used to produce 6V DC output. The rear or bottom of the chassis will be eminently suitable.

COMMISSIONING

When all component placement has been carefully checked and wiring is complete, connect a suitable test load to the output of the unit; a 6V 35W bulb was purchased from the local branch of Halfords for 65p for use with the prototypes. Connect an accurate meter, preferably a DVM, across the test load. Arrange an input DC supply which will provide at least 6·2V at the trough of its output ripple at full load, as discussed; if an oscilloscope and suitable load resistors are available it might be as well to establish that this is the case before proceeding. Also ensure at this stage that TR1 is mounted on some form of heatsink, although its requirements in this respect are small as mentioned earlier.

TESTING

For initial testing, remove IC2. Switch on the input supply and apply a positive voltage at pin 18 corresponding to the supply voltage of the heater relay; after a short delay the output voltage should begin to ramp up from zero and after about 30s it should have reached a figure in the region of 6V. Set it to precisely 6·00V by adjusting RV1. Switch off and replace IC2 in its socket. Switch on and allow the output voltage to ramp up as before; it is likely that either an overcurrent or an overvoltage alarm l.e.d will illuminate and the supply will switch off. Note that both alarms are latching and must be reset by removing the input voltage. RV2 and RV3 can then be adjusted to set the required limits; at this stage the final setting of the overvoltage alarm threshold via RV3 can be made but the overcurrent alarm must obviously be set finally when the unit is supplying the heaters of the valve(s) used "for real". In fact it is probably better to defer final setting of RV3 until the voltage at the heaters pins themselves can be measured, thus allowing for voltage drops in cables and connectors, although perfectionists may use remote sensing if a return lead from the heater pin is provided and fed to the board at pin 16. If a Variac is available it might be prudent to set the overcurrent alarm threshold with the mains supply to the heater transformer set to 220V or thereabouts, thus ensuring that a low mains voltage condition is not assumed by the circuitry to be a heater overcurrent fault. This was not done with the first prototype, and some considerable time was spent chasing mysterious and apparently random "overcurrent" trips which ultimately turned out to be caused by the mains voltage drop associated with switching-on of the GW4FRX domestic immersion heater. ...

Integration of the heater supply with the rest of the amplifier's power supply is shown in Fig 4; for those using the FRX/JZQ power supply and control unit previously mentioned, R7 on the main control unit PCB should become 10K. RV3 will now function as a "heater supply voltage low" alarm threshold setting control.

CONCLUSION

The unit is now ready for service. Initially it is suggested that, if the valve(s) in use are new or reasonably so, their heater(s) are run at 6·00V measured at the socket and that this value is maintained for about one hundred hours' use. The procedure mentioned in the introduction can then be adopted. When the optimum heater voltage in a particular application has been set, the overvoltage alarm should be reset so that it trips at some 0·1V higher than the voltage in use as outlined earlier.

THANK YOU

The authors would like to thank friends and colleagues in the BBC, the Civil Aviation Authority, the Ministry of Defence and Varian/Eimac for providing relevant data.

HF

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NEVER GIVE UP . . . G2HLU took part in the ROPOCO 1 contest recently and enclosed a letter with his entry. It turns out that he gave G3FKM his sixth QSO ever way back in the dark ages when Harold was ZD4AM! The reason for mentioning this is that he still has paperwork from his 1947-1950 operation from ZD4AM (now known as Ghana) and that he also has some blank QSL cards. . . .

Bernard Robinson (of 5 Copperbeech Close, Birmingham, B32 2HT) has an extensive collection of *Rad Com's* which covers a number of issues from 1966-1970, 1971 (less May), 1972 (minus August) and 1973-1985 (complete). He would be happy to find a good home for these – please contact him direct.

Chris Baker, G4LDS, has had problems as a result of my reference to him in March *HF News*. There was a misunderstanding because, as he rightly points out, he has no Omani licence and therefore cannot operate. Further – as a non-member of ROARS he has no access to the club station. However, there *is* another Chris at Salalah who holds the callsign A4XYU and who operates the club station! Unfortunately, there seems to be no progress in resolving the reciprocal licensing problem between the Sultanate of Oman and the UK and the apparent procrastination (I suspect mostly at the UK end) must be very frustrating for those who are working in A4 and have UK callsigns.

David Norris, N8HKV, who was trying to locate Harold Bride, the wireless operator of the RMS *Titanic*, has established that Bride moved to Scotland and died in 1956 and that he was reported to stay up at night "talking to people all over the world". David thinks that this must mean that he had an amateur licence! Is there anyone who knows what his callsign was? He lived in Aschcliffe Dunning in Perthshire, and, at the time of his death, in Glasgow.

News from overseas

Ernie Sumption, G3DQL, has at last received his permanent call in Gambia. This is C53CS but it may be some time before his tower and beam can be installed as he is now living in rented property and is restricted to using a dipole. He intends to be on 14 and 21MHz cw most days and QSLs may be sent to his home call or to the address in *QTH Corner*.

A most interesting letter arrived from G3YWZ, who recently made his third visit to China during March of this year, suitably armed with an introduction from the Society's membership services department and information on reciprocal licensing. He is at present at Beijing Peoples' University and will be there until September. He has been corresponding with an engineering student at Quinghua University for several years and obtained an introduction to Mr Chang at BY1QH, which is in the physics building, and was allowed to operate the TS930S and TH7DX. He then visited B Y1PK and met Tong Xiao Yong, the club station chairman. The station itself was involved in a schedule with the joint Chinese/Nepalese/Japanese Everest expedition and he briefly spoke to the operator in Lhasa. During the rest of his visit, G3YWZ will visit both stations as often as possible and will be looking for UK stations on 14MHz ssb. He is planning a visit to China for a group of amateurs and listeners in 1989 and asks anyone who might be interested to contact him at his UK address when he returns in September.

G4ZAU sent a copy of part of a letter received from VK5NM in which the latter draws attention to the fact that there are frequencies in the 10MHz band which VK amateurs are not allowed to use – this is the segment 10,137·5 – 10,146·5kHz. So calling "CQ VK" in this area is not likely to produce results.

Expeditions

John Kelly, G0HMZ, will be on the air from the Shetland Is as GM0HMZ/P from 19 to 29 July with an FT707 and G5RV antenna. He will be on all hf bands with a preference for 3,640 (0530-0630) and 14MHz ssb. His exact location will be near Sullom, which is in NGR square HU 37 (the Locator square was not known at the time of writing). Schedules are welcomed – write or telephone (0629) 55420.

List operations

It seems fair to print one reply to the comments by ON4UN which appeared in *HF News*. This is by well-known dx'er Ian Shepherd, G4LJF, and goes as follows:

"I was somewhat saddened to see that John Devoldere has joined the fashionable vogue of "Net Bashing". You will not find myself on nets, for I am one of the lucky dxers in this world who has an effective enough station to work what I want on my own. Net operation for me is far too time consuming and tedious. But that doesn't mean I think nets should be condemned.

In my travels around the world I have met many dx'ers who are not so fortunate. Some are confined to very short transmissions due to rfi problems and cannot make long "CQ DX" calls, and many are restricted to very modest low level antenna systems or even indoor dipoles due to local planning constraints. For these dxers, working DXCC is an uphill task. Many of the world's so-called "big-league" operators possess acres of real estate and are equipped with huge antenna systems (such as beverages to listen on in all directions, large amplifiers etc), and for them, all that working dx entails for most of the time is stumbling across something rare that in all probability someone else has found, and then pressing the button!

Come on John – leave the nets alone. For many they provide the opportunity to achieve DXCC, something which they have every right to do. They are no different from the big timers. They too have earned their licences. Its just that they are less fortunate.

Whilst I have to agree with John that the passing of reports is an intolerable crime, many nets are extremely well run, and to outsiders who undoubtedly listen to the amateur bands, the discipline and international camaraderie displayed on nets must give a much more favourable impression than the snarling aggression of a full-blooded pile-up! Can you really blame the rarer dx stations for seeking refuge in a well run net rather than having to endure the ever worsening rudeness, indiscipline, and poor operating technique that is occurring on the bands, particularly from stations within Europe.

Finally – if only dxers would refrain from making duplicate contacts with countries they have already worked or, even worse, have confirmed, then the less fortunate would not have to spend hours of their time involved with nets to get their chance to try to work a new one. You only have to listen to ON4UN's favourite band, 3·5MHz, to hear the same group of stations making repetitive contacts with the same dx stations night after night, whilst there are undoubtedly those on frequency with lesser stations who would love to have the chance to work a new country or zone . . .

Why do they do it? Just to inflate their already over-inflated egos, often in complete contravention of their licensing conditions. These selfish operators establish themselves on the best frequencies in the dx window, then chip in their colleagues when they wish to show those listening how easy it is to work dx with their "super-station" yet again. If this isn't a net, then what is it?"

Very definitely, this correspondence is now closed! ▶

Keith Orchard G3TTC, at the S79KO operating position in Mahe (see text)

DX news

The Long Island DX Bulletin reports that there is now a lady operator on the air from **Antartica**, that her name is Tarry, and that she operates from Palmer Station as KC4AAC on 14,226kHz from 1700.Y88POL is believed to keep a schedule on Thursdays at 1500 on 21,275kHz, and also can be found from 1800 near 7,005, 14,105, 14,275, 21,015, or 21,275kHz. *DX-NL* reports activity from ZL5BKM from Scott Base on **Ross Is**, near 14,198skHz at 0800. Sojo, formerly VK0SJ, is now ZL5BA. DJ9GR is in **Ivory Coast** until mid-August and on the air as TU4GR. He is reported to have been worked on 21,030kHz from 1800. TZ6PS seems to be a new one from **Mali** and likes 14,177kHz from 2300. T5GG from **Somalia** is regularly in the 14,200-210kHz area from 2200. SM7DZZ is believed to have been issued with the callsign C9MKG for his **Mozambique** activity, He visits frequently and hopes to be active on 3·5 and 7MHz in due course as well as on the hf bands. 9L1GG is expected to leave **Sierra Leone** in August, in the meanwhile he can be found on 14 or 21MHz around 2100 in the cw bands.

EL2BA has advised that Victor, 9L1VM, who was vice-president of the Sierra Leone national society, became a silent key on 16 August 1987. Another owner of a well known dx callsign, S79WHW, died in mid-April.

Bruno, FR0EH, was expected to be on from **Glorioso Is** as FR0EH/G until the end of July. Look for 3B9FR on **Rodriguez Is** near 14,183 or 21,335kHz from about 1830. N4NW/9Q5NW has been trying to get a licence for operation from the **Congo** for some time. He now has this and his callsign is TN4NW. TR8CC is a new station in **Gabon**; he was previously FY7CD.

According to *DX News Sheet*, licensing conditions have been tightened up in the **Solomon Is** and now only operators who have passed a morse test will be allowed on the hf bands. H44X is on the air until the end of August and celebrates the 10th anniversary of independence in the islands. A special QSL will be issued and will be available from H44SI (see *QTH Corner*).

There are two new stations in **Syria**. These are Tana, YK1DS. and Sihan, YK1YL – both are daughters of YK1AO.

Bing, VK2BCH, is probably still on **Cook Is** using his ZK1XV call – please note that QSLs must only be sent direct.

Stations in **Nevis** and **St Kitts** will be allowed to use the V45 prefix to mark the fifth anniversary of independence, the club station may become V45SKN for a special event on 19 September. IK1EDC is hoping to be on the air from the Yucatan peninsular in **Mexico** this month and from 5 to 14 July he will visit **Cozumel Is**. He will use the callsign IK1EDC/XE3. N6OND is said to be on **Clarion Is**, which counts as **Revilla Gigedo**, XF4, using the callsign XE2HUM/XF4. He is expected to be there for several months and is using a TS440S with battery power only – 14,025kHz at 0000 has been suggested as a suitable time and place to look for him.

DX-NL reports that BT0LS and BT0ZMS are often to be found on Wednesdays and Sundays on 14,180 or 14,280kHz at 0000 or 1200.

It is rumoured at the time this is being written that there will be another visit to **Mt Athos** in September. This will be carried out by the SV2 group again as part of the 30th anniversary celebrations of RAAG – the Greek national society. LA8KY has returned to **Jan Mayen** and will be there until late September; he has been in the vicinity of 14,180kHz around 1500 and again at 1800.

OH2BH and EA9IE announced at the Visalia convention that the Lynx DX Group had finalised arrangements for an operation from 4W around the end of June. Both equipment and licence were said to be to hand. However,

HF LAYER PROPAGATION PREDICTIONS – JULY 1988

The time is presented vertically at two-hour intervals 00(00)gmt for each band, ie 00=0000, 02=0200, 04=0400 etc.
The probability of signals being heard is given on a 0 (indicated by a dot) to a 9 scale; the higher the number the greater the probability with 1 meaning 10 to 19 per cent of days, and so on. Additionally 50MHz F-layer and 1·8MHz openings are indicated by a plus (+) sign in the 28 and 3·5MHz columns respectively.

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.	...1111.133.	..1233223562	435666556897	876444444689	753211112367	42.....35
MALTA	.....	.....11.	...111111441	1..343333673	634666666898	987654445789	886322122468	++3.....4+
GIBRALTAR	.....	.....	.....12.	21111352	411465444786	976765555789	987532222478	++42.....24+
ICELAND	.....	.....	.....	121	2..123222465	755555445678	776432222356	4432.....23
** ASIA								
OSAKA	.....	.....	.....1...	...121112121	1.1132123464	....1...1362	.....13.	.....
HONGKONG	.....	.....1..	...11111131.	..1122223632	2.1122124676	2.....1365	142	.....
BANGKOK	.....	.....1..	..1122112421	1.1223224653	411112224687	3.....1467	1.....145	2
SINGAPORE	.....	....11..11..	..122221332.	1.2233324651	411112224686	4.....1468	1.....146	3
NEW DELHI	.....	...111..121.	..122221331	112223325763	532111124687	62.....1478	3.....146	3
TEHERAN	.....11.	...1111.133.	..2333224662	214433335785	755211124688	852.....1478	63.....146	3.....3
COLOMBO	.....	...1111.1...	..133322411.	1123334335342	631112124676	72.....1478	4.....146	2.....3
BAHRAIN	.....121.	...112112431	1.2333335763	324433446886	755111124689	862.....1478	73.....146	4.....3
CYPRUS	.....1..122.	...222112441	1.2455445774	424666667897	877655556799	985322223578	8631....1257	53.....24
ADEN	.....11112..	...212223421	2.2434446754	524433446877	876211124689	873.....1478	751.....146	42.....3
** OCEANIA								
SUVA/S	.....	.....	.....	....1111.221	..2332112552	..231....133.	...1.....11.	.....
SUVA/L	.....	1.....21	2111.....54	3323.....75	22561.....63	..331....231	...1.....11.	.....
WELLINGTON/S	.....	.....	.....1.	...11.....31	113431.1..64	11331....1152	..11.....12.	.....
WELLINGTON/L	.....	1.....1	31.....4	5321.....16	5554.....46	22441....153	..11.....12.	.....
SYDNEY/S	.....	.....	...121.....	..2433.....2	213542111215	1.131....1354	...1.....141	.....
SYDNEY/L	.....	1.....2	31.....5	4212.....7	43351.....26	11242.....54	...1.....31	.....
PERTH	.....	...111.....	..23432.....	2134543.....	53334211.11.	52..1....134.	2.....143	3
HONOLULU	.....	.....	.....	.....1..1211	..2222112411	..332...12..	..11.....	.....
** AFRICA								
SEYCHELLES	.....111...	...2122231..	..243344642.	114433446643	645211124687	863.....1478	74.....146	4.....3
MAURITIUS	.....111231.	...222324531	..2434446863	1.4544446886	5.6312124689	843.....1478	751.....146	42.....3
NAIROBI	.....1123..	...11233451.	1.1433556832	414533456865	857411124688	8851....1478	762.....146	43.....3
HARARE	.....122342.	1..112345642	3..434557875	6.1644456898	945622123689	8863....1378	763.....146	44.....3
CAPETOWN	.....1231..	....213452..	...3435675..	...55445672.	...642123672	54.31....1377	7621.....146	44.....3
LAGOS	.....12353.	...12134575.	21.343457883	532553346896	886631113689	88631....1378	7741.....146	44.....3
ASCENSION Is	....1..1232.	....2112365.	53345882	2...64345895	64.142113688	88431....368	7741.....146	44.....3
DAKAR	.....1133.	1...21133651	31.253345884	642464334797	986642111589	88741....268	7741.....46	44.....3
LAS PALMAS	.....12.	11111341	2..143343674	521465566897	976776555799	998643233479	886311...257	+53.....24
** S. AMERICA								
Sth SHETLAND	.....212..	.....1334..	.....35562.	.....34575.	1123672	2.1.....367	7541.....146	44.....3
FALKLAND Is	.....1133.	.....13355.	355781	1345884	4.1..2123688	85521....358	7741.....136	44.....3
R DE JANEIRO	.....1123.	1....1132451	31...3344785	642..4344787	986122122479	88731....158	7741.....26	44.....3
BUENOS AIRES	.....1.22.	1....1122442	31...2344675	6421.3344687	9864.2122469	88741....147	7741.....15	44.....2
LIMA	.....1.	.....1.122	3...2.222255	62.141232357	974442121137	88642.....4	6741.....1	34.....
BOGOTA	.....1.	22	3...12121244	62.133232246	874442121126	78642.....3	5741.....1	24.....
** N. AMERICA								
BARBADOS	.....1.	1....1.1.122	3...12121255	62.134232367	974442111147	88642.....15	6741.....2	44.....
JAMAICA	.....	11	2....1111134	51...2221236	863322111115	68642.....2	4641.....	.4.....
BERMUDA	.....	11	2....1111134	51...3221246	863322111136	78642.....3	5641.....1	24.....
NEW YORK	.....	1	1.....13	41....1111125	752112111125	68632.....3	3641.....	.3.....
MEXICO	.....	1	1.....1..22	31....121123	54221.121112	37631.....	1541.....	.2.....
MONTREAL	.....	.....	1.....13	3....1111125	642112111125	57632.....3	3641.....	.3.....
DENVER	.....	.....	.....	2.....1	4321..111.12	25531.....	.341.....	.....
LOS ANGELES	.....	.....	.....	1.....11	3222...12111	14531.....	.131.....	.....
VANCOUVER	.....	.....	.....	.....	22221..11111	13531...1...	.131.....	.....
FAIRBANKS	.....	.....	.....	.....	112321111111	.1332...11..	..11.....	.....

The provisional mean sunspot number for March 1988, isksued by the Sunspot Index Data Centre, Brussels, was 76·22. The maximum daily sunspot number was 120 on 31 March and the minimum was 20 on 11 March. The predicted smoothed sunspot numbers for July, August, September and October are respectively: (classified method) 59, 61, 63 and 66; (SIDC adjusted values) 66, 69, 73 and 77).

according to *DX-NL*, cards have been circulating from 4W/DL0MAR and these have caused embarrassment to the administration in **Yemen** with the result that there will be no amateur radio in that country for some time to come – one report has to be wrong!

Contests

The UBA SWL Competition

Some notes for those taking part in this listener competition. First – Aruba (P4) may be counted this year, however, Western Sahara (SQ) will not count until 1989. Plese also note that 1·8MHz was added this year. In category 3, packet radio may be included but only direct QSOs may be counted. Interim results show UK participants as Tina Parry (88,245 points), RS28198 (70,560), G1RPA (69,639), G6XOU (34,524), RS87156 (29,036), G20091 (12,480), and RS88825 (3,102). In the cw section RS52868 has 44,604 points, and RS84869 (7,920).

AGCW-DL QRP Contest

16-17 July

AGCW-DL YL-OM 80m CW Contest

8 August

yl/OM Summer SSB Sprint

1800-2200 6 August

Copies of rules of any of the above in exchange for an sae.

Results of the **1987 ARI Contest** show that in the **single-operator** section (cw) **G4UOL** was ninth in the foreign "top ten", and **G3VOF** sixth in the similar ssb section. UK scores were: (ssb) G3VOF (75,900 points), GW4HSH (48,380), and GM4ELV (13,924). (Mixed) G3VZT (24,764), G4TXM (3,800), and (cw) G4UOL (51,072), and G4JMI (5658).

In the **1987 YL Anniversary Party** results, ssb section **G0EIX** scored 1,518 points, **GM4YMM** 675, **G4EZI** 528, and **G4KVR** 189. All but G4EZI had "low power multipliers".

Dublin Millenium Day Contest

2300 9 July to 2259 10 July

Single-operator, all-bands, mixed modes. 3·5, 7, 14, 21, and 28MHz or vhf only sections. Each QSO with an EI station counts five points, and the multipliers are the counties of EI (total 26) plus Dublin postal districts (21), and EI stations will give their county identifier unless they are located in Dublin (city) in which case they give their district number. Stations outside Eire give report and QSO number. The county indicators are: CW, CN, CE, CK, DL, DN, GA, KY, KE, KK, LS, LM, LK, LD, LH, MO, MH, MN, OY, RN, SO, TY, WD, WH, WX, and WW. Send log details and signed score/summary sheet to reach IRTS, PO Box 462, Dublin 9, no later than 30 September 1988. Subject to working at least 10 counties and 10 postal districts of Dublin, the highest scoring entrant from each DXCC country will receive a "Dublin Millenium" version of the "Worked EI Counties Award".

TEMPORARY CLOSING OF RSGB QSL BUREAU

A repeat of last month's request from Ted Allen, G3DME that readers please note that the RSGB QSL bureau will be closed for the whole of the month of July. Please do not send envelopes of QSLs to Ted during this time.

1987 OK DX contest

In the 1987 OK DX Contest results UK scores were as follows: (All-band) G4ODV – 66,154 points, G3ESF – 26,640, G4ETJ – 4,950, and G0FKX – 1,188. On 14MHz G4SZD scored 18,688 points.

March "CQ" listed the winners of the 1987 CQ WW WPX CW Contest. In the QRP section GM4ELV was the only UK entrant, scoring 59,330 points on 14MHz. Other scores were as follows:

SINGLE-OPERATOR SINGLE TRANSMITTER

GM4GPN	(All-band)	301,924 points
GM4WEN	,,	177,000 points
G3VOF	(21MHz)	42,228 points
GW4BLE	(14MHz)	3,229,446 points
GB6AR	(14MHz)	401,580 points
GB8DX	(1·8MHz)	64,258 points
G3XWZ	,,	3,182 points

In the Multi-operator Single-transmitter group GB8AU came 15th in the world listing with 3,080,525 points – 14 operators are listed, GB8PX scored 261,392, and G4CVK 85,782. The only UK entrants in the WAE DX Contest 1987 (ssb) were in the swl category – RS87156 scored 190,688 points and RS87949 14,602.

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.

G3KPO with Bill VK2AGF, Clive GK2DQE, Noel VK2BSN and Jim VK2ANP (l to r) at a meeting of the St George Amateur Radio Society in Sydney, when Douglas was presented with the St George award certificate confirming contacts with 10 club members on 28MHz. Sorry, the 28MHz metre band has not opened – all the QSOs were made during his recent trip "down under"!

TABLE SERIAL NO 24
ALL TIME BAND TABLE CURRENT COUNTRIES No 8

Callsign	1·8 MHz	3·5 MHz	7 MHz	14 MHz	21 MHz	28 MHz	Total
G3KMA	124	236	298	317	315	300	1,590
G3GIQ	71	208	262	316	315	297	1,469
G3MCS	64	211	259	314	314	294	1,456
G3XTT	159	203	244	291	281	249	1,427
G4DYO	66	184	233	309	302	283	1,377
G4GIR	98	208	241	288	269	254	1,358
G3UML	33	219	237	318	287	245	1,339
G4BWP	102	215	240	283	250	247	1,337
G2DMR	60	185	206	307	295	262	1,315
G3ALI	2	223	238	305	278	240	1,286
G4FAM	64	180	238	268	265	240	1,255
G3XQU	56	178	195	296	272	246	1,243
VK9NS	80	184	226	290	243	192	1,215
G4LJF	31	201	231	287	252	207	1,209
G3TXF	64	162	185	261	246	206	1,124
G3NOF	5	96	95	314	315	267	1,092
G3IGW	105	148	234	226	190	172	1,075
G4OBK	124	140	168	243	198	167	1,040
G3YMC	80	107	171	240	243	187	1,028
GW4OFQ	52	222	196	215	189	135	1,009
GM3YOR	75	137	186	220	200	180	998 (all cw)
GM3PPE	66	152	159	189	176	141	883
G4JBR	62	142	124	142	156	172	798
GM4ELV	36	93	142	189	126	129	715 (QRP)
Average	70	176	209	268	249	221	1,193

Next deadline – for All-Time (with deletions) – **to reach G3GIQ by 8 July** please.

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 1 January 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 28 May 1975. ECOWAS countries are: TY, XT, D4, C5, 9G, 3X, J5, TU, EL, TZ, 5T, 5U, 5N, 6W, 9L, and 5V.

For all 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 cost US$5.00 or ten ircs, and applications should be sent to Awards Manager, PO Box 987, Monrovia, Liberia.

