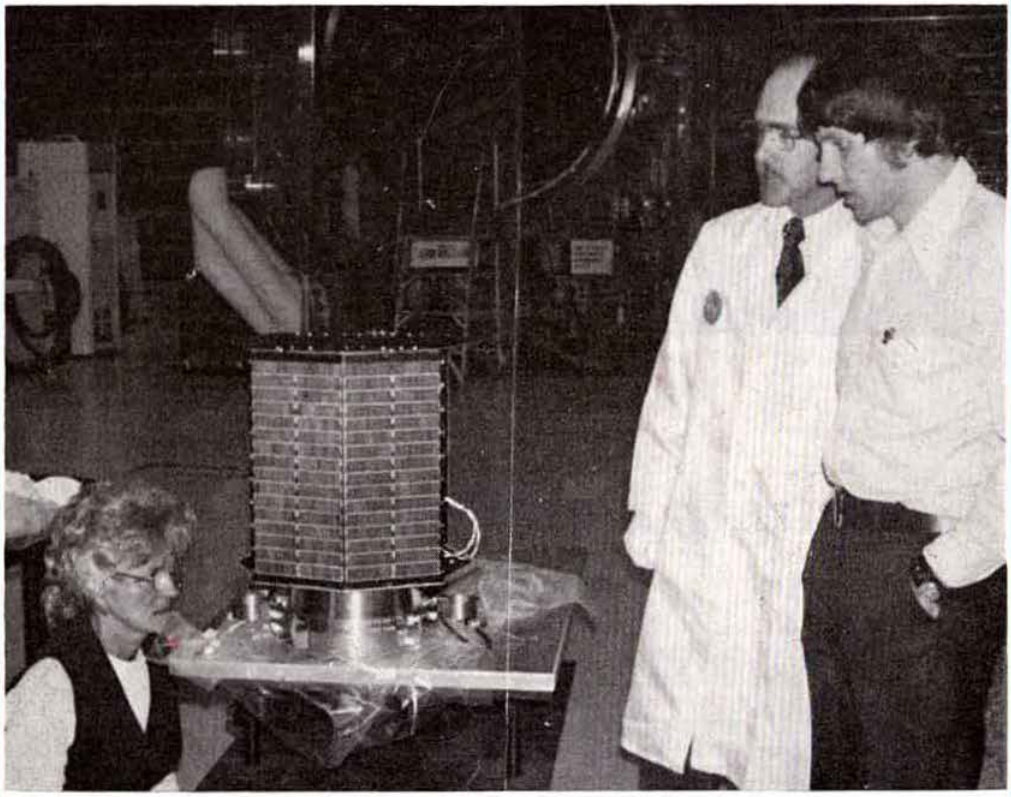
radio communication

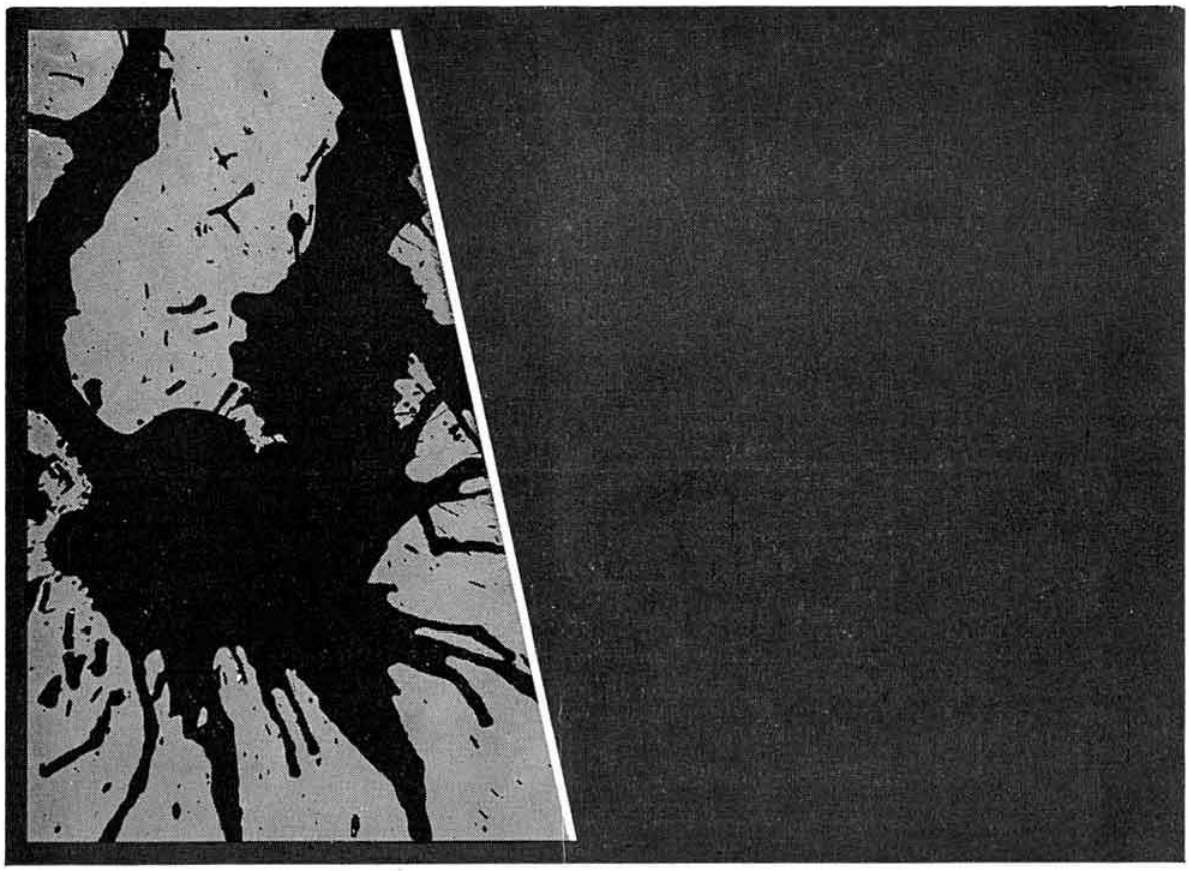
November 1974

OSCAR 7



Marie Marr, Dick Daniels, WA4DGU and Jan King, W3GEY (project manager), inspect Oscar 7 before it goes into the thermal vacuum test chamber

journal of the Radio Society of Great Britain



SSB-ers:

increase talk power, cut "splatter"

Our *444 base station microphone* not only gives you increased talk power, but cuts "splatter" (and QRM complaints) to an absolute minimum! It has superbly tailored response, with sharp cutoffs below 300 and above 3,000 Hz and a rising response characteristic for maximum intelligibility. The 444's rugged, reliable Controlled Magnetic element has been proved in safety communications, and other tough professional communications applications. It delivers a clean signal to the transmitter at levels as high as crystal units! (And, unlike crystal and ceramic units, the element is totally immune to the effects of temperature and humidity.) The 444 also features an adjustable height stand that makes for comfortable "ragchewing" sessions, an optional-locking bar for push-to-talk or VOX operation, and a practically indestructible Armo-Dur® case. Write:

Shure Electronics Limited
Eccleston Road, Maidstone ME15 6AU
Telephone: Maidstone (0622) 59881

SHURE

radio communication

Volume 50 No 11 **November 1974** Price 40p

CONTENTS

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

ABC
MEMBER OF THE AUDIT BUREAU OF CIRCULATIONS

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Advertising, other than Members' Ads, should be sent to the above address marked for the attention of Mr C. C. Lindsay. Tel 01-837 8688 (or 01-686 5839, advertising only).

A • •

LOWE ELECTRONICS

NEW MODELS

BELCOM LA106 2 METRE LINEAR AMPLIFIER

At last the Belcom company have produced a linear amplifier to match up with their incredibly successful Liner 2 transceiver. Completely self contained, mains powered with a built in variable gain receiver pre-amplifier with helical filters for extra selectivity. Provides regulated 13·5V supply for powering Liner 2 or any other transceiver requiring up to 2·5A. RF operated VOX switching needs no connection from transceiver. High power output with no noisy blowers.

SPECIFICATION
Modes: SSB, FM, CW
Output Power: 100W
Input Power: 10W
Input and Output Impedance: 50Ω
Pre-Amp Gain: 10dB
Power for Transceiver: 13·5V @ 2·5A Regulated
Size (mm): 315 × 148 × 280
Weight: 12kg (26½lbs)

All-in price including postage and VAT; fitted 6 channels **£31.26**

LOWE 2 METRE MONITOR RECEIVER REC-1420C

Here is a simple, low cost F.M. monitor receiver which monitors up to six channels and has an excellent performance/price ratio. Ideal for mobile use and when fitted with popular F.M. frequencies along with a repeater or two ensures that it is in the midst of any F.M. activity.

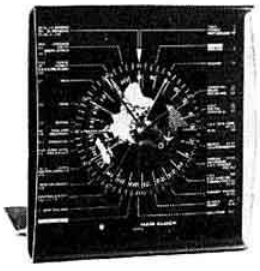
No necessity for a bulky and costly tunable I.F.—no fiddling around when driving—just scan the channels and if there is much F.M. activity you are sure of hearing it. Being F.M., ignition etc. suppression is not essential, and thus makes it the ideal mode for mobile. It's diminutive size (4ins. W × 2½ins.H × 8ins.D) and weight (2½lbs) make it a snip for portable. In fact it is the one receiver that is cheap enough for everyone to carry around anywhere.

R.F. STAGE **REQUIRES 12 to 15V D.C.** **6 CHANNEL CAPABILITY** **4 I.F. STAGES**
DOUBLE CONVERSION **EXCELLENT SQUELCH**
PRICE (Less crystals) **£19.95 plus VAT**

CRYSTALS

145·000	Popular	145·725	
145·500	calling	145·750	Repeaters
145·525	channels	145·775	
145·550			

£1.50 each plus VAT



HAM CLOCK

Have you ever wondered why the amateurs in Hong Kong are not replying? Maybe it's because they're in bed and you forgot just how many hours time difference there is! The TRIO HC2 Ham Clock is a 24 hour battery powered (up to 1 year on a single HP2) clock which gives instant readout of the time anywhere in the world. Beautifully styled so that you won't know whether to keep it in the shack or out in the home, it is a real asset to the DX chaser. At only **£11** (VAT exc.) it is incredibly good value.

HEAD OFFICE **119 Cavendish Road, Matlock, Derbyshire. Tel. 2817 or 2430**

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AGENTS Alan GW3YSA. 35 Pen-Y-Waun, Efail Isaf, Nr. Pontypridd. Tel. Newton Llantwit 3809
John G3JYG. 16 Harvard Road, Ringmer, Lewes, Sussex. Tel. Ringmer 812071
Sim GM3SAN. 19 Ellismuir Road, Baillieston, Nr. Glasgow. Tel. 041-771 0364

MANY MORE EXCITING TRIO MODELS AVAILABLE. JUST ASK US!

73 from BILL G3UBO/VE8DP, ALAN G3MME, JOHN G3PCY/5N2AAC, IAN G3ZYC

Western

PLEASE NOTE; We've Moved!

We are pleased to announce that a major re-organization has taken place in the company and that we are now located at:

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The Directors of the Company wish to make it known that WESTERN ELECTRONICS (U.K.) Ltd. is a fully independent company and is not associated in any way whatsoever with any other concern.

The new premises are merely the first phase of a redevelopment programme aimed at keeping ahead in providing you with the finest service in the country. Our new much larger showroom is right in the middle of Southampton opposite the Civic Centre Police Station. Whilst the family enjoy the excellent shopping facilities close at hand you will be more than welcome to come in and just browse around. Parking is available on our premises for 7 cars and there are two car parks immediately opposite. Hope we'll see you soon.

YAESU

UNITED KINGDOM DISTRIBUTOR
of
THE WORLD'S FINEST RANGE OF AMATEUR RADIO EQUIPMENT
BY

YAESU MUSEN

It's worth remembering that when you deal with WESTERN ELECTRONICS you have the best after sales service in the country. We have the best equipped service department in the country in our trade and provide free collection and re-delivery on all warranty work. It's all part of our service!

YAESU – YOUR ASSURANCE OF QUALITY – introduce

The superbly engineered FR-101 Receiver

- ★ **Entirely solid state.**
- ★ **Transceiver with FL-101 (available shortly).**
- ★ **23 Bands.**
- ★ **160m. - 2m.**
- ★ **Plus general coverage.**
- ★ **SSB/FM/AM/CW.**
- ★ **Digital readout option available later.**

Full specification available upon receipt of S.A.E. for both models.

FR-101S, £245 + VAT.
FR-101D, £330 + VAT.

Western

Announcing . . . the ATLAS 180 . . . It's Sensational !

GENERAL SPECIFICATION

BAND COVERAGE: 20, 40, 80, and 160 metres.
FREQUENCY RANGES: 1,800-2,000, 3,500-3,850, 3,700-4,050, 7,000-7,350, 14,000-14,350 kc.
EXTENDED FREQUENCY RANGES: With external crystal oscillator accessory: 1,800-2,050, 3,400-4,300, 7,000-8,000, 13,900-14,900 kc.
FREQUENCY CONTROL: Highly stable VFO common to both receive and transmit modes. Tuning dial calibrated in 5 kc increments with easy interpolation to 1 kc. Tuning rate: 15 kc per revolution of the tuning knob.
EXTERNAL FREQUENCY CONTROL: Rear socket provides for plug in of external VFO or crystal oscillator accessory for separate control of transmit and receive frequencies, or for network and MARS operation.
CIRCUIT DESIGN: All solid state, 4 I.C.'s, 18 transistors, 32 diodes. Single conversion, 5,520 kc I.F.
MODES OF OPERATION: SSB: lower sideband on 40, 80, and 160 metres, upper sideband on 20 metres with SB selector switch in NORM. position. Opposite with switch in OPP. position. CW: offset frequency in transmit mode.
MODULAR CONSTRUCTION: Includes plug in circuit boards for ease of maintenance.
PLUG-IN DESIGN: Transceiver plugs into the de luxe mobile bracket, or into the AC power supply console, making transfer or removal a simple operation. All connectors are standard: SO-239 antenna jack, ¼ in. phone jacks for Mic., CW key, external speaker or headphones, and linear amplifier control.
POWER SUPPLY REQUIREMENTS: Operates directly from a 12 to 14 volt d.c. course with negative ground (standard automotive system). Current drain is 300 to 500 mA in receive mode, 16 amps peak in transmit mode. Atlas models AR-117 and AR-230 power supply consoles are available for AC operation.
FRONT CONTROLS: Tuning Dial, Dial Set, Function Switch, Band Switch, A.F. Gain, R.F. Gain, Mic. Gain, Sideband Selector, Calibrator On-Off, Dial Light Dimmer.
FINISH: Black vinyl covered steel cabinet, anodized aluminium panel.
DIMENSIONS: 9½ in. (24·1 cm) wide, 3½ in. (8·9 cm) high, 9½ in. (24·1 cm) deep, overall. **WEIGHT:** 7½ lb. (3·4 kg) net. 9 lb. (4·1 kg) shipping weight.

RECEIVER SPECIFICATION

CIRCUIT DESIGN: Front end design provides exceptional immunity to overload and cross modulation, matching or out performing the best vacuum tube designs. Signals are converted directly to the 5,520 kc I.F. without preamplification. Converter and product detector are double balanced diode rings. I.C.'s are employed in I.F. and A.F. stages.
SENSITIVITY: Requires less than 0·3 micro-volts for a 10 dB signal-plus-noise to noise ratio (typically 0·2 microvolts).
SELECTIVITY: Crystal Ladder Filter, 8 poles. Bandwidths: 2·7 kc at 6 dB., 4·3 kc at 60 dB, 9·2 kc at 120 dB! Ultimate rejection more than 130 dB! Shape factor: 1·6.
IMAGE REJECTION: More than 60 dB.
INTERNAL SPURIOUS: Less than equivalent 1 microvolt signal.
AGC CHARACTERISTICS: Audio output constant within 4 dB with signal variation from 5 microvolts to more than 3 volts.
OVERALL GAIN: Requires less than 1 microvolt signal for 0·5 watts audio output. (CW carrier, 1,000 cycle heterodyne.)
AUDIO FIDELITY: 300 to 3,000 cycles, plus or minus 3 dB.
AUDIO POWER: 2 watts to a 3 ohm speaker with less than 10% distortion.
INTERNAL SPEAKER: 3 in., 3 ohm, 0·68 oz. magnet. Rear jack permits plug in of external speaker, or high impedance headphones. When transceiver is plugged into the AC power supply console, internal speaker is disconnected automatically, and front-facing speaker on console becomes operative.
METER: Reads S units from 1 to 9, plus 10 to 50 dB.
CALIBRATOR: Provides 100 kc check points for accurate dial setting.