KARL Awards

A special awards programme to celebrate the 1988 Seoul Olympic Games has been arranged. There are three classes: Class A, which requires a contact with one special event station (using the 6K prefix) and at least one other from each of the five HL call areas HL1-HL5. Class B, the one special callsign as before plus contacts with other Korean stations the last letter of whose suffixes spell the word "Seoul", and Class C which requires the words "Seoul Olympics" to be composed with the last suffix letters of stations worked. These stations must include one HL and five or more different DXCC countries. All QSOs must have been made between 1 January and 5 October 1988, and to apply it is necessary to send a certified list plus US $5.00 or 10 ircs and one's own QSL before 5 October 1989 to the Korean Amateur Radio League, Central PO 162, Seoul, Korea. These awards are also available to listeners.

The Wroclaw Award
Issued by the Polish Amateur Radio Union club station SP6PKQ – "Ikar" located in Wroclaw. Available for contact with stations in Wroclaw since 6 May 1945. European stations need 45 points, others 15. Each ordinary QSO counts two points, with SP6PKQ five points, and QSO made during the "Days of Wroclaw" (6-10 May) count double. Stations may be worked on different bands and modes for credit. Listeners may apply. Send ten ircs and a list of contact details (certified by two licensed amateurs or a club) to: Klub Krotkofalowcow SP6PKQ – "IKAR, PO Box 2190, PL 50-985 Wroclaw 47, Poland.

EXPEDITIONS

Ian, G3WVG, and Nigel, G3TXF, made 11,735 cw QSOs during a six-day dx-pedition to the Maldives in April, operating as 8Q7VG and 8Q7XF. QSLs may be sent to the addressses in "QTH Corner" or will be answered 100 per cent via the bureau.

Keith, G3TTC (ex-ZD8KO, G3TTC/VS6), spent over three weeks in the Seychelles but due to delay in getting his licence he only managed to operate from 23 to 27 April inclusive. Nevertheless he had 330 QSOs with 50 countries – including about 25 Gs. As S79KO he operated exclusively on 21MHz ssb with an IC735 and a dipole.

A postcard arrived from Bing, VK2BCH, shortly before copy date for the column and this said that he would leave on May for W. Samoa, the Tokelau Is (ZK3), and the south and north Cooks (where his callsign will be ZK1XV). He says that he will be away for three months and that cards must be sent only direct and not via the bureau.

Bermudian novice licences
Steve Dunkerley, VP9IM, secretary of RSB, has sent along details of the new novice class licence in Bermuda. This will be valid for two years only and will not be renewable. The callsigns will be VP9N followed by two other letters and when upgrading takes place the "N" will be dropped. Novices are restricted to cw only 3,500 – 3,750, 7,000 – 7,150, 21,000 – 21,200, and 28,000 – 28,500kHz. For the Worked All Bermuda Award QSOs with novices are valid, and for the Bermuda 100 Award contacts with a novice before and after upgrading will count as two valid QSOs. At the time Steve wrote VP9s NLP, NLQ, and NLS were on the air and two novice training classes were due to have been completed. DTI please note!

1988 28MHz COUNTRIES TABLE

G3VOF	131
G4XAH	119 (ssb)
G4MUW	108 (ssb)
GD0ELY	85
GD4XTT	84
G0DNV	79
G4NXG/M	52
G4JBR	50
G4SJG	45
G0FYD	38
G4OBK	24
GM4CHX	23
G4OUT	10

10MHz COUNTRIES TABLE

	All-time	1988
G3PJT	106	36
G3SED	26	26
G4XRV	23	23
G3JJG	102	18
G4VDX	71	
G4YWG	64	
G4OBK	57	
G4YSN	1	

BAND REPORTS

Thanks go the following for providing logs: G2HKU, G5JL, GJ3EML, G3s GVV, PJT, and YRM, G4s FMO, MUW, NXG/M, SJG, XAH, GD4XTT, and GD0ELY.

Stations listed in italics were using A1A.

3·5MHz 0500 *PT7AQ, ZC4LW, ZL1AIZ.* **0600** *GI3IVJ/CT3, PP7IE* **7MHz 0500** *HI50-0RCD, TI8LGM, W6s. WE7B* (Utah), *7X3DA.* **0600** *CO8TV, HK1KXA, K7CW, YV4OY, ZL1BI,* **0800** *4K0E.*

10MHz 0000 *W2-W4.* **0600** *N6QR, W7EXR, VE7.* **0700** *W4.* **0800** *OH0PA, VE7ZG.* **1300** *HB0/HB9BFN.* **1700** *EA9FT.* **1900** *JA1,2,6,8, UA0FN.* **2000** *LX1DA, PZ1DV.* **2100** *KP4TIN, ZL3GQ, ZS6CEV.* **2300** *YV1ECX.*

14MHz 0100 *4S7s EA, UP.* **0600** *JY5DL,* KH6, VK3-5, W6-W7. **0700** *T22VU,* ZL1-ZL4. **0800** C53GS, FO0ZR, *KL7s,* XE2NNZ, 4K0E. **1200** CI8JH. **1300** UW3HY/1. **2000** S92LB, VI88SA, ZL40P, 4KODX. **2100** *JW0B, KL7PJ, PZ1AV, VE7ZK, VU2CGS,8Q7VG.* **2200** *EX0VE* (N. Pole), *FY5BO, NZ7B,* VU2TJW. **2300** CE0ICD, *VE6-VE7, W7,* ZL3GQ.

21MHz 0600 *JT1KAR.* **0800** *OE8PRK/YK.* **0900** HL0CEF, JT1KAA. **1000** JT1BG, VI88NSW. **1100** HL5FEI, RA0AGO, UA0DBW, VK4LSJ. **1200** UA0ZDZ, 5T5HH, 9N1MM. **1300** OX3BA, VK9NKG, *VU2BK.* **1400** AX9NKG, *HK0BKK, KX7SR* (Ariz). **1500** 4D0P, 9N1RN, 9V1RH, 9V1XE. **1600** BV6IA, VK9NKG. **2100** *HK6ISX, YV2IUT.* **2200** VK2,3,7, ZL3-ZL4.

24MHz 0800 *VK6AKG, OE8PRK/YK.* **0900** *AX6RO.* **1300** *KV4AD, PY2RN, VU2LO, W4, 5B4OG.* **1400** *ZS6s AOR, AVM.* **1500** *W5.* **1600** *W4-W6.* **1700** *LU5DJO.*

28MHz 0600 UL7OB. **0700** AX9NKG, KH6FOO. **0800** *AX6ZH,* VU2ONL, *4S7WP,8Q7VG.* **0900** T77V, VK6CI, VK9NKG, XX9JN. **1000** A4XZK, ZD7CW, 9X5SP. **1100** FT5ZB, VK6-VK8, 3B9FR. **1200** J52US, 5T5NU. **1300** J28EO, TR8SA, VP8-BRB, YC0JIV, *Z21FN.* **1400** HC1BVE, TR8CR, ZC4DS, 9X5NH. **1500** JY1, TA2AO, 3B8CFF, 9M2BZ. **1600** OD5VT, TL8CK, TY0LC, DJ6SI/TY, 5T0RIM. **1700** FH8CB, HH2Z, S0RASD, TU2QW, TZ6VV, ZD9BU/MM, 3DA0BW, 5V7WD, 7P8DU, 7X2BK. **1800** CP, CX, J52US, KP2AH, TZ6FIC, VP8ML. **1900** D44BC, HI3JH, NP4A. **2000** FY5EM, V47NXX,9L1RK.

Thanks are also due to the following for items extracted: The *Ex-G Radio Club Bulletin* (GI3OEN/W6), *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) and *DX News Sheet* (G4DYO). *DX report* (UK9NS).

Closing date for receipt of material for **September** issue is **8July.**

QTH CORNER

AX9NKG (see VK9NKG)

C53GS E. Sumption, Private Mail Bag 274, Serekunda, The Gambia.

CI8CPU VE3CPU, J. C. Adams, 5 Romco Court, St. Catharines, Ont, L2N 7AI Canada.

CI8JH VE3CKF, J. D. Hutchinson, 20 Harbour Heights, St. Catherines, Ont. L2N 4K3, Canada.

FY5AN C. Loit, Box 746, F-97305 Cayenne, French Guiana.

H44X H44SI, Box 4168, Honiara, Solomon Is.

S79KO K. Orchard, G3TTC, 5 Hurst Close, Chessington, Surrey, KT9 1XE.

S79 QSL Bureau, Richard Barnes, S79D, PO Box 191, Victoria, Mahe, Seychelles.

SU QSL Bureau Egypt Amateur Radio Society, c/o Wireless Officers Club, Ramsis Building, Flr 13/Flt 10, No 6 Ramsis Sq, Cairo 11111, Egypt.

T32JA N6CW, 4639 Katharine Pl, La Mesa, Cal, 92041, USA.,

V47NXX Via AA4FS, PO Box 798, Ellerbe, NC, 28338, USA.

VK9NKG VK6NKG , 154 Warwick Rd, Duncraig 6023. Western Australia.

XE2HUM/XF4 Via W6RQ, 46 Cragmont Ave, San Francisco, CA 94116, USA.

ZY0TF (Also ZY0TK, ZY0TO, ZY0TR, and ZY0TW), via Karl Mesquita Leite, Caixa Postal 385, 59001 Natal, RN, Brazil.

8Q7VG Ian Pritchard, GW3WVG, Homelea, Manor Rd, Abersychan, Pontypool, Gwent, NP4 7DY.

8Q7XF Nigel Cawthorne, Holt Cottage, Kingston Hill, Kingston-on-Thames, Surrey, KT2 7JH.

VHF/UHF

KEN WILLIS G8VR

6 Lerryn Gardens, Broadstairs, Kent CT10 3BH

Just as we were all getting excited about the possibility that Cycle 22 might peak a lot earlier than expected and give a modicum of F2 propagation on 50MHz this autumn, Russ, W4WD, sent a copy of an article in an American publication reporting that scientists have already identified the beginnings of the next cycle, not the current one! Jet streams are apparently being observed on the Sun which are expected to produce sunspots by about 1997, "bolstering a theory that upsets traditional notions about the sunspot cycle". Modern equipment and observational techniques are revealing phenomena, notably these jet streams, of which little was previously known. As a result, astrophysicist Richard Altrock and astronomer Peter Wilson have proposed that "the 11-year cycle is simply a part of a previously unknown 18-22-year cycle which produces sunspots only during its last 11 years". Jet streams have been identified at a latitude of 70 degrees on the sun, equivalent to a region on the earth as far north as Alaska. These are expected to migrate into the regions where sunspots typically form, probably by the year 1997, since any outbreak of activity near the polar regions of the sun takes 18 to 22 years to migrate to the sun's equator.

Smithy, G8KG, and John Bazley, G3HCT set out to analyse the Botswana UK openings on 50MHz last October, using a Mini-prop computer program. They assumed that the propagation was a 2-hop F2 and a single hop Es path, with the F2 terminating in the Mediterranean. Using the monthly sunspot number which was 61, the program predicted F2 muf's above 40MHz from 0930 to 1500gmt, peaking at 45MHz, so it was quite possible that a path at 50MHz would be open at 1600gmt when the action occurred.

When they looked at the reception of a VK6 by LA6QBA on 50MHz they "found this more instructive". On this day, 28MHz was open to all continents as a result of an X-flare on the previous day which produced an F2 enhancement, a magstorm and subsequent aurora. Smithy says that the significance for 50MHz operators is simple. Cycle 22 is rising so rapidly, still ahead of all others so far recorded, that F2 propagation was already occurring during the 1987/88 winter season (though only on favourable paths or during the enhancements which sometimes follow major flares), supplemented by sporadic E because of the generally poor situation of the UK (except for auroras). With NOAA Boulder predicting a peak smoothed sunspot number of 193 in December 1989 (and this may top 200 when account is taken of the further upsurge which occurred in March and April this year) then there is a better than even chance of some F2 dx on 50MHz on the more southerly paths this year, though the true "goodies" are a year away.

Smithy concludes "A good knowledge of the pattern of dx openings on 28MHz is invaluable, and the same goes for a general coverage receiver with which to observe the daily rise in muf's. Good F2 conditions on 50MHz often occur a few days after daily sunspot numbers and solar flux. Our low power allocation is no real restriction since attenuation on 50MHz paths is extremely low and dx signals can sometimes be copied at S9 with a small screwdriver as an antenna". Almost makes one want summer to end and to hear the rustle of autumn leaves underfoot, masked by the S9 sounds of VS6, ZS3, VK4 and JA on 50MHz from the loudspeaker!

EXPEDITION TIME

A chance to work a rare square, IO57 (VR), will arise next month when the Five Bells Contest Group visit St Kilda. To operate there, the group had to obtain permission from both the Scottish National Trust and the Ministry of Defence. The number of visitors to the island at any one time is strictly controlled, not that it is easy of access, for normally a boat has to be chartered to cross to this outermost Hebridean island, which lies some 100 miles from the Scottish mainland.

Five Bells plan to operate on 144·215 and 432·215MHz from 1 to 7 August. The probable callsign will be GB4VR, though this had not been granted as we go to press. 144·028MHz will be used for cw meteor scatter. Look for them on the 14·345MHz vhf net for skeds. At the time of writing it was hoped that some 50MHz operation will also be possible, but with the last part of the trip having to be made in a rubber dinghy, space may not be found for the equipment! Operation may have to be limited to conserve fuel supplies. Operators will be G4ODA, G1DXI, G4DHF, G4NPH and G8IJC. QSLs either direct to G4DHF (QTHR) or via bureau. In the past four summers this enterprising group has operated from XS, WQ, WR, ZT, ZU and UM. Thanks are due from the many who have worked rare squares through their efforts.

Another interesting one, this time on 50·122MHz, will be G3POI/P, since Clive plans to be QRV from the Orkneys (IO88OW, YS07g) during the first week of this month (July).

John Kelly, G0MHZ, (Matlock), will operate on 144MHz from Shetland between 19 and 29 July, running 100W to an eight element Jaybeam. Operation will be somewhat random to fit in with other commitments, but skeds can be made in advance by telephoning John on 0629 55420 prior to his departure, or write to him QTHR. When John wrote, the precise location was not known except that it will be close to Sullom and in NGR square HU37. John hopes to come up on some of the WAB nets on 144MHz.

Derbyshire Hill Contest Group has planned another expedition, their seventh since 1981, this time to the Isles of Scilly. The dates have changed since their original plan was outlined, so they will now be on site between 4 and 14 August. Operators will include G4VVZ, G6ABU and G6HKS. Operation will be on 70·220, 144·220 and 432·220MHz from locator WL 09e (IN69TV), with callsign G6APZ/P. For meteor scatter, 144·144MHz will be used for cw and 144·444MHz for ssb. Further details and advance skeds from Nigel Wilson, G4VVZ, QTHR. They will also monitor the 14·345MHz vhf net.

COLOUR TV VIA AURORA

Readers may recall that some time ago, Chris, GM3WOJ, received a slow-scan colour tv signal from G3NOX on 50MHz during a long meteor burst, and that his tape recording of this burst, when played back through G3NOX's equipment, gave a remarkably good reproduction of the transmitted picture. Jeremy, G3NOX, carried out a similar test, this time with GM3TSL (Aberdeen), during the aurora of 4 April, again on 50MHz, and the results were again very interesting. Unfortunately we are unable to reproduce the colour prints which Jeremy sent to me, but they show that while there is severe distortion of the picture due to the doppler shift and general noise which would be expected from an aurora, the colour values have reproduced very well with the callsign incorporated in the transmitted picture readable.

NETHERLANDS TRANSPONDER

Via G3LQR, PAOPLY of the PI6SHF Transponder Working Group requested that details of their linear transponder be publicised as widely as possible. Basically this group has established a transponder which accepts signals in the shf part of the spectrum, and replays them on an output frequency of 432·625MHz, with an erp of 12W and a bandwidth of 35kHz. Currently the transponder is set up to receive signals on 2320·350Mhz which might be considered of little interest to anyone not operating in the microwave bands. However, the system can be switched to a beacon mode, when the input is disabled and callsign plus locator details etc are transmitted on the output of 432·625MHz. Callsign in this mode is PI6SHF, and normal beacon-mode times are 0200 to 1400gmt. The current antenna heading of 180 degrees does not greatly favour the UK but on the other hand it provides a weaker signal which is perhaps more useful for a beacon so close to our shores. Having established the system, the group plans an extension of the transponder's facilities in the future, including a wider range of input frequencies and a broader antenna pattern. The group can be contacted through PA0PLY, Muiderbos 63, 2134 SN Hoofddorp, Netherlands.

SOME INTERESTING PROPAGATION

Not all readers enjoy constant reference to our 50MHz allocation. But we are privileged to have it, and it displays many characteristics not to be found in our higher frequency bands. One obvious one is that sporadic E propagation will often occur at 50MHz on occasions when it does not reach as high as the 144 or even the 70MHz band. It follows that since Es is somewhat "seasonal" in its approach, it is usually noticed by 50MHz operators in April or May, whereas it is June when the first major sporadic E events of any significance are normally experienced.

This year was no exception, and by the end of April several crossband contacts 50/28 were taking place with countries within Es range of the UK.

On 6 May there was an aurora which lasted several hours commencing around noon. On ▶

144MHz it was mainly a "Scottish type" though some good European dx was worked. On 50MHz, activity was high, so as well as the usual G, GM, GW, GI, EI contacts, some LA and PA stations were worked by this mode. The event tailed off around 1730h, but then, surprisingly, while operators awaited a possible second phase, a large sporadic E event started up giving contacts between the UK and Malta until about 2200gmt. The event was enlivened by much 28MHz crossband activity providing 50MHz operators with contacts all over Europe. Geoff, G3ENY, noted a fall-out of "Sahara dust" over his part of the country and mentions it purely for the record. Who knows whether it played any part?

Incidentally, the aurora on this day was quite good with Edmund, DK3UZ, since he worked UP2, UZ3, UB5, UA2, UA3, SP2, 4, 9, as well as many nearer prefixes. On 11 May a solar disturbance was announced at 11·48h. Shortly afterwards a major sporadic E event favouring 50MHz commenced. It seems unlikely that any connection existed between the solar event and the sporadic E, but whatever the cause, signals from LA were exceptionally strong for some hours, and Scottish stations were end-stop in the south for a time.

The big day, however, was Sunday 15 May, with much European activity crossband 28/50 and several UK stations having crossband contacts with a new one in the form of YO2IS. During the afternoon, 50MHz opened to 9H1, with EA and I being worked crossband indicating the true spread of the propagation. The best was yet to come, however, for around 1730gmt the excitement was intense as some of the more westerly UK stations began to copy weak signals from the Ascension Island beacon ZD8VHF. It took a full hour for the propagation to "creep across" the south before Ken Ellis G5KW heard signals from this beacon. He related it to his experiences at the peak of the last solar cycle when he went as far west as possible, to the Scillies and Cornwall, to "connect" with transatlantic propagation as early as possible. Shortly after hearing this beacon, Ken detected signals from the keyer of Mike, ZD8MB, who unfortunately was at work and forced to leave his rig unattended and so could not attempt a two-way contact on this band.

Things look very promising indeed, perhaps the more so for 50MHz addicts, since as well as auroras and Es, there is always the chance of some F2 propagation later in the year though this would be rather early in the cycle on past experience. By the time this appears in print it will be interesting to note whether last summer's openings to the USA on 50MHz have been repeated, or were these reserved for the very low point of the cycle and not to be experienced again for some years? Let's hope not.

REPEATER NEWS

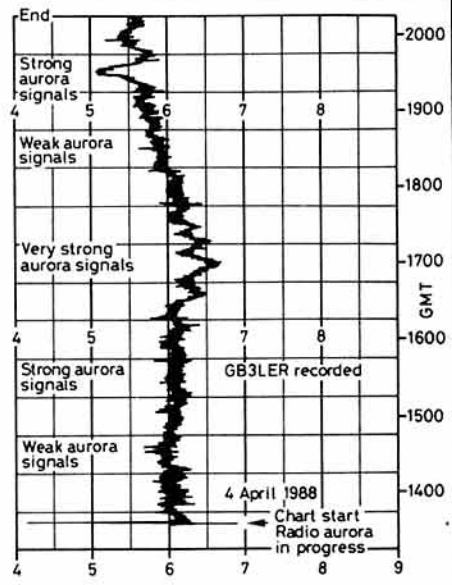
Only one repeater group, Kent, checked in this month. Their Newsletter No 52 (for May 1988) prints in full the Group's Constitution, which might interest the officers of similar groups. Secretary is G0AMZ, QTHR. Kent reported that GB3NK (RB4) had been QRT for some time as a result of sudden bereavement in the power amplifier. By now it should have been restored to service. GB3RE (RB11) has been repaired following hurricane damage, thanks to a large turn-out of stalwarts who braved pouring rain and stood ankle deep in water to form a working party to lower and replace the antenna system.

THE JAMJAR MAGNETOMETER

Interest in this simple magnetometer (VHF/UHF April 1988 and March 1987) continues, with so many readers having requested information on its construction and operation that my local copy-shop owner is beginning to look forward to an early retirement. Many may have been put off by the long "optical lever" used in the original design, but as mentioned in the April issue, Doug Smillie, GM4DGS, overcame this to a large extent by the use of a photomultiplier and a chart recorder. Few of us have access to the type of instrumentation available to Doug, so fortunately he has simplified and improved the design. Instead of using a light beam to indicate movements of the magnet, he first damped the motion of the magnet by suspending it in a light oil, and then beneath it positioned two Hall Effect devices connected to produce a differential output whenever the magnet changes its position. This output is fed to an amplifier, and the amplified current used to deflect a meter or drive a chart recorder.

The Hall Effect sensors and the amplifier Doug uses are inexpensive stock items from a well-known supplier. The modified design makes for a very compact direct-reading instrument, and with it Doug obtained excellent recordings during the aurora of 4 April, finding that the saw-tooth deflection illustrated coincided with the period of strongest radio aurora signals. If you require details of this new design, please send me a sae and 30p in stamps for photocopying.

Writing from New Jersey, John Power, W2AXU (and RSGB member since 1947) is another magnetometer user. His was designed and built mostly of wood, by Dr. McWilliams of St. Cloud University, Minnesota. John sent some magnetograms which he recorded for the period 13 to 19 January 1988, and they clearly indicated the onset of the magnetic storm of 13 January, with resultant auroras on 14 and 15 January. What particularly interested me is the fact that Trenton, New Jersey, the QTH of W2AXU, is about as far south in latitude as southern Spain, so this should give heart to those in the southern part of the UK who feel, perhaps, that they are not well situated to use a magnetometer. John's instrument uses a light beam and photo-sensitive cell, and drives a chart recorder via a MC3410P amplifier chip.



BEACON NOTES

The Jersey beacon (50·065MHz) mentioned last month was on display at the VHF Convention. It is a beautifully engineered job, and while awaiting its licence, Geoff GJ41CD, arranged for it to be QRV at 1000gmt on 9 May with reduced power using the callsign GJ4HXJ. It was soon being received all along the south coast, and shortly afterwards in SM, OZ, EA, I, CT, YO, LA,9H1 and DL (some via Es or meteor scatter). Geoff says that the beacon uses FSK, so remember to zero beat when you tune to it. Reports welcomed by GJ4ICD QTHR.

The Six Metre Group sent details of the Gibraltar and Icelandic 50MHz beacons. The ZB2VHF unit on 50·035MHz, another work of art also on view at Sandown Park, runs 35W output and uses a keyer to the G4FRE design which permits a second transmitter (say on 70MHz) to be keyed using the same callsign. Message format is callsign: Gibralta: Locator IM76HE followed by six "G's". Some choice of antennas is under consideration, possibles being a five element yagi, a dipole or a pair of stacked dipoles spaced 5/8 wavelength vertically.

The Iceland beacon TF3SIX runs 50W output on 50·057MHz. A 5/8 wavelength vertical antenna designed by G3JVL is to be used on this beacon to provide as wide a coverage as possible. The keyer is also to G4FRE design and again permits a second transmitter to be keyed.

There was much excitement on 50MHz during the afternoon of Sunday 15 May when several southern stations copied the Ascension Island beacon ZD8VHF at good strength. There was widespread sporadic E at the time.

MORE MILES PER WATT

Two readers commented on the "Miles Per Watt" topic in the May *VHF/UHF*. Andrew Smith, G4OEP (Bristol) made the valid point that if one looks at the situation purely mathematically, then it will be obvious that "the contest for miles per watt will be won over short distances and low powers" and that the "best results will be obtained on the test bench rather than in the field." This is indeed true, and it took me back to the mid 1940's, when Jack Kay, G3CO, used to cause havoc with a tv set a couple of doors away when he switched on his communication receiver! The local oscillator radiated sufficiently to pattern the screen of the vhf television set of the day, so here were test-bench miles per watt exemplified!

Alan Chester, G3CCB, (Fareham) took a similar view, pointing out "the erroneous idea that range is proportional to power" and that nature has it otherwise since "radio range is proportional to the square root of power, all things being equal". This leads to the conclusion that the USA "1000 miles per watt award" should require 2000 miles per 4W, 4000 miles per 16W etc, and to achieve the same level of

performance using 5mW one would need to work over a distance of 70 miles, not the five miles quoted by G0DJA.

Andrew Smith no doubt hits the nail on the head when he says that the 1000 miles per watt award is probably an idea to promote QRP working, not something to be analysed mathematically and taken too seriously, so if it achieves this purpose, it is worth while even if somethat illogical. This doesn't alter the fact that sometimes the laws underlying the behaviour of electromagnetic waves will seem to have been repealed, for most of us have a favourite story to tell of incredible dx worked when the antenna relay was open circuit or the linear not switched on. Did I ever tell you about the day when . . .?

SPORADIC E MONITORING

Brian Clowes, GW4HBZ (Clwyd) wrote describing the Radio Data System equipment (RDS) which is being installed in BBC frequency modulation transmitters and which is already used extensively by fm broadcast stations in other countries. RDS uses a 57kHz sub-carrier to transmit various types of information which can be interpreted only by the use of a special decoder. When allowed to test one such decoder, Brian was able to identify fm broadcast transmissions from Finland, Italy and Sweden. He says that many more countries are now using the system. Since he advocates the use of vhf/uhf broadcast stations for Es monitoring, he hopes that such decoders will become generally available as a means of identifying the location of dx fm broadcast stations heard. He cites the reception of a very exotic-sounding broadcast on Band II which turned out to be Radio Cologne doing a broadcast for foreign workers, so here RDS would have been invaluable. Brian says that fm broadcast receivers are now being designed to respond to RDS but not to display the information it transmits. His reason for preferring broadcast stations for monitoring for Es, is that their erp so greatly exceeds that of local beacons. He is experimenting with a narrow band fm receiver and finds it much easier to pull in weak dx stations on frequencies close to local stations. From his professional experience, Brian doubts very much whether 50MHz operators in this country could seriously interfere with continental tv reception while accepting that under strong Es conditions some slight interference may be caused (signals as much as 55dB down on the vision carrier can cause patterning). He says that for years we "pumped hundreds of kilowatts erp at them from our Band I stations, all day long", and believes that the major source of QRM would be from other Band I countries, notably those in the USSR and Eastern Europe.

FROM HERE AND THERE

Brian, GW4HBZ, Clwyd, has a contact with a supplier of low-loss foam-filled cables from West Germany, and thinks that lower prices might be negotiated if there is a sufficient demand. The range includes 10, 12, 16 and 28mm sizes, plus a "superflexible" 13·5mm type which is said to be as flexible as UR67 but half as lossy, in fact better than H100 type. For several years I have used RG8/U foam-filled feeders which are very managable and not all that expensive, though it helps if you have someone in the USA who can buy it at their prices and ship it over. Contact GW4HBZ by telephone (074 571 2777 evenings) or write to him QTHR for further details.

George, PA3BIX asked me to say that from 00·00gmt Saturday 16 July until 2400gmt next day, a group of Dutch amateurs will be QRV on 144MHz from JO22RC using callsign PI6VHF. These dates coincide with the fourth annual CQ Wide World VHF WPX Contest.

Jan, OH1ZZA, telephoned to say that there was reason to hope that by this month some selected Finnish amateurs would have been granted permission to operate on 50MHz. If so, this will be an excellent QRB for 2-way sporadic E contacts, hitherto restricted to crossband working by the OH's.

Bud K2YOF (New Jersey) says that there is now a permanent 50MHz operator in Honduras in the form of Gary, HR1GSK. To get started, Gary had a FT7 and a 10W transverter, and was limited to operation just above 50·500MHz until a new crystal was obtained. He had plans to build a linear amplifier using an 829B valve (old timers will know how good these can be on 50MHz, and cheap too!). Bud says that he often hears Gary on 28MHz between 28·470 and 28·490MHz.

Jack Hum, G5UM, reminds us that the current upper limit for 432MHz squares/countries awards is 130/18. Two were issued recently in the category 100/15 to G4RNL (Warrington) and G4RGK (Marlow). In his claim, David G4RGK included two transatlantic contacts via the moon using 100 watts to 4 × 20 element yagis. One was with KP4I who was using "the biggest dish in the world", presumably the radio astronomy one in Arecibo. The KP4's signals were peaking 589. Said Dave, "not surprising, considering the 20 acre surface of the dish and its profile accurate to 0·125 inch over the entire surface!"

G5UM also says that new fields to conquer on 144MHz are 300squares/40 countries, 350/45 and 400/50. Having taken years to reach 258/49 when I moved to this QTH, I doubt whether I shall start all over again on 144MHz.

ROLAND WHITING, G3UYO

Ray Cracknell, G2AHU, had the sad task of notifying the death of his great friend "Chalky" Whiting, G3UYO, VQ4RAW, ZC4WR, ZD7RW, 5B4WR, who died on the morning of 13 March while preparing to give his weekly "How's DX" programme over Dubai Radio. Chalky retired as Chief Engineer of the BBC re-broadcasting station on Cyprus some eight years ago and since had been installing high power hf transmitters for Dubai Radio and Color TV Service. Ray first met Chalky in 1944 when in the army in Kenya. Later when Ray was signing ZE2JV, and Chalky was in Cyprus, they worked closely together on tep experiments and co-authored several articles on the subject in the RSGB Bulletin. They pioneered the technique of measuring time-delays over amateur radio circuits and opened up the first tep path from Africa. Chalky also received Ray's first 432MHz transmissions from ZE2JV. Chalky was responsible for establishing the original Cyprus beacons which he built and maintained. One of his slogans is one which we might all take to heart. It reads "You never know that it won't work until you have really tried it". ■

MICRO-WAVES

MIKE DIXON G3PFR

At a joint meeting between the Microwave Committee and Packet Working Group on 9 April, frequencies in the 1·3, 2·3 and 10GHz bands were designated for **formal** digital communications links between various officially licensed packet repeaters, thus creating the basis for a national "trunk" network which will remove a lot of the "routing" activities at present on 144·650MHz. As the 1·3GHz band is the most accessible in terms of available equipment, at least at the moment, it is probable that the first part of the network (Eastnet in East Anglia) may be up and running (in the 1240-1241MHz area of the band) by the time you read this!

Extensive theoretical and some practical work by members of Eastnet has shown the feasibility of this to link their four East Anglian repeaters (GB's 3HX, PX, EA and NP) as a pilot experiment. The link budget requirements of these particular paths are such that the recently published G4DDK driver (*Rad Com* Feb/March 1987) and 1W linear amplifier (*Newsletter,* Oct/Nov 1987) are more than adequate to provide the transmitter needs for the links.

It came as a surprise to me that many of the packet users present at the joint meeting, which included user-group representatives, were unaware of, or had overlooked, these two important designs! Moral of the story – watch this **and** the *Newsletter* space for further developments!! Full details of the various recommended linking frequencies on the 1·3, 2·3 and 10GHz bands should appear in the next issues of the *Microwave Newsletter* and *Connect International.*

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

OMISSION AND REDRESS

Both my and G4DDK's apologies for an omission in the component list for the 1W linear amplifier design mentioned above. C3 and C11 shown on the circuit schematic were not given values in the list which accompanied the article. C3 should be either 470pF or 1nF plate or disc capacitor, value not critical, and C11 should be a 47pF sub-miniature plate. This might seem a very small value to shunt across a larger coffin bypass, but it seems essential in this form of multiple bypassing to use an additional component whose self-resonant frequency is very high: this would be achieved with a larger value.

By way of some technical compensation for this omission, the circuit shown in *Fig 1* (due to G4DDK, modified from the circuit of some years ago used with the Microwave Committee UHF source board) is recommended for frequency modulation of the source board. The addition of the modulator components will cut down the efficiency of the oscillator somewhat and reduce the output of the board, in Sam's "one-off" case to a little under 10dBm. The ▶

components should be mounted rigidly close to the oscillator and certainly within the same screened enclosure to prevent unwanted hum and noise modulation. Application of about 160mV pk-pk audio gave about 5kHz peak deviation which will, however, vary according to crystal and component tolerances and should be taken as a guide figure only.

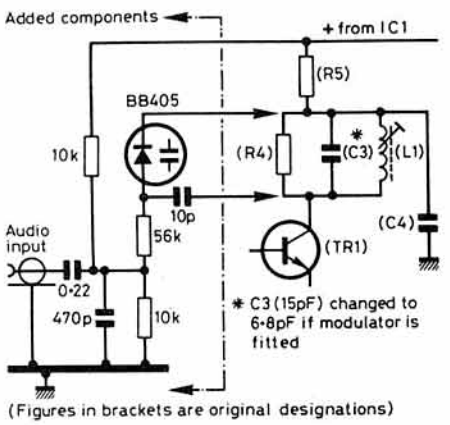


Fig.1. Fm modulator circuit for G4DDK 1·3GHz source board (Feb/March 1987 RadCom).

Sam, G4DDK, and Dave, G4FRE, conducted some brief packet experiments at 1296·7MHz using 600mW over a 5km path between their respective QTH's and exchanged error free packets for over an hour. Reduction of the power to 6mW did not affect error-free copy. Later, tests under laboratory conditions showed the modulated spectrum to be nice and symmetrical, indicating good linearity in the crystal-pulling circuit. At 4·8kHz modulation frequency, the spectrum was still clean and symmetrical, indicating the possibility of running 9·6kBd packets through this simple circuit.

Although these experiments were carried out at 1296·7MHz, "opportunist" packet users are asked to avoid use of this part of the band since a Dutch linear repeater, PI6ASD, has output around 1296·650 and a beacon at 1296·637MHz. Both are audible quite often in East Anglia. It is recommended that casual use (as distinct from the formal links mentioned earlier) should be **above** 1297MHz, possibly using some of the unassigned RM channels. Alternatively, for those with equipment able to cover more than the 2MHz of the usual transverter, the multimode segment at 1285-1290MHz is another possibility. In any event, all are urged to avoid interference with the 1296-1297MHz international weak-signal band by thoughtful frequency use and operating.

OPERATING NEWS AND AWARDS

Apropos the 24GHz distance awards mentioned in the April column, Jack, G5UM (microwave awards manager), received a 'phone call from Les, G3BNL, indicating that (yes, I had a premonition!) the first two 150km+ awards on this band had, in fact, already been issued. They went to G3BNL/P and G(W) 3EEZ/P for a contact as long ago as September 1975! The certificates were issued in October 1975, so the record book should read:

Advanced:	G3BNL/P	(1)
	GW3EEZ/P	(2)
Intermediate:	GW3FNQ/P	(1)
	G3NKL/P	(2)
Beginners:	No claims yet	

It seems quite remarkable that in the thirteen years since the first ever awards, there have been no further claims. Perhaps this was partly due to the "difficulty" of 24GHz, the fact that parts were not too readily available and the fact that pre-registration of sites with the DTI was needed. Now that most of these restrictions have been removed, let's see some more claims! The "splitting" of the award into three categories seems to have been fully justified by this brief history.

More recent awards were mentioned by Jack, as follows:

CALLSIGN	QTH	BAND	AWARD
G6HXR	Portsmouth	1·3	5 squares (70) Distance Award (QSO with HB9ADF/P)
G6HKM	Essex	1·3	Standard FMD (77)
G4NBS	Cambridge	1·3	45 squares (6)
G0CPU	Harlow	1·3	10 squares (61)
G6DER	Barnsley	1·3	60 squares
		2·3	30 squares (2)
		3·4	5 squares (3)
		3·4	Distance award (5)QSO with DF7VX
G4EML/P		10	Distance award (89) QSO with GU4EFT/P
G6CMS/P		10	Distance award (90) QSO with PA0PLY/P

QUESTIONNAIRE

Gus, G3ZEZ (Clacton), returned his *Microwave Newsletter* questionnaire together with a note to the effect that LA6LCA is active on all bands from 144MHz to 10GHz from JO59CE. Looking at a map, this locator seems to present an unobstructed (apart from earth curvature) over-sea path all the way to the east coast of the UK: a point worth bearing in mind once conditions across the North Sea improve with the onset of warmer and more settled summer and autumn weather later this year.

Whilst on the subject of the questionnaire, about fifty-odd forms have been returned to the committee to date, a return rate of about 20 per cent. Can we please have some more? The information and comments so far received have proved most useful to the committee and for the main part are very constructive in their approach. We can only make a meaningful and useful analysis for publication if we receive more! It will only take a few minutes to fill it in and return it, either directly to me or via RSGB HQ.

We hope to publish a "directory" later this year, similar to the ones published some years ago: this should help newer operators to "locate" their nearest neighbours, many of whom have indicated their williness to assist with test equipment or by setting up skeds on an occasional or more regular basis. I should add that topical microwave information is appearing more frequently on packet now and this, too, can be a useful source to those who are equipped for the mode.

YET MORE HELP NEEDED

It seems that not only the NW Kent Beacon Group suffered quite considerable losses in the October hurricane and the January gales. Circulars have been received from the South West Hertfordshire UHF Group (treasurer G3THQ, QTHR) and the Farnham VHF Group (secretary G4EPX, treasurer G8VWH both QTHR) detailing the equipment which they have built, installed and maintained for the common good. Damage to existing installations or the financial strain of new devices has stretched both groups!

The SW Herts group run a 1296MHz repeater, GB3BH and the well known 10GHz beacon GB3SWH: damage has been sustained to their other device, the 432MHz repeater GB3HR, in this case to feeder, pa and psu, caused by water getting into the system. Improvements and repairs to both GB3BH and GB3HR are planned as soon as funds permit.

The Farnham group are responsible for the 432MHz repeater GB3FN and the 1296MHz repeater/beacon GB3FM. In their case, no damage was mentioned but GB3FM, being new on the air and of high specification, may need more support than is currently available from the group. Given funds, the group are interested in siting a 2·3GHz beacon alongside the existing devices.

Sorry to keep harping-on about beacons and repeater-beacons, but they really are essential to continuing microwave development in the UK and should be given all the support needed to get them on the air and keep them functional. This may not be possible simply from "locals". Reports and donations to any such groups are always welcome – there is usually a lack of both!

SATELLITES

RON BROADBENT G3AAJ

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As you'll see from the new name and address, the monthly news about satellites has been taken over by me, at least for the time being, from our friend and fellow Committee man of AMSAT-UK R.O. (Bob) Phillips, G4IQQ. It's my honour to offer a big thank you to Bob for the many hours he has put into compiling and writing this monthly column for the past several years. Bob now finds that his daily work leaves him very little time for writing, keeping deadlines, answering members queries, and keeping up with all that goes on in this sector of amateur radio. This is particularly understandable as his job now involves much travelling across the world. I am assured, however, that he will pass on 'satellite' information collected during his travels; he is, as some will know, professionally involved in the commercial satellite business. Thank you, Bob, for a job well done.

Any writer who takes on a task for Radcom must always have in the back of his mind the long period which has ensued from the time he writes his 'copy' to the moment Radcom drops onto a member's doormat. In the very best case this can be six weeks — at worst eight weeks. Your new RadCom editor has vowed to reduce this time-lag by introducing as much new technology as possible, but for the moment I am having to cover only general future satellite information. For instance, at the time of transmitting this to RSGB HQ, OSCAR 13 is sitting on top of the V-23 Ariane Rocket on the Launch pad at Kourou, French Guiana (Devil's Island, that was), due for launch on 15 June. By the time you read this it will either be launched and operational, or have gone swimming as did the previous but one — Phase IIIA.

In consequence I cannot in this column give you precise dates/times of operation and modes of Oscar 13. However, there is a chance that it will make the (later) deadline for the News Bulletin section of RadCom. I have, on behalf of AMSAT-UK, been sending this data to RadCom every issue and will, of course, continue to do so. So this column will contain the interesting background information, but to find the latest gen you must flip a few pages to the News section. In any case, as a new boy at writing for RadCom, until I get the feel of what you require I'll be guessing a bit. So please let's have your comments.

For instance, do you require a monthly forecast on what OSCAR 10 will be doing? Do you require Kepler Elements and how to use them in your Computer programmes? Do you wish to have precise technical details on the 'guts' of the UOSAT's? Do you want to read about personalities in the satellite world? Or are you bored with the whole business?! If so, say so; we can then devote these pages to another aspect of our hobby...!

In this first effort of mine let me give you one or two sources of information. Sets of Keplerian Elements and latest items of interest are always available on the RSGB pages of Prestel Clubspot and, of course, on the AMSAT pages. In both cases you only have to type the NAME followed by the hash sign to get the information. RSGB Database is also another source. Various amateur radio nets are conducted across the world on most bands. In the UK listen for G0AUK on 3780 MHz + or — QRM on Sundays at 10.15am; Monday and Wednesdays at 7.00pm; Sundays 7.15pm. On 144.280MHz G6ZRU beams north from Brighton during the week — there are several others too. The AMSAT European Net is on Saturdays, 14.280MHz at 10.00gmt and the AMSAT USA Net is on Sundays at 19.00gmt — again on 14.280MHz. Be assured that you will be made welcome if you care to join in on any of the nets. Do please, however, remember that on any net there are usually quite a few others listening in, awaiting their turn. So watch your transmission time. The Net controller will not be too pleased if you take 20 minutes to ask questions which have already been transmitted once before!

CURRENT SATELLITES

At the time of writing (1 June), the following amateur satellites were operational:

"UOSAT 1 and 2. Bulletins on world wide satellite and Skitrek progress. It is expected that today or tomorrow the skitrek party will come ashore in Canada. They reported by radio on 30 May that they had only 33km to go, but had encountered a whole area of water where it wasn't expected, the North Pole not being as cold as it should be at this time of the year."

"RS10/11 Transponders. These two transponders are still giving lots of DX to many first time users. There is a slight problem with the mode KA and K, in as far as some terrestrial operators are still not aware that they are accessing a satellite, and when they do get on the ball, find that the bird has passed on it's orbital way again."

"Oscar 10. This satellite still continues to give a good account of itself, and although a few persons are putting up high EIRP the knowledge is gradually getting through that low power use may keep this satellite working for a long time yet. It can only operate if it gets a good charge via the Solar cells. As at least two of them are defunct not much current is available at the best of times."

"RS5 and RS7 have not been heard for some weeks by me. Any news would be welcome."

"The 'MIR' spacecraft is not strictly within the remit of amateur radio satellites, and I have yet to be convinced that publishing details of conversations heard on 143.625MHz, is strictly within the terms of our licences world-wide. There is, however, a large following interested in what the manned Russian Spacecraft is doing, and radio passes are issued on nets. The orbit is far too low to allow predictions more than a few weeks ahead, and the orbit is boosted UP to keep the inmates from frying. Readers may also like to know that you can see it with the naked eye when the pass time coincides with twilight zones over the southern UK."

IN THE OFFING

Future plans for the Space sections of our bands include building at least five 'amateur' satellites, although to be honest I feel that some agencies are expecting to produce signals within the International Amateur Satellite Bands that are not as yet strictly within the IARU concept. These issues may well have to be discussed at great length before such satellites are launched. Some of us are worried that commercial and government agencies, especially in the third world, see the amateur space bands as easy fruit for picking. For instance, a Digital Orbiting Vehicle called by AMSAT-Brazil 'Brazil Peacetalker', is proposed to give out words of Peace in English, Russian, and Portugese. Obviously the words can be programmed for any situation. Do we really want an orbiting satellite in the amateur bands spraying out "Peace to all nations — don't use the Bomb"? Is it legal anyway? The full concept has not been announced yet, although it has been written that "any Ham could hear it on his 2 metre HT."

JAS-2 SOON

JAS-2 may be operational within a few months. This would be the same concept as JAS-1, and include a Digital as well as Voice system aboard. Our own UOSAT-C (3) will be built this year for an expected lift-off in the early-1989 time frame. There are hopes of a Transponder on board which could be accessed by normal amateur radio stations, and not via the DCE system as on UOSAT-2. Construction is well ahead for this Educational and Amateur Radio satellite.

PHASE IV SATELLITES

New Gas-can specials are under construction in the USA, and a device for the MIR station to place into low orbit is planned. PACSAT is in the planning and building stages by AMSAT-NA, and the new concept of Phase IV satellites could be a reality in to 1990's IF there is enough money available. This is really where we came in. Hopefully some of the questions will be answered, or actions agreed upon at the International Satellite Convention held in Godalming on 28 July this year. This is sponsored by RSGB as part of the 75th Anniversary Year and being Chaired by Terry Carrell, ZL3QL of New Zealand. Most of the big names in amateur satellite and vhf/uhf organisations, and national radio societies have been invited to send representatives.

At least all shades of opinion on funding, planning, operation, frequencies and national requirements across the world could be agreed in principle, but in practice it is obviously far too much to hope that full agreement will be obtained inside so short a Convention period. We will report further down the log.

NEXT MONTH

Well, the Editor said between 1000 and 2000 words and keep it light. Here are 1637 (sorry, there are only 1530 left now! — ed). Hope this is what YOU the readers require. Let us know what you want. Next month will see the full operational details for OSCAR 13 in this column, IF it flies. Some of us still remember Black Friday (and now no. 13 — who's superstitious?) and the number of magazines who were telling their readers how to operate the new Phase IIIA at the bottom of the Atlantic Ocean! ■

DATACOMMS

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The first RSGB Data Symposium takes place this month, on 22/23 July, at the historic Harrow School, a few miles north-west of London. The two-day event will consist of a comprehensive lecture programme, covering the many and varied modes of data communication currently in use by radio amateurs, as well as looking at developments for the future. At the end of each day's session there will be an open forum, giving everyone the opportunity to put questions to the various lecturers.

At the time of writing this (late April), the exact timetable was still being put together. However, the organisers are hoping to include the following, presentations (although not necessarily in this order):

"A Short History of Telegraphy" by Alan Hobbs, G8GOJ, and Sam Hallas, G8EXV.

"The Other Side of the Coin – What went wrong in the USA?" by Gwyn Reedy, W1BEL.

"The Irish Packet Scene" by EI5CI.

"High-Speed Linking in the Amateur Packet Network" by Ed Harland, G3VPF.

"Packet Systems – Which way now?" by Ed Harland, G3VPF.

"9600 bps Packet Radio Modem Design" by James Miller, G3RUH.

"Keeping in Touch" by John Kirk, G4LPQ.

"Commercial Aspects of Data Transmissions" by John Coll.

"RTTY Night Owl Theatre (RTTY pictures)" by Lindsey Rohrlach, G1XPG.

"Overture and Beginners + Video on Packet Radio" by Phil Bridges, G6DLJ.

"The Trials and Tribulations of a Mailbox Systems Operator" by Andy Witts, G1DIL.

"Rail Block Signalling" by Mr Giles of British Rail.

"Satellite Digital Communications".

"AMPRNET" by Gareth Howell, G6KVK.

"The Application of AMTOR in the Amateur Radio Global Message Handling Network" by Peter Martinez, G3PLX.

Altogether a most interesting programme, and an excellent opportunity to meet in person many of the trailblazers in the world of data comms. Full booking details for the symposium were included in the *Bulletin* section of April's *Rad Com;* alternatively, they can be obtained by sending a large sae to the Membership Services Department at RSGB HQ.

The G3RUH 9600 bps modem

James Miller, G3RUH, has been developing a high performance 9600 bps modem for packet radio use with amateur voice-band nbfm radios. James reported recently that the prototype design was ready to be laid out as a pcb, and that a limited number of boards would be made for beta testing. He is now inviting people with the necessary skills and equipment to take part in the testing. Being a beta tester means that you will receive one or two pcbs at cost, and will be expected to build them up pronto and report back within 28 days with constructive criticism. Suitable suggestions will then be incorporated into the production design.

As a taster of what is to come, James provides the following brief specification for the modem.

Modulation: Direct carrier fm is applied to the transmitter varactor. ±3 kHz deviation produces an rf spectrum 20kHz wide (-60dB), fitting easily into the standard channel bandwidth.

Transmitter modulator: 8-bit long transversal filter (10-bit optional). This gives a "brick-wall" audio characteristic, typically -6 dB at 4800 Hz and -60dB at 7700 Hz. Compensation is possible for the characteristics of the radio and the receiver filter, allowing a perfect receiver eye-pattern to be achieved. There are six filter selections including audio loopback. The output is adjustable 0-10v pk-pk.

Scrambler: A 17-bit feedback shift register scrambler is included (this breaks up long runs of zeros or ones, improving the clocking performance at the receiving end). There is a choice of taps, to suit the K9NG system, UoSAT-C, maximal length and others. Data mode or BERT mode is selectable.

Receiver demodulator: Audio from the receiver discriminator (50mv-10v pk-pk) is passed through a 3rd-order 5kHz Butterworth filter. Other features include a new digital phase-locked loop clock recovery circuit with 1/256 bit resolution, a de-scrambler and data carrier detect output.

Power consumption: 200 mA at 12v. There are 20 integrated circuit chips, including two thirsty 27128 eproms.

The unit will work with any of the standard tncs capable of connection to an external modem, such as the TNC-1, TNC-2, Tiny-2, BSX-2, PK-87 and TNC-220. The only set-up required is the transmit audio level, and the modem will run at other speeds if filter capacitors are changed. James will provide details of cost and availability of the production versions as soon as they are available.

Packet Radio in the real world

When people ask: "what does amateur radio do for the world?", you can refer them to two recently published articles describing amateur radio's impact outside the shack. The first of these is titled "An underwater visit to Aquarius", written by Glenn Zorpette and published in the March 1988 issue of *IEEE Spectrum*. It describes a high tech underwater habitat that features an autonomous life support system with advanced sensing and data handling capabilities, permitting scientists 50ft below the surface of the Caribbean to concentrate on their underwater studies, while their life support system is monitored automatically.