TRANSMITTER SPECIFICATION

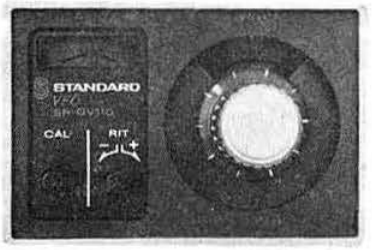
CIRCUIT DESIGN: Broadband design eliminates transmitter tuning. Single conversion from I.F. to output frequency produces minimum spurious and mixing products. Two section low-pass filters on each band provide harmonic suppression equal to commercial standards. Includes ALC and infinite SWR protection.
FREQUENCY CONTROL: Internal VFO automatically transmits on exactly the same frequency that is being received. Rear socket provides for plug in of external VFO or crystal oscillator accessory for separate control of transmit and receive frequencies, or for network and MARS operation.
POWER RATING: 180 watts P.E.P. input, and CW input (with 50 ohm resistive load and 13·6 volt DC supply). Power output: 80 watts minimum P.E.P. and CW (100 watts typical).
EMISSION: SSB: lower sidband on 40, 80, and 160 metres, upper sideband on 20 metres with SB selector switch in NORM. position. Opposite with switch in OPP. position. CW: offset frequency.
UNWANTED SIDEBAND: More than 60 dB down at 1,000 cycles A.F. input.
CARRIER SUPPRESSION: More than 50 dB down.
THIRD ORDER DISTORTION: Approximately 30 dB below peak power.
SPURIOUS AND IMAGE OUTPUT: More than 40 dB below peak power.
HARMONIC OUTPUT: More than 35 dB below peak power.
CW KEYING: Manual send-receive. Semi-break-in with CW accessory installed in AC power supply console.
TRANSMIT CONTROL: Press-to-talk with Mic. button, or manual transmit with function switch on front panel. Automatic voice control when VOX accessory is installed in AC power supply console.
MICROPHONE: Dynamic or crystal. Plug requirement: standard ¼ in. diam. 3 circuit phone plug.
AUDIO FIDELITY: 300 to 3,000 cycles, plus or minus 3 dB.
METER: Reads power amplifier collector current, 0-16 amps.
LINEAR AMPLIFIER CONTROL: Rear jack provides for keying of linear, and ALC control from linear.

Electronics (UK) ltd

the most comprehensive range of FM equipment by a specialist VHF/UHF manufacturer STANDARD RADIO CORPORATION

144 MHz

CV110 VFO



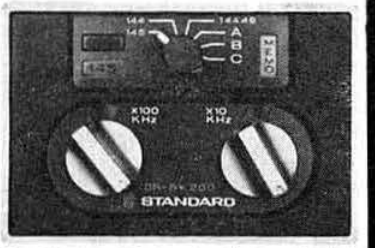
The CV110 is a remote VFO for the C140 Transceiver and has a centre tuning meter plus RIT (± 5 kHz) and CAL position to accurately calibrate the VFO.

The C140 is a 10w. 12 Channel transceiver + 1 Memory Channel and measures only 3½" wide × 2½"

C140 TRANSCEIVER

high! The microphone has two switches, the normal PTT switch plus the MEMO switch. A flick of the switch and the transceiver overrides the Channel selector and you can transmit or receive on another frequency. The C140 takes the CV110 Remote VFO or SY-200 Synthesizer and comes complete with microphone, line filter and mounting hardware.

SY-200 SYNTHESIZER



The SY-200 is a 200 channel synthesizer unit plus 1 priority channel and 3 MEMO channels. The size of this is the same as that of the C140.

The C826MB is a 12 Channel 10w o/p unit. Tone burst and separate transmit and receive crystals permit repeat operation and are readily accessible via a hinged lid underneath. Receiver sensitivity is excellent being 0·4 uV or less (20-dB quieting). Transmitter and receiver test sockets are fitted at the rear for servicing. The C826MB has provision for the CV100 dual VFO giving separate VFO's for transmitter and receiver operation. Each 826MB carries its own test certificate so you get guaranteed performance. Line filter and microphone are included. The CV100 has a centre signal meter and calibrate (CAL) position to zero the transmitter on to the receiver's frequency.

C826MB TRANSCEIVER

CV100 DUAL VFO

C146A is a 2W 5CH. Hand transceiver with tone burst and the capability of repeater operation. Ni-cad batteries and many accessories are available (but not fitted) making this superbly built unit the finest available. Complete with leather case and fitted crystals on 145·00 and 145·15.

432 MHz

The C432 is a UHF 2W 5 Channel Hand transceiver with a full range of accessories as the C146A. The C430 is a 10W 12 Channel highly compact and efficient unit of the same size as the C140. This is the first professional 70 cm transceiver available and will enable you to get going on 70 cm with the advantage of smaller antennas and greater band space.

PRICES (Carriage/VAT Paid)

CV100. VFO for C826MB	£30.00
CV110. VFO for C140	£40.00
C140. 2m Transeiver	£110.00
C146A. 2m Hand Transceiver, 5 channel	£79.50
C826MB 2m Transceiver	£125.00
SY-200 Synthesizer	£85.00
C430. UHF Transceiver	£139.00
C432 UHF Hand Transceiver, 5 channel	£99.00

ACCESSORIES

C—12/230-5AE AC PSU/SPKR for all models	£22.00
C—12/230-6E AC CHARGER for C146A and C432	£3.00
Ni-cad Batteries, set of 10	£10.00
2-205K remote speaker for all models	£9.00
CAD external antenna coupler	£1.95
CSA Base charger unit for C146	£14.00
CAT08E. Rubber flexible antenna	£2.75
CMP08 External microphone for C146A and C432	£9.00
CMP02 Telephone handset for all models	£24.00
C—12/230-2. AC Charger/Speaker	£66.00

The Standard Radio Corporation produce only VHF/UHF Communications equipment and in this field they excel. All transceivers have automatic final protection circuits and are very well engineered. Because of the quality, the units are not cheap but nevertheless you will find their prices highly competitive and you have many advanced design features not found elsewhere. Delivery is ex-stock at the time of going to press. We regret the Standard accessories are only available to purchasers of Standard Transceivers.

VHF EQUIPMENT (Prices Carriage/VAT Paid)

BELCOM	Line 2 145·25-0·48 or 144-1 0·34, ex-stock	£132.00
BRAUN	SE600 Digital 2m AM/FM/SSB Transceiver	£895.00
FDK	Multi 2000	£264
TEMPO	6N2WE 2KW 144 MHz SSB/FM amplifier	£385.00
	12v DC Amplifiers 502 (50w o/p)	£62.70
	802 (80w o/p)	£107.80
	1002-3 (100w o/p)	£130.90

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Agent: G3PRR CHESHAM (02405) 4143

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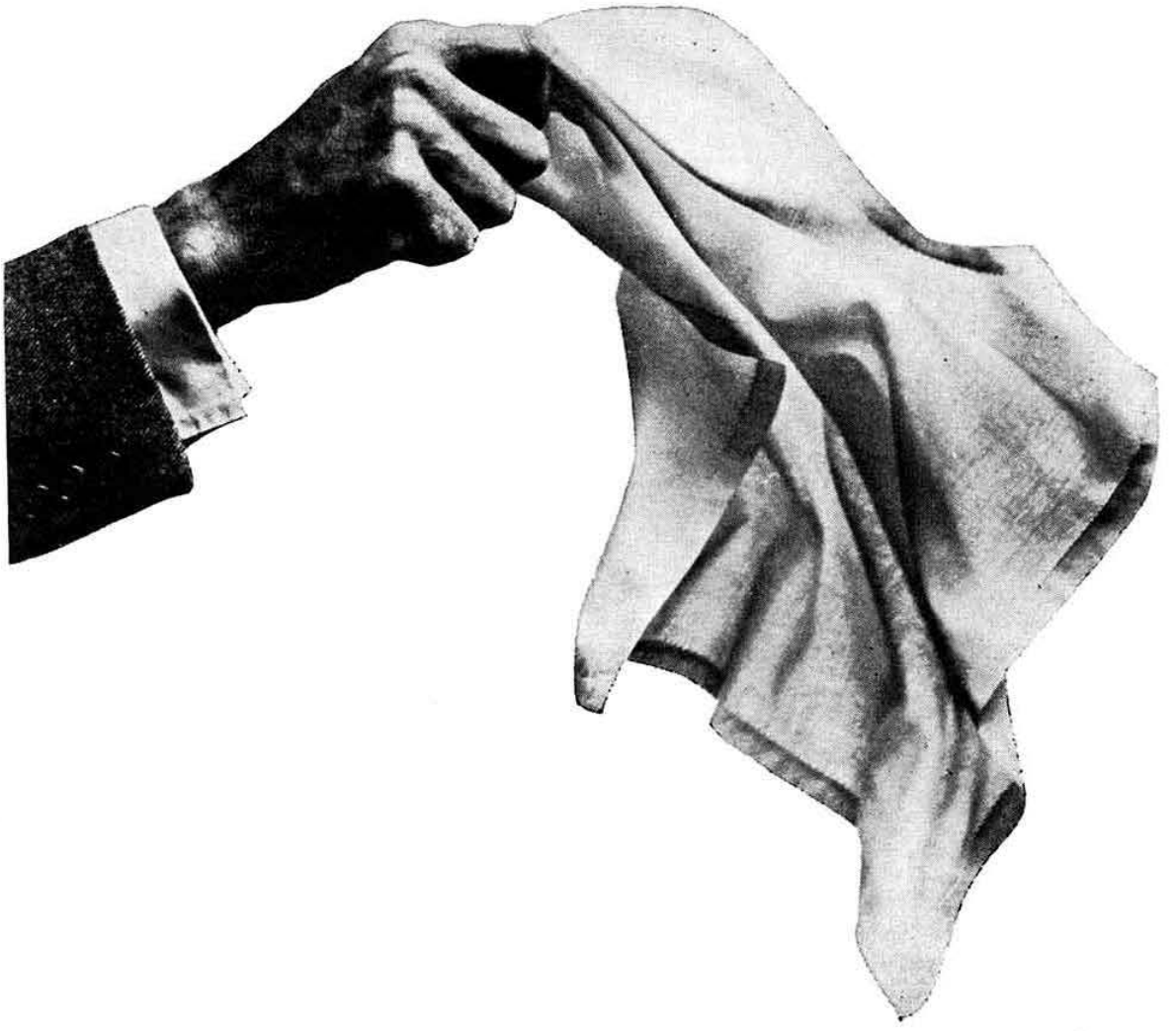
Goodbye to the long wait



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If you've been buying electronic components long you'll know all about the long wait.

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DORAM

S.M.C. Ltd.

YAESU MUSEN DISTRIBUTOR

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THE SUPERBLY ENGINEERED FR101 RECEIVER

EX STOCK IN TOTTON

YAESU

NEWS!

FL101 matching TX (with RF clipping) and the digital readout FR101

HERE SOON

FR101S (STANDARD) £245
FR101D (DE LUXE) £330

The FR101D is todays pace setter among amateur receivers; consider the signal path: a 0 to 20dB Switchable Attenuator two section permeability tuned input filter. Mosfet R.F. stage, Mosfet crystal controlled mixer, followed by a 3 section top coupled bandpass filter, ganged to the VFO. No gain at first I.F. frequency. I.C. balanced mixer followed by 20kHz (F.M.) crystal filter, then the shunt diode noise blanker, one FET buffer stage, and on through the AM, CW, or SSB (RTTY) filter, to the selected detector, then audio stages. Add to that the two excellent V.H.F. converters, the squelch, the FM detector, the 1kHz readout, the rock like stability, the TX monitor control, the crystal control positions, the switchable AGC, the wide coverage (23, 500kHz sections), the mains or 12V DC capability, the transceive capability, the digital readout option. For the price, for the quality, it must be YAESU.

YAESU PRICES (Carriage Paid by Securicor)

HF TRANSCEIVERS		**VHF TRANSCEIVERS**		**HF RECEIVERS**	
FT101B	**£330.00**	FT220	**£264.00**	FR50B	**£80.00**
FT/FP200	**£215.00**	FT2FB	**£115.00**	FR400	**£155.00**
FT/FP501	**£428.00**	FT2AUTO	**£157.00**	FR400SDX	**£210.00**
FT401	**£310.00**	SIGMASIZER200	**£180.00**	FR101D	**£330.00**
				FR101S	**£245.00**
LINEAR AMPLIFIERS		**TEST EQUIPMENT**			
FL2100B	**£165.00**	YO100	**£93.00**	**HF TRANSMITTERS**	
FL2500	**£150.00**	YC355	**£99.00**	FL50B	**£79.00**
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TOTTON

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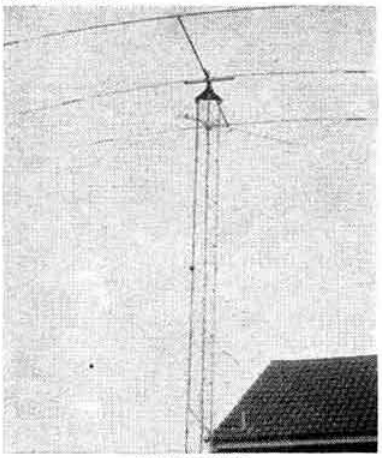
From **£88.50** + VAT.
Also available **THE SLIM LINE** 40' and guyed commercial masts to 150'.



30' HAMTOWER

VERSATOWERS

TILTING & TELESCOPIC

Post mounting ex-stock.

Type P40—40', type P60—60'

Wall Mounting.

Type W60 and W40.

85', 101' and many other types available.

ALIMASTS

Carr. pd.

6 metres to 21 metres in 1·5, 2 or 3 metre section lengths supplied with mast bands.

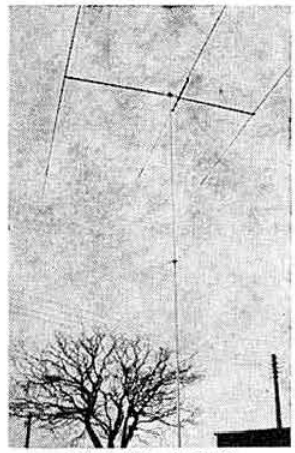
These masts suitable for VHF and UHF antennas.

Prices from **£11.60.** Rigging wire and fittings available.

J-BEAM—all models in stock

Telescopic galvanised masts 10' section length. Prices carriage paid.

	Mast only	Mast & Rigging Kit
30'	**£15.00** + VAT	**£29.00** + VAT.
40'	**£20.00** + VAT	**£39.00** + VAT.
50'	**£25.00** + VAT	**£49.00** + VAT.



TELEMAST with TA33

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BGA ¼ Wave 144MHz, **£6.00** | **70¼** 70¼ Wave 70MHz, **£3.00** | Trunk Lip Mount, T.B.A.

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G WHIP THE BRITISH MOBILE HF ANTENNA (Carriage 75p)
TRI BANDER—10-20m, **£12.30.** Base, **£1.65.** Resonators LF 40-160, **£4.10.** Whip for LF coil, **£1.10**
MULTI MOBILE 71—10-20m, **£14.30.** Base, **£1.65.** Resonators MM 40-160, **£4.10.** Whip for MM coil, **£1.10**
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★ **NEW CD-44 £60**

★ **NEW HAM-2 £90**

(Illustrated right)

CDE ROTOR PRICES:
AR22R, **£27.5**
AR30, **£25**
AR40, **£30**

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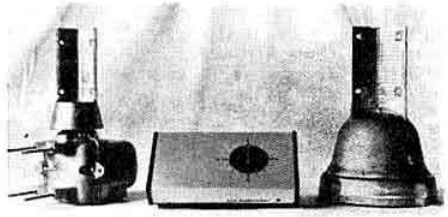

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REPEATERS

As you read in last months' Radio Communication (p. 699) repeaters are playing an increasingly major role in VHF mobile activity. Those who live within range of repeaters already operating will know that for successful contacts it is not only necessary to have the correct amount of deviation but also to have adequate clipping to secure maximum talk power without being cut off by the repeater for over-deviating. The audio frequency tailoring should be correct for maximum copiability under noisy mobile conditions and there must be a switchable tone-burst generator which does not drift significantly when the rig gets hot.