The key to the monitoring system was designed by Dave Brecher, an amateur radio operator, who used off-the-shelf amateur packet radio tncs to transfer life support data to the shore via vhf radio. Data is sampled by sensors in the Aquarius, collected by the computer on-board, and then transferred by modem to a tnc on the Aquarius life support buoy. Here the data is packetised and transmitted to the support base on shore.

The second article appears in the April 1988 issue of *Macworld*, and describes the work of Paul Flaherty, N9FZX, in using packet radio to provide remote connections to mainframe computers. Paul is experimenting with packet on microwave frequencies, to extend Stanford University's Ethernet and Appletalk networks beyond the campus, making them available to researchers working at home. Using 2-foot diameter dish antennas, Paul estimates that 10-mile links may be established.

Do you know of any other interesting applications of packet? If so, let's hear about them.

Amtor software available

If you are interested in building your own Amtor system, there is a full description of the Z-Amtor controller in the *ARRL Handbook*, based on a *QST* article by Paul Newland, AD7I. This gives full circuit details for the unit, which uses a Z80A micro. For the run-time software, builders are invited to send a 2764 eprom with return mailer to Paul, who will program it for you.

However, if you already have a Z80 system and have been wondering how to use it for Amtor, you will be interested in Paul's recent announcement that the assembler source code is now available. The code may be used for personal hobby purposes, and you can get it free of charge by sending a formatted 360 kB MS-DOS floppy and prepaid return mailer to Paul at PO Box 205, Holmdel, NJ 07733-0205, USA. You will probably have to make minor changes to the code to suit your own hardware, but the core of the Amtor control software will probably function without modification, saving you a lot of work.

Host-mode software for the TNC-2

One of the major features of the standard software provided for tncs like the TNC-2 and its clones is that it is designed for use by humans. You type in commands using meaningful (?) mnemonics, and the tnc replies with user-friendly (?) responses. The trouble is, the messages appearing on the screen are a jumbled mixture of commands, responses and data, much of which appears when and where the tnc decides it should, rather than when and where you would like it to.

All of this is no great problem if you just want to use the tnc as a simple controller which communicates direct with eyeballs and fingers, but if you want to use it in conjunction with more intelligent software (such as split-screen display, or disk handling), then life gets a lot more difficult. The real problem is that the tnc effectively controls the terminal (your computer), rather than the other way round. With standard software, the tnc sends messages to the screen when it wants to, and different types of messages use different formats. The net result is that you have to write a lot of very messy software to handle everything that the tnc is likely to throw at you.

To overcome this unsatisfactory situation, host-mode software is now available for some tncs. With this software, all communication between the computer and the tnc is now under the control of the computer, and uses simple well-defined formats. The computer now decides exactly what information it wants from the tnc, and exactly when it wants it. This makes split-screen and disc handling very much easier, as the program in the computer knows **in advance** exactly what each piece of incoming ▶

SWL

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IT IS POSSIBLE that the column may have some additional space in the future. I am therefore keen to establish a good selection of photographs of swl shacks to use when the additional space permits. Also any diagrams, etc, to explain or expand a topic will also be well received. I might also find a few column inches to publish the tables a little more frequently. I hope that my swl readers will provide the extra material so that I can fully utilize the extra space.

SWL CONTEST

A timely reminder that the Society's SWL Contest takes place on 9/10 July.

Participation in the last two years has been encouraging and the Contest Committee are hopeful that the number of entrants will once again push the total entry over 35. It would be particularly welcome to receive more logs for the cw section. In the past, entry to this section has been poor with only three or four entries. Surely, there must be more than this number of listeners in Britain who like listening to cw contests. Why not make a determined effort this year to send in an entry and swell the number of cw logs received.

VHF CONTESTS

Following my remarks in an earlier issue, Joan Slater BRS90400, made her first entry to one of the Society's VHF Contests. She listened to the 144MHz event on 9/10 April and sent me a copy of her log. She listened for about nine hours at different times of the contest and was quite surprised by what she heard from a poor location in Matlock and with a home-made vertical. She was quite impressed with GMOFRT (IO87), but was disappointed that it took some time to log all the relevant details.

What is important, however, is that she decided to "have a go", got some enjoyment from it, and will probably enter further events. With several vhf events coming up this month, it would be good to see a few more swls "having a go" and getting into the contest spirit.

At the VHF Convention, Mick Toms BRS31976 and myself had a long discussion with G3XDY, Chairman of the VHF Contests Committee, about rules for vhf swl contests. We covered a number of topics and we may see some changes for next year's events.

EARLY ES

6 may saw the beginning of my sporadic E season. 50MHz provided GM's, LA and 9H1 from about 1800. At 2044, CT0WW was heard, with 9HIBT varying between 53 and 57 until 2108. The GM beacon was heard at 0820 on 7 May, after which some tropospheric enhancement allowed good copy of GW3XJQ in IO71.

On the DXTV scene, my set-up had not produced anything of great note at the time of writing, but on 15 May TVE1 (Spain) was quite a good signal, followed by some weak Eastern European or Russian signals. The best is yet to come, and I hope to give readers some insight into the dx signals heard in the coming months. If you have a DXTV, or converters for 50 or 70MHz, let me know what you hear during the summer Es season.

QSL BUREAU CLOSURE

One final mention not to send your QSL cards to the outgoing QSL bureau this month. I know that G3DRN will also appreciate it if large bundles of cards are not posted to arrive on 1 August!

DX NEWS

I am pleased to be first with this news. G4OHX and G4WYG are holidaying in VP2M, with their xyl's, from 2-21 August and will be signing /VP2M. They are particularly keen to receive listener reports on their signals on all bands from 7 through to 28MHz. Although VP2M is not the rarest country in the world, most of the expeditions there coincide with large contests and the operators consider that many swls have heard VP2M, but have not received a QSL card. They will be active on cw only, but will qsy for ssb skeds on request, with 14·185MHz the preferred frequency. QSL with suitable postage or ircs to the operators' home QTH, or via the bureau.

Many listeners would have heard some of the Soviet stations which were on the air as part of the "Skitrek" activities. Some of the QSL routes might not be known and this list may be of use. –

EK0CR via UA3CR	4K0DR via RW3DR
EK0KP via UK3KP	4K0DX via VE3CDX
EK0QCG via UK3KP	4K0E via UA1ADQ (op Vlad)
4K0D via RA3YA	4K0E via UA1AFM (op Mikhail)
4K0DC via UA3AOC	4K0GZ via UW3GZ

Robert Small, BRS 8841, was pleased to have heard the KH5 expedition on both Kingman Reef and Palmyra. Conditions during the expedition were good and their signals were quite strong at times. April seemed to be the time for amateurs in China to be on the air. Robert heard many and remarked that he heard five in one evening session on 14MHz. SV9ANK had been heard on 3·5MHz for a new country, only Franz Josef and Albania are now required for a full set of European countries on that band (you will have a long wait, Robert!). 28MHz had provided some interesting dx (and a few Europeans as we moved further into May) with TY9SI, VP8ASL, I0NLD/5H3 and 9Q5BG the best in the logbook. Lastly, more from the log of Colin Watson, BRS46598. He had also spent much time on 28MHz and offered TA1E/2, TZ6MG as his best dx during the period. On 24MHz, PZ1DV had been heard for a new country.

MAILBAG

Several new members of the Society had written about the rules for the 1988 HF Table. The rules are very simple. You can enter the table by writing to me with (a) your BRS No.; (b) the total number of dxcc countries heard in 1988; (c) the number of countries heard on each of the six main bands (1·8 to 28MHz) during the year; and (d) the total of the six band scores added together.

With luck, I should be able to include the table each month in future, so follow the simple rules and send them to me at the address at the foot of the column by the first copy date quoted. Dean Allison wrote to say he had passed the RAE and had the callsign G7ATO. Being something of a cw man he had the morse test booked, and was hoping to obtain a Class A licence soon. In the meantime he will continue listening on the hf bands.

Peter Austin, RS90393, wrote from Leeds with a long and interesting letter. He uses an FRG7700 with matching atu and vhf converter with a G5RV for hf and a nine element yagi for 144MHz. He has been listening for over a year and in that time has received some interesting QSL cards and Awards, including one for hearing 100 GB callsigns. On the construction side, Peter is to build a 110 to 150MHz receiver. He is also interested in contests and wondered why the White Rose and Cray Valley Societies were the only ones who sponsored contests for the swl. The answer is that both these Societies have active swls as members and have been able to assert some pressure to ensure that the swl is better represented. It would be good if other Societies were prepared to sponsor swl events, and not just in the contest field. I mentioned in a recent issue that the White Rose Society were withdrawing their sponsorship of the lf band contest after 1989. That is just one opening where an active Society can step in to save this successful event. Please think seriously about whether **your** Society can help with this, or other new events for the swl. I shall be pleased to have your ideas.

FINALE

Please try to send me a photograph of the shack, or any other item that would be of interest to the SWL. I can easily fill any extra space that might be available, but please make sure that I have **your** news. ■

DATACOMMS

information represents, and can decide when to listen to the serial link from the tnc and when to read/write to the disc.

Host-mode software for tncs like the TNC-1, PK-87 and PK-232 has been available for some time. For the TNC-2 and its clones, a new upgraded version of the WA8DED 2·1 host-mode package has just been announced by the North German Packet Radio Development Group (NORDLINK). The software is almost all in "C", and is public domain. Full details from Detlef Schmidt, DK4EG, Steinbrecherstrasse 22, D-3300 Braunschweig, West Germany. ■

Contest News

1988 70MHz Cumulative Contest results

The interest in 70MHz continues to grow as witnessed during this year's 75MHz cumulatives. Although the overall number of entries was down by one, this year there was a 33 per cent increase in the total number of stations active, with 163 stations (4 EI, 8 GM, 4 GW, 147 G) appearing in the logs.

Conditions were generally described as poor, with the usual QSB prevalent on the band. Many competitors commented on the lack of activity from the remote corners of the UK whilst those living in these parts bemoaned the lact of contestants beaming at them.

There were few comments on the timing of this years event, only questions on why 70MHz contesting was becoming a predominantly cold weather sport! There were also two pleas to revert to not normalising the scores, perhaps they should re-read this years rules. Logging was good but some stations insisted on correcting QSO information by overwriting, the previous details. This made it impossible for the adjudicator to decide which was the correct version and hence lost points.

Congratulations and certificates to the section F winner, C. Easton and runner-up M. Vincent also to the Flight Refuelling ARS winners of section O, by a narrow margin over the Sheppey outcasts.

G4FRE

Section F

Posn	Callsign	Points	Qsos	Sessions	Loc	Best Dx	Km
1	G8TFI	723	132	1,2,3	81UQ	GM4ZUK/P	584
2	G3UKV	695	125	2,3,5	82RR	GM4ZUK/P	467
3	G4EPA	470	108	2,3,4	92KI	GM4ZUK/P	517
4	G4ULS	460	111	2,3,5	82TI	GM4HAM	402
5	G3XBY	459	112	1,3,4	92DG	GM4HAM	418
6	G3TCU	387	80	3,4,5	91QE	EI9FK/P	432
7	G4NBS	362	70	1,2,5	02AF	EI9FK/P	427
8	G4AHN	315	70	3,4,5	91OE	EI9FK/P	412
9	G8PNN	276	44	1,2,4	95EF	G4RFR	495
10	G4AFJ	275	77	3,4,5	92HO	G3YJX	336
11	G3UAX	241	59	1,2,4	91LK	EI9FK/P	392
12	G4JNT	222	53	1,3,5	90IV	G8ECI	297
13	G8DXC	175	31	2,3,4	02DL	G4MGR	247
14	G3BPM	162	34	3,4,5	80OW	EI9FK/P	332
15	G4EYD	152	56	1,3,4	92AJ	G4KUX	245
16	GW4ALG	132	24	3,4,5	81PP	EI9FK/P	283
17	G2DHV	71	25	2,3,5	01BK	G4BVY/P	232
18	G4JED	41	9	2,4,5	01DF	G4BVY/P	248
19	G6CSY	13	5	1,–,–	01BI	G4BVY/P	232

Disqualified: G4CIZ, rule 9 (erroneous distance calculations).

Section O

Posn	Callsign	Points	QSOs	Loc	Sessions	Best DX	Km
1	G4RFR	1331	161	90AS	2,3,4	GM0FRT	699
2	G4BVY/P	1316	194	82LB	1,2,5	GM4AFF	586
3	EI9FK/P	1219	95	63WC	2,4,5	G4ZTR	497
4	G4MGR	538	89	83KH	3,4,5	GM4ZUK/P	420
5	GM4HAM	515	38	85JW	3,4,5	G4RFR	580
6	GM4ZUK/P	400	29	86RW	3,4,5	G4RFR	686
7	G7APD	363	97	92JI	2,3,4	GM4ZUK/P	516

Checklogs received with thanks from G0EHV, G4FRE, G8XTV, GM0FRT, G4BVY

March 144/432MHz Contest results

Entries for this contest were considerably down on last year despite much better weather than in recent years, particularly in the south. Radio conditions on both bands were described as between poor (a more restrained interpretation of the comments of some contestants) and average, with a few reasonable but short-lived openings. Activity was low, particularly from the continent and several stations commented on the viability of running this contest so early in the year. This may not be the general view as there are evidently others who enjoy the challenge of mounting and operating portable stations in poor conditions. G1KMI/P's comment "Nothing special to report" sums it up.

Smaller groups continue to find it difficult to mount two stations effectively and there were requests for the removal of mandatory 432MHz entry from this contest. This requirement may also be contributing to the smaller number of participants. The Maidenhead locator still causes comments, particularly the requirement to send the effectively superflous first two letters.

The standard of logs was variable, some extremely good, others apparently written in the dark by a pneumatic drill operator. Contestants in dual-band contests shold also pay careful attention to the rules regarding cover and summary sheets.

Congratulations to the winners and runners-up in each section. Certificates will be awarded as appropriate.

G4WAD

Single-Operator Section (Overall) band position

Posn	Callsign	Points	144MHz	432MHz
1	G8HHI	1255	4	1
2	G0CLP/P	1203	1	6
3	G4NBS	744	3	2
4	G6KZP	599	2	10
5	G4APA	592	5	3
6	G1KDF	533	6	4
7	G4FOH	353	9	5
8	G4XEN	251	12	7
9	G6HXU	231	7	9
10	G6YLW	192	10	8
11	G1TCH	123	8	11
12	G2DHV	70	11	12

Multi-Operator Section (Overall) band position

Posn	Group	Points	144MHz	432MHz
1	The Black Adders	1996	1	2
2	Warrington CG	1955	2	1
3	The Hillbillies	1386	3	6
4	Flight Refuelling ARS	1298	11	5
5	Sheppey Outcasts CG	1138	15	4
6	Clockwork CG	1098	9	7
7	Victory CG	1016	4	11
8	Wulfrun CG	989	12	8
9	Flowerpot Men CG	926	6	10
10	Southdown ARS	865	5	20
11	Five Bells	837	10	9
12	Exmoor RC	822	—	3
13	Aberdeen VHF Group	754	8	13
14	Hastings ERC	710	7	21
15	Watford CG	522	14	15
16	Crowborough ARC	441	17	12
17	Wyre ARS	435	16	18
18	North Wakefield RC	392	18	16
19	11th Hour CG	382	20	14
20	Oldham CG	328	19	22
21	WDRCSA	210	21	19

SWL Section band position

Posn	Station	Points	144MHz	432MHz
1	BRS31976	2000	1	1
2	BRS32525	1247	2	2

Checklogs received with thanks from: G0HGA, G1SMD, G3YSX, G6MXL, G8XTV and G8ZRE.

144MHz Multi-Operator

Posn	Callsign	Points	QSOs	Loc	Pwr	Ant	Best dx	Km
1	CW6APZ/P	6612	642	81LQ	400	2×19	DL2EFA	810
2	G3CKR/P	6318	687	93AD	400	2×17	DF0OG	774
3	G4XUM/P	5732	498	84XT	400	4×9	FC1BJD/P	748
4	G8LNC/P	5711	639	90MX	400	4×19	DL0EO	814
5	G1KAR/P	5310	491	00DR	400	19	DL0HER	786
6	G8SJP/P	4927	487	03AH	400	2×19	DL2HBQ	749
7	G6HH/P	4471	421	00HU	400	17	DL3LAB	763
8	GM0FRT	4267	254	87WB	400	19	F1HDI/P	827
9	G1KMI/P	4092	555	91GI	400	2×19	DF0WZ	756
10	G4SIV	3959	381	92TR	400	4×16	FC1HGO	820
11	G4RFR/P	3769	430	80/WP	400	2×19	GM0FRT	713
12	G3XBY/P	3650	494	92DB	400	2×17	DJ1QQ	698
13	G4UHF/P	3400	510	91LT	400	2×17	FC1HGO	722
14	G4VCO/P	2820	489	91PS	120	18	DF2UQ	730
15	G4GFX/P	2695	332	82LB	300	2×17	DF8WS	716
16	G0HSF/P	2439	341	84SA	400	2×9	FF6KGT/P	616
17	G0CRW/P	2183	332	01BB	200	13	GM3ZBE	712
18	G4NOK/P	2088	302	93FM	200	2×14	FC1CNE/P	677
19	G1ORC/P	1985	350	93AO	300	2×17	PA0PB	580
20	G6CSY/P	1877	341	91XG	250	17	GM0FRT	658
21	G7ABU	958	188	81UJ	30	16	DD2ER	612

Disqualified: G0ARC/P (Rule 3)

432MHz Multi-Operator

Posn	Callsign	Points	QSOs	Loc	Pwr	Ant	Best dx	Km
1	G8XVJ/P	2552	271	93AD	400	4×21	DL0GS/P	746
2	GW0FRE/P	2543	246	81LQ	250	4×19	DJ9DL	705
3	G4JKN/P	2099	198	81CC	400	4×28	DK1OS	802
4	G4BVY/P	1862	208	82LB	400	4×21	LX1JX	678
5	G0FRR/P	1859	187	80WP	400	4×24	GM4ZUK/A	713
6	G4THB/P	1324	129	84XT	350	4×21	FF1MKJ	650
7	G4KZY/P	1225	190	91GI	400	2×21	DJ9BV	810
8	G8KQW/P	1116	196	92DB	400	4×19	DJ0UI	592
9	G8ZHP	607	81	92TR	400	4×21	DL0GS/P	631
10	G6JIM/P	463	68	03AH	300	4×19	OZ9PZ/A	650
11	G8NEH/P	388	80	90/MX	50	15	PA0GUS/P	500
12	G4DRV/P	284	85	01BB	12	21	—	—
13	GM4ZUK/A	278	19	87WB	20	2×21	G0FRR/P	713
14	G6CTU/P	251	92	91XG	200	44	—	—
15	G6YLJ/P	244	81	91PS	50	48	—	—
16	G1UDF/P	195	47	93FM	200	2×21	GM4ZUK/A	396
	G8AHK	195	52	91QF	200	88	G4THB/P	409
18	G7AAB/P	168	38	84SA	30	48	G0FRR/P	424
19	G1YOA/A	166	23	81UJ	10	48	PE0MAR/P	447
20	G3WQK/P	158	24	00DR	10	22	G4THB/P	480
21	G1HHH/P	86	12	00HU	10	21	G4THB/P	450
22	G4ORC/P	72	28	93AO	10	42	—	—

Disqualified: G0ARC/P, G0CAD/P (Rule 3)

144MHz SWL

Posn	Station	Points	QSOs	Loc	Ant	Best dx	Km
1	BBRS31976	365	59	01HO	9	DJ1QQ	547
2	BRS32525	330	50	01AL	9	F6KSL/P	513

432MHz SWL

Posn	Station	Points	QSOs	Loc	Ant	Best dx	Km
1	BRS31976	166	27	01HO	19	—	—
2	BRS32525	57	17	01AL	19	G8XVJ/P	230

144MHz Single-Operator Section

Posn	Callsign	Points	QSOs	Loc	Pwr	Best DX	Km
1	G0CLP/P	2749	339	84KD	60	F5IL	620
2	G6KZP	1589	299	91RP	400	GM0FRT	611
3	G4NBS	913	127	02AF	250	DK0BN/P	595
4	G8HHI	700	112	91OH	80	F6KSL	549
5	G4APA	679	111	83TD	150	F6GOE/P	590
6	G1KDF	587	86	83NN	180	PE0MAR/P	582
7	G6HXU	416	88	83RF	30	FA1LIX/P	499
8	G1TCH	297	40	90WW	160	G4XUM/P	450
9	G4FOH	218	31	92XI	20	DK0UKW	511
10	G6YLW	192	28	01HI	130	PA0GUS/P	384
11	G2DHV	176	24	01BK	25	DK3KD/P	525
12	G4XEN	171	27	92PH	90	FA1LIX/P	341

432MHz Single-Operator

Posn	Callsign	Points	QSOs	Loc	Pwr	Best DX	Km
1	G0CLP/P	2749	339	84KD	60	F5IL	620
2	G6KZP	1589	299	91RP	400	GM0FRT	611
3	G4NBS	913	127	02AF	250	DK0BN/P	595
4	G8HHI	700	112	91OH	80	F6KSL	549
5	G4APA	679	111	83TD	150	F6GOE/P	590
6	G1KDF	587	86	83NN	180	PE0MAR/P	582
7	G6HXU	416	88	83RF	30	FA1LIX/P	499
8	G1TCH	297	40	90WW	160	G4XUM/P	450
9	G4FOH	218	31	92XI	20	DK0UKW	511
10	G6YLW	192	28	01HI	130	PA0GUS/P	384
11	G2DHV	176	24	01BK	25	DK3KD/P	525
12	G4XEN	171	27	92PH	90	FA1LIX/P	341

1st 1·8MHz Contest 1988 results

A contest with a sting in its tale! Poor band conditions prevailed for most of the event resulting in a reduced entry from both UK and Overseas. However, an opening to Stateside in the last 20 minutes produced ten stations in W1, 2, 3, 4, 9 and VE1 call areas.

The experience of Dave Lawley, G4BUO, enabled him to capitalise on this to clinch the winning spot and take the Somerset trophy. The Overseas entry was once again led by Paul O'Kane, EI5D1.

The leading two UK stations each had a choice of two antennas. G4BUO used a dipole at 40 feet with an inverted L at 52 feet (the latter was probably used to hook the Stateside QSOs). Whilst G0FDX had a dipole at 58 feet and a 60 feet high top-loaded vertical.

Those stations not fortunate enough to have such antennas available might like to note the following tip. The maximum signal radiation on an antenna occurs at a distance of a quarter wavelength from the non-fed end of each leg. For example, a 130 feet end-fed used on 1·8MHz would be radiating maximum signal at its feed point, probably in the shack. Adding 30-50 feet of wire to the far end (even coiled up) would take the current antinode out into the clear making it more efficient. Effort can then be made to increase the height of this section of the antenna.

Apologies to the Scottish entrants in contention for the Maitland trophy, which the HFCC is unable to award owing to action taken after the November 1987 event: and thanks go to those entrants who included dupe sheets, saving much time for the adjudicator.

G3SJJ

1st 1·8MHz Contest 1988 results

British Isles

Posn	Callsign	Valid QSOs	Bonus QSOs	Total points
1	G4BUO*	174	51	817
2	G0FDX (G4OBK)*	158	61	779
3	G3LET*	137	59	706
4	G3OLB	142	54	696
5	G3PDL	130	54	657
6	GM3RAO	108	51	579
7	G3SWC	107	50	571
8	G3SWH	116	44	568
9	GM4SID	104	51	567
10	G4IUF	100	47	535
11	G3VYI	98	45	519
12	G3SSO	96	44	499
13	G5MY	93	41	483
14	G2MJ	90	43	482
15	G4EBK	83	38	439
16	G4IUZ	80	39	435
17	G3HZL	82	37	430
18	G2HLU	82	34	416
19	G3YLC	75	37	410
20	GW3JI	67	39	396
21	G3SXW	74	32	382
22	GM3UM	70	34	380
23	G3MCX	67	34	371
24	GM3CFS	62	36	366
25	G0CGB	58	35	349
26	G3AWR	62	28	326
27	G3GMM	56	30	318
28	G3OLK	50	30	300
29	G3LIK	49	30	297
30	G3FVW	43	31	284
31	G3ZRZ	39	23	232
32	G8VF	39	21	222

Overseas

Posn	Callsign	Valid QSOs	Bonus QSOs	Yoyal points
1	EI5DI*	61	33	348
2	SP1PEA*	54	33	327
3	OK1DFF*	49	32	299
4	OK1FDY	45	27	270
5	DL8BAV	43	28	268
6	UQ2GMB	37	23	222
7	ON4XG	34	23	217
8	UQ2GN	32	23	214
9	OL1BPJ	33	21	204
10	F8TM	29	22	195
11	RA1CW	29	21	192
12	DK9NH	28	20	184
13	ON6TJ	28	19	179
14	DF4PD	24	19	167
15	DL1ZQ	25	16	156
16	HB9AGA	21	18	153
17	OK2BQU	22	17	151
18	UQ2GHX	16	14	123
19	HB9DDZ	13	11	94
20	OK1OPT	12	10	86
21	OE1NDW	11	9	78
22	OK3CUG	8	8	64
23	UA9FAR	7	7	56
24	OK1FPV	3	3	24

SWL Section

Posn	Callsign	Valid QSOs	Bonus QSOs	Yoyal points
1	BRS528668*	79	49	482
2	BRS1066	63	37	374
3	UB5075145*	15	8	80

Check-log received with thanks from G4LZB.* = certificate winner.

50MHz Fixed station results

Despite being held on Easter Saturday, this contest can only be described as a success, with a level of activity and entry totally beyond expectations. Many complimentary comments were received in the logs and many stations entered their first contest in several years. Others made their first GJ, GM or PA contact, showing what the band could be capable of if it was populated more often.

There were a few comments requesting a longer contest next time with several complaining that because of the initial high level of activity the dx was swamped until the end of the contest. Whether because of this, or due to improved propagation caused by a weather front or the sun setting is not clear but the longer QSOs were mostly made in this period.

The only adverse comments related to a lack of activity in the outlying areas, particularly in the west with very few GWs appearing in the logs.

Surprisingly, the results didn't rely on being in a good site; several stations poorly located for other vhf bands did well on this band. Also, everybody being limited to the same erp appeared to rekindle the "friendly" atmosphere in this contest – a welcome codtrast to the trend in 144MHz contests where everything has to be big. This is best summarised by G1XOF – "6M helps compensate for the hills and allows competition on a firmer basis than on 2M". Should we introduce an erp limit in other contests? Your comments please!

The standards of log-keeping were generally very good, but few stations actually provided all the paperwork required by the rules for a multiplier style contest (Rule 14). A quarter of all logs received contained no check list, therefore losing all their multiplier points. Of the remaining logs, a quarter failed to provide the serial number of the QSO on the check list and some logs didn't clearly show the multiplier contact – these haven't been penalised this time but will be in future contests. Please read all the rules carefully; if you are unsure of the requirements ask one of the committee members for advice.

SINGLE OPERATOR SECTION

Pos	Callsign	Points	MultQSOs	Loc	Best Dx	Kms
1	G3XBY	22,932	39	139	92DG PA0RDY	447
2	G3UKV	21,294	42	113	82RR GM3ZBE	509
3	G4UXC	19,147	41	115	92BC GM3ZBE	579
4	G3IBY	18,620	38	112	90IW –	–
5	G0AFH	17,152	32	124	01EI PA0RDY	329
6	G4GDY	16,731	39	109	92GJ G1MEJ	226
7	G0FAJ	8,764	28	72	80SO –	–
8	G4AFJ	8,679	33	75	92HO G4KUX	225
9	G4MUT	6,880	32	65	91NK G3FDW	336
10	G4FOH	5,824	28	55	92XI PA0RDY	337
11	G4XEN	5,096	26	57	92PH G4KUX	266
12	G4BWP	4,920	24	46	02FH G4KUX	297
13	G4EQD	4,508	23	52	93QN G3OGP	278
14	G1KDF	4,401	27	41	83NN GM3ZBE	418
15	G4ZFQ	4,356	22	55	90IR G6APZ	–
16	GJ6OZB	4,144	16	36	89VF G6APZ	432
17	G3AEZ	3,620	20	62	91UE PA3BFM	268
18	G4CXT	3,173	19	37	02OB –	–
19	G1DWQ	2,286	18	42	90AT G6APZ	255
20	G3UAX	1,746	18	31	91LK GJ6OZB	259
21	G1YNR	1,710	15	36	93QN G3POI	254
22	G6MXL	1,470	15	33	80XR G6APZ	265
23	G4IPR	715	13	21	91XQ G4UXC	132
24	G1FUT	704	11	14	02KH G4KUX	312
25	G3BPM	660	11	20	80OW G6DP	255
26	G1SMD	630	10	27	90AR GJ60ZB	168
27	G4ZGY	600	10	21	02GJ G4KUX	–
28	G4AHN	557	–	141	91OE G4KUX	380
29	G3ZSS	380	–	124	91TH G4GAI	287
30	G3SED	366	–	100	90LW GW3MHW	254
31	G4DEZ	283	–	77	01IN –	–
32	G1HJW	255	–	72	01IN G3UKV	257
33	GM4HAM	253	11	11	85JW GM3ZBE	163
34	G1HYG	224	8	14	94DU GM3ZBE	275
35	G1XOF	187	–	52	92FH G4KUX	257
36	G4CCN	181	–	32	02PD G4KUX	352
37	G1TCH	151	–	49	90WWG6APZ	264
38	G4HUP	139	–	34	02PD G4KUX	352
39	G5UM	81	–	27	92MP G4KUX	230
40	G4WQY	71	–	25	91WA G4LOJ	196
41	G1OWP	28	–	17	94FV G0CYB	196
42	G2DHV	14	–	10	01BK G4RGK	68
43	G1JDP	10	–	10	94FU G4IJM	43

ALL OTHER SECTIONS

Pos	Callsign	Points	MultQSOs	Loc	Best DX	Kms
1	G4KUX	49,063	43	136	94BO G4RFR	426
2	G3OGP	38,520	45	173	91SB G4KUX	405
3	G4BLX	36,212	44	171	90WV G3FDW	413
4	G4SIV	20,710	38	116	92TR PA0RDY	356
5	G4RFR	17,688	33	119	90AS G4KUX	426
6	GM3ZBE	5,712	24	30	87UH G4UXC	579
7	G6EKR	1,974	14	33	01OI G6APZ	308
8	G1MWS	1,845	15	52	83WG G4VXE	153
9	G0CYB	355	–	101	93JD GM3ZBE	468
10	G8BFL	61	–	30	92BQ –	–

Disqualified – G0BRC/A (Rule 6); G3COJ and G6WOI (Rule 3). Check logs gratefully received from G1DRG/P and G4OTU.

Congratulations and certificates go to G3XBY and G4KUX, the winners of the two sections, and G3UKV and G3OGP the runners-up. Also thanks to all who operated and entered in the contest, and for all the many comments in the logs which were very useful in judging the success (or otherwise) of the format of the contest.

G4NBS

432MHz Fixed, SWL, and Affiliated Societies contest results

This year's contest saw a slight increase in entries and activity over last year, with scores slightly improved and fewer complaints about conditions. Many entrants managed DX over 500km, with DL2KBB featuring in many logs. The lack of any significant activity from GM was commented upon, and is evidenced by the complete lack of entries from there.

Some comments from the logs included "Band as flat as last Tuesday's pancakes" (G0EIY), "Very pleasing to work so much as this contest is my annual visit to 70cms" (G4BLX), "Conditions very 'average' large amount of QSB and good activity" (G3UNU). "Good to have another event with a listener section in it. Hope the swl activity warrants its inclusion"(BRS32525). "Disaster followed disaster. Many problems with amplifier and RF getting into 12V PSU" (G6APZ).

The swl section has been included for the first time, and this led to four entries which compares well with other 432MHz listener events. On this occasion Mick Toms (BRS31976) emerged with a clear lead.

In the single operator section G8TFI was the winner by a clear margin over G3NNG. Zonal winners were G8TFI, G6OYL, G4NBS, G8ATK, GI6ATZ, and GW6ZUQ. The multi operator section was won by G3UNU (Nottingham University A.R.S.), with G8XVJ as runner-up. Zonal winners were G3UNU, G3XVJ,G3KFT, and G2DMR. In the Affiliated Societies section the Sheppey Western Contest Group were overall leaders and Zone B winners, with the Derbyshire Hills Contest Group runners-up and leading Zone A entrant. Harwell ARS "A" won Zone D, and Sutton & Cheam RS Zone C.

Congratulations to all those mentioned above, who will receive certificates.

G3XDY

AFFILIATED SOCIETIES SECTION

Posn	Club	Score	Callsigns			Zone
1	Sheppy Western CG	2,861	G8TFI	G3KFT	G4BVY	B*
2	Derbyshire Hills CG	1,704	G6OYL	G6APZ	G4CYA	A*
3	Harwell ARS "A"	1,593	G3NNG	G0CFS	G8NRP	D*
4	Cambridge & D ARC "A"	878	G4NBS	G6YAD	G0GLJ	B
5	S Manchester RC "A"	772	G4JLG	G4NTY	G3ZDM	A
6	Washington ARC	746	G1GEY	G8PNN		A
7	Five Bells	725	G4SIV			B
8	Sutton & Cheam RS	694	G2DMR	G3CDK		C*
9	N Wakefield RC	596	G4NOK			A
10	Farnborough & D RS "A"	535	G8ATK	G8PDP	G1IPO	D
11	Leicester RS	534	G4JDI	G5UM	G3LRS	B
12	Reigate ATS	372	G8JXV	G1WIS		C
13	Wigstone ARC	262	G8ZQB			B
14	Salop ARS	248	G0EIY	G1SPU		B
15	Wimbledon & D ARS	238	G3WIM			
16	Mayland & D ARS	187	G4TVI			C
17	Harwell ARS "B"	161	G0GLB			D
18	S Manchester RC "B"	144	G4MYB	G1JPO	G1JVF	A
19	Old Swinford Hosp ARS	133	G4CVK			
20	Cambridge & D ARC "B"	93	G6UGI			B
21	Farnborough & D RS "B"	24	G0GCI			D

SINGLE OPERATOR SECTION

Pos	Callsign	Points	QSOs	Loc	Zone	Best DX	(km)
1	G8TFI	1,448	209	81UQ	D	DL2KBB	593*
2	G3NNG	977	184	91EP	D	DL2KBB	547
3	G4JNZ	907	159	91LC	–	DL2KBB	502
4	G8HHI	851	157	91OH	D	GM4LBV	566
5	G6OYL	687	111	93JK	A	PE1EWR	388*
6	G1GEY	559	57	94FW	A	G0FRR	463
7	G1GHA	529	98	92CM	–	DL2KBB	578
8	G4NBS	515	93	02AF	B	GI6ATZ	470
9	G4JLG	493	85	83TM	A	G4BLX	329
10	G4XEN	489	91	92PH	B	DL2KBB	501
11	G4JSX	483	105	92LJ	B	PA3DZZ	430
12	G8NEY	480	82	81VK	D	PA3DZZ	508
13	G4CYA	444	72	93GJ	A	PA3AEF	456
14	G0FEH	432	79	93GE	–	DL2KBB	432
15	G4BVY	429	75	82TD	B	PA0RDY	494
16	G1KDF	376	61	83NN	A	G4BLX	358
17	G0CFS	354	72	91GS	D	G1GEY	351
18	G6HLL	321	61	83RE	A	G3GIM	339
19	G6IAT	301	73	91TV	B	PA0AD	354
20	G8ATK	286	76	91OF	C	PA0RDY	410*
21	G8ZQB	262	64	92JN	B	G8PNN	298
22	G4JDI	261	61	92NR	B	PE1ALA	379
23	GI6ATZ	243	17	74BN	F	G4BLX	561*
24	G1EHJ	217	55	92EO	B	G3DAH	234
25	G8JXV	216	53	91VE	C	G4NOK	297
26	GW6ZUQ	204	48	81PP	E	G4MJC	230*
27	G6YAD	192	40	02DE	B	G8XVJ	233
28	G8PDP	191	41	91PG	C	G1KDF	294
29	G8PNN	187	21	95EF	A	G4JNZ	460
30	G1SPU	174	47	82PQ	B	G4BLX	266
31	G0GLJ	171	36	02BF	B	G8XVJ	221
32	G4NTY	167	43	83TM	A	G4JNZ	283
33	G0GLB	161	41	91IQ	D	G4JLG	216
34	G1WIS	156	39	91WG	C	G8XVJ	287
35	G1NRM	153	54	91UO	C	G8XVJ	250
36	G6CSY	145	33	01BJ	C	G6OYL	244
37	G5UM	144	43	92MP	B	G1GEY	291
38	G3LRS	129	37	92KP	B	GW0HOL/P	193
39	G0FKY	118	20	80XS	–	G4LOJ	309
40	G3ZDM	112	34	83UK	A	G4JNZ	273
41	G8XYN	96	33	91OM	D	G8XVJ	239
42	G6UGI	93	19	92XB	B	G8XVJ	224
43	G0EIY	74	20	82OR	B	G4BLX	274
44	G4MYB	66	23	83TJ	A	G8HHI	256
45	G1IPO	58	21	91OH	D	G6APZ	208
46	G1JPO	55	28	83TK	A	G8HHI	259
47	G0GCI	24	20	91OF	C	G0FRR	96
48	G1JVF	23	14	83WJ	A	G3NNG	197
49	G2DHV	21	5	01BK	–	G8TFI	173
50	G1LKE	3	3	01HI	–	G4DEZ	23

MULTI OPERATOR SECTION

Pos	Callsign	Points	QSOs	Loc	Zone	Best DX	(km)
1	G3UNU	1,218	203	92JW	B	DL2KBB	555*
2	G8XVJ	1,051	157	83RJ	A	DL2KBB	655*
3	G4BLX	1,005	146	90WV	–	EI5FK	594
4	G3KFT	984	172	91AV	D	DL2KBB	574*
5	G4SIV	725	115	92TR	B	DL2KBB	494
6	G4BWG	706	150	91VG	–	G1GEY	417
7	G4NOK	596	93	93FR	A	DL2KBB	614
8	G6APZ	573	101	93DC	B	GU2FRO	410
9	G2DMR	410	100	91VH	C	DL2KBB	447*
10	G3CDK	284	60	91WI	C	G1GEY	410
11	G8NRP	262	60	91IQ	D	G1GEY	361
12	G3WIM	238	75	91VH	–	DL2KBB	446
13	G0FQA	199	60	92PH	–	PE1ALA	424
14	G1LHD	195	35	01GI	–	G8XVJ	308
15	G4TVI	187	37	01IS	C	G8XVJ	284
16	G4CVK	133	42	82WK	–	G1GEY	280

SWL SECTION

Posn	Callsign	Points	QSOs	Loc	Best DX	(km)
1	BRS31976	221	47	01HO	DL2KBB	393*
2	BRS32525	177	43	01AL	G4JLG	280
3	BRS52543	152	27	83LT	G8HHI	316
4	BRS25429	123	27	93FX	G4BWG	312

Checklogs are gratefully acknowledged from: G6DZH, PE1EWR, G6DER.

Disqualified: G0FRR, G3WQG, G4GGV, G0CWI; General Rule 2 G4MJC, G4AGE; General Rule 3.

ROPOCO 1 1988 Contest Results

Quite a fall off in numbers taking part this year. However, those who did enter sent in a number of comments suggesting that they enjoyed it. These included: "On the face of it, most of the postal codes look reasonably credible this time. On the other hand I can 't work out why, when many of the entrants are the same as in previous events, very few post codes are. Can it be that new ones are invented each time? (G3LET). As always, a great contest and thoroughly enjoyed it (G4KWI). Many thanks for the contest. There seemed to be a lot of regulars missing but a lot of new call (G3HKO). My second entry in ROPOCO. Most enjoyable again – just about the right length in my opinion (G0EBV). Thanks for an interesting contest. The recognisable distortions in late-received postcodes reminds me of the old story of message distortion – "send three and fourpence" instead of "send reinforcements"! (G4PTE). "Thanks for a cracking contest" (G4PVB). Verulam Silver Jubilee Trophy will be presented to F. Handscombe G4BWP. This trophy is awarded to the entrant having the highest scoring log.

Posn	Callsign	Points	Posn	Callsign	Points
1	G4BWP	700	24	G3OLU	440
2	G0FDX	680		G2HLU	420
3	G3LET	660	25	G4ECI	420
4	G3OLB	610		G0CGB	420
	G4BUO	610	28	G3MCX	410
6	G4CWH	590	29	G3HKU	400
7	G3UFY	580		G4HZF	400
8	G3JJG	560	31	G3BPM	380
	G3VYI	560	32	G3GMS	370
	G4ARI	560		G0EBV	370
	G4OGB	560	34	G3YLC	360
12	G3GC	520	35	G4PUR	350
	G4KWI	520	36	G4FUI	340
14	G3MA	500		G0BVW	340
	G4HZV	500	38	G3KZJ	330
16	G4CZB	490	39	G0B LQ	300
	G4HSD	490	40	G3AWR	280
18	G4EBK	480		G3JSR	280
19	G3NKS	470	42	GM3UM	260
	G4PKW	470	43	G4PTE	250
	G4WZV	460		G0ATR	250
21	G0HHR	460	45	GW4KVJ	160
23	G4IZZ	440	46	G4PVB	60

Thanks also to G4UOL for his useful checklog.

IARU Region 1 VHF/UHF/SHF Listeners Contest rules

The IARU Region 1 VHF/UHF/SHF Contest rules should be used, with the following differences.

1. Eligible entrants. All listeners in Region 1 may take part. Licensed amateurs are not eligible to enter.

2. Contest sections. (a) There will be one section in the September 144MHz contest. (b) There will be one section for each band from 432MHz to 47GHz in the October contest.

3. Reporting. Any station may be logged only once on each band, whether it is fixed, portable, or mobile. CQ or test calls will not count for points and should not be logged. Stations hear via active repeaters, translators, eme or meteor scatter do not count for points. The callsign of the station contacted by the station heard may only appear five times, or if there are more than 100 QSos logged, only once in every 20 logged contacts.

4. Scoring. Points will be scored on the basis of one point per kilometre between the listener and the station heard.

144MHz Trophy and SWL Contest rules

1400-1400gmt 3/4 September 1988

The general rules published in the "Contest News", *Rad Com* January 1988, will apply. There will be three sections, section S for single operator stations, section M for Multi-operator stations, and section L for listeners. The Thorogood Trophy will be awarded to the winner of the single operator section, and the Mitchell-Milling Trophy to the leading multi-operators entrant. Certificates will be awarded to the leading stations in each RSGB zone, and entrants should include their zonal code (see p899, December 1987 *RadCom*) on the cover sheet. If you wish to enter the concurrent IARU contest, please complete an extra cover sheet (427-86), and score contacts using both the radial ring system and 1 point/km.

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

70MHz Trophy & SWL Contest rules

0900-1600gmt 18 September 1988

The general rules published in the "Contest News", *Rad Com* January 1988 will apply. There will be three sections, section F for Single Operator Fixed stations, section O for other stations, and section L for listeners. County and Country multipliers will be used in accordance with general rule 14.

The station with the highest overall score will receive the VHF Manager's Trophy.

All entries and check logs to: VHF Contests Committee, c/o A J Collett, G4NBS, 10 Quince Road, The Limes, Hardwick, Cambridge, CB3 7XJ.

432MHz-47GHz UHF/SHF & SWL Contest rules

1400-1400gmt 1/2 October 1988

The general rules published in the "Contest News", *Rad Com* January 1988 will apply. There will be three sections, section S for single operator stations, section M for multi-operator stations, and section L for SWLs. Individual band tables and an overall table will be published. Scoring will be at one point per kilometre. Entries will be forwarded for the concurrent IARU contest.

All entries and check 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.

IARU Region 1 VHF/UHF/SHF Contest rules

1. Eligible entrants. All licensed amateurs in IARU Region 1 can participate in the contests. Multi-band entries from UK groups competing in the IARU Region 1 UHF/SHF Contest, working from a single location and using one callsign on each band, will be accepted for the "all other stations" section of the contest. The contest entry should show which single callsign should be used in the overall tabulation of the results. Contestants must operate within the letter and spirit of the contest and at no greater power than permitted in the ordinary licences of their country. Stations operating under special high power licences do so *hors concours* and cannot be placed in the contest proper.

2. Contest sections. The contest will comprise two sections for each band:

2. All other stations.

3. Dates of contests

VHF contest: The contest will take place during the weekend of 3 and 4 September 1988 on the 144MHz band.

UHF/SHF contest: The contest will take place during the weekend of 1 and 2 October 1988 on all bands from 432MHz to 47GHz.

4. Duration of contest. The contest will commence at 1400gmt on the Saturday, and end at 1400gmt on the Sunday.

5. Contacts. Each station can be worked only once on each band, whether it is fixed, portable or mobile. If a station is worked again during the same contest, only one contact will count for points, but any duplicate contact should be logged without claim for points and clearly marked as duplicate. Contacts made via active repeaters, translators, eme or meteor scatter do not count for points. Any telephony contacts made with stations generating in the cw (A1A) sub-bands shall not count for points.

6. Type of emission. Contacts may be made on A1A, R3E, J3E or F3E. F2A may be used above 1GHz. Only one transmitter may be used on each band at any time.

7. Contest exchanges. Code number exchanges during each contact shall consist of the RS or RST report, followed by a serial number commencing at 001 for the first contact on each band, and increasing by one for each successive contact on this band. This must immediately be followed by the locator of the sending station (eg 59 003 JO22PB).

8. Scoring. Points will be scored on the basis of 1 point per kilometre. The final claimed score must be shown on the first sheet.

9. Entries. Entries should be sent to the RSGB VHF Contests Committee, c/o the adjudicator for the RSGB contest on the same date. Separate cover sheets (From 427-86) should be completed for the RSGB and IARU events, but common log sheets may be used with both radial ring and points per kilometre scoring shown.

10. Awards. The winner of each section will receive a cetificate. The entrants compete for the following challenge trophies:

VHF contest: (a) The IARU Region 1 VHF Trophy for the winner of the single-operator 144MHz section. (b) The PZK Trophy for the winner of the all other stations 144MHz section.

UHF/SHF contest. (a) The Vittoria Alata Cup 1, for the winner of the single-operator 144Mhz section. (b) The Vittoria Alata Cup 2, for the winner of the all other stations 432MHz section.

Overall winner: An overall winner of the IARU Region 1 UHF/SHF Contest will be declared. For this competition the scores of entrants will be normalised for each band and the resulting scores combined. The 3·4GHz band will not be included in calculating this overall score.

The entrant with the highest score will be awarded the IARU Region 1 Medal.

DF Qualifying event – South ManchHester

Date: 10 July 1988
Map: O.S. Sheet 109 1:50000 series, Manchester
Assembly: 1300 BST for start at 1320 BST
Location: Lay-by on A34 at Bruntwood Hall NGR 855873

Competitors requiring tea should notify Mr C. Wells, 31 Madison Avenue, Cheadle Hulme, Cheshire. Tel: 061 485 1707 not later than 3 July 1988.

DF Qualifying event – Mid-Thames

Date: 31 July 1988
Map: O.S. Sheet 174 1:50000 series, Newbury and Wantage
Assembly: 1300 BST for start at 1320 BST
Location: On Ridgeway Path East side of road at Bury Down NGR 480840.

Competitors requiring tea should notify Mr W. Pechey, Jays Lodge, Crays Pond, Reading, RG8 7QG. Tel: 0491 680552 not later than 24 July 1988.

Ropoco 2 1988 rules

1. The general rules for RSGB HF contests, as published in 'Contest News', *Rad Com* Janaury 1988, will apply.

2. Date and Time. 0800-1000 gmt, 28 August 1988.

3. Sections. Single-operator entries only. All entrants must be paid-up members of the RSGB, resident in the British Isles, and holding a Class 'A' licence.

4. Band and Mode. cw in the 3·5MHz band only. Entrants are requested to confine their operation to 3·520-3·570kHz.

5. Exchange. Send rst, plus – for the first contact, entrant's own postal code; for the second and subsequent contacts, the postal code received in the previous contact. Contacts with European stations will not count.

6. Scoring. Ten points per contact.

7. Documentation. Entrants are requested to use RSGB HF contest log sheets (HFC 1) and the cover sheet (HFC 2), which must include a signed declaration stating that the rules and spirit of the contest were observed. Column five should be headed 'postcode received' and used for this purpose.

8. Name and address for logs. Logs should be sent to Mrs H Claytonsmith G4JKS, 115 Marshalswick Lane, St Albans, Herts AL1 4UU.

9. Date for entries. Logs to be postmarked not later than Monday, 12 September, 1988.

10. Awards. Certificate of merit will be awarded to the first, second and third placed entrants. The G3XTJ Memorial Trophy will be awarded to the entrant with the highest checked score and most accurate log. This trophy will be awarded once only in 10 years to the same station. Previous winners – GW3YDX, G3SXW, G4DJX.

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 . . . .

FT101ZD MK3 WITH FAN, 500Hz cw filter and fox-tango 2.1KHz ssb filter, £420. FV101Z remote vfo £60. FTV107R with 6m and 2m modules £200. TR7800 2m fm £130. Don, G3XTT, QTHR. Tel: 0734-724192.

YAESU FT290R muTek boxed, c/w case, manual, charger, nicads, strap, mint. £250ovno. 9-ele fixed Tonna; 9-ele portable Tonna. £10ea. WANTED: 10m monoband beam, vgc. G4MTC, QTHR. Tel: 043471-2642.

DRAKE R4B T4XB, AC4 power supply notch passband four filters covers all ham bands 100w output. Linear power supply variac control 0-3kv 500m/a, £65. Heavy duty winch £28. 800LB winch £20. Buyers collect. G4LW, QTHR. Tel: Trowbridge 3166 (anytime).

FT102 TRANSCEIVER ssb 1.8/3.1KHz, cw 300/800Hz, cw 270/600Hz filters +fm +MH1 mike. Immac condx, reason for sale want to go hf mobile, £640. G4OAB, QTHR. Tel; Runcorn 65804.

COLLINS S-LINE, 75S3B receiver 32S3 transmitter, psu and in-line matching 160m tsvtr. Perfect performance on all bands. Spotless condx. Inc quantity of extra crystals and number of spares for every valve, £500. No offers. GW3DIX, QTHR.