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SOLE INOUE IMPORTERS

Of course you have all the advantages of the IC-22 plus the availability of 80 channels, without having to buy another crystal, if you get an IC-225—see our advert on page 713 of last month's issue.

Please do not hesitate to write or phone us for further details-evening or daytime. We offer credit facilities, or if you have an Access card why not phone your order together with your Access number and your name and address as it appears on the card, before 3 PM and we will dispatch transceivers to you by Securicor the same day subject to stock conditions. We can now accept Barclaycards also.

PRICE LIST — November 1974

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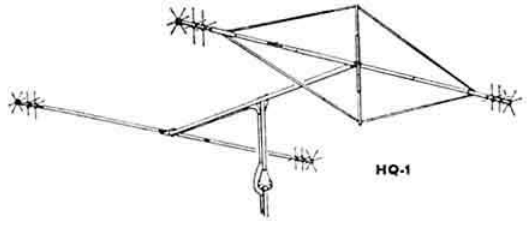

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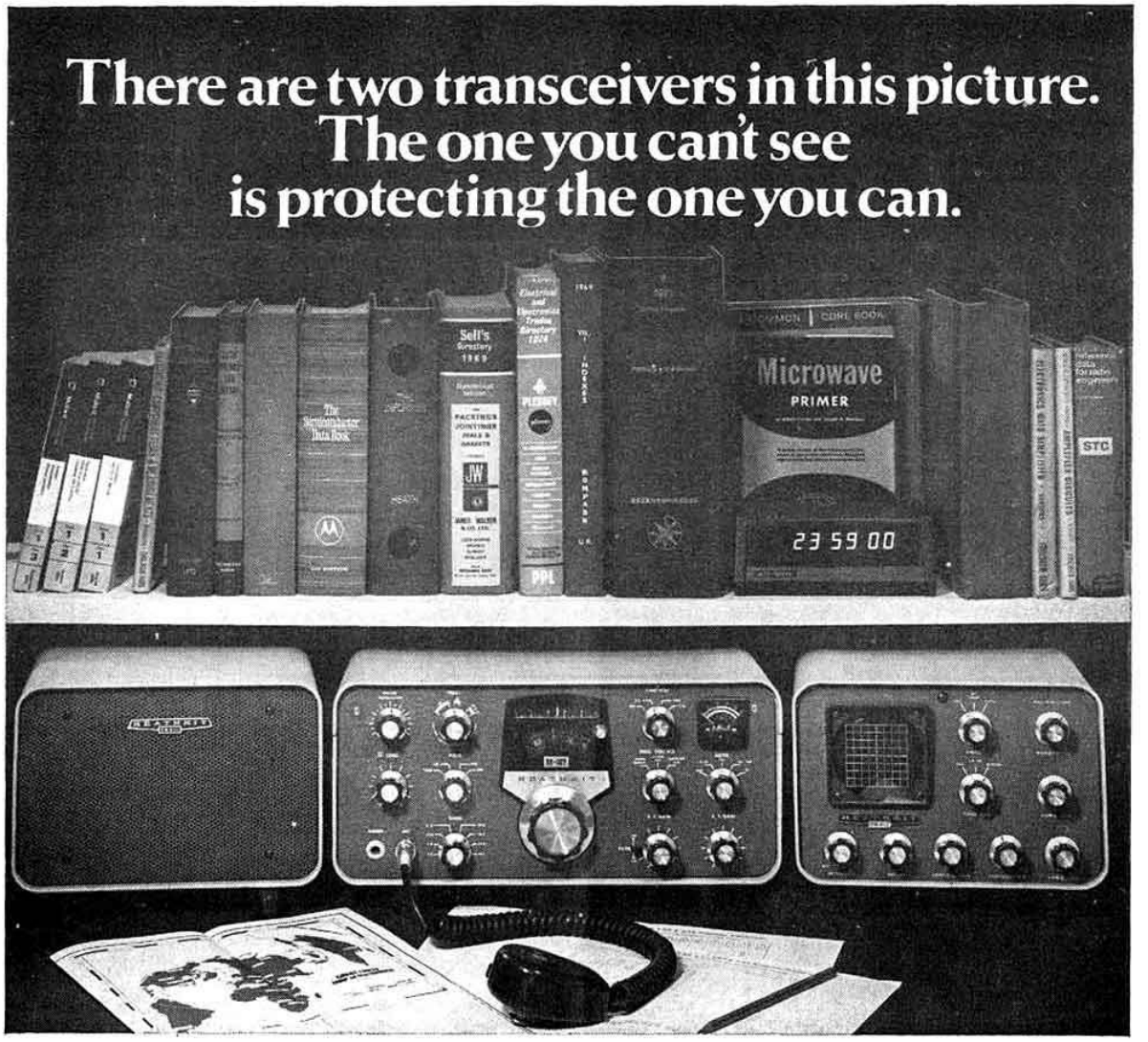
There are two transceivers in this picture. The one you can't see is protecting the one you can.



Top shelf, ninth book from the left. The Heathkit GD-39 ultrasonic burglar alarm.

It works by transmitting a silent ultrasonic signal throughout the room. And continuously receiving and monitoring it.

Any movement made by an intruder will then automatically produce a change in the signal. Which can trigger off a lamp, and, thirty seconds later, a remote buzzer (that only you hear—so you can call the police). Or a loud bell, guaranteed to scare the living daylights out of a burglar.

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And with all that valuable equipment around, it makes a lot of sense.

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For full details, send for your free Heathkit catalogue today.

Or, if you're in London or Gloucester, call in and see us. The London Heathkit Centre is at 233 Tottenham Court Road. The Gloucester showroom is next to our factory in Bristol Road, Gloucester.

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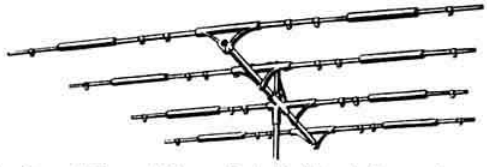
THE FANTASTIC SWAN 4 ELEMENT TRIBANDER TB-4HA (AN S.A.E. WILL BRING YOU DETAILS OF THE FULL SWAN ANTENNA RANGE).



The Swan 4 Element Heavy Duty Multiband Beam gives you 4 working elements on each band: 10, 15, and 20 metres. That's 4 working elements on each band. Other antenna brands, advertised as 4 element antennas, and even 6 element, actually offer only 3 elements on the 15 and 20 metre bands . . . and cost considerably more than the TB-4HA. The 24' boom permits optimum spacing for maximum forward gain and front-to-back ratio. All traps have been precision tuned and weather proofed. The Heavy Duty mechanical design of the TB-4HA means it will easily take winds up to 100mph, and give you years of rugged, reliable service in any kind of weather from the arctic to the tropics.

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Membership rates: UK—£5.50, VAT included (Unlicensed members under 18 years of age—£2). Overseas—£5 (USA $12). Members are asked to notify changes of address without delay.

QTC AMATEUR RADIO NEWS

Postal delays

Members will have read in the national press of the postal difficulties in the West Central area of London, which includes Doughty Street. Both incoming and outgoing mail is subject to very long delays, eg 11 days for a second-class letter from Wimbledon—a distance of 9 miles, and the Society is now finding it necessary to post outgoing mail at post offices away from this area in an attempt to hasten delivery.

The Post Office has informed us that in future we will have to pay £1 for each collection of parcels from 35 Doughty Street. Parcel charges are already excessive and to reduce the impact of this additional charge we will have to restrict our postings of *parcels* to once weekly.

Fortunately most of our publications are within the weight limit that allows them to be sent by second-class letter post—increased charges for this will undoubtedly follow!

Facts and figures

The Home Office advises that the following numbers of amateur licences were in force at 31 August 1974:

Class A	15,148	Class B/M	1,423
Class B	4,779	Television	264
Class A/M	3,319		

The Callsign Record received from the Home Office, dated 21 September, gives the latest callsigns issued in the G4 and G8 series as G4DJN and G8JEN respectively.

At the end of September RSGB membership totalled 17,250, made up of 14,510 UK corporate, 1,020 UK associate members and 1,720 overseas members.

Licence renewals

There is a temporary delay in the despatch of reminders for licence renewals, and licence holders whose licences are due for renewal during the next few weeks are asked to send the renewal fee without waiting for a reminder.

Renewal fees (£3 for a fixed station and £1.50 for a mobile licence) should be sent to the Accounting Officer, Home Office, Waterloo Bridge House, Waterloo Road, London SE1 8UA. The callsign must be quoted for reference purposes.

Reciprocal licences

Referring to the information appearing under this heading on page 666 of the October 1974 issue, the last sentence should read "Permission will not be given unless the equipment covers at least three amateur bands in addition to 26·1-28·00MHz".

Radio Amateur Old Timers Association

The RAOTA net seems to have got off to a flying start and so far over 36 members and prospective members have joined in the get-together on 80m.

The president, G2DX, who was first licensed in 1912, still holds the place of honour as oldest holder of an amateur callsign, and the others range all the way to the youngest who was first licensed in 1948.

All amateurs who have been licensed for 25 years and over are very welcome to join in on 3,740MHz approximately at 1000gmt. The official net meets on the first Thursday of the month, with informal gatherings on the other Thursdays.

Further details of RAOTA can be had from the secretary, Miss M. Gadsden, 79 New River Crescent, London N13 5RQ.

Presidential Inauguration 1975

Mr C. H. Parsons, GW8NP, as President for 1975, will receive the chain of office at a social occasion to be held in

Cardiff Castle

on

Friday 17 January 1975

As accommodation is limited, regretfully it will only be possible to consider applications for tickets from members of the RSGB and their ladies.

Will members who wish to attend please apply to RSGB headquarters **on or after 15 November 1974.**

Nobel Prize for G3CY

The Society offers its congratulations to Professor Sir Martin Ryle, FRS, G3CY, the Astronomer Royal, who jointly with Professor Antony Hewish has been awarded the 1974 Nobel Prize for Physics. Both men have worked together at the Cavendish Laboratory, Cambridge, for 25 years and have been awarded the prize for their pioneering work in radio astronomy.

Professor Ryle, who has been Professor of Radio Astronomy at Cambridge since 1959 and is Director of the Mullard Radio Observatory, is an Honorary Member of the RSGB.

Proposed inter-club ssb net

The White Rose Radio Society, Leeds, G3XEP, proposes that an inter-club ssb net should be formed, and that it should meet on the first Sunday of every month, at 10am on 3,734kHz, or near; the first net to be on Sunday 1 December 1974. It will provide an opportunity for clubs to exchange news and views, and other stations would be welcome to call in.

IARU Region 1 meeting

The annual meeting of the Executive Committee of the Region 1 Division was held between 11 and 13 October at The Hague. In addition to the routine matters of the division, items under discussion included the intruder watch (IARU monitoring system), the 28MHz beacon network and the future amateur space programme. Arrangements were agreed for the Region 1 Conference to take place at Warsaw between 14 and 18 April 1975 and a very considerable proportion of the meeting time was devoted to the subject of preparations for the 1979 ITU World Administrative Radio Conference.

Members of the Executive Committee present were P-A. Kinnman, SM5ZD; Axel Tigerstedt, OH5NW; Roy Stevens, G2BVN; W. Nietyksza, SP5FM; J. Znidarsic, YU3AA, and H. Walcott Benjamin, EL2BA. Also present were C. van Dijk, PA0QC (chairman of the vhf working group) and Noel Eaton, VE3CJ and Vic Clark, W4KFC, president and vice-president respectively of the IARU.

IARU Conference

The next triennial conference of the Region 1 Division of the IARU will take place between 14 and 18 April 1975 at Warsaw, where PZK will be the host society. It is expected that the majority of the 41 member societies of the Region 1 Division will be represented. The RSGB delegation will consist of four members under the leadership of Tim Hughes, G3GVV. Already a number of papers have been submitted by members of Society committees for consideration at the conference and others are in preparation. One of the major agenda items will be the preparations for the 1979 World Administrative Radio Conference of the ITU. If amateur radio is to continue, an agreed policy for the retention and expansion of our bands must be supported by all national societies.

ITU

The Commonwealth of the Bahamas, by its accession to the International Telecommunication Convention, has become the 148th member country of the ITU.

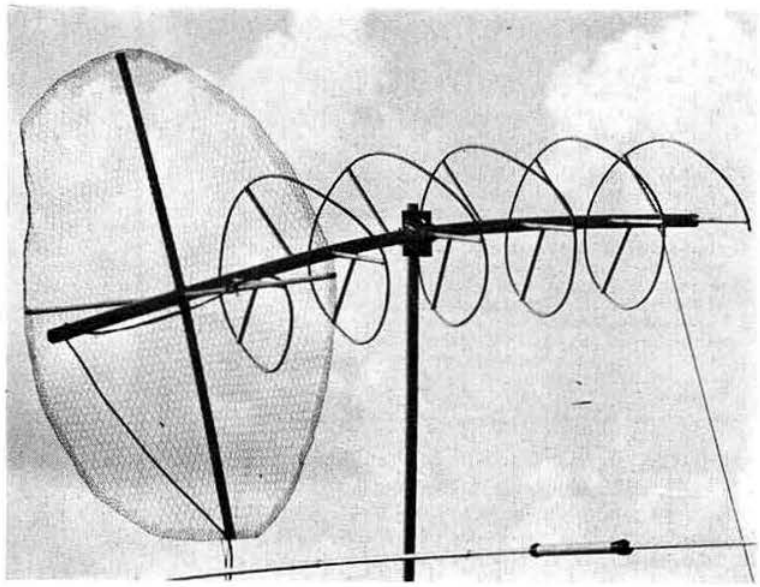
The second world telecommunication exhibition will be held in Geneva between 2 and 8 October 1975. This will be known as *Telecom 75*. M. M. Mili, the Secretary-General of the ITU and Patron of the IARC, has circulated all national radio societies inviting their participation in the exhibition and particularly in a world amateur radio convention for which the weekend of 4-5 October 1975 has been reserved.

The IARU participated in the first exhibition, *Telecom 71*, and it is hoped that radio amateurs and national societies can, through the IARU, take part in *Telecom 75*. Co-ordination with ITU headquarters at Geneva will be through the Executive Committee of the Region 1 Division of the IARU. Any comments may be addressed through the secretary, G2BVN.

New book

The General Electric semiconductor handbook is now in its second edition containing data and applications of all current GE semiconductor products including diodes, triacs, transistors, optodevices and many others. The handbook costs £2.75 post free and may be obtained from Jermyn, Sevenoaks, Kent.

A 2m helical aerial for satellite communications



by R. W. L. LIMEBEAR,
G3RWL, 8P6DR, VP2AGA*

The idea and purpose

IT was apparent from the start of operations on Oscar 6 at 8P6DR that some signals from the satellite were less prone to fading than others. The reason was almost certainly that polarization changes at the satellite, due to roll pitch and yaw, were responsible.

The aerials in use at that time were both horizontally polarized; a 3-element beam for 10m and an 8-over-8 slot for 2m. Some consideration was given to the receiving aerial but, due to physical size and electrical limitations, this was not altered and it also possessed a certain amount of gain. Thought was then concentrated upon the "up-link" aerial; with circular polarization as the ideal.

Circular polarization can be either of two senses, right hand circular polarization (rhcp) or left hand circular polarization (lhcp). For guidance, rhcp is also known as clockwise circular polarization and on an rhcp helix the turns will wind in a clockwise direction away from the viewer when he looks along the axis of the helix from either end.

With the launch of Oscar 7 circular polarization becomes even more desirable to those wanting maximum communications efficiency. Due to a circularly-polarized 2m/70cm aerial on the satellite, northern hemisphere ground station aerials required for optimum efficiency include rhcp for transmitting and lhcp for receiving on each of those bands (up-link and downlink have opposite polarization). A plane-polarized aerial for each band will give reliable communications via the satellite but the reward to those stations using the correct sense of circular polarization will be an extra 3dB on each link.