WANT TO GO MOBILE, Yaesu FT707 with atu Tokyo hi-power HC200 in good condx. £375, or would exchange for Panasonic video recorder NV870B. TelQTH 0527-67781. GOFZR.

HAVE MOBILE HOLIDAY home with resident mast, rotor and 7a 13.8v psu. Ideal vhf/uhf. All electric, gas hot/cold, fridge, full cooker, flush toilet, shower, etc. Colour tv and radio. Convenient for sea fishing (200metres from sea) & next to golf course. Location, Deal, about 8 miles north of Dover. Equipped for six, need to cover my ground so only £70 per week total. Tel: 042879-3189.

FT101ZD HF TCVR, 6-bands. Fitted cw filter and fan. C/w Shure desk top mic. Perfect working order, £380. G4HIZ, QTHR. Tel: 0634-681920.

VERTICAL J-BEAM VR3 and stainless wire radials 10-15-20m £40. Would the Mersey Maritime Museum interested in my Marconi TV5 please get in touch again. G4EUW. Tel: (Brightlingsea) 020630-3071.

BELCOM LS102L TCVR, 26MHz-30MHz fm/am/usb/lsb/cw. c/w mobile mount, mic, manual, boxed, never used mobile, mint condx £180. Also Wood & Douglas 2m linear 25w £20. GI3YDH, QTHR. Tel: Mark, Belfast 795783.

TR9000 10W, 2M, all-mode tcvr, BO9 plinth, PS20 psu, SP120 spkr, used indoors only, as one lot, £375. MC50 desk mike, £25. Daiwa SR1000 fm rx, 144-153.9MHz, £60. EC10, needs refurbish, hence only £25. All ono. Eddystone EC990R vhf rx, am/fm/cw; good offer might part me from this quality rx. Several reversible geared AC motors, 115v & lower, also coil winding machine and optical bench, if interested, phone for info. Peter, G8ZKZ, QTHR. (Romford) 0708 769770.

AEA CP1 TERMINAL UNIT, MBA-TOR amtor/cw/rtty/ascii cartridge for C64, £150ono. Catronics rtty terminal unit £25. GW4ACO, QTHR. Tel; 0492-515240.

PROFESSIONAL SIG/GEN. Systron Donner. 1702 0-1GHz in 10Hz steps. IEEE interface, incredible bargain, £475ono. Creed 7E/RP superb condx. Buyer collects £30. Burndept handportable uhf 1w rf working order with battery, £65. 3-chan. G1NOL. Tel: 0297-503568.

FT757GX Mk2 HF TX/RX. Mint condx £750ono. FT480R 2m multimode, £325ono. 14" colour tv/prestel auto/dial/answer modem £115ono. ZX Spectrum, ZX printer modem s/w £110ono. MMC432/144 convertor £40ono. Sony V30 8mm camcorder & Accs, £775ono. Eproms 2764/32/16, £2/1.5/1. G4MWD, not QTHR. Tel: 0903-893060 (if answerphone please leave message).

HITACHI V-423 40MHz dual beam oscilloscope. Delayed sweep, 12kV accelerating voltage. 3-years' old, COST £750. Unmarked condx, manual, boxed, total running time since new less than 20hrs. £400ono. G0BII, QTHR. Tel: Oxford 880229 (after 7pm).

GM3HAT D/D £15. Trap dipole with balun 80/10 £25. 70cm slim Jim £3. 70cm 13-ele slot £25. 2m 5-ele xy £25. ST5 tuning unit mains, £30. Disc drive 5.25" BBC leads not cased £35. G3BDK, QTHR. Towcester, Northants; 0327 52309.

ICOM IC751A, latest version hf tranceiver, fitted CR64 ovened reference crystal, £1100. AT500 high power auto atu, £250. PS30 systems psu, £225. SP3 matching speaker with Microwave Modules 2m and 70cm receive converters built in, £50. All in mint unmarked condx, 12 months' old. RC10 remote frequency controller also available, £20. Everything boxed with manuals. Total new cost £2484. G0BII, QTHR. Tel: (Oxford) 0865 880229.

13CM 150W dummy load. VSWR 1.1 to 23cm, 1.2 to 13cm, £100. Also 250W VSWR 1.1 to 70cm, 1.2 to 23cm, £100. Qty new unused NEC transistors NE72089 GaAsFET £18, 3SK124 dual gate GaAsFET £1.60, NE64535 £11. Steve, 0656 5225.

KENWOOD TH215E 2M handheld, as new, £190. Daiwa PS120M 10 power supply unit only £50. Tel: Ricky, G1RWV on (Farnborough) 0252-515127 (evenings).

TRIO TS520S HF SSB tcvr, DG5 digital display/frequency counter and AT200 atu. All matching units. Prefer not to split. £450. Genuine reason for sale. Please contact Phil, GM0GNM, QTHR. 0309-31082. Will add vertical hf antenna if buyer collects.

ROBOT 800 terminal, input level, mark suppression fitted, split screen, OPC video, Model OVM9PGR, RS232 output, Baudot 60-132 wpm ascii-110, morse code, sstv output. £400ono. Aberdovey 367. GW4IUY.

YAESU 480R 2M 'MULTIMODE in ex condx c/w mobile brkt and boxed. Must sell, require money for hf equipment £300ono. G0JDG, 0623-552912. Also 10-ele 2m beam in box. Never been used, £20.

FT23R YAESU 2m handie tx (extended rx range 140-164MHz), charger, car adaptor, 5/8 whip, Microwave Modules 144/30 linear amp. £275 complete. Tel: (Southampton) 0703-255962 (evenings).

KENWOOD 830S hf rig plus SEM atu, £800ono. G1MJO, tel: 0527-67293.

YAESU FT726R 2m £575. 70cm module £175. 6m module £200. Sat-board £50. Complete system £950. TS430 am filter £30. FP707 power pack, £60. Oscilloscope OS240 DC-10MHz needs attention £40. G4GWZ, QTHR, Stroud 04536/2429 (Glos). (After 6pm).

IC22A 2MFM XTALS for 21-chan, tone burst, mic, mobile mount, handbook, boxed £75ono. FT290R, handbook, mobile mount, nicads, charger, carrying strap, soft case, matching Yaesu FL2010 10W linear £235ono. MM 2m/70cm varactor trippler, £10. MM 70cm/2m receive converter £10. Solidisk 128k old style sideways ram board, handbook, for BBC 'B' £30ono. Hewlett Packard scope 185B mainframe, 187B dual trace 1GHz vertical amp, h/book £65ono. Buyer inspects/collects. Mike, G8GTP,QTHR. 061-766-6269.

EDDYSTONE 730/4 rx £60 0.5-30MHz. Also transformer primary 240v secondary 4,450v. Yes 4.5kv at 650mA weighs 72lb, offers. Buyer collects. G3PLP, QTHR. Tel: 021-706-0759.

HEATH HW12 80m tcvr, revalved. Valve output good condx. £65. G4RWL, QTHR. Tel: 022872-227.

COMMODORE 64 computer, 1541 disk drive, joystick etc, plus accounts program, mini office II, and other software. All with programmers manual, all for £175. G3MSV, QTHR. Tel: 0395-68259.

P40 VERSATOWER c/w head unit, three years' use with unused post mount, ready to take away, £375. Tel: 0794-516007 (Hants).

YAESU FRG7700M communications receiver with memories, FRA7700 active antenna, FRT7700 atu, FRV7700 118-130, 140-150, 70-80MHz converter. All as new, manuals, boxes, practically unused, £330 ono. May consider p/x Sommerkamp TS788DX, Belcon LS102. 051-625-7909. Simon, RS90607 (after 6pm).

TEN TEC ARGONAUT 515 QRP transceiver (ser.no.0806) matching ac psu and single paddle keyer, £350. Lowe FX1 GDO £25. G8CZW DFM £35. Shure 201 mike £15. Pair 10W traps £10. All good condx. G4KKG, QTHR. Tel: Yeovil 25327.

FT290R, NICADS, charger. Wood & Douglas 70LIN10 amp plus BNOS LPM432 50W amp. All good condx, £420ono. G6NPC. Tel: (Milnthorpe) 04482-2979 (evenings 6-9pm).

FT221R. ONE OWNER, 144-148, ssb/fm/am/cw, handbook workshop manual. Not used last three years, minor fault (dirty switch?) £300. 01-640-6020.

YAESU FC707 ATU, mint condx, orig pkg, manual, £130. Buyer inspects/collects. G0JCM, not QTHR. Tel: Shorne 3797.

AMSTRAD 6128 c/w green monitor plus second Amstrad external FD1 disk drive. Also included DrGraph supercalc word processor accountancy toolkit, plus other utility software. Approx 35 discs £230. G4LTM, QTHR. Tel: 061-338-3787.

RACAL RA17,+manual, £130. Binatone 4.5" mini vision, television £39. Ferguson 20"colour tv new crt £75. Various ex linear tuning capacitors. Would consider p/x any of above for 2m hand-held. G4OOW, QTHR (Leics). Tel: (Hinckley) 0455-612091 (after 7.30pm).

ICOM IC751 HF gen/cov tx/rx, 250Hz cw filters, RC10 frequency controller £895ono. Philips CD304 CD player (infra-red remote control)£135ono. G4WVX Bruce, QTHR. Tel: 06286-64415.

TEAC 40 track 1/3 HT disc drive virtually new and unused, orig box and pkg, £35. Acorn disc drive 40-track 1/2 HT disc drive, cased £25. Disc drive psu. Two BBC type power out sockets, £20. G3BDK, QTHR. Towcester 52309.

TRIO TS430S, few months' old, boxed, guarantee perfect condx, £700. New Shure desk mic to match £35. Yaesu FL2100Z 1.2kw linear - perfect condx; £550. Amcomm hf atu, new, £60. SMC hf/vhf swr meter, £10. 517 amp cb psu £10. 30A professional homebrew psu, fully protected, £50. G5RV +26m of RG213 coax, new £20. 1/2 lambda 10m vert +RG213, brand new £20. 10-ele J-beam (2m), new, coax, £20. All brand new perfect condx. Tel: G0HFF, 0209-714342. Genuine reason for sale.

FT290R Mk1 with muTek, 1.8AL nicads, soft case, helical whip, replacement mic, £250. IC240 2m fm £100. Cirkit 2m 25w linear amp, 2.5w i/p, optional rx amp, £26. W&D 2m 25w linear amp, 2.5w i/p, unboxed £24. Cirkit 70cm rx converter, 2m or TV o/p £16. Autumn '86 callbook £1.70. All items vgc. WANTED; IC202S circuit diagram/info. Peter, G0JEW. Tel: (Lutterworth) 04555-2683/2123.

YAESU FT102 HF trans. All bands warc/cw filter fm/am board fitted, etc, boxed as new £525ono. WANTED: Icom IC202S 2m ssb trans. Must be vgc. Tel: 0305-813202.

ICOM IC02E HANDHELD c/w charger, £200. Hitachi V212 dual-trace scope, £200, c/w probes +manual. Prefer buyer collect scope if poss pse. Tel: (Mere) 0747-860222, ask for Dick.

THE ULTIMATE COMBINATION, Drake C-Line, comprising the fabulous R4C rx, fitted with all xtal filters, MS4 speaker, MN4 aerial matching unit, T4X transmitter, AC4 psu. This equipment is absolutely

mint condx, and re-valved (see report by G3OSS). Will sell for £750, no offers no split OR will ex for Corsair II. 10m Multimode £100, 10m fm fitted xtal filter. 2m atu £15. Hygain 18AVQ/WB £60. FP757GX sw mode psu, £65. Will run 100w rig. Buyer inspects/collects. GOAYZ, QTHR, 0705-589560.

ICOM ICR70 rx, £450. AOR2001 scanner, £195. FT290R muTek front end, rubber duck, charger, nicads, case, £265. J-beam, CR2-24cm antenna £20. All rigs ex condx in orig pkg. NEC uhf/fm 2-ch PMR suitable 70cm £30. G1NVV. Tel: 0582-668648 (Dunstable QTHR)

RELUCTANT SALE: Yaesu FT221R multimode base stn. vg condx. Preamp. Var rf output for driving transv linear. Offers. GW8FKB, QTHR. Tel: 0248 723143.

YAESU FP757HD HEAVY DUTY psu +spk in ex condx and still in g'tee £130. Brian, G3WQF, not QTHR. Tel: 0440-704045.

65' LATTICE TOWER WITH tiltover stand and tower stand rest when working on antenna. Buy/collect, needs four burly men to carry it, £225ono. Tel: Brentwood 810241.

YAESU FT101ZD WARC, 250Hz cw, fan, mike, manual, £375. G3BJD, QTHR. Tel: 0946-810047.

TS930S MINT CONDX. Never transmitted. £1500ono. G1AGN, Derran Wright, Windmill Cottage, Lanlivery, Bodmin, Cornwall, PL30 5DE. Tel: 0208-872065.

LAFAYETTE MULTIMODE converted to 10m usb/lsb/am/fm £100ono. Icom scanning hand mike, £5. Drae 4a psu, as new, £20. Kenwood ssb filter YK88S, suit 130, 430 etc, £20. Kenwood YK88SN filter required. Tel: 0782-395017. G4YRR, QTHR.

TONO 9000E with vdu, £200. G3TJO, QTHR. Tel: 0227-363345.

FRG7 RX, 0.5-30MHz. vgc +handbook, £120. RS90877. Tel: John (Essex) 0255-554612.

EDDYSTONE 940. Revalved ex condx. Orig instruction manual with circuit diagram, etc. G5HX, QTHR. Tel: 0203-412397.

KENWOOD TS130S immac never transmitted with MC50 mic, £400. Icom IC255E 2m, hardly used, £110. Panasonic DR49 hf gen/cov receiver, £80. Tel: (Gerrards Cross) 0753-885163.

ALINCO 140-160MHz handheld, 3w 10-mems, LCD display, scanning, battery save facility. c/w speaker/mic, charger, soft case, antenna. Boxed, under warranty, £175. FT290R muTek, nicads, charger case. 30w linear, boxed, vgc, £335. No offers/timewasters please. 01-517-8277. G1HQK, QTHR.

WRASSE SSTV CONVERTER, cost £1200. Accept £595ono. Yaesu FT208 c/w charger, £130ono. FT767GX c/w 2m, 6m. As new, £1400ono. Tel: 0534-24018 (day), 0534-24119 (evenings/weekends).

TRIO 9500 70cm multimode £350. Trio 9130 2m multimode, £350. Both never used mobile, and ex condx. Orig pkg etc. AOR 240A handheld 144-148MHz fm charger, case, speaker mike, 1/4 whip. Helical £100. G6MAW, QTHR.

EXECUTOR DISPOSING OF G2DLS estate. Printed lists of gear available for offers. Please send sae to Fishel, 26 Links View, Wallasey, Merseyside, L45 0NQ.

TRIO TS711E 144MHz all mode base station, superb new condx, boxed, complete in every detail. Factory fitted voice synethesizer. £650. Tel: Terry, G1UOY, 0904-763571.

IC751 VGC WITH 250Hz cw filter, speech synthesizer hi-stability crystal, reference manual +service manual. AT200, also vgc, £980 the lot. 4CX250B bits, sae for list. Tel: 02357-2568 (Oxon). G8MYX, QTHR. (Ask for Robert).

HEWLETT PACKARD HP432A power meter, c/w manual, leads, 10MHz-18GHz head type 8478B and 10MHz-10GHz head type 478A, £195. HP5327C frequency counter, 0-550MHz +period etc, cw manual, leads, £150. HP1801A 50MHz scope, plug in, £75. John, G8BXH. 01-428-0974 (Watford).

USA RECTIFIER RA34F 1000v 350MA. Weight 200lbs, output variable. Also 12v ct at 10a ac and 12v dc at 2a, with cords and full info. HT and LT metered CB protected. Spare 866A's, £40. G3EHD, QTHR. Tel: 01-529-5642.

TRIO 930S plus auto atu +MC60 mic +SP930 speaker, £1200. Tono 5000E terminal unit, vdu plus keyboard ascii/rtty/amtor/cw £600. Tel: 0934-812 348 (Avon)

YAESU FT757 GX. Boxed with manuals, £650. Hansen FS500H power meter. New boxed, £70. MFJ 901B versa tuner. New boxed, £50. 20a psu metered, new, £85. G1UIY, not QTHR. Tel: 0474-328163 (Gravesend, Kent).

RACAL RA317 PROFESSIONAL quality communications rx, ex condx, with manual, £275. Also quantity of valves for sale, sae list. BRS32276, 132 Limpsfield Road, Sanderstead, Surrey. Tel: 01-657-0430.

TRIO TS430 and matching PS430. Hardly used, £750. G4JQO. Tel: (Kings Lynn) 0553-811275.

TRIO 9130 MINT condx, orig accessories, boxed, £350. psu stabilisied and protected, dummy load, 9-ele Tonna, FU200 rotator, HB9CV, slim jim, all as new with cables. Complete station for £400. Carriage extra. G3RCU, not QTHR. Tel: 0202-475048 (after 6pm).

TRIO TR9130 2M multimode. Used base station only. Ex condx, unmarked, £350. Go on spoil yourself, you deserve it. GM1NDP, QTHR. Tel:032486-506 (evenings/weekends).

ICOM IC490E, multimode 70cm tx, good condx £350. Trio TR9000, multimode, 2m tx, good condx, £250. FT200 with power supply, good condx, £195. G3VDN, QTHR. Tel: 0623-795915.

FT290R, orig pkg, case, charger, nicads, muTek f/e vgc, £250. MML144/100LS linear, orig pkg, vgc £125. Welz SP15M swr/power meter. 1.8-150MHz 200w, boxed/vgc, £25. Quad 6-ele vhf antenna, £25. Drae vhf atu £10. G4PEY, QTHR. Tel: (Horsham) 0403-69835.

DESK TOP HOMEBREW 2m linear, built in ps. Spare 4CX250B, £175. 14-ele parabeams x4 £30ea. Tonna 4-way splitter, 144Mz £25. Heavy wall aluminium poles, 13'x2" suitable H Frame. G4XEK, QTHR. Tel: 0538-754553.

HQ1 MINI BEAM fitted balun, spare spokes, instructions, buyer collects, gwo, £75. KW107 super match atu fitted dummy load, 1kw working manual, clean condx, £100ono. G3NEE, QTHR. Tel: 0992-468065.

ICOM 290E 2m multimode, 10w, £285. Yaesu FT790 70cm multimode, £285. Matching Yaesu 7010 linear £60. 2m Daiwa mobile rx £30. KDK2030, 2m, 25w tx tempremental, hence £80. Transmit tripler 70/23cm +filter £15. G1BWW. Tel: 0462-711722.

ADMIRALTY B40D receiver, 0.6-30MHz, £50. Marconi No.52 rx 1.7-16MHz, £30. Heathkit Mohican rx 0.6-30MHz solidstate, £50. TM56B marine vhf rx 12 fixed +4 scan channels, 240v +12v £70. Large qty RadComs, offers. Buyer collects. Tel: (Essex) 0702-540023.

APRICOT f1 PC MSDOS, 756R ram 3.5 disk. Lots of software inc wordstar/turbo/pascal, data base 2, GW basic, etc.runs most PC software. Would make a good rtty packet set up £400. No offers. Tel; 0993-811747 (after 6pm/anytime weekends).

YAESU FT767GX inc 6m, 2m, and 70cm modules, MH1 mic and RWC synth mods; as new, £1650ono. G3ZSS, not QTHR. Tel: (Cobham) 0932-63552.

PW MEON 2/4m trsvtr kit. Complete, unopened, £40. Two 50m rolls HD copper aerial wire, £6ea. 3-ele 4m Yagi, unused, £20. G4ZHI. Tel; 0491-651236.

FT101ZD 6-BAND. FC902 atu, both in perfect condx. £500. Prefer buyer inspects/collects. Hicks, G4DVP, QTHR. Tel: Weston Super Mare 514019.

KENWOOD VHF fm transceiver (handheld) TH215E. Charger and spkr/mic. Cost £300. Bargain £200. Mint condx. Little used. Reason for sale impending s/k. G4CHG, QTHR. Tel: (Torquay) 0803-37050.

YAESU FT767GX with 2m and 6m trsvtrs fitted. Withers VCO mod fitted. 8 months' old, hardly used, showroom condx, orig pkg and manual etc., £1500ovno. G4RPV, QTHR. Tel: 021-459-7041 (after 6.30pm).

YAESU FRG7 Receiver digital readout and 2m converter fitted, gwo £140. Hokushin HF5 vertical antenna with radial kit £45. Europa B 2m tsvtr suits FT101 etc, £35. Creed 444 teleprinter 50 bds gwo £15. G4GZK, QTHR. Tel: 0902-790750.

TRIO 2300, case, nicads, charger, £120ono. Also Crotech 3030 15MHz single trace oscilloscope, £150 ono. G8YOS. Tel: (Ruislip) 0895-631825.

YAESU FT727RH dual band handie. Hardly used with spk/mic £295. Also Yaesu FT2700 dual band mobile 25w good condx with hand and mobile mics, £325ono. Tel: David, G4TJG, 0734-866770 (after 6pm).

YAESU 2700 DUAL BAND mobile, 5/25w one year old still under Yaesu warantee. Rarely used, superb condx, £350. GOCFG. Tel: 057-645-8519. May consider part/x for cheap hf rig.

PYE POCKETPHONES PF1, 2 pairs complete xtalled +wkng on RB14 +SU8. 10-way charger unit +spare batts £30 ono. Steve, G6UXN QTHR. Tel: 01-427-4667 (after 7pm).

2M HANDHELD KP202 S16, S20, S21, S22, R1, R4, modified for mobile use, c/w nicads, charger, hand mic +15w linear, £70. G4VMZ. Tel: (Herne Bay) 0227-369028.

TET 2-el t/bander 10/15/20. 17' elements approx £110ono. 8 ELX 2mts Yagi, £15. Buyer collects. Commodore 64 computer pwr supply, datacorder, MPS801 printer, joystick, £150. GW0AVD. Tel: 0407-3994.

TRIO TS120V 10W HF only used for transverting. vgc, cw filter fitted. Complete with manuals, £275ono. GM8MJV, QTHR. Tel: 031-553-2662.

TRIO TR9000 £300. Mains psu £50, system/base £25, Trio TR2500 2m handheld £120, TR3500 70cm handheld £185. Mains base ST2 charger, £40. Trio TS770 2m/+70cm ssb/fm dual/band tcvr, mains/12v dc £750. Trio TS930S with atu, £1100. G8EBM, QTHR. 0335-60755.

MICROWAVE MODULES 144/1296 trsvtr, less drive attenuator. Fully working, GaAsFet front/end, £110. G4AEZ, QTHR. Tel; 01-553-8450 (day), 01-360-7100 (evenings).

HF SOLID STATE linear, model SL250DX. 5/15w drive 100-200w o/p, 160m to 10m. Brand new condx, fully working. £110. G4AEZ, QTHR. TEl: 01-553-8450 (day) 01-360-7100 (evenings).

KW2000A 80w 160-10m +mains psu and spare valves, 6146Ws in final £195. Mobile psu with spares, £35. £210 for both. Yaesu FT301D 100w 160-10m solid state tcvr, 12v lead, am/cw filters fitted, £345. FP301 mains power/supply with spk £85. FC301 antenna tuner with twin swr meters, £95. YO301 monitor scope £185. LL301 landliner £35. £725 for all Yaesu items, which are in orig pkg. Reasonable offers considered. Tel: (Northampton) 0604-44341. G4IRD, not QTHR.

BENCHER IAMBIC PADDLE key (in orig box) black base, £35. G3MDQ. Tel: 021-354-9972.

FT290R MUTEK FE, listen on input, cw soft case, nicads, flexy 1/4 wave, speaker/mic. All vgc, £250ovno. G4MYB, QTHR. Tel; 061-973-1507 (eves).

BBC B ISS7 COMPUTER, ATPL rom board with 32k ram fitted, Cumana 40/80 dual disk drive, Torch Z80 board, roms, games, joystick, manuals, £450. Swap for R2000, AOR2002 or WHY? GM0EZR, QTHR. Tel: 0592-756682 (evenings).

ACORN BBC B with monitor, 2x80 track drives and sideways extension board. Acorn second processor 6502 and psu for disc drives. Call Neil, G4RQN. Tel: 0553-675676.

TS530S with MIKE, box and book, beautiful, £535. Old 28' lattice mast, rusty but strong, needs ingenuity, but has supported multiple hf beams £25. Carriage extra. Tel: (Staffordshire) 0283-840667.

FT690R MK1, as new condx, boxed, with j-beam 4-ele antenna, £250. No offers. Converted CB 10m am/ssb £85ono. G0JNT, not QTHR. Tel: (Grimsby) 0472-752794.

SOMMERKAMP YS2000 pep/rms swr power meter, 1.8/60MHz 200/1000/2000w, large meter face £60. KW-Ezee match £40. AR40 rotator c/w 2 lots 65' 5-core cable £50. G4IHF, QTHR. Tel: 0253-726685.

HELIAX LDF450 NEW COAX from end of reel £2 per metre, but may haggle. Some connectors £10. Tel: Chris, 0243-374283 (Near Chichester).