When a plane-polarized aerial such as a dipole is placed in the field from a circularly-polarized transmitting aerial and rotated through 360°, no difference due to polarization changes is noticeable in the signal strength at the receiving aerial. There is, however, a 3dB drop compared with a circularly-polarized receiving aerial due to the polarization difference.

There are two main types of aerial giving a circularly-polarized field, the crossed Yagi and the helix, and two aerials are required for each band if the devotee wishes to make full use of circular polarization. A *QST* article on the crossed Yagi was given a great deal of study but eventually rejected due to complications in the matching and phasing arrangements at the feedpoint. It was not possible at that time to purchase a ready-made crossed Yagi, and the cost of four of these units could be a deterrent. Two crossed Yagis with suitable phasing arrangements could give the desired effect but the cost must be considered.

Attention was then turned to a brief description of the helix in the *Radio Communication Handbook*, but according to calculations based on the handbook the element thickness required was ¾in, which is rather difficult for the average amateur to obtain. Also, if this thickness was available through copper tape on a piece of hosepipe or some other ingenious device, the actual weight of the driven element would necessitate a sturdy supporting structure. All in all, for 2m this would result in an aerial weight unacceptable to most rotators. The project was then shelved pending future ideas.

A short while later, while looking through some back issues of *QST*, a tip was discovered which made the helical aerial a feasible project ("NASA Tech Brief 70-10016", *QST* June 1972). This idea entailed the use of thick coaxial cable as the driven element, with inner and outer shorted together at both ends. The impedance of the cable is of no consequence, just the thickness (the thicker the better).

Construction of the support assembly

The aerial was designed and constructed to have five turns; mainly due to the fact that the longest available boom was 10ft. If longer booms are available then more turns can be added by extending the design. It must, however, be borne in mind that extra turns, while increasing the aerial gain, will

* 60 Willow Road, Enfield, Middx EN1 3NQ

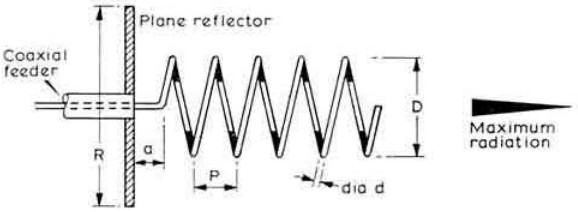


Fig 1. The helical aerial. The plane reflector may take the form of a dartboard type of wire grid. The dimensions given in the table are based on a pitch angle of 12°. The helix, which may be wound of copper tube or wire the actual diameter of which is not critical, must be supported by low-loss insulators. Dimensions are scaled down from those given in the handbook. In practice dimension D was less than shown

add to the weight of the aerial and reduce the beamwidth. Six turns would seem to be the maximum permissible under these limitations. Forward gain of the aerial is of the order of 10dB and 12dB for five and six turns respectively. Fig 1 shows the electrical structure of the helix.

The supporting structure was constructed from plastic electrical conduit; 2in outside diameter for the boom and ¾in for the element stand-offs. Plastic drain-piping was considered but rejected because the thickness of the walls does not provide sufficient strength to take the weight of the complete aerial.

First the boom was marked and drilled to take the stand-offs; see Fig 2 for drilling dimensions. An easy way to make sure the holes are in line is to pass some string or thin wire through the conduit, returning along the outer surface of the conduit, and then pulling and tying it very tightly before fixing it in some way to prevent it from rolling around the perimeter. The author did this by lashing the longitudinal wire with more wire tied tightly around the perimeter every foot or so. The conduit was then marked along its length ready for drilling. It is a good idea to use a long, previously marked out, tape-measure for this in order to avoid a build-up of error which could occur if the centre-to-centre distances were measured individually. Fig 2 gives cumulative measurements in addition to individual measurements for this purpose. Once the first side has been drilled, move around the perimeter 120° and repeat the operation with the next measurements; and after that repeat once more. This will give mounting holes for three stand-offs per turn of the helix. For rhcp, looking from the reflector end of the boom drill, referring to Fig 2, in the order (a), (b), (c) working anti-clockwise around the boom. For lhcp the order (a), (b), (c) should work clockwise around the boom. One side has one more mounting hole than the other two sides. Drilling operations and accuracy are facilitated by first drilling the marked positions with a small drill and then using a ¾in drill; the smaller drill will help to locate the larger drill and also aid accuracy.

Next the 16 stand-offs required are cut to length and their ends grooved with a round or half-round file. The grooves in this design are for the ½in diameter (including insulation) type of coaxial cable. If a different diameter cable is used, the grooves should be of such depth that the centre (inner) of the cable is 12¾in from the geometrical centre of the boom. At this time also cut the reflector supports to length, two at 5ft 6in and two at 2ft 8in. The 2in conduit is used for the boom and the ¾in conduit makes the stand-offs and reflector supports.

Before the start of gluing operations the author recommends a "dry run" whereby the constructor should follow the instructions in the next two paragraphs *but without using glue*. This will show up any possible snags and give some practice before any irrevocable action is taken.

Having cut the element and reflector supports to length the stand-offs should now be inserted in the boom and glued into position. The glue used on the original aerial was obtained by asking the conduit supplier for whatever adhesive was correct. In this case it was "Egaweld No 1" which seemed to do a reasonable job of fixing but tended to be rather brittle when hardened, ie once the supports were glued in and the glue hardened any hard knock sideways would "break" the gluing. One stand-off should be used to check the fit in all the holes; some holes may have remnants from the drilling in them and, if the stand-off will not go in, the holes should be

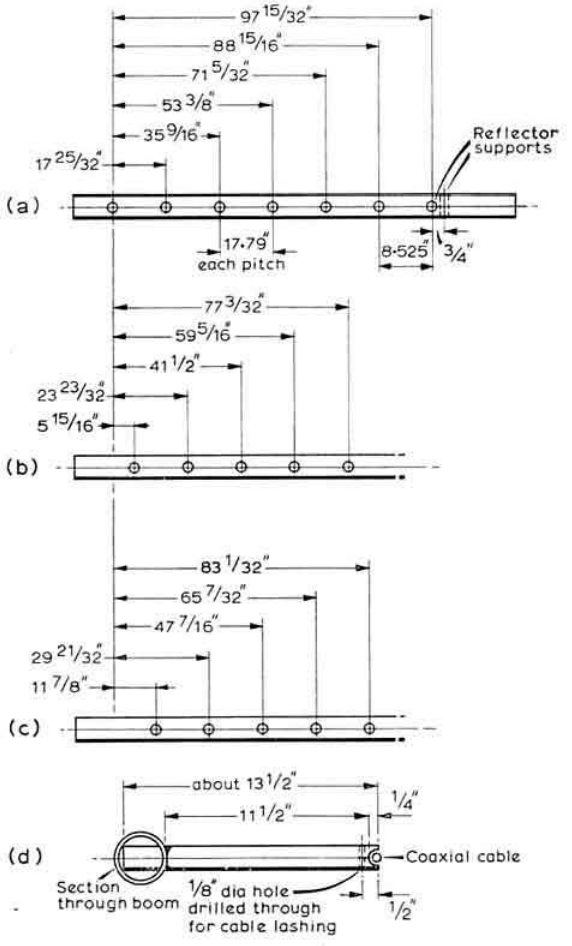


Fig 2: (a) first side drilling dimensions, reflector support holes are drilled at right angles; (b) and (c) are drilled at intervals of 120° and 240° respectively from (a); (d) gives cutting and filing dimensions for the element stand-offs, fractions of one inch are to the nearest 1/32in

trimmed with a penknife or similar tool, but too much trimming should be avoided and the stand-offs should make a tight fit in the mounting holes.

Now commence gluing operations: the glue should be lightly daubed around the ungrooved end of each stand-off before rapid insertion (the glue sets quickly) and thereby provides some lubrication which makes insertion easier. Push each stand-off in by hand as far as possible and check that it is not slanting in any direction before aligning the direction of the cable groove; then finish off by lightly tapping with a piece of wood. Repeat this operation for each stand-off. The first side is easy but the other two sides are a little more complex in order to avoid accidentally stressing those stand-offs which have already been inserted.

The author suggests the use of two trestles of any sort to support the boom at each end away from any other surface which could move those supports already placed. Also the boom can be rolled around on the trestles to gain access to all sides. It is recommended that after each of the three sides is completed the assembly be left for half an hour or so to allow the glue to harden; otherwise the tapping involved in the next placing could partially dislodge those stand-offs already placed and not set. When the glue on the last side has hardened a brief check should be made to confirm the lower edges of the grooves are 11½in from the outside edge of the boom—adjust by filing, *carefully*, if necessary.

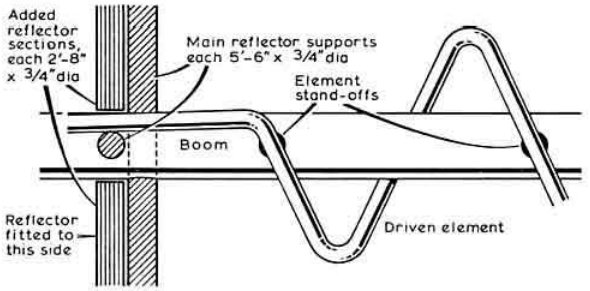


Fig 3: (1) assembly of reflector support structure and (2) alignment of grooves in the stand-offs. It should be noted that, because the cable has to be bent, the groove angle in the first stand-off is different from the rest; but actual angles are not critical

Once the stand-offs have been placed, the reflector supports should be inserted and gently tapped until they are about 3in from their central position. Then daub some glue around them and tap them into their final position. Once the glue has hardened around the reflector supports two more pieces of conduit, as shown in Fig 3, should be fixed to both sides of the reflector support which is nearest to the element stand-offs. This is done by first lashing the conduit to the rearward side of the reflector support with two or three pieces of wire each, and then filling the valleys between the conduits, on both sides, with glue. More glue can later be added to all stand-offs and supports, where they meet the boom, for extra sealing.

After the glue has set, the wires should be removed to leave the reflector supports in line with each other at 90° intervals around the boom. Two long supports are used, with two short pieces to make them of comparative level, rather than four short pieces placed at 90° intervals which would (a) have less individual mounting area and (b) weaken the boom where, were this done, there would be four holes in one plane.

Construction of elements

One end of the coaxial cable should be shorted, outer to inner, as follows: carefully remove 2in of the outer insulation and push the outer braiding as far back as possible; cut away the inner insulation, stretch the braiding back over the now bared inner conductor and twist it tightly around same; flow solder into this connection and, when cool, cut off all but the last ½in or so of the joint. The outer insulation, suitably trimmed, can now be replaced over the joint and some weatherproof (insulating) tape used as a final seal.

Now attach the coaxial cable to the element stand-offs, starting at the end furthest from the reflector mounting, by fitting the cable into the grooves and lashing with some strong twine; the author used nylon cord for this purpose. The dimensions given for the supporting structure are designed around a circumference of one electrical wavelength and assembly is eased by marking the coaxial cable at intervals of one wavelength (the handbook says 81½in) and lashing one circumference at a time. Start with the wavelength mark and distribute the cable loosely around the circumference until it looks as near to a circle as possible. Finally lash all joints. When putting the wavelength marks on the cable, extra marks of one third of a wavelength can be added for this purpose if desired. Once all the turns have been mounted, the remaining untrimmed foot or so of cable should be left loose for the time being.

Attention should now be turned to the reflector, a 5ft 6in diameter circle of wire mesh. If the mesh has been purchased as a 6ft square the perimeter can easily be traced by the following method: tie two pieces of string, or wire, across the square between opposite corners; where the strings cross it is the centre of the square. Tie another piece of string to this point and then remove the other strings. Measure 2ft 9in along the remaining string and mark this spot with a knot or some unmistakable marking. All that remains is to keep the string tight and swing it round through 360° and mark, on the mesh, the course of the knot. The author did this by threading a piece of wire around the circumference but easier methods exist. Once marked the mesh can be cut about one inch larger than the radius and then bent over to the exact diameter; this will give some strength to the edge of the reflector which does not need to be any more accurate than ±0·5in. Now, returning to the centre point, mark a circle 2in diameter around the centre. Cut away this section and reinforce the inside edge with wire—the boom has to go through this hole.

The author used ½in chicken-wire for the reflector but it was heavy and caught the wind. One inch mesh, as used for fences, will do the job just as well as would any mesh up to about 4in (for 2m). The author emphasizes, from painful experience, that using ½in mesh and then cutting lumps out of it to reduce weight and wind loading is just a scientific means of raising blisters on one's hands in addition to wasting several hours. This is not a passive reflector; the helix is tuned against it so the crossing points of the mesh must make good electrical contact. For this reason plastic coated wire, formed into a mesh, would not be suitable unless specially treated.

The reflector can now be placed on the boom, from the rearward end, and fixed to the reflector supports by twists of wire or twine. At least four ties are recommended for each

Materials required

Thickest coaxial cable available, 12yds.
300Ω ribbon feeder, 1½yds.
Mesh, 6ft by 6ft (see text).
Four 10ft lengths of ¾in plastic electrical conduit.
10ft of 2in plastic electrical conduit.
Small tin of glue for conduit.
Ball of string.
Metal plate about 6in by 6in by ⅛in.
Two 2in U-bolts.
Two U-bolts to suit mast (see text).
75/80Ω coaxial feedline.

support; one by the boom, one at the outer edge, and two or more in the intervening space.

Feedline termination

The coaxial cable, previously left dangling, should now be bent round and pushed through the mesh adjacent to the last fixed point of the helix. Mark the cable about ½in rearward of the mesh and then short inner and outer together at this point as previously described. Some of the outer insulation should afterwards be replaced to prevent electrical contact between the cable and the reflector. Then lash the cable to the reflector mounting.

Published data on the helix gives the feedpoint impedance as approximately 140Ω. If the constructor does not have 140 or 150Ω coaxial cable available another published article suggests that direct feed by 80Ω coaxial cable would not result in too much mis-match. However, the author did not like the sound of that and some form of impedance matching was deemed necessary; a quarter-wave transformer was suggested. Data in the handbook indicated that in order to match 80Ω feedline to an aerial of 140Ω, a quarter wavelength of feedline of about 104Ω was necessary, but no such thing was available. The author tried putting three pieces of 300Ω ribbon, each ¼λ long, in parallel (by Ohm's law = 100Ω?) and it worked; ¼λ is 17⅓in and the ribbons should be taped together after parallelling. The author did not have 50Ω coaxial cable available but, where it is available, the feedline can be made from this and a ¼λ transformer made from 14in of 75 or 80Ω coaxial cable should be employed. The formula on page 14.10 of the *Radio Communication Handbook* gives the desired matching impedance as 83·7Ω which is sufficiently close to the available values. The difference in length is due to the difference of velocity factor between flat twin and coaxial cables.

All that remains is to connect the coaxial feedline, via the transformer, to the aerial in such a way as to connect the inner to the helical element and the outer to the reflector. The connection to the reflector should be made within ½in of where the cable passes through the mesh. The author did not like to leave the feedline dangling from the reflector and so, having used 10ft of conduit for the boom, of which a couple of spare feet protruded rearwards, lashed the feeder to the rearward end of the boom. The aerial is now complete but there still remains the small(?) problem of putting it where it can be used.

Fixing to a mast

For operation via Oscar we are told that best results can be obtained with elevation tracking (up and down) as well as azimuth tracking (side to side). This can be achieved by various methods; handraulic, the use of two rotators, etc. The

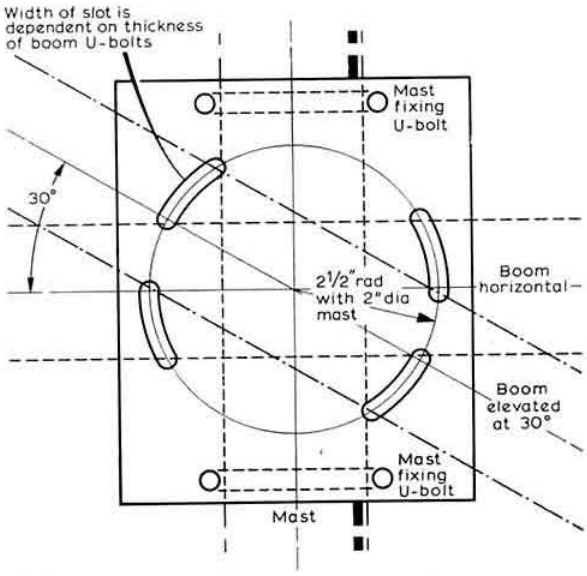
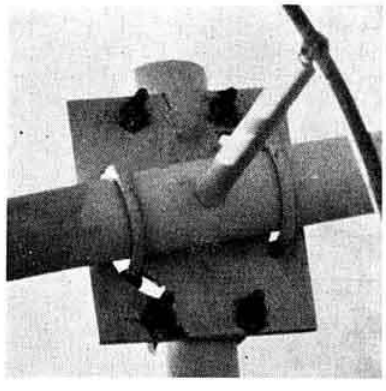


Fig 4. Mounting plate theme. Dimensions, where given, are based upon both boom and mast diameters being 2in. Suggested plate size 6in by 8in by ⅛in

beamwidth of this aerial, however, is theoretically 48-50° between the 3dB points and the author decided to use a fixed elevation mounting because 50° covers quite a lot of sky (rf off the side of the aerial seems to be adequate when the satellite is higher than 50°). The choice of elevation angle is left to the constructor; mounting plate dimensions can be calculated from a scale drawing of that shown in Fig 4. The mounting plate is fixed to the boom with U-bolts close to the centre of gravity (approximately at the seventh element support from the reflector on the author's helix). To determine drilling dimensions for the mounting plate the author merely drew a scale outline of the plate, found the centre point, and drew a circle on the paper. Various angles were then laid off on the paper with the aid of a protractor and the dimensions measured. Fig 4 shows a mounting plate that provides for semi-variable elevation; the elevation angle can be changed by shifting the boom fixing bolts. Any constructor who



Close-up of the mounting plate

desires extra precision can determine dimensions by trigonometry. A mast diameter of *not less than* 1½in is recommended, and adequate tying is a must.

Operation

The author started off with an elevation of 30°; results were reasonably good but tended to drop off at low angles (satellite close to horizon). Figures in the author's case for his own signal returned from the satellite were of the order of 589 when the satellite was overhead and 339 with the satellite on the southern sector horizon (no-one else on the satellite). Because the author was more interested in dx, and therefore wanted a stronger horizon signal, the elevation angle was altered to about 15°; this resulted in returned signals still being 589 overhead but 449 close to the northern horizon (satellite occupied) and "below the horizon" returned signals have also been observed.

A few words of warning about interaction between the helix and other metal objects. When first erected the aerial was mounted on a 2in metal pole just below the 10m beam used for receiving. In fact, as a result of the elevation angle, the forward two turns were above the 10m beam while the rest were below it. Poor results suggested something was wrong. Firstly the 2in aluminium mast section running vertically through the helix, and about 2m long, was replaced by 2in plastic electrical conduit—results improved but could be better. The helix and the 10m beam were then transposed vertically to end up with the helix reflector a few inches above the boom of the 10m beam, and results were improved to the acceptable levels previously mentioned. The minimum distance recommended between aerial mounting centres is 5ft; any closer will affect the relayed signal. To avoid excessive sway in the plastic masting, the helix was tied fore and aft to the 10m beam with plastic clothes-line.

A heavy aerial atop a plastic mast appears rather insecure but thanks to tying the helix fore and aft, and by parking and lashing the aerial beaming upwind when not in use, it did not fall down and survived 30-40 mph wind gusts on the roof of the author's seaside apartment. However, a stronger, non-metallic mast is recommended where frequent high winds are expected. The author experimented inconclusively with a wooden pole through the middle of the plastic mast. Another reason for parking the beam upwind was that the rotator in use, an AR-22, was rather overloaded with the 3-element beam and the helix so a "meaty" rotator would be an asset.

Another minor problem experienced was the noise caused by the wind blowing across the open ends of the boom and reflector supports. The forward end of the boom was sealed with insulating tape and the reflector supports were blocked up with a few chips of wood. The rearward end of the boom was left open, and contributed little noise, to prevent any build-up of rainwater inside the boom. The helix was, it would seem, far enough away from the 3-element beam, a Mosley Mustang, for its radiation pattern to be more or less unaffected; the reverse cannot be said for the 3-element beam though, and the radiation characteristic of this was noticeably different after the helix had been erected.

There is a small amount of droop in both the boom and the turns of the helix which could cause eliptical polarization but no difference in signal strength has been noticed.

Conclusions

The change from horizontal to circular polarization has given much more consistent signals from the satellite even though the receiving aerial is still horizontally polarized. Unfortunately the author was unable to take swr measurements, but a good amount of rf gets "airborne" judging from results.

The author is not an aerial boffin. The construction of this aerial was an exercise in putting together information from one principal source and several minor sources. To any boffins who go into a quiet corner and cry after reading this article, the author offers condolences but assures them that it works. Any suggestions for improvement will be welcomed, as a future article is planned for construction of a 70cm helix.

Acknowledgement is made to ARRL and the United States National Aeronautics and Space Administration for kind permission to use the *Tech Brief* in this article. The author also wishes to thank the many amateurs, mostly in the AMSAT net, for their suggestions and patience in explaining various ideas.

THE OSCAR FILE

THE Oscar 6 telemetry provides no indication that the batteries on board the satellite are deteriorating and with the forthcoming launch of Oscar 7 (scheduled for 29 October at 1711ut) it is opportune to consider the basic equipment necessary to operate through the 145 - 29MHz repeaters carried on board these satellites. It should be noted that the passbands for these repeaters are not the same in both satellites:

Oscar 6, uplink 145·900–146·00MHz; downlink 29·450–29·550MHz

Oscar 7, uplink 145·850–145·950MHz; downlink 29·400–29·500MHz.

In addition Oscar 7 carries a 432 to 145MHz translator and further information is given in the November 1973 issue of *Radio Communication* by the article "Oscar 7 and its capabilities".

To receive the downlink signals a sensitive low-noise receiver covering the 29MHz passband is essential. This requirement may be met by:

(*a*) a receiver of acceptable preformance at 29MHz,

(*b*) a receiver with a low-noise preamplifier, or

(*c*) a crystal-controlled converter using a convenient low frequency tuning segment, eg 4 - 6MHz. The bandwidths required are those suitable for ssb and cw. A receiver lacking an i.f. filter for the latter mode may usually be improved by the addition of an outboard audio filter.

Receiving aerials range from the simple to the ambitious. For maximum distance low-angle reception a beam is invaluable. For satellite angles of more than 30° above the horizon crossed dipoles or a vertical dipole will provide improved results. It has been found by practical experience that crossed dipoles (also known as a turnstile) optimized

at 29·5MHz and used at a height of no more than 3m above the ground, will give excellent results on the higher-angle passes.

Transmitting equipment will usually be that which is already available or which can be readily built or converted. The output power will depend on the type of transmitting aerial to be used. If nothing more than 144MHz crossed dipoles or a vertical dipole is possible then the target should be 100W of rf. If an aerial giving appreciable gain is to be used then this power requirement can be modified. The transmitter will be either a unit intended for 144MHz operation or an hf transmitter used with a transverter giving output in the appropriate 144MHz segment. Crystal-controlled or vxo operation is acceptable but vfo control will bring improved results. If output power is only marginally sufficient, ensure that wastage is minimized by using coaxial cable with low attenuation at 144MHz.

There is a wide choice for the uplink aerial. A simple omnidirectional aerial will obviate tracking problems but the results will obviously be inferior to a cross-polarized Yagi steerable in azimuth and elevation. What is physically possible will usually dictate the choice which ranges from a dipole or simple linear beam to Yagi arrays with switchable polarization. For beams not adjustable in elevation is it recommended that these be fixed at an angle of about 25° to the horizon. This will give acceptable results for all except overhead passes.

The various possibilities having been briefly outlined, some indication of the sources of these items is desirable. Many hf stations will already be equipped with 28MHz beams, usually in the shape of the popular tri-bander. Sources of these aerials are many and well known. There is no known source of crossed dipoles for 28MHz, but Jaybeam of Northampton can supply the centre insulators, and the use of light tubing is entirely practical. The basic information on this type of aerial will be found in an article by J. B. Hodgson, G3YKB, in *Radio Communication* for July 1972. Dimensions will require rescaling according to handbook formulas. Alternatively, a supported wire version is possible, and physical layout will determine the choice; an article by G2UK in the *Radio and Electronics Constructor* for March 1974 shows one possible approach.

The purchase of a receiver solely for use with Oscar is unlikely. A description of a 29·5MHz preamplifier appeared in the *AMSAT Newsletter* of March 1973 and copies of this information can be obtained by sending an sae to G2BVN. Alternatively, Microwave Modules and other *Radio Communication* advertisers can supply suitable converters for use with receivers whose performance at 29MHz is less than acceptable.

Uplink transmitting equipment can be relatively simple for cw, and that manufactured by Telford Communications of Bridgnorth and reviewed in the September 1974 issue of *Radio Communication* is one example. Alternatively, one of the imported units can be used on ssb and a keyed oscillator used to produce cw. There is no great choice of transverters and the Europa, manufactured by Solid State Modules, is regularly advertised in this journal, and a low power unit requiring a following amplifier is manufactured by QM70 Products of Droitwich. There is a transverter available in West Germany and suitable for use with the FT-101 equipment but this is not handled by any of the UK outlets, as far as is known.

For equipment requiring an amplifier the most economical approach is probably by the use of a QV06-40 or, for higher power, a 4X150A or similar. There is no shortage of design data and suitable circuits. When operating equipment capable of high power outputs, comply with licence conditions and use the minimum output necessary to communicate via Oscar.

Suitable types of 144MHz aerials are available from *Radio Communication* advertisers including Jaybeam and Antec.

Articles in editions 2/1973, 4/1973 and 1/1974 of *VHF Communications* provide a considerable amount of information on crossed Yagis and methods of selecting polarization. While the more complex aerial systems increase the system performance, they are not essential for communication and it is anticipated that Oscar 7 will give superior results to Oscar 6 for users of simple equipment.

Oscar 7 band plan

Following a number of requests, AMSAT has agreed that a band plan is desirable in the operation of the 145-29MHz repeater and the following has been suggested:

Uplink

145·850–145·905MHz ssb and other modes
145·895–145·945MHz cw

Downlink

29·400–29·455MHz ssb and other modes
29·445–29·495 cw

The beacon is on 29·500MHz and a 5kHz guard band is proposed. The reason for the selection of the high end rather than the low end for cw is that it is felt that cw stations will pose less of an interference threat to the beacon. Also, many stations on cw on Oscar 6 are crystal controlled whereas almost everyone on ssb uses vfo control.

Oscar 6 orbits

Reference equatorial crossing times and longitudes for November are:

16 November, orbit 9,543, 1822ut, 323°;
17 November, orbit 9,551, 0942ut, 193°;
18 November, orbit 9,568, 1817ut, 322°;
21 November, orbit 9,606, 1907ut, 334°.

VHF BEACON STATIONS

Callsign	Location	Nominal frequency	Emission	Aerial direction
GB3ANG	Angus	145·95MHz	A1	SSE
GB3CTC	Redruth, Cornwall	144·13MHz	A1	ENE
GB3DD	Dunstable Downs	1,296·05MHz	F1	N
GB3DM	Burnhope, Co Durham	145·975MHz	F1	N/S
GB3GI	Bangor	145·99MHz	A1	NE/SE
GB3GW	Swansea	144·25MHz	A1	ENE
GB3GM	Thurso	145·995MHz	A1	S
GB3LDN	S. London	1,297·950MHz	F1	E/NW
GB3SC	Sutton Coldfield	432·025MHz	F1	N/S
GB3SU	Sheffield (temporary location)	70·695MHz	A1/F1*	Omni
GB3SX	Crowborough	70·699MHz	A1	N
GB3VHF	Wrotham, Kent	144·15MHz	F1	NW

* Callsign on F1 continuously, on A1 once a minute. When on A1, F1 is suppressed.

Injection locking of reflex-klystron oscillators

by V. J. LUDLOW, MSc, G3JLZ*

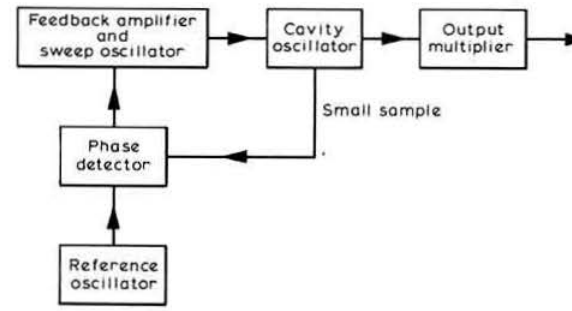


Fig 1. Representative microwave phase-locked loop

ANY oscillator may be injection locked by the introduction of energy on a frequency equal to, or near, the natural frequency of oscillation of the circuit. The synchronization of the oscillator is dependent upon the ratio of injected power to oscillator power and the frequency difference between the free-running output and the injected signal. Locking has been observed in the laboratory with injection signal power levels 60dB or more below the oscillator output level, but 30dB ratios are, perhaps, more practically realizable. In this article, experimental injection locking results for 10GHz operation are presented and suggestions made for crystal control of reflex-klystrons in the amateur bands above 3GHz, where reflex-klystrons might be expected to be used. Many people have klystrons of the 2K25 or 723A/B type, and similar devices for the lower gigahertz bands, and they may be interested to know that they can operate these valves with crystal control via a chain of multipliers giving only some tens of microwatts output at the required final frequency. Additionally, the Ruthroff injection-locked fm receiver is introduced to a wider audience.

Theory of injection locking

There have been many investigations into the subject of synchronization of oscillators. Huygens (1625–95) noted that two clocks hung on the same wall tended to synchronize, and a paper in German by Möller in 1921 showed that there was early recognition of this effect in electronic oscillators [1]. In fact it is possible to feed an external signal into any oscillator, of frequency very close to that at which the oscillator would normally operate, and by means of this external signal to cause the oscillator to put out power which not only has its phase determined by the external signal but which even has its frequency equal to that of the external signal, provided that frequency is close enough to that of normal operation [2].

It is typical in the electronic art that active devices are useful as oscillators at frequencies considerably in excess of their highest useful frequency of amplification. The synchronization of an oscillator by an external signal whose power level is a few orders of magnitude below the oscillator power output may be considered a form of amplification. While the results of microwave amplification by the injection-locking technique are similar to those of the phase-locked loop type of synchronization, the two techniques should be distinguished one from the other [1].

The configuration of a representative microwave phase-locked loop is shown in Fig 1. The cavity oscillator typically has a transistor operating in a coaxial cavity in the 1GHz to 2·5GHz region. A small sample of the cavity oscillator output is fed into the sampling diodes of a phase detector. The reference signal, which can come from a crystal oscillator or from a frequency synthesizer, is fed through a buffer amplifier to a step-recovery diode (srd) in the phase detector. The srd generates gating pulses for the detector diodes, thus sampling the small part of the cavity oscillator signal at a rate equal to the reference frequency. The sampled output of small pulses is integrated and fed through a feedback amplifier to a control varactor diode in the cavity oscillator, thus closing the phase-lock loop. If, in the phase-locked condition, the cavity oscillator frequency tends to deviate from an integer multiple of the reference frequency, this will show up as a phase error and therefore an error voltage, in the phase detector. The feedback amplifier will amplify the error signal and correct the deviation to an extent dependent on the loop gain available. Included in the feedback loop is a sweep oscillator whose function is to ensure that the frequency of the cavity oscillator will be brought close enough to a harmonic of the reference signal for phase lock to be acquired [3].