FT726R 70CM/2M/satellite unit, mint. With Hansen FS603M, AR40, MET14T 2m. J-beam PBM18 and colinear 70cm. Some unused. Could deliver £1095, or p/ex Cambridge CD1 or Durst M670K and JOBO CPE2. Glenn, G6EYD. Tel: (Chesterfield) 0246-39487.

AT230 ATU. Never used, £165. SP230 speaker, immac £45. KW 3-way coax switch, £9. Daiwa PS120M p/sply 10a immac, £65. Tel: 0740-51938 (evenings).

YAESU FT902DM tcvr, with Shure 444 mic, FC902 atu, FV901DM vfo, SP901P, £800. Also Daiwa 6a p/spply £40. CT300 1k d/load £25. Vibroplex key £25. All boxed in mint condx. Tel: 0292-268055.

ALTRON 31' SLIMLINE MAST tiltover post mount, £175 buyer collects. Also CP4 vertical £80, CH22 2m colinear still in box, £25. Tel: 0292-268055.

COMPUTER BOFFINS YOUR ATTENTION . Motorola micro boards. MEK6800D2 motherboards, 3off. Keyboards 3off. Discdrive controller 1off. 16k AROM rom board 1off, uncertain condx, £40 the lot or will split, £5ea. Newbury 7000 terminal unit +modem £90ono. Radio equipment: mono tv, camera requires Videcon £30ono. 70cm 46-ele beam £20. Hewlitt Packard microwave freq/converter, £50ono. needs mains transformer. Large selection valves and transformers, enquire. Will swop all/any selected items for 6m linear or 23cm tsvtr/cash adjustment. GW4BZD, QTHR. Tel:0248-600241 (after 6pm).

ICOM IC251E with muTek front end. Ex condx, must be one of the best available, £485. No offers. Prefer buyer collects and inspects. G0AWP, QTHR. Tel: (Hull) 0482-651827 (after 6pm).

TRIO 7200C 2m, fm, tcvr, 17-chan £70. Vertical hf antenna C4 as new £45. SEM 50w/2m power/amp requires attn £15, 2m mobile antennas, 5/8 lambda boot mount , £10. 5/8lambda gutter mount, £10. 1/4lambda gutter mount, £5. 5/8lambda new £10. Gutter mount new £5. Joystick & Joymatch, £25. Approx 50m 50ohm coax nearly new, £5. G4GKN. Tel: Bristol 833572.

PYE LOWBAND W30AM mobiles, F30AM base, cheap to clear. Pye 400 rx £35, tx £50. Valves 5B254M, E182CC, 6AS6, ECC40, E81L, many more B7G/B9A. 70cm mobile aerial £7. Ex mobile Selcall units £5. TF2006 sig/gen, swap for hf tcvr. 5G3V, 5G5U, swap for Bird elements, or WHY? WANTED: faulty 2m and hf rig. Also modern Pye mobiles, base and controller cash or exchange? Also interested in '00' model railways. Also want hf mobile aerial system. G3XDA, QTHR. (Lincs) 0775-66533.

NRD525 NEW from Lowes, £950. Hammarlund SP600JX, £80. AR88LF, £40. Global AT1000 £40. Echo Mariner rx £30. Datone D70 £30. FS10 marine scanner £70. Telereader CD660 new £200. QF1A active audio filter £40. Wurlitzer X7 juke box, £300. Tel: (Tenby) 0834-3057.

IC251E ICOM BASE MULTIMODE with muTek front end, little used, ex condx £425. G0CPB. Tel: (Sussex) 0424-64723.

YAESU FT757GXII boxed, manual little used, £650. Icom 271E, muTek front end, £475. Icom ICPS25 internal supply for 271E/471E, mint £80. Datong FL3, unused £95. Star CMOS memory keyer with MS option, unused, £70. G4PLZ. 061-439-4136 (after 7pm/weekends).

TOKYO HY-POWER HT106 6m ssb/cw mobile base trans, mic, boxed, mint, unwanted gift, £270ono. WANTED: Trio/Kenwood TS130V or TS120V hf trans. Must be vgc. Tel: 0305-813202.

HQ1 MINIBEAM GOOD condx c/w instruction manual, £100; Trio 9R59DS communications rx £45. Homebrew psu 0-15v 500MA £15. Hartley oscilloscope CT436 needs attention, £15. All carriage extra. Tel: Martin, G3ZZS, Plymouth 707550.

60' 3-section tower mounted on trailer, ideal contest group etc. £600 or will split, or swap for hf tcvr, TS830S etc. Tel; (Leicester) 0533-674112 (after 6pm).

FT902DM TCVR, all options superb rig. FC901DM vfo 40-mems scanner. Welz vswr power bridge, RMS&PEP 1kw. SEM noise bridge. Altai GDO! transister tester. Butternut 40/80 vertical new. Rotator medium 60lbs max. Scarisbrick 880345.

ICOM IC240 excellent 2m fm mobile rig, vgc, £110. Homebrew psu and 80-chan switch for IC240 £15. 2m 5/8lambda mobile antenna magnetic mount £10. Pair wall brackets £5. 800v homebrew psu £15. WANTED: Microwave Modules 432/28 tsvtr. G3XEF. Tel: 0952-607586.

TRIO 9130 2M MULTIMODE 5/25w boxed, mobile brkt, vgc. Little used, c/w 10-ele parabeam, rotator, colinear, mobile ant, £380. Microwave Modules preamp 2m £18. Cobra 148GTLDX converted 10m by Spectrum Com. Good condx, £115. G0EML, QTHR. Shrewsbury 245896.

EIMAC 4CX250B unused, £25. Heathkit SB634 station console built in clock and swr power meter. (Also has phone patch facility) £35. G4KGK, QTHR. Tel: 0704-24700.

RACAL RA17L good condx with full service manual, and operating instructions, £150. Noel, G0JFY. Tel: 0203-491245.

HF SOLID STATE LINEAR amp CP163X, i/p .5/5/10w, o/p 30/60/100 £60. Met 17-ele Yagi £15. Met 17-ele crossed Yagi £15. G6UJI, QTHR. Tel; 0242-584696.

ICOM IC4E 70cm with nicads, charger, spkr/mic £180. Shimizu SS105S 80-10 tcvr, ssb/cw/fm 10w o/p £250. Two 6JB6 £5. Teletext tv adaptor £50; Oskerblock SWR200B power meter, £30. Siekosha GP100 printer, Centronics i/f £50. G3RSJ, not QTHR. Tel: 02214-61476.

HITACHI 12" BLACK/WHITE high definition monitor. Ideal for weather satellite display or as video monitor £50. Also 4' diameter aluminium petal dish £25. Also j-beam 2m 4-ele quad £10. G3XFB, QTHR. Tel:0902-850033.

UHF YAESU 790R multimode, nicads, charger, boxed as new, £300. Tristar 747 multimode CB converted 10m 28.115-29.705 £90. Pye Olympic 12-chan fm converted to 4m with 4-chan fitted mic and spkr. £80. G0DWS, QTHR. Tel: 0474-357795.

ROTEL RECORD DECK NAD3020A amp, Yamaha tape deck, Trio tuner, Tangent speakers, ex condx, orig. cost £600, Approx value £350. Exchange for good condx 2m handheld plus access. or WHY? G7APW. Tel: 0926-36915.

YAESU MD1 desk mic, dual impedance, fast and slow scan, tone control, £40 +£1.50 towards p&p. GW0IWK, QTHR. Tel; 0745-4995 (North Wales).

M/MODULES 50MHz TSVTR, 2m IF, £195. SMC 13.5v/8a power supply, boxed, £30. MMG144V switched GaAs-FET preamp, £18. SEI 9MHz ssb filter with carrier crystals, ex-G3ZVC board. £15. 50MHz, 5-ele tonna, still boxed £25. G4PLZ. Tel: 061-439-4136 (after 7pm/weekends).

SINCLAIR QL 128k (1985) plus 10 microdrive cartridges (cased) 'serial' (Model 8056) thermal DM printer, i/f lead, two rolls paper. All relevant documents and three programming books, £100ovno. G8ZEB, not QTHR. Tel: (Cirencester) 0285-67668.

MUTEK 50MHZ TVTR, 144MHz IF, £175. BBC'B', ss 40TRK and 80/40 drives, 32k solidisk, s/ware, £250. Hitachi 9" b/w monitor, £25. Altron 3-ele minibeam, 14-50MHz, needs retuning, £60ono. WANTED Prop-pitch motor. G3SEK, QTHR. Tel: 0235-31559.

YAESU FT77 HF tcvr, £400. BN0S 25a psu, £125. Datong auto speech processor, £35. Trio TR3200 70cm fm £70. Alinco 70cm linear 3w/in 30w/out, £50. LCL 10m fm £35. G4EDR, QTHR. Tel: 0723-515675 (after 6pm).

FT690 Mk1 c/w nicads, case, manual, and orig pkg mint condx, only 9 months' old, (still smells new!) not used since antenna blew down in last year's hurricane, £235. Contact John, G0AJH, QTHR. Tel: (Hornchurch) 04024-72390.

VIC20 COMPUTER datarecorder, psu, rtty, tx/rx facilities. G3LIV interface, 16k expansion, mother board all £145ono. G3XMA, QTHR. Tel: (Coventry) 0203-410208.

KW ATLANTA TCVR. Ext vfo, matching psu/speaker good condx. Hefty traditional rig, would suit club. Reasonable best offer. WANTED: for KW108 monitorscope, manual/circuits, or would copy all expenses paid. GW4PVK, QTHR. Tel: (Dyfed) 09747-281.

SWAN 500 tcvr. 80-10m psu, 1-speaker, vxo unit, spare 6HF5's . Manual, £200ovno. WANTED: DC5 digital display, any condx, depending on price. G4DBI, QTHR. Tel; 06845-66728.

JAYBEAM MINIMAX tribander beam, good condx, £200. G4BXR, QTHR. Tel: 0908-566266 (after 6pm).

GEN COVERAGE RX, Lowe SRX30 digital £139. Katsumi keyer EK150 £88ono. Ayr teletext adaptor, needs aligning hence £30. BLY91A pwr transistors £3ea. unused. WANTED: Gamma radiation monitor, cheap 2m hand portable. Pair 6146B's. FT301 hf tx/rx. Tel: 0843-294446.

PYE VCAM1 colour video camera and psu. 6X manual zoom, CVBS and uhf outputs, £150. BNOS LPM144-3-100 2m linear/preamp, boxed, £120. Nascom 2, cased, 48k ram, with Eprom, I/O and digitalker cards, £50. G4GND, QTHR. Tel: (Ely) 0353-741095 (evenings).

TS120V TCVR, SP120 speaker, DFC230 digital freq controller, PTT mic, manual, £400. Would consider exchange Icom ICR70, must be mint condx. Century 21 gen/cov comm. rx, 500KHz-30MHz, manual, £95. Both carriage paid. G1UGA, not QTHR. Tel: (Peterborough) 0733-230088.

MONODIAL SUPERHET RECEIVER, Wireless World design constructed, 1933 in double tier cabinet with radiogram condition, barely fair, needs new parts some available inc valves. Offers please to GM4WEX, not QTHR. Tel: Ballantrae 380.

FT101, FITTED CW filter, 10MHz rx, spare pa valves, manual, £250ono. G3LVP. Tel: (Glos) 0452-856001 (after 6pm).

SCOPEX 4D-10B DUAL TRACE solid state scope with 10x & 1X probes, £120. ST5MC £55. Welz matching network (atu)£40. Mobelec car maximiser fuel computer unused, as bought new, £25. Two Marconi morse keys £35ea. G3BDK, QTHR. Tel: Towcester 52309.

KENWOOD MC85 desk mic unwanted gift, new and unused, cost £95, offers? Howard, G0HZH. Tel: 0394-460-474.

TH2E HANDHELD Mobile 2m fm complete battery charger 1 nicad mobile LS/mike mobile voltage reducer, spare power pack, 3 antennas, leather case, 100% OK accept £86 carriage extra. Peter Craw, 117 Sea Lane, Rustington, W.Sussex, BN16 2RU Tel; 0903-784584.

KENWOOD TS520. New PA valves, cost, £450. Bargain price £350. MFJ de-luxe versatower tuner II. Cost £150, £100. Buyer collects. G4CHG, QTHR. Tel: 0803-37050.

YAESU FT707, FP707, FC707, mic 80-10m complete hf set up, £500. Trio TS780 dual band multimode base station. Two & seventy plus MC60A base mic up/down scan. 70cm 2m colinears £680. Yaesu FT290R, 30w Alinco linear, mobile mount, headset with electro-set mic on/off switch, nicads, charger, carrycase, rubber duck. Never used mobile, £300. All above groups perfect. Rigs sold with their access. no splits, buyers to collect or make arrangements. G0DLI, QTHR. 01-309-7096.

SELL/EXCHANGE: HW8 immac professionally constructed for 2m fm handheld 1w/5w tcvr. Brand new Altai KDM6 dip meter for qrp dsb tcvr, 80/40m. Brand new HC2020S multimeter for PF8. Tel: 0480-68300, John, G4KJJ, QTHR.

REALISTIC 2001 scanner £90+postage. Airband hand/held rx 537 £45. RAE c/course £20. Satellites rx +Halbor interface for BBC computer £75 +post. Tel: 0903-724805.

KW-E-ZEE MATCH atu £25+postage, or carriage. G8PP, 11 Church Road, Harold Park, Romford, Essex, RM3 0JX.

TS830S c/w MC35S mic, £790. AT230, £160. FT290R nicads, mic, £250. All as new used few hours only. G0EKX. Tel: 0704-67577.

TRIO TS711E 2m base station, fitted voice module. Ex condx, sell £600 plus carriage, or exchange TS430 or FT757. G4VKE, QTHR.

ICOM 271E muTek front end, power supply, and base mic included, £600. Yaesu FTV tsvtr modules, 70cms £160. 6m £100. Yaesu FT726R 2/70 £625. EHT transformer 620-0-620 £15. Alan, G6ZYG. Tel:(Northants) 0933-318493.

YAESU FT726R fitted 2m/70cm board, with SP102 matching speaker and MH-88 mike, as new, orig boxes, £650. G1LVP, QTHR. Tel: 0926-32486.

ICOM R70. VHF converter fitted immac condx, £450. Manual orig box. GM3JDX, QTHR. Tel: 031-445-2426 (Mon-Fri 8pm-9pm).

FT902DM HF transceiver c/w DC lead, hand mic and 300Hz cw filter £585. FC902 matching atu, £100. Both good condx & boxed. G4WMH. Tel: 021-705-0488 (evenings) QTHR.

FT726R 2/70/SAT perfect, £795. FTV901R, £175. FV901DM £195. Mirage B3016 £135. FT720R mint £185. HL82V 2m linear £85. FT203R new, £140. TR7850, £180ono. NDIHC1400 £125. Minireg £30. WANTED: FT757 or other solid state hf. Tel; G0JLA, 0305-814196.

YAESU FT1 TCVR, all options fm/ram filters, keyer, mint, all boxes, mic, manuals £1000. Ten-tec Corsair 2 ham bands, tcvr, 1.8KHz-500Hz filters, HD psu, mic, manuals, 4 months' old £1195. Both incl Securicor delivery. px JST125. GW4RLP. Tel: 0286-3567 (evenings). QTHR.

OLD WIRELESS COMPONENTS, R4C cw filter, Lafayette HE80 g/c rx. WANTED: Eddystone 940 rx must be near mint condx. Deluxe tuning knob for 820 series. Mr. Wright, 54 Queen Mary Avenue, Basingstoke, Hants. (0256-468649).

SOMMERKAMP FT277ZD hf tcvr, (similar FT101ZD), 160-10m plus warc bands, am. Very good condx, orig pkg, manual, £450. WANTED; cheap KW2000, 2000A, 2000B. Prepared to repair faulty rig. G4ILA, QTHR. Tel; Lymm 2388.

YAESU FT726 2m 70cm SAT cw filter. G0CBN, QTHR. Tel: 051-327-2425.

YAESU FT290 including 2.2AH nicads, charger, case, muTek £260. Sommerkamp Yaesu FT790 including case, nicads, £275. Microwave 30w linear, 2m MML144/30 £60. Microwave 30w linear, 70cm MML432/30 £80. All boxed and mint. G6YIW, QTHR. Tel; (Stoke on Trent) 0782-321131.

SUPERBRAIN DOUBLE density computer IBM compatable, needs keyboard encoder chip. Disc drives ok. Some business software £150ono. Microline 82A printer needs new head, £30ono. IC290D all mode 2m tcvr, as new, boxed £360ono. GW1IEF, QTHR. Tel: 055-934892.

JRC, JRC, JRC, JST125 tcvr, NBD500G power supply, NFC97 antenna tuner, £1550. NRD525 rx, NVA88 speaker, £950. All tested only, brand new, boxed. Tel: 0602-609345.

HY-GAIN TH3 MkIII SNR 2kw triband beam, fully pvc covered, all stainless steel fittings, BN86 balun, 50' coax, totally clean as new, £285. Diawa MR750-PE h/duty rotator with preset positioning, 60' cable, unused, boxed, as new, £255ono. Tel; 0602-609345.

DRAKE MN2700 2kw atu/matcher. Mint as new, £425. 1kw dummy load DL1000 in h/duty cast heatsink, £78

Tono 5000E terminal unit with additional 12" green monitor, £595ono. New, unused, full rtty/amtor/ascii/morse. Tel; 0602-609345.

EXCHANGE FT211RH 45w switchable scan, priority, memorys, everything, matching speaker, 5/8 revco magmount all mint, unmarked and boxed condition for YO901 multiscope or muTec'd FT290 with accessories or WHY? G1VPE, 10 Apple Tree Road, Stanfree, Bolsover, Chesterfield, Derbys.

YAESU FT902 DM hf all mode transmitter. Yaesu FC902 atu, TH3 antenna, Daiwa DC7011 round controller. Mint condx, boxes, manuals inc £850ono. Kenwood, TR900 2m all mode B09 base SP120 speaker, 10-ele crossed yagi, mint, £300ono. GM0BOR, QTHR. Tel: 0324-711363 (after 6pm).

FT102 SUPERB CONDX and performance in orig box with instructions, £585. Global SWL atu £45. BNOS LP50-3-50 amplifier £145. FC700 hf atu used two months only, cost £150, accept £95. G0JFM. Tel: 0803-882281.

TRIO TS530S with instructions and service manuals. CW filter fitted. Very nice condx £525ono. Leak troughline II fm tuner. AM with MPX output. Good condx, offers. G4NIV, QTHR. Tel: 061-456-7112.

YAESU FRG8800 mint condx. Limited use, handbook, boxed, £400ono. Consider part/ex 2m setup FT290R etc. Cash adjustment. Voightlander Vitessa. T F2.8 ERC hood filters. Agfalux flash. All ex condx £75 or exchange FC707. Cash adjustment. Gwynedd 0758-740171.

SERVICE MANUALS; CR300 £7. CR200 £7. CR150/3 £7. BRT400 £7. BC348 £6. BC312 £6. BC342 £6. BC314 £6. BC344 £6. S36 £5. AR8516L £7. CR88B £6. AR77 £6. AR88LF £5. BC221 £5. SP600JX £6. Super-Pro £5. R308 £4. R107 £4. DST100 £6. NC46 £4. R208 £4. BC221 P/P £2. R1475 £6. 358 £3. 640 £3. BC611 £5. 504 £3. 556 £3. HRO £3. MCR1 £3. AR88D £5. R1556 £3. P&P inc. EFC Owen. Cheltenham 35235.

YAESU FT200 hf tcvr with FP200 power unit 80-10m ex condx owners handbook, ideal first rig, £200 ovno. G0JFU, QTHR. Tel: 0452-862773 (Glos).

FT102 270Hz filter mic, £500ono. G4MPK, QTHR. Tel: (Leatherhead) 0372-375514 (evenings/weekends)

TRIO TR2300 2m fm tcvr, with matching VB2300 10w power amp. Carrying case, MB2 mobile brkt, charger, mic, nicads, manuals, £140. Sentinel 2m linear, 10w in/40w out. Switchable preamp, £45. G3KNB, QTHR. Tel; Stafford 44964.

HYGAIN TH3 JNR, BN86, coax etc, one element slightly damaged, £80 excl p&p. GM4/5B4GF. Tel: 031-6643258 (home), 031-6671991 (work). Dr Haji.

WESTOWER 42' 2-section titover tower. Good condx. Two winches, buyer to remove. Best offer. G3CQR, QTHR. Tel: 0332-661651.

TR2200 S18 S20 four repeaters, works well spare crystals, charger, nicads, £45ono. Power pack 13.5vx10a, exc, £37. Transceiver boot mounting S18-23 SN repeater, £15. Transformers LT heavy duty £2, postage extra. Some valves. G3NGT, QTHR. Tel:0705-584861.

TWO 9-ELEMENT Tonnas with power splitter, £30. HQ1 minibeam £65. FT290R with portable and mobile access. also 6m tsvtr, £295. Can deliver reasonable distance. WANTED: general/coverage rx. G3RYY, QTHR. Tel: 02572-62250.

FT290 with nicads, charger, w+d 25w linear preamp £270. Good condx. G0J0J. Tel: (Sheffield area) 0909-564309.

YAESU FRG7700, all mode rx, FRV7700 converter, FRT7700 atu, mint condx, boxes, manuals, £300. AVO valve tester, base +meter, £15. Windsor Model 30A oscilloscope £10. Abandoned project. All the bits to make G3JFL or similar linear amp, 300w grounded grid using PL509. Take away the lot inc circuit drawings £25. Heathkit further education module ET3100, books, components, records. As in Maplins catalogue. To clear, £60. Fishing tackle sea +course, as new, £120. Full list sae. G4HBU, QTHR. Tel: Bristol 611093.

TS180S HFTX, warc bands 100w in vgc, £450. TR9000 & psu PS20, mint condx, never used mobile, £325. MML50S 2m linear, mint not 12 months' old, hardly used, £70. 8-ele yagi 2m, £35. Colinear £20. G0HIZ, QTHR. Tel; 0270-257578.

FT208 as new condx with case, little used £140ono. inc rubber duck, antenna. G1SJY, QTHR (Redditch, Worcs). Tel: 0527-69998 (anytime).

KENWOOD TM221ES 2m fm 45w tcvr. 10 months' old. As new condx. Still under guarantee. Cost £317 new no reasonable offer refused. G4VYN, QTHR. Tel: (Lowestoft) 0502-731640.

WRASSE SC1 £800. Icom 71E fm board and crystal filter fitted £650. Icom 7000 plus 800H Carex uhf/vhf preamp, £850. Comax CD670 £170. Datong outdoor antenna, £40. Indoor £30. Morse tutor, £30. Tel: (Medway) 0634-828952.

ICOM 730 fm and cw narrow band filter fitted. No psu, so £350. J-beam VR3, £35. G4SLT, QTHR. Tel: Reading 478729.

PYE WESSIES low band fm £30, high fm, £35. uhf £39. Pye psu 8a approx £20. Pye SG3V/SG5U vhf/uhf sig/gens £90ea. Audio generator £15. Dual beam scope mint £125. Some other items. G4YVJ. Tel: (Lincs) 050785-203.

MAPLIN SATELLITE decoder board, c/w 3off plug-in boards, populated but no ic's, £25. 6m/2m/70cm switchable pwr/swr meter, remote sensing head, £20. Chris, G4UKF, QTHR. Tel; 0935-823475.

SIGNAL RS17 vhf airband handheld rx with original instructions, case and seven xtals, vgc, £45. Realistic DX400 hf rx with vhf bc, vgc, boxed with orig manuals, £70. John, G6IBC, QTHR. Prefer buyer collects or plus postage. 01-790-8163 (after 5pm).

MICROWAVE MODULES MML144/100 linear power amp. £100ono. Buyer to inspect and collect. Tel: Andy, 0590-73476.

QTH CARSHALTON Beeches Surrey, Spac 3 bed SD house good condx, 2 lge recep rooms, well-fitted kitchen bathroom and sep wc, gas fired ch, 100'x42' rear garden, sep brick gge, 7'x20', enclosed side entrance, 15'x10' workshop. 60' tiltover tower, c/w electric winch, TET 3-ele beam, 2m 17-ele tonna, MBM88 2m colinear and cables URM67, ex vhf/hf location, 260' ASL, £140,800. G4OWM, QTHR. Tel: 01-647-8399.

FLDX400 HFTX £65. FRDX400 rx £65. Matching speaker inc 2m/70cm converter, £25. Shure 444 desk mic £25 TR2200GX inc nicads, £55. G8CZW, QTHR. Tel: 061-4396304.

ASTEC 1020 TUNER 970MHz-1430MHz, 612MHz IF £20. 11GHz manual scalar feedhorn £8. X-band Gunn oscillator, from vhf/uhf manual, £8. JS Roberts G8FDJ. Tel: 0742-333847.

KSR33 ASCII printer, RS232 interface, working, £5. Spares for KSR33 and Creed 7, 75 etc. Large audio sig/gen +valve voltmeter, £5. Modem No.2 £25. Quantum stereo amp £10. Vols of radio +TV servicing £5ea. G8UDJ, QTHR. Oxford 735821.

TR9000 2m MULTIMODE. Very good condx. no mods, £300. FT690R 6m multimode c/w nicads and charger, £200. G4FHX, QTHR. Tel: 01-428-7039 (after 7pm/weekdays).