The basic injection-locked oscillator configuration is shown in Fig 2. For those not familiar with the operation of a circulator, it can be imagined as a "roundabout" in which the traffic (the signal) enters by one road and has to leave by

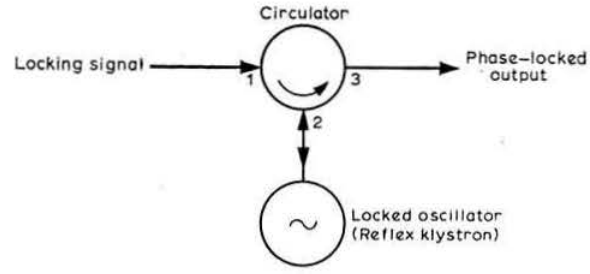


Fig 2. Basic microwave injection-locked oscillator configuration

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the next exit in the direction of the arrow on the circulator. Thus locking energy entering port 1 leaves by port 2 and goes to the klystron to effect locking. The output signal from the klystron enters the circulator by port 2 and is constrained to leave by way of port 3 to feed to the load. Some circulators are 4-port devices, with a dummy load connected to port 4. The dummy load absorbs any energy reflected from the load connected to port 3.

An external signal of exactly the same frequency as that of the power being put out by an oscillator, fed in through the output line of the oscillator, cannot be distinguished from a reflected wave. It will simulate a correction to the reflection coefficient, or to the impedance or admittance of the load, of magnitude proportional to the ratio of the amplitude of the external signal to the amplitude of the signal being produced by the oscillator, and of phase depending on the phase difference between signal and oscillator output. This can have the effect of pulling the frequency of the oscillator. If originally the oscillator were operating at a frequency different from that of the signal, the signal can pull the oscillator into synchronism with it, and into a definite phase relationship with it, provided there is some phase for which the reactive effect of the simulated admittance of the signal is large enough to provide the necessary frequency pulling. As soon as the external signal is present, in situations where locking is possible, the phase difference between external signal and oscillator output will begin to approach just the right value to produce this frequency pulling, and after a very short time the oscillator will have settled down to a steady state, synchronous with the external signal and with a phase angle between them which is proportional to the original frequency difference between the signal and the oscillator output. Thus we can lock an oscillator to an external signal and make its frequency exactly equal to that of the external signal.

Adler, in 1946, obtained a number of equations relating to locking phenomena in oscillators [4]. Included among his results was the relationship between the locking signal voltage and the oscillator voltage for locking to occur:

$$\left| 2Q \cdot \frac{E}{E_1} \cdot \frac{\triangle w}{w} \right| < 1$$

$$\text{or} \quad \frac{E_1}{E} > 2Q \left| \frac{\triangle w}{w} \right|$$

where: E_1 = the locking voltage
E = the output voltage of the oscillator
Q = the loaded Q of the oscillator tuned circuit
$\triangle w$ = locking frequency range
w = the natural frequency of the oscillator.

It is often more useful to be able to work in terms of the relative powers in the system, and also to take the limiting case so that the ratio of the two powers can be equated to the other factors:

$$\frac{p_1}{p} = \left(\frac{2Q \cdot \triangle w}{w} \right)^2$$

$$\text{or} \frac{p_1}{p} = \left(\frac{2Q \cdot \triangle f}{f} \right)^2$$

where: p_1 = the locking power
p = the oscillator output power
Q = loaded Q as before
$\triangle f$ = the locking frequency range
f = the natural frequency of the oscillator.

Thus with an external Q of 100 and a signal voltage $\frac{1}{10}$ of the voltage in the oscillator circuit, which means a signal power $\frac{1}{100}$ of the oscillator power, it can be shown that the maximum frequency pulling which the external signal can produce is about $\frac{1}{2{,}000}$ of the whole frequency. If the oscillator were originally tuned closer than this to the signal, there would be a correspondingly smaller phase difference between the signal and the oscillator output when the steady state was reached.

If the signal frequency is too far from the oscillator frequency for locking to occur, the signal perturbs the oscillator operation, so that it tends to pull the oscillator frequency towards the signal frequency and at the same time introduces harmonics into the oscillator operation, both phenomena becoming larger as the signal frequency approaches the limiting value at which it can produce locking. The following situation is then obtained, when an oscillator is operated continuously, and a continuous external signal is tuned closer and closer to the oscillator's frequency. As the external signal frequency approaches the frequency for which lock-in is possible (a value which will be further from the oscillator's natural frequency as the amplitude of the external signal is increased), the oscillator's frequency will pull toward that of the external signal, and at the same time side-bands will build up, separated from the oscillator frequency by integral multiples of the frequency separation between the oscillator and signal frequencies. These side-bands will increase in intensity as the external signal comes closer to locking the oscillator. Finally, lock-in will occur, the side-bands will disappear, and the oscillator will operate at the same frequency as the external signal. As the signal is then tuned onto the natural frequency of the oscillator, the oscillator will follow its frequency but will be changing its phase with respect to the external signal. As the external signal is tuned away from the oscillator resonance on the other side, the same events will be observed in reverse sequence [2].

By injection locking an oscillator as just described, the oscillator frequency stability will become of the same order as that of the locking source. If a crystal oscillator is used in conjunction with frequency multiplier stages, then a very respectable improvement in the frequency stability of a klystron oscillator can be obtained. Furthermore, the locked oscillator also acquires the noise bandwidth of the locking source. In this way the noise bandwidth of a typical klystron oscillator may be reduced from a few hundred kilohertz to a few tens of kilohertz. These two factors enable narrower bandwidth receivers to be used, with improved signal-to-noise ratios.

Measurement of locking bandwidth for a reflex klystron

A knowledge of the locking bandwidth is necessary to enable one to determine the "pull-in" range for a given locking power. It will also be seen to be important in determining the signal bandwidth which can be accommodated by the fm receiver to be described later. The locking bandwidth for a 723A/B klystron has been measured [5], and the data

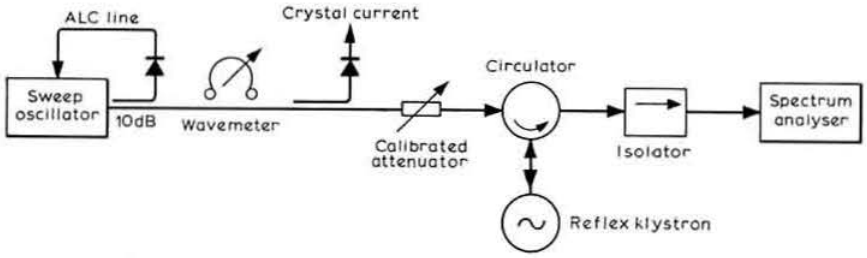

Fig 3. System for measurement of locking bandwidth

obtained should be reasonably correct for 2K25 klystrons and similar devices. The locking bandwidth measurements were made using the system of Fig 3, at a signal frequency of 9·5GHz. A single Hewlett-Packard power meter was used, connected to a fixed point in the system after power transfer ratios to various points in the system had been measured.

The procedure used to measure the locking bandwidth was as follows:

1. The klystron output frequency was set to 9·5GHz by means of the cavity adjustment, the reflector potential being adjusted so as to keep the klystron at the peak of its −180V mode. (The klystron was a standard one, not adapted for amateur band working). The tuning of the spectrum analyser was then adjusted so as to display the narrow spike of klystron energy near the centre of the screen. (The spectrum analyser is essentially a swept-frequency receiver with a panoramic crt display).
2. With the sweep oscillator set to "CW", its tuning was adjusted until its spike appeared on one edge of the crt. At this stage its frequency was too far removed from that of the klystron to effect locking. With the wavemeter tuned well away from the operating frequencies so as to minimize power absorption, the power level in the main guide was then monitored, with the power meter connected in place of the crystal detector for this purpose.
3. The sweep oscillator frequency was then manually tuned towards that of the klystron, until locking was just obtained, as evidenced by the disappearance of the beat-frequency spectrum from the display. Figs 4, 5 and 6 show the appearance of the display for the unlocked condition, signals close to the locked condition, and signals-locked condition, respectively.
4. With the klystron signal just locked to that of the sweep oscillator, the crystal detector was re-connected to the 11dB coupler output and the sweep oscillator frequency determined by tuning the wavemeter for a dip in crystal current. This frequency reading gave one edge of the locking bandwidth.
5. With the wavemeter again well detuned from the operating region, the sweep oscillator was tuned through the original klystron frequency and out towards the other edge of the locking bandwidth until a beat-frequency spectrum just re-appeared, indicating the other edge of the locking bandwidth. This new frequency was measured by means of the wavemeter as before.
6. The procedure of 1 to 5 was repeated with various degrees of attenuation set on the calibrated attenuator. The results obtained are plotted in Fig 7. The gradient of the curve—assumed to be linear over the small range of locking powers plotted (although from Adler's equations we can see that locking bandwidth $\propto \sqrt{p_i}$)—gives a locking bandwidth of the order of 340kHz at an injection power level of 20μW. Even lower levels of injection power have been used to obtain locking, although with very low locking powers the klystron may unlock as a result of thermal drift unless adequate draught shielding is employed.

The fact that a reflex klystron can be adequately injection-locked with only a hundred or so microwatts points the way to the possibility of a crystal-controlled transmitter for, say, the 3cm band. The use of step-recovery diodes in the necessary frequency multiplier stages will ensure adequate output at higher multiplication factors, although if enough drive is available for the final multiplier a cheaper kind of diode may be used here since only a limited power output is required. The injection-locked klystron will, in fact, act as a power amplifier with a power gain of the order of 20-30dB, and even with only 20 or 30mW out from the klystron the use of a directional aerial such as a horn or a parabolic dish system will ensure a respectable erp.

The Ruthroff injection-locked fm receiver

A conventional phase-locked loop can be used as an fm receiver, and similarly an injection-locked oscillator can be used in a "synchronous" fm receiver, since the operation of the two types of circuit is described by the same mathematical equation [6]. However, although the principle of

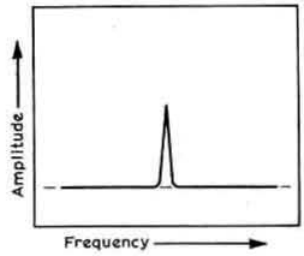

Fig 4. Klystron output spike centred on analyser display

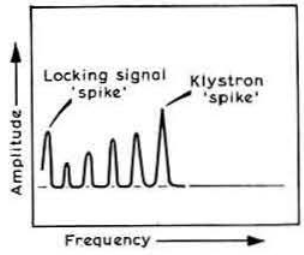

Fig 5. Beat frequency spectrum with signals close to locking

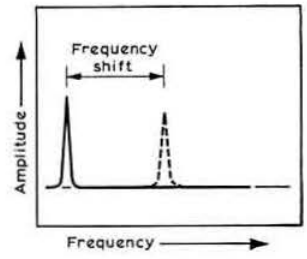

Fig 6. Klystron output locked to frequency of locking signal

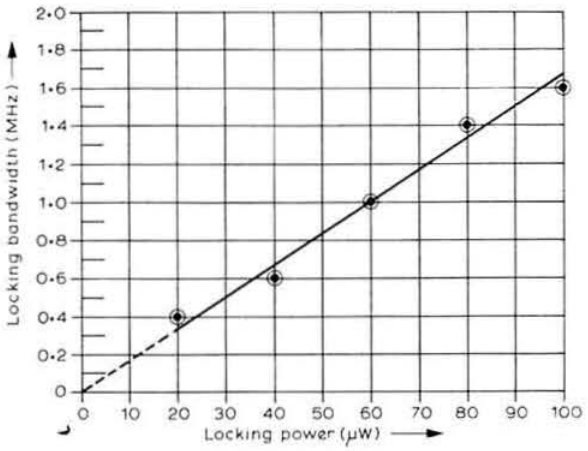

Fig 7. Locking bandwidth versus locking power for a 723A/B reflex klystron operating with an output level of 22·3mW.

operation of the two receivers is the same there are important practical differences. The baseband bandwidth of the phase-locked loop is limited by delay in the feedback loop to frequencies of the order of 1MHz. The baseband bandwidth of the injection-locked fm receiver can be as large as half the locking bandwidth of the injection-locked oscillator; thus with a 723A/B klystron with 20μW of locking power, the baseband bandwidth could be of the order of 150MHz!

The block diagram of the Ruthroff fm receiver is given in Fig 8. The input signal from the aerial is passed through the directional coupler which produces two outputs of equal amplitude but 90° out of phase. One of these outputs is used to injection-lock the klystron local oscillator. Since the klystron responds mainly to the phase of the locking signal and not particularly to its amplitude (within reason), the oscillator output amplitude will be sensibly constant if the variations in amplitude of the input signal are not too severe. Although the signal amplitude variations will be present in the signal input to the linear mixer, the low-frequency output from the mixer will be predominantly due to the frequency modulation on the input signal. With a signal deviation very much less than the locking bandwidth of the local oscillator, the output should be relatively free from distortion, provided

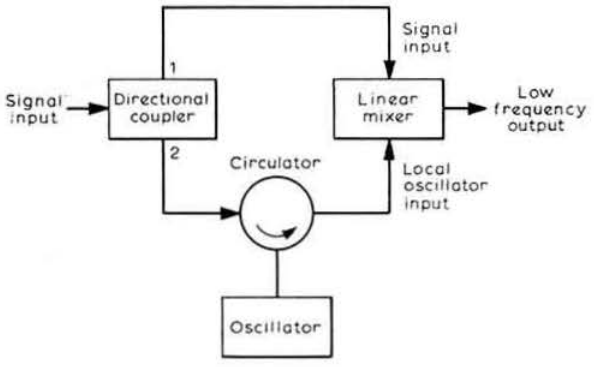

Fig 8. Block diagram of the Ruthroff fm receiver.

that the natural frequency of the oscillator is not greatly different from that of the input signal.

When the two frequencies are different, the receiver output contains a direct current component. This current gives information on the direction and magnitude of the frequency difference, and by suitable processing it should be possible to produce a control voltage to be applied to the klystron repeller to effect automatic frequency control. This complication could be necessary in some circumstances, since although the local oscillator will track to the input signal once locking has been achieved, if the two frequencies were originally very different a phase tracking error will exist between the locked output and the input signal, and this means distortion. It should be noted that since the local oscillator frequency needs to remain firmly locked to that of the input signal, this type of receiver will probably only work well in practice when the available signal input power is of the order of many tens of microwatts.

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[2] *Microwave Electronics*, Slater; published Van Nostrand.

[3] "Phase-locked signal source design", S. Rupp; *Microwave Journal*, vol 17, No 6, June 1974.

[4] "A study of locking phenomena in oscillators," R. Adler; *Proc IRE* and *Waves and Electrons*, pp 351–357, June 1946.

[5] "A technique for separating the modulated components of microwave backscattered signals from precipitation particles," V. J. Ludlow; *MSc Dissertation*, Southampton University, 1972.

[6] "Injection-locked-oscillator fm receiver analysis," C. L. Ruthroff; *Bell System Technical Journal*, pp 1653–1661, 1968.

Ron Ham reports on solar activity, 6-19 September 1974

The following diary of events, recorded at the writer's observatory in southern England, describes the daily events during this solar storm which readers can co-relate with any unusual atmospheric disturbances which may have occurred during this period.

Daily observation of the sun, 1030 to 1330gmt at 95 and 136MHz

Sept	
7	Several individual bursts of radio noise.
8	Few tiny bursts.
9	Several bursts, some lasting up to 4min, in addition to a slight increase in the general noise level.
10/11	Frequent individual bursts, lasting from 1 to 6min, appearing individually, and concurrently on both frequencies.
12/13/14	Strong radio noise storm.
15/16	Severe radio noise storm. An aurora borealis took place on 15 September at the height of the solar storm and many radio amateurs worked long distances via the auroral curtain.
17	Few small bursts, and a 16min event (1148gmt) recorded.
18	Severe radio noise storm.
19	Several small individual bursts and slight radio noise storm.

4m ssb from a Pye Ranger

by R. F. McLACHLAN, G3OQT*

AFTER some years' experience of operation on the 4m band using a.m., the author was tempted to join the growing numbers of ssb stations. As an existing Pye Ranger low-band transmitter chassis covering the 4m band was available it was decided to modify this for use as an ssb transverter, as most of the necessary hardware and tuned circuits already existed. The particular version of this unit available was that using a QQV03-20A in the pa, with a modulator using two 6V6s in push pull on the same chassis, but the same philosophy could be applied to any of this range of units, all of which are readily and cheaply available.

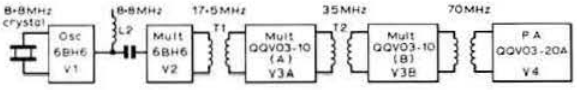

Fig 1. Original unit block diagram

Original unit and modifications

The original line-up of the transmitter is shown in Fig 1, together with the operating frequencies of the various stages. After much calculation it was decided to use a 49MHz local oscillator mixed with 21MHz ssb to produce 70MHz ssb. The modified block diagram of the unit is shown in Fig 2. In order to minimize the number of coils to be wound, existing transformers were used wherever possible. The original T1 which was on 17·5MHz was moved to the L1 position to allow one winding of it to be used as the oscillator anode coil. This was achieved by simply changing the fixed capacitor. A later version of this transverter used a 12·25MHz crystal, and the secondary of T1 was used to provide inductive rather than capacitive coupling between oscillator and multiplier, thus reducing unwanted harmonics.

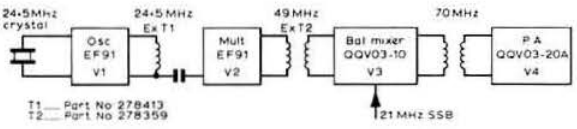

Fig 2. Transmitter block diagram

Similarly, the original T2 on 35MHz was moved to the T1 position and retuned to 49MHz. The QQVO3-10 was modified to become a balanced mixer, and this necessitated a centre tap being added to the secondary of the 49MHz transformer (ex T2), which can conveniently be brought out to a spare pin on the transformer base.

The modulator now not being required, this section was stripped out and a mains power supply built in the space. This supply provides heater power, 250V ht for the unit with the exception of the pa, and a negative bias supply. The only coil that has to be wound is the tuned circuit for the pa grid, which consists of six self-supporting turns wired directly across the grid pins, placed beside the mixer anode coil and tuned by a 3–30pF beehive trimmer.

The only problem encountered in the original modification was that of obtaining sufficient 49MHz drive to the mixer. The original circuit employed 6BH6s in the first two stages, and it was found necessary to replace both of these by EF91s to achieve the required drive level. This modification simply entails reversing the suppressor and screen-grid connections (pins 6 and 7). Several changes in component values were also made, as shown in Figs 3 and 4.

Balanced mixer

The circuit of the QQV03–10 balanced mixer is shown in Fig 5. Although this stage was originally connected so that one

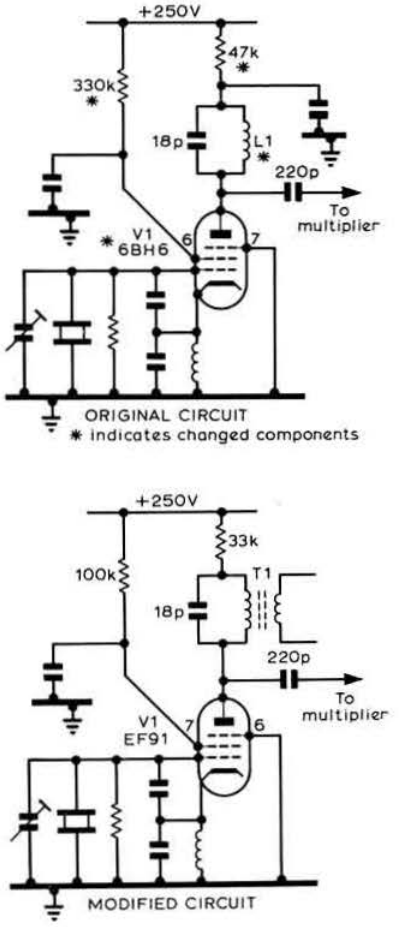

Fig 3. Oscillator circuit modifications

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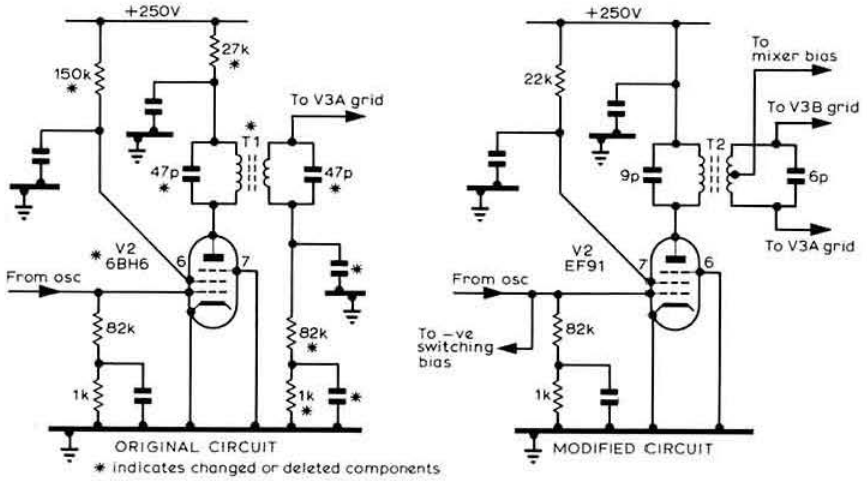


Fig 4. Multiplier circuit modifications

section of the valve drove the other, the actual wiring modifications are simple once T2 has been removed.

PA stage

As the original pa stage employed capacitive input coupling from each end of the driver anode coil, this must be replaced by inductive coupling to ensure sufficient drive and rejection of unwanted mixing products. The modified circuit is shown in Fig 6. The pa screen grid needs to have a stabilized supply of 250V. This was achieved by the use of two high voltage reference diodes in series, but VR tubes could, of course, be used.

Power supply and bias switching

As the unit already incorporates an aerial changeover relay whose coil is in the ht feed to the driver stages, it was felt advantageous to retain this facility; hence, some form of bias switching was needed. As previously mentioned, the modulator section had been removed to allow space for a power supply. The circuit of the power supply and changeover switching is shown in Fig 7.

In addition to the above, the resistor across the changeover relay coil is changed from 1kΩ to 68Ω. This is to allow the relay to drop out completely when the bias switching voltage is applied to the various stages. The pa is fed from a separate external 400V supply. Metering has been added, which can be switched to read either mixer or pa anode current.

Adjustment and setting up

Remove pa valve and mixer valve. Plug in 24·5MHz crystal and, using a gdo or an rf "sniffer", adjust T1 primary (secondary now not used) for maximum signal at V2 grid (24·5MHz). Then adjust T2 for maximum 49MHz signal at the input to the balanced mixer. Replace the QQV03–10 (V3) and re-peak. Remove drive by taking out V2, and check that the mixer anode current is approximately 2mA. If it is not, adjust the value of the 82kΩ resistor in the bias chain in Fig 7 to achieve this figure. Replace V2 and peak the tuned circuits to give a mixer anode current of 30mA or more. (In practice it will require some considerable adjustment to obtain this current, and it is for this reason that EF91s were

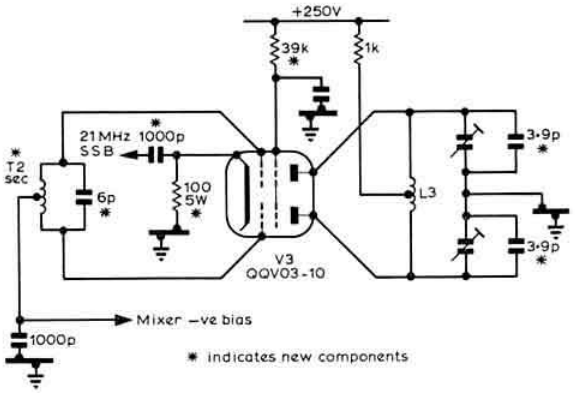


Fig 5. Balanced mixer

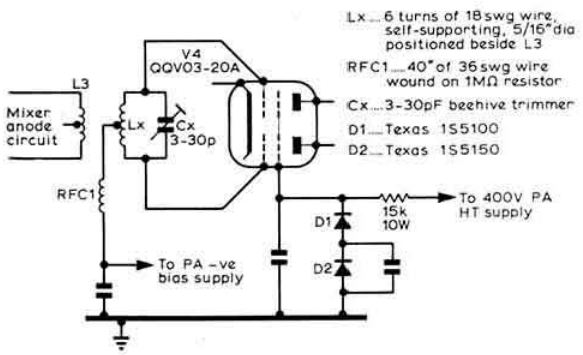
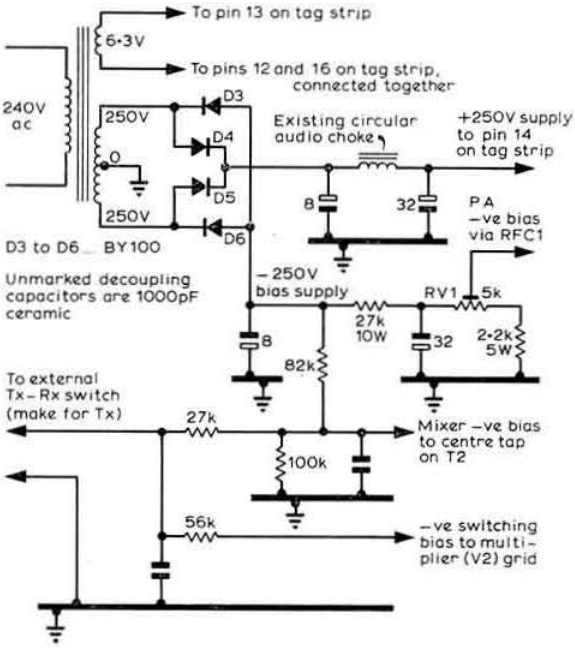


Fig 6. Modifications to pa stage



◀ **Fig 7. Power supply and tx/rx switching**

substituted for the original 6BH6s.) Now apply ssb drive at 21MHz, and increase this until the mixer anode current kicks some 2–3mA on speech peaks. The pa can now be inserted, and the bias adjustment potentiometer RV1 adjusted to give a pa standing current of approximately 25mA. All tuned circuits should then be peaked for maximum drive to the pa.

In the unit described, the author uses a KW Vespa to produce the ssb drive. It is loaded into a 75Ω dummy load, and a 1000pF capacitor is taken from the hot side of the load; however, the ssb could, of course, be alternatively taken from a lower level point in the exciter.

Conclusion

With the modifications made to the original unit as described, and a 400V ht supply to the pa, the author obtains approximately 20W p.e.p. output, which is used either directly into the aerial or to drive an external linear. Care should be taken to conform to licence conditions for this band.

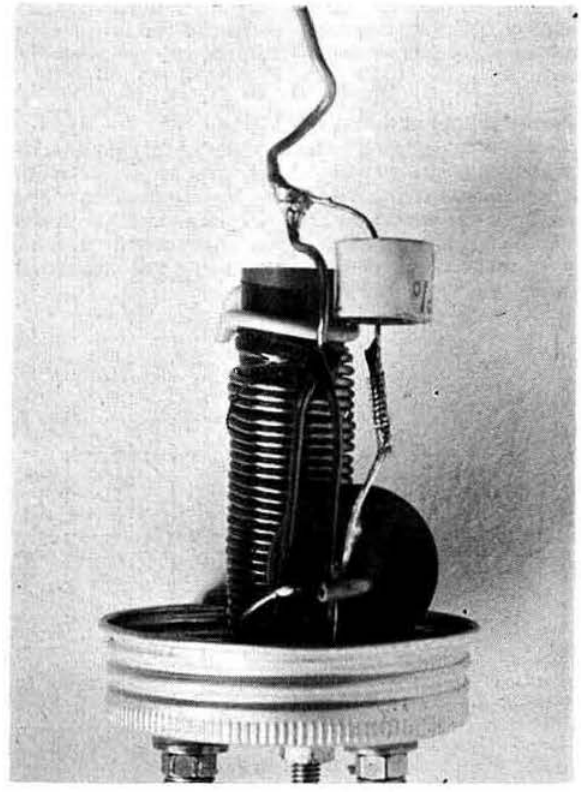
It is hoped that this article may encourage others to make a useful item of equipment from what is now a rather old fashioned and hence cheaply available piece of surplus radio telephone gear, and thus swell the growing ranks of ssb stations on the 4m band.

A balun transformer for 50 and 75 ohm lines

by ZYGMUNT T. CHOWANIEC, G3PTN*

FROM correspondence received in connection with the Zygi beam (*Radio Communication* July 1973) it is apparent that the balun transformer suggested for the feed point of the aerial created some problems. A number of amateurs had difficulty in obtaining toroid cores and it would appear that none succeeded in getting copper tape required for the G3HZP balun. On the other hand, balun transformers available commercially are relatively expensive, and in view of this the author designed a transformer which utilizes readily available and cheap components and is suitable for all applications where a balun transformer is called for.

This balun uses tri-filar winding on the ferrite rod core (Fig 1), the ferrite rods being of the type used in portable receivers for mw aerials, and the wire 18swg enamelled copper. For power up to 1kW ssb a core of $\frac{1}{2}$in or $\frac{5}{8}$in is adequate, but if rod of these diameters is not available, two



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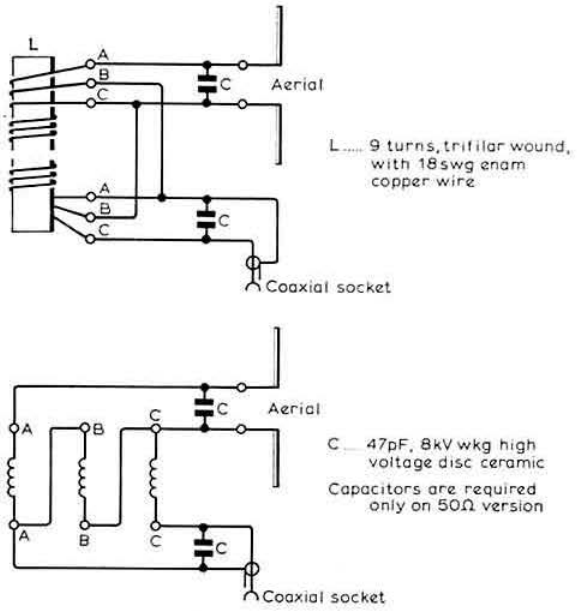

Fig 1. Winding details

rods of ¾in can be taped together using pvc tape. The length of the rods is not critical, and with the 18swg wire 2in is sufficient. Before windings are made the core should be covered with a single layer of pvc tape. Nine turns are required

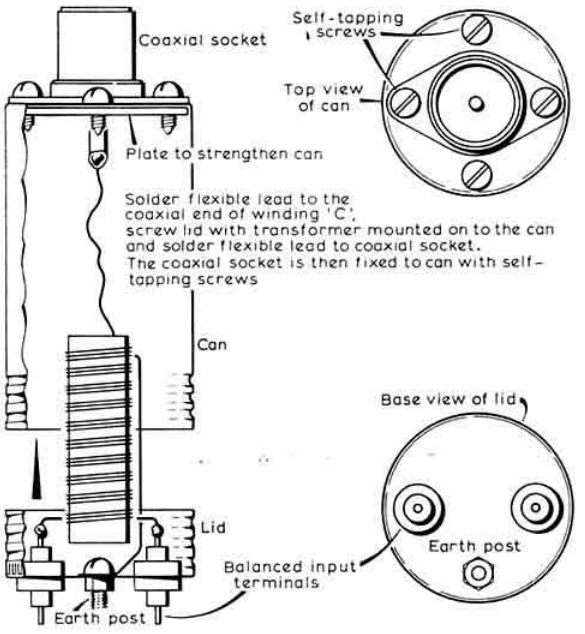

Fig 2. Mounting arrangements

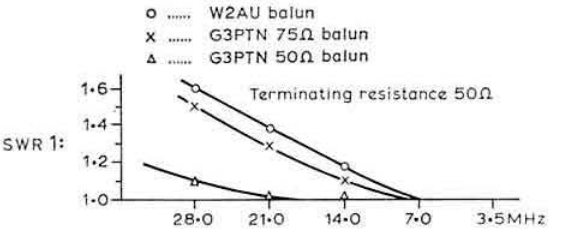

Fig 3. Comparison with a commercial transformer

and three 20in lengths of 18swg wire will be needed. Windings should be made as tight and as close as possible.

The balun transformer thus formed can be mounted in a metal container (see photo) and the way it was done by the author is shown in Fig 2, an aluminium can being obtained from a local chemist. The transformer can be potted using epoxy resin, or just waterproofed. How the balun compares with a commercial transformer is shown in the Fig 3.