19" RACK, 4' high in attractive olive green with fan, £30. Coutant 15a computer psu (pro quality) £40. Teleprinter KSR33 £30. Pye Westminster highband £30. G3PLX vdu with keyboard, £10. Buyer collects. G8JPL, QTHR. 021-705-1154.

SINCLAIR ZX81 microcomputer +16k memory pack, £20. Texas Instruments TI-99/4A microcomputer £30. Both ideal for rtty use. Can supply appropriate documentation for conversion. Contact Ray Heath, G0IME, (Swindon) 0793-643168 (evenings).

YAESU FT726R fitted 10m/2m/70cm plus satellite board. MD1 desk mike good condx £750. Brian, G1ORH QTHR.Tel: 0203-373781.

ICOM IC505 50MHz tx, no fm board, 100% working condx. £275 or exchange for photographic equipment WHY? Tel: Bev, on Pontypool 57221.

TRIO TS830S fitted 500Hz filters plus AT230 £850. G3JLB, QTHR. Tel; 0474-534694.

SOUND LEVEL METER 50-126dB battery, case, £20, as new. 80ohm dummy load adjustable £5. 500v megger leather case, cossor valve volmeter, all rangers. OOV06.40A Mullard boxed. AVO model 8 with valve/voltmeter attachment leads. 2m linear unfinished, reasonable offers. G3JNY, QTHR. 863058.

YAESU's famous twins FR101S and FL101 offers the flexibility of separates. rx has 600Hz filter, 144MHz unit, fm board and crystal for 10MHz. tx has spare new 6JS6C tubes. Manuals, connecting leads all in orig boxes. Ex condx. £450. Good specification home brewed linear for hf using pair TT21 valves. Integral 1200v psu, spare valves, 400w pep input. Passive 50ohm drive. £350. Z-match £30. 5/8 2m whip/magnetic base £12. Carriage extra or collect Chelmsford area. G3GOT, QTHR. Tel; 0245-33229.

WANTED....

ICOM IC202, IC202S, perfect condx with manual, preferably boxed. G1XWZ. Tel: Burnham on Sea 781513.

INFORMATION AND SOFTWARE for Sharp MZ80A personal computer. G4EMB, QTHR. Tel; 0621-891090.

BASES FOUR PIN UX suitable for 35T two off preferably ceramic. John G3DVV, not QTHR, except latest callbook. Tel: 0608-44371.

HF LINEAR, KW1000, or homebrew would be considered but must be in good condx. Chris, tel: 0430-430321 (East Yorks).

YAESU FT102 with FC102, FV102, SP102. Must be vgc. Price and particulars to Wegg, 23 Kerdane, Dane Park Road,OPE Hull, HU6 9EB. Tel: 0482-855052 (after 4.30pm) G1ZNO.

HANDBOOK FOR SOLARSCOPE CD1212, or any info alignment calibration etc. All replies acknowledged. Can photocopy. G0CXL, QTHR (Yorks).

CODAR TYPE 250S ac/pus as used with AT5 tx's. Also any rx covering vlf; lf and mf bands; older valve rx very ok. Must work on 240 volts ac. Price/details Marris, 35 Kingswood House, Farnham Road, Slough, SL2 1DA.

FT75 +VFO +GWHIP wanted, preferably working but faulty unit considered. Also wanted 80m to 2m wattmeter and 100w dummy load. G4LBH, QTHR. Tel: Luton 415846.

VALVES, 4-65A, QY3-65, CV1905, CV6122. Must be in good condx. Percy, G2BUJ, 32 Pound Lane, Pinehurst Swindon, SN2 1PS.

DIP METER Kenwood DM81 or similar. G2AVI, QTHR. Tel: 0227-37-4774.

DRAKE R4C RX - good price paid for specimen in first class condx. Chorley, 7 Foxfield, Everton, Lymington, Hants, SO41 0LR. Tel: Lymington 45231.

HANDBOOK OR CIRCUIT diagram for Marconi impedance bridges No5, type ZD00254, also Cossor oscillograph No.3339. Borrow or photocopy, all expenses paid. Eric, GW0DDK, QTHR. Tel: (St Davids) 0437-721324.

VALVES: MULLARD types PM2, PM2DX, PM1LF; also information on MCR1 receiver to copy. G3UIK, QTHR. Tel: 01-458-6171.

URGENTLY REQUIRED: Memory unit for Yaesu FRG7700. For sale, 9-ele 70cm tonna as new, £15. Scarab rtty program for Amstrad 6128. G8EHU, QTHR. Tel: (Burton on Trent) 0283-790454.

G3YNT. PLEASE CONTACT G3RUK. 0386-831-322. I have tried to phone or write but no address details in callbook. Have moved QTH to address in latest callbook. Bob, G3RUK.

YAESU FC102 ATU preferably with antenna relay switching unit. Will collect in reasonable distance. G0HHH, QTHR. Tel: (Kidderminster) 0562-67026 (any time).

GEC BRT400 (pref k/n with cabinet), Hallicrafters SX28, Drake R4C fitted Sherwood filters, Eddystone 940 (late issue), Scott-Taggart WHY? CV-Commercial Cross-reference guide. Good used 7360's. Genuine private collector, will travel. Chris, G8JFJ, QTHR. Tel: Horndean 591216 (Hants).

WANTED FOR CASH, TS120S, TS130S, FT707 or similar mobile, 100w hf rig. Tatty rigs and/or requiring repairs not objected to providing the price is commensurate with condx. Graham, G4VOE, QTHR. Tel: 061-740-4126 (anytime).

HIGH RESOLUTION VDU COLOUR. Contact Riley BRS41542 Tel: 061-980-4357. Suitable Commodore 64 output plug must be provided.

WWII DISC AND WIRE recorders, phonographs, cylinders, etc. Any sound gear 1890 to 1945. Also modules, 12v psu for A41. Exchange notes with other green box users. Selling Trio 9000 £275, 70cm tsvtr, £70. G8UNZ, John. Tel: Colchester 574656 (evenings/Sunday).

MUTEK 70MEG preamp any condx. Also MM 70meg tsvtr 28IF. G4NHA, QTHR. Tel; 0293-786371 (evenings).

OSCILLOSCOPE bandwidth 20MHz min dual trace preferred, other specs considered. Ex WD telegraph morse sounder. G4MKK, QTHR. Tel: 051-480-0240.

YAESU FP700 AC power unit urgently wanted for FT77. May consider other similar psu, but must be able to give up to 20a. G3TKN, QTHR. Tel: 0705-265101.

DRAKE R4C FILTERS WHY? MN4 aerial matching unit Drake C4 station control. Cushcraft 204CD 4-ele 20m beam or Hygain 204BA or 205BA. Gavin Williams, G3YCP, QTHR. Hove, E.Sussex.

ICOM 240 board diagram with values to repair an old friend. Photocopy expenses, postages gladly sent. GM8NZX, QTH Dundee. Tel: Donald, 0382-43111 (reversed - after 9pm).

CIRCUIT DIAGRAM OF 1948-49 Premier Electrostatic Televisor, using VCR97. Also voltage details of tubes, VCR97, VCR517C. G3YNN, QTHR. Tel: 0424-893078.

R109 6V RX Pref unmodified, your price paid + carriage paid. Also "19 Set" type aerial vari-ometer atu. Peter. Tel: 0287-34397 (days only).

70CM FM PORTABLE or mobile crystal transceiver, any type considered. G1LII, QTHR. Tel; 0753-884520

EXTENDER BOARDS FOR FT107M, and workshop manual. Scrapped CB multimode for parts, unmodified concord, Tristar, Cobra etc. Hygain 3-ele 10m beam or Cushcraft 10-3CD. GW4TVQ, QTHR. Tel: 0639-820356.

EARLY EDDYSTONE RECEIVERS, components and literature wanted by keen collector. Top prices paid and collection arranged anywhere in the UK. Tel: 021-556-3324 (anytime except weekends).

BELCOM 26/30MHz must be in good wkg order. Tel: Dursley 3003. Dick, G0IMD, not QTHR.

REQUIRED FOR CADET unit. Information on Pye Admty Pattn 100337 TXHF 1955 by Pye Marine. Circuit diagram and/or details of psu, original or xerox. Your price paid. Gillham, G3ING, 14 Masefield Ave, Southall, Middx, UB1 2ND. Tel: 01-574-5261 (evenings or weekends).

XTAL FILTERS 455KHz/10MHz/9MHz ssb/cw with carrier xtals WHY? Circuit diagram for Swan 500 tcvr loan or copy, costs reimbursed. 70cm/10m satellite converter vacuum variable capacitor 0-250pF WHY? Details mods for FRG7700 costs reimbursed. Mullin, PSA, Verden, BFPO 32.

REQUIRED URGENTLY. Base insulator suitable for mounting a 100' guyed tower. Also Talurit, or similar, hydraulic wire rope splicing press and ferrules, suitable for splicing 4mm and 6mm wire rope guys. Will collect. G3RRN, QTHR. Tel; 0522-751557.

1296MHz TRANSVERTER Microwave Modules preferred. G3GHI, QTHR. Tel: 01-660-4068.

EDDYSTONE SEMI-AUTOMATIC bug key. Good orig condx with cover. Your price paid. DJ0OS, Waldstr 57, D4902 Bad Salzuflen, Germany. All letters answered UK cheque payment and contact QTH.

YAESU FL2100Z linear amp will travel - third element model CK2/3 for TB2 antenna, also swap local m/side area eight ele cross yagi, 2m, 6 months' old, for 2m colinear. Please ring Colin, GODNQ, 051 678 6052 (Wirral, not QTHR).

WANTED DEAD OR ALIVE! Old Heathkit RA1 rx's for spares and test beds. Please send details and realistic price(s) to Richard Marris, 35 Kingswood House, Farnham Road, Slough, Berks, SL2 1DA.

813 VALVEHOLDERS. Two wanted, G4EBT, QTHR. Tel: 0709-370021 (after 6pm please/weekends)

HF TCVR WITH general coverage rx, any condition damaged, faulty, incomplete, anything considered. G4IVF, QTHR or tel: (Leics) 0664-65985 (day) must be cheap!!

EDDYSTONE 850/2. LF model +info or AR88LF +info. in good condx, or Eddystone 888. GM3JDX, QTHR. Tel: 031-445-2426 (Mon-Fri 8pm-9pm).

BACK NUMBERS of QST Magazine years 1972-1982, or any before 1946. Can arrange collection. G4UZN, QTHR. Tel: 0532-693892.

R109 6V RX ex-WD pref unmodified. Also vari-ometer atu (19 set type). Your price + carriage paid. Peter, 0287-34397 (days only).

POWER TRANSFORMER for WW2 AR88 receiver. Advertiser will pay transportation. Tel: Stevenage (0438) 353636 any time.

RACAL! Do you have any items of Racal tactical (green) equipment? Collector requires one each of: MA934 battery, BCC540B, MA4190A 12/24v, MA945S, TA944C, PRM 4041A, MA4025A/C, MA4705A, PRM4700, TA4703, BCC587, BCC588, MA4204, WHY? Tel:Lancaster (W. London) 01-845-4008.

TS930S; TL922; versatower 60' hd; Racal 1218; Bencher keyer; Sampson memory keyer; NRDC515. FOR SALE: Shure 419B noise cancelling hand mic with clip £15. Heathkit RF1U sig/gen 100KHz-200MHz £20. Tel: 0565-873205.

EDDYSTONE RECEIVER 958, good working order, any reasonable price. Brown, G4PJN, QTHR. Tel: 0895-421234.

VFO82U OR VFO520 - external vfo required for TS820. Must be in good condx. Particulars to G3JHL, QTHR. Tel: 0794-512283 (evenings/weekends).

COLLINS R390A RECEIVER, preferably working. Good price paid. G3MDQ, QTHR. Tel: 021-354-9972.

DRAKE TR7 WITH HD power supply and matching atu. Must be in good condx. GW4EVJ, QTHR. Tel: 0792-843948.

HRG50 RX in good working order and condition. Tel: Malvern 4968. G8WTY, QTHR.

8-TRACK RECORDER. Any condition. Les G1HFJ, QTHR. Tel: 0272-640629.

SECOND RIG WANTED FOR CW ONLY. Must have cw filter. Almost anything considered if in good working condition. Full particulars to G4AYP, QTHR.

KENWOOD TL120 LINEAR amplifier for TS130V. GM2ASU, not QTHR. Tel; 034-987-693.

WANTED BY COLLECTOR: WWII avionic equipment, radar jamming units APT2, APT4, TDY, APQ2, APQ9. Elint receivers, APR1, APR2, APR4. Tuning units TN18, TN19. Indicator units 6A, 62A, 162C, 182A. H2S units No64 T/R 3151, T/U 207a. Any IFF tx/rx. Also interesting WWII vhf/uhf or early (pre 1923) valves. Also Perdio transistor radios. Good prices paid. WHY? Please write giving details to Rod Burman, G4RSN, "Kinnagh", Hancocks Mount, Sunningdale, Berks. SL5 9PQ. All letters answered.

YAESU SP102 external speaker for FT726R. Tel; Jeff, (Runcorn) 0928-717580.

HEAVY DUTY ROTATOR (pref Daiwa MR750) or WHY? 100' H100 or similar coax. 70cm linear 1W drive. G1VVU, QTHR, or tel: 0665-720854 (afternoon - ask for John).

EARLY WIRELESS AND XTAL sets: particularly WWI equipment or parts, early valves, horn speakers, old radio books, magazines, catalogues, pre-war tv; keen collector pays well for anything associated with early wireless. James, G4ERU, 5 Luther Road, Winton, Bournemouth. (0202-510400).

POWER TRANSFORMER FOR WW2 AR88 receiver. Advertiser will pay transportation. Tel: (Stevenage) 0438-353636, any time.

MUTEK 2M TRANSVERTER TVVF144a, 144MHz, 28MHz IF. G3FPD, QTHR. Tel: 040-372-3205.

EXTERNAL SPEAKER SP230 Trio, also digital world clock HC10 with dual display plus memorised and two additional regions. Each item must be in good wkg order. Tel: Dennis, 0407-830182 (evenings). Anglesey, Gwynedd.

DRAKE MN2000 ANTENNA tuner and W4 wattmeter. G3CGK, QTHR. Tel: 0954-210374 (Cambs).

TRIO TS120 or TS130 V or S model, and TS530S. G3XFB, QTHR. Tel: 0902-850033.

PAIR 10GHz gundiode transceivers (gunplexers) Prefer MA type with varactor tuning, not Doppler alarm types. G8AVA, QTHR. 0268-752434. FOR SALE: space saver ant. AQ6.20 from Allweld. Prefer buyer collect, inspect, £90.

CIRCUITS FOR THE following Pye Marine Ltd communications rx, ADM patt 100339, MF/HF, 60KHz-30MHz, 1955. Electrohome Ltd TV monitor, V10-412 of 1975 vintage. All help acknowledged gratefully. G8UDJ, QTHR. Oxford 735821.

DST100 MK3 rx wanted. Also 1154 tx and 1155 rx. Good prices offered for items in good condx. Have engine hoist and trailer so collection no problem! Selling surplus AR88 (£75) and HRO (£75). GOHTR, QTHR. (Tamworth) 0827-898024.

COPIES OF RADCOM OR THE BULLETIN. Single editions or volumes. GW4AXR. Tel: (Cardiff) 0222-552830.

INFORMATION, circuit, manual, etc. regarding two ancient pieces of test equipment to assist restoration attempt. Taylor valve tester Model 45 and Taylor Universal meter Model 83A. Beg, borrow or buy. G4KVV, QTHR. Tel:(Peacehaven, East Sussex) 07914-81107.

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PHILIPS P2000 RC. The RS232 module or details of same required. Will of course pay for above information or module. Can anyone please help urgently G3TXO, QTHR. Tel: (Royston, Herts) 0763-48483.

EXCHANGE AMSTRAD PCW8256 for anything interesting. WHY? Good collection of components considered. Definitely no Jap. Boxes. Write to G3WCE (B. Edwards) QTHR.

KW2000B MUST BE IN first class condx and with psu and manual. Spare valves and mic advantage. G3ASE, QTHR. Tel: 0480-63129. TL47.

FOR AR88 - "S" METER. GD3RFH, QTHR. Tel: 0624-842571.

SERVICE INFORMATION on Intel PDS (RAM error) on crt and power led on. Keyboard for research machines 380Z. Any info on Micropolis double disk drive unit (blue box). March 81 RADCOM. Tel; (Rotherham) 0709-554665. G4NMP, QTHR 1986 on.

KW204 SSB TX or similar wanted. G3XVL. Tel: Ipswich 689982.

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MUTEK GDIF 107UB. Good condx. GW4JJW, QTHR. Tel: 0222-752189.

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EXCHANGE MY FT101ZD Mk3 fm 9 bands, orig box, vgc, for mobile rig TS430S or FT757GX cash adjustment, if necessary. I am staying at Stafford for the NEC Convention and could possibly meet then. G4WOX, QTHR. Tel; 0670-815587 (near Newcastle).

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MUTEK FRONT END BOARD FOR FT221/225 or info about same. Good price paid. Phone Mike, G4XBF on 042879-3263 (evenings).

IN MEMORIAM

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

ERIC LIONEL MOLLART, G6AGE

Eric, an Oxford man, had been interested in amateur radio for nearly 50 years and was an active member of the RSGB and the Oxford & Dis ARS from the late 40's, when he became very interested in direction finding and took part in his first event in 1952/3. With his enthusiasm and drive which were coupled with a considerable degree of diplomatic persuasion the Oxford society soon became the leader of this activity.

Eric was National DF champion 6 times, and this repetition with his considerable ability to put the message across made him a very popular lecturer to radio groups up and down the country and championed the course admirably. He was a member of a number of these groups as well as being a founder member of mid-Thames DF Club, which was set up to support all the DF enthusiasts in the High Wycombe and Marlow areas.

He understudied Geoffrey Peck, the National DF Organiser for several years before donning the official mantle of corresponding member of the RSGB HF Contests Committee. This not only entailed the updating of the rules on DF from time to time, and arbitrating on those rare matters of dissention, but required a considerable database of competitors, clubs and organisers, the preparation of the national events calendars and the re-organisation of these with local and club events. Some 60 or so letters and other items a year had to be written and sent, often to all competitors and clubs each time.

In addition to all this Eric was a keen listener to good music of all kinds and member of the RSPB, loved camping and was a regular tree climber for ODRS NSB Aerial Erection team each year until rules changed in 1976. He had a major commitment to the Marlow Scout Group and was the main instrument in enabling and building their new HQ. On top of this he had a very heavy workload with his professional career in post office engineering and, latterly, BT, where he completed his service as General Manager of the Reading area.

Eric eventually got round to obtaining a 'B' licence and was issued with call G6AGE, and due to his abundant white hair, let to calling himself "aged geriatric Eric", which was also a very good indication of his sense of humour and general nature; indeed on reflection there does not seem to be anyone who had a harsh word to say about him.

The stroke that Eric suffered a few months after retiring from work came just after what he described as "the best game of table tennis I have ever played" was a most unfair reward for his endeavours. The hard work and perseverance that followed in his efforts to rehabilitate himself was another 'eye-opener' to his friends and relatives, and in spite of inevitable bouts of depression he was eventually able to 'walk' again. His mental abilities were not impaired and as a result he was able to visit a number of DF friends where he was taken as close as possible to the hidden transmitters. His work as National DF Organiser kept him very busy and the result is that the remainder of the 88 season was run itself. Such was his commitment to the RSGB and DF in particular he was in line to be recommended for the Founders Trophy.

Sadly, Eric suffered another stroke on the 12 May 1988 from which he did not recover. The DF fraternity and amateur radio in general, will miss his outstanding personality, help and general attitude and, especially his encouragement to all newcomers. He cannot be replaced. The support he received from his wife, Jean, his daughter and son must not go unmentioned, our deepest sympathies go to them. *G3JLE*

M G W Adams, G4AKN, on 24/4/88.
Mr R R Butler, G2BUW, on 3/3/88.
Mr G Campbell, VK2ZQC, on 17/12/87.
Mr R V Cheesman, G0ENK, on 6/4/88.
Mr H W Davey, GI1XFD, on 30/3/88.
Mr J W Egerton, RS19943
Mr A C Fishel, G2DLS
Mr A G Furze, G1GVL, on 12/12/87.
Mr W S Gandy, G4WSG, June 1987.
Mr W E Green, G3BTC, on 18/3/88.
Mr T A K Hamblett, G1GYD, on 24/2/88.
Mr J K Hampton, G4KQW, on 27/4/88.
Mr R E Harrison, G1PRT
Mr S Hasselbalch, OZ7T
Mr M C Newcombe, G4FJZ, on 23/2/88.
Mr D R Saunders, G0AKB, on 18/8/87.
Mr P D Smith, G3PNM, on 14/4/88.
Mr N Hyde, G2AIH, on 3/5/88.
Mr A J Stevenson, GM3HVS
Mr C P Walker, G4XSE
Mr J A Ward, G4EOI, on 30/10/87.
Mr W Warwick, G6CVM, on 23/4/88.
Mr T H Williams, GW5TW, on 23/3/88.
Mr F D Wright, G8QV/EAS, on 9/4/88.
Mr G A Wright, GM3HZN, on 17/2/88.
Mr H Wilson, EI2W, on 18/4/88.
Mr G Wylie, GM3HZN, on 17/2/88.
Mr T Clark, G3SPR
Mr S T Cooper, G8YXD, 14/5/88.
Dr S B Darbishire, G3REO, 27/1/88.
Mr T S Few, G8AAK, 16/5/88, aged 73.
Mr W R Griffiths, G3TKU
Mr D Hill, G4XJK, 2/5/88, aged 68.
Mr A Horner, G3FTS, 22/5/88.
Mr R G Hurst, G0CGK, May '87.
Dr M H Jeynes, G8EVJ
Mr F MacFarlane, GW3YR, 28/6/87.
Mr E L Mollart, G6AGE, 17/5/88.
Mr J D Morris, G2DRR, Feb '88.
Mr P C Norton, G3DY, 2/4/88.
Mr A R Reid, G0ASR, 11/3/88.
Mr R G Reeves, G4BRR, 2/5/88, aged 68.
Mr I P Richter, G0AVA, 26/5/88, aged 82.
Mr C F D Smith, GW30JB, 21/2/88.
Mr R N R Smith, GM3DFM
Maj P D Smith, G3PNM, April '88.
Mr G F Steer, RS44094
Mr H P Townhill, G5XL
Mr R Tunney, G8DD, 8/3/88, aged 73.
Mr H A M Whte, VE3BWY, 15/5/88.

APOLOGY

In this column in the April issue, the callsign G4IAV was inadvertently appended to the name of the late Mr Frank Dilworth, G2ANC. We are pleased to report that G4IAV is alive and kicking, and we apologise to him for any inconvenience which this error caused.

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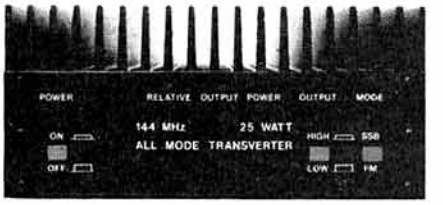

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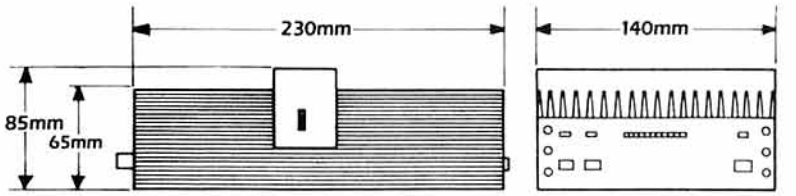

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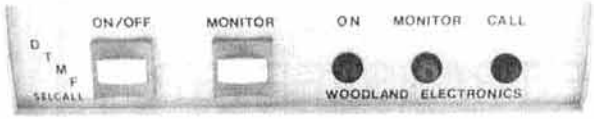

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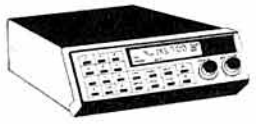

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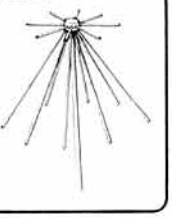

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RSGB 75th ANNIVERSARY CONVENTION

National Exhibition Centre Birmingham

Opening Ceremony and Address
to be performed by
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THE DRAW WILL TAKE PLACE AT THE RSGB'S ANNUAL MEETING ON SATURDAY, 10 DECEMBER 1988

★ The RSGB 75th Anniversary Lottery is being promoted to raise funds for the furtherance of the work of the Society and in particular that of reaching young people and encouraging them to take an interest in amateur radio through Project YEAR.

Amateur radio is a technical yet sociable hobby which offers vocational training and can provide a platform for any scientific, electronic or technical career. We need to make industry and government bodies aware of our plans and our commitment to broadening the appeal of amateur radio. This will incur promotional expenditure and the lottery was conceived as a means of helping to fund these objectives. You can play a part in helping to strengthen and develop the future of amateur radio by buying or selling as many tickets as possible. That way, we can all move forward together.

We thank you in advance for your support.

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Please send me_____ **additional tickets for the Lottery**

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"They said I couldn't work DX with just 100 watts. Especially with a radio that has less than 1000 switches on the front panel.

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"They laughed when they saw my radio. Then they saw my logbook."