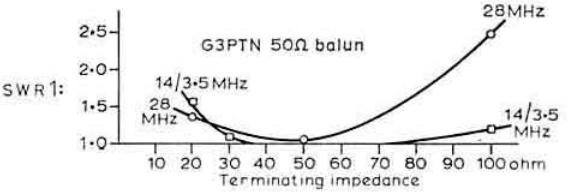

Fig 4. Performance of the 50Ω balun

Both transformers, when terminated with a 75Ω resistive load have 1:1 swr between 3MHz and 28MHz, but are introducing about 1·6:1 swr at 28MHz when terminated with a 50Ω load. The 1·6:1 swr represents transmission loss of approximately 0·26dB. If the transformer is to be used with an aerial system requiring 50Ω cable, ie Zygi or tri-band beam, capacitors C (Fig 1) tuning out reactive component at higher frequencies (Fig 3) should be fitted. Capacitors are available from RS Components Ltd via any radio dealer. Fitting of the capacitors reduces loss at 28MHz to almost nil.

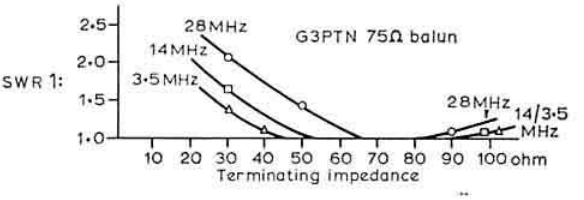

Fig 5. Performance of the 75Ω balun

It is useful to know how much mismatch can be expected from the balun transformer when used to feed multiband aerials or determining input impedance of the beam, and Figs 4 and 5 supply the information.

The insertion loss of the 75Ω balun is 0·17dB up to 14MHz, rising to 0·58dB at 28MHz.

C • •

TECHNICAL TOPICS

by PAT HAWKER, G3VA

A COUPLE of months ago, Fred Ness, GD3ESV, wrote a well-deserved letter to our editor congratulating him on the way that *Radio Communication* "turns up with unfailing regularity each month" in a year when many journals have been highly erratic.

Among the problems which the editor—and to a lesser extent the contributors—have to contend with are the increasing delays in the mail. Even a few years ago it was the exception when a letter posted in central London was not delivered early next morning. It is my experience that today it is becoming unusual when it is: three, four, five, or more days are increasingly common. Magazines may take a week. The air-mail letter from Bernard Randell in Mexico, referred to later, with a postmark of 18 September, arrived on 5 October. Magazines from the USA come when they will (some after immersion in the Atlantic as though to prove they came by sea mail). It seems a world-wide (certainly a South London) phenomenon.

Since the production of even *TT* involves, after the copy is written, the passage of a minimum of six letters through the post with proofs and drawings and so on, it becomes a very near-run race against time and the printing schedules. British monthly radio journals have always had significantly shorter production times than those in the USA—it will be a great pity if this advantage is lost. I suppose we live in an age of electronic communication; perhaps we should take a leaf from the 'thirties when several complete technical articles for the *T & R Bulletin* were sent from New Zealand via amateur radio. But one still laments the demise of what was once a wonderfully reliable, efficient and cheap postal service.

Constant-amplitude ssb

The advantages of a transmission that is not constantly varying in amplitude are by now well recognized: nbfm or fsk, for example, generally causes less tvi or interference to audio equipment than ssb, a.m. or cw. A couple of years ago, Hanno Scheps, PA0EPS, successfully developed a system, known as phase-locked ssb or plssb (*TT* March 1972), which provided constant-amplitude signals but with considerably greater communications punch than nbfm. Briefly, an ssb signal (usually at 9MHz) is infinitely clipped. This results in constant amplitude, even during speech pauses when the residual carrier is brought up to full level, but also considerable spectrum broadening, mainly because of the large and abrupt phase changes at the zero crossings. However, the clipped signal is tracked by a phase-locked oscillator; by carefully tailoring the time constants in the loop filter a reasonably clean and good sounding signal is produced having enormous punch but not too wide a spectrum. This signal is then heterodyned to the required hf or vhf band where, unlike conventional ssb, the power amplifier can be Class C.

It was noted in 1972 that on 144MHz a plssb signal sounds "very loud and rather swollen", having a dx performance superior to nbfm yet with the fm advantages in respect of tvi/bci and hi-fi interference. Since then quite a few amateurs, including some in the UK, have investigated plssb.

Now, however, Dick Rollema, PA0SE, of *Reflecties* fame, has sent details of a further development in constant-amplitude ssb as described in a two-part article by Jan Flint, PA0KT, in the July/August issues of *Electron*.

In the first section, PA0KT discusses some of the theoretical aspects of plssb and comes to the conclusion that even when carefully optimized, the spectrum of such a signal will tend to be rather broader than is really desirable, particularly, for example, when several plssb stations are taking part in a vhf/uhf contest. On the other hand, for hf operation, he considers this broadening as less serious since the spurious component will normally be lost in the usual noise and interference levels. Since this does not apply at vhf/uhf, where a much wider dynamic span of signals can be accommodated, PA0KT began to look for alternative systems of producing a constant-amplitude ssb signal that would be free of spectrum broadening.

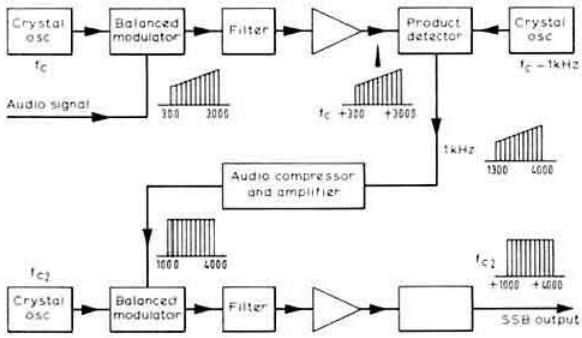

Fig 1. Block diagram of PA0KT's first method of achieving an ssb signal with constant amplitude using a fast-acting compressor at audio frequencies with an off-set technique that produces the residual carrier at 1kHz so that full output can be obtained during speech pauses

The first PA0KT constant-amplitude system

The first system developed by PA0KT is outlined in Fig 1. This uses a fast-acting compressor at audio frequencies. Although this is capable of ironing out the amplitude variations, it would, in itself, fail to produce a carrier at full output during speech pauses. For this reason the af signal is first converted into an ssb signal in the usual manner, with the balanced modulator leaving some residual carrier at about —30dB. The ssb signal is now converted back into af by means of a product detector but with an oscillator signal that is 1kHz lower than the original carrier oscillator feeding the balanced modulator. This means that the residual carrier now appears as a 1,000Hz note and the whole af spectrum is shifted upwards by 1,000Hz. This signal is then compressed

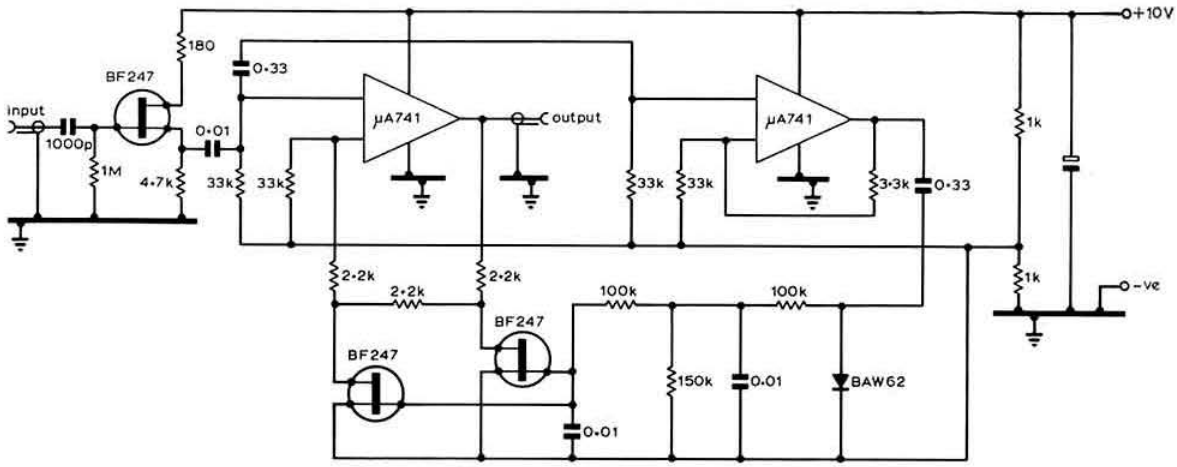

Fig 2. The audio frequency compressor used by PA0KT in conjunction with the system outlined in Fig 1

in the fast-acting audio compressor which should have a span of at least 30dB (Fig 2). This particular compressor uses variable feedback around a type 741 op-amp ic. The output remains at 4V pp with input signals between 5mV and 2V peak-to-peak.

This constant-amplitude signal is fed to the input of an ssb transmitter in much the same way as with the closed-loop type of rf clipper. For the listener the fact that the transmitted signal has been shifted through 1kHz goes unnoticed since he simply tunes his zero beat with the carrier and so obtains af corresponding to the original audio.

However, it should be noted that it is important that the second balanced modulator should have very good carrier suppression, since otherwise a 1kHz note will be heard (a problem not unlike that well known in connection with "third-method" ssb generation).

PA0KT used this system for several months and obtained better reports than from plssb, but the weak link is the audio compressor. The time constant of the control loop must be so small that it is of the order of the cycle-time of the lower audio frequencies. This makes it difficult and tricky to adjust and it appears to be virtually impossible to avoid small jumps in the signal amplitude.

This problem set PA0KT looking for an alternative approach; and he has come up with one that is not only better operationally but is simpler into the bargain!

PA0KT cassb with rf compression

The outline of this second method is shown in Fig 3. Again an ssb signal with partially suppressed carrier is generated. However, this time the compression is applied directly to this signal *at radio-frequency*. A time-constant of about 100µs

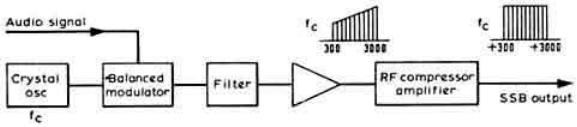

Fig 3. The second, simplified system used by PA0KT in which constant-amplitude ssb is achieved by means of rf compression

enables the compressor to follow all amplitude variations; but since this is still large compared to the cycle-time of the rf signal (about 10MHz) the design is greatly simplified and a suitable arrangement is shown in Fig 4. Compression control is effected by three BF245 FETS operating as variable resistors in the emitter circuits of three transistor amplifiers, thus causing control by negative feedback. The output level is adjusted by P1 which produces the reference voltage for the control circuit. The FETS are driven by an op-amp having a voltage gain of 100. The capacitor C1 in parallel with the 5·6MΩ resistor sets the time constant (C1 is not absolutely necessary but values between 10 and 100pF are suitable). While in principle the circuit is broad-band up to about 10MHz, L1 resonating at 8MHz with circuit capacitance gives some tuning and greater output at resonance frequency. Since the characteristics of FETS tend to vary considerably, some device selection may be necessary; and the source voltage divider (470Ω and 1·8kΩ) may need to be modified to suit the available FETS.

In practice, the control range is about 40dB. Maximum output voltage is about 4V peak-to-peak for input voltages between about 10mV and 1V. The input is adjusted so that the residual carrier is a little over 10mV, say about 30mV. The maximum ssb signal should not exceed 1V.

This form of constant-amplitude ssb is very effective. However, it has been argued by some Dutch amateurs that the signal will collapse if the input decreases to below −40dB. The example can be quoted of the two-tone test signal; provided the two tones are equal and spectrally pure to −40dB (one per cent) this argument is valid, but in speech such conditions rarely occur.

Nevertheless it should be recognized that small amplitude variations do remain. The investigations carried out by PA0KT show that this form of cassb is effective in curing most problems resulting from detection in domestic audio equipment (called "lfi" in Holland). In a few stubborn cases lfi has persisted, and for these it would seem that the original technique of plssb is the only answer.

Dick Rollema, PA0SE, suggests that the rf compressor is also a useful tool for increasing average power in ssb, possibly doing much the same as an rf clipper but without

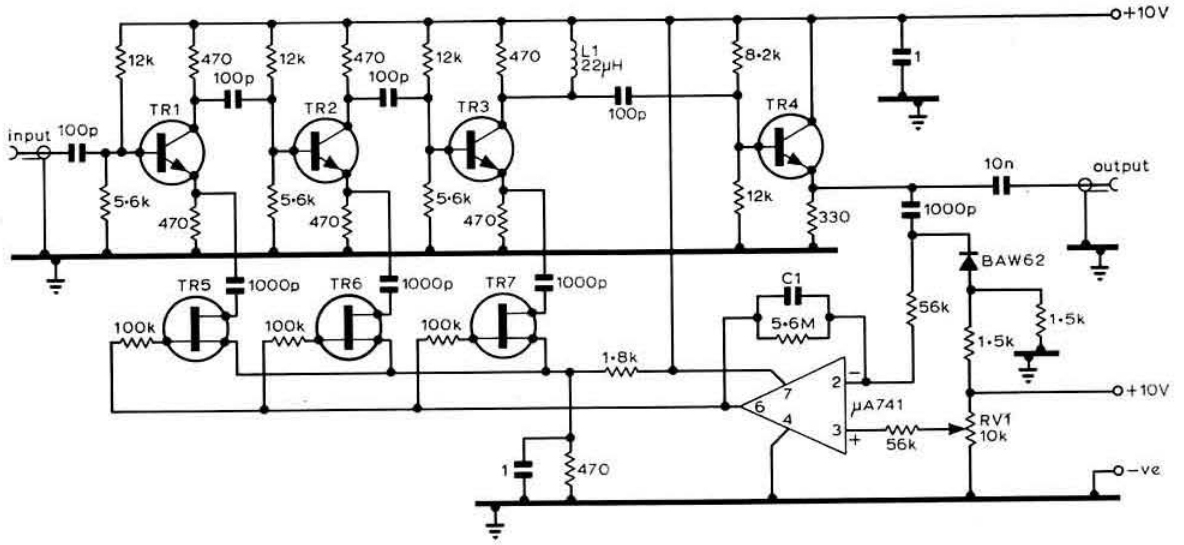

Fig 4. Circuit details of the rf compressor used in conjunction with the system of Fig 3. TR1, 2, 3 2N2222, TR4 2N2219, TR5, 6, 7 BF245

requiring the second ssb filter needed for conventional rf clipping, although some spectrum broadening is unavoidable. Arie Dogterom, TJ1EZ (formerly PA0EZ), has pointed out that there is no fundamental difference between compression and limiting, being only a matter of choice of time-constant. Both a compressor and a limiter can be likened to amplitude modulators with the speech signal at one input and the control voltage at the other. As in any modulator, sum and difference frequencies are formed, adding to the original signal. The faster the control voltage varies, the wider its frequency content and the stronger the distortion products, causing broadening of the original spectrum. The clipper represents the most extreme case since the "control signal" is very complex and extremely broadband—as will be the spectrum emerging from a clipper. On the other hand the degree of spectrum broadening resulting from the PA0KT rf compressor is relatively small and entirely acceptable. It need hardly be said that the circuit details of the compressor are relatively unimportant and that other circuits could be used; the crucial point of the PA0KT system is the use of a compressor at radio frequency.

I am sure that many British amateurs will be most grateful to Dick Rollema, PA0SE, for his trouble in providing detailed notes in English on what is clearly a very interesting system offering further scope for experimental work.

Top-loaded vertical aerials

The current interest in the use of shortened vertical aerials for such bands as 1·8, 3·5 and 7MHz is reflected in the many articles in recent years on various forms of top loading: the classic inverted-L or T; the radial "top hat"; the folded umbrella aerial and "guy-wire" loading; helical winding of the aerial on insulated masts; ddrr hula-hoop (in which radiation is from the 2·5° vertical section), etc. In general, the use of loading decreases the radiation resistance and hence demands an even better earth system as well as making the inherent bandwidth narrower. So if you can put up a $\frac{1}{4}\lambda$ monopole without any top loading, by all means do so (my only reservation would be the inverted $\frac{1}{4}\lambda$ ground plane or vertical-T which I still believe has some advantages over the conventional monopole in some circumstances).

Spiral top-loaded aerial

Another, but little-known, candidate for top-loaded aerials is the "spiral top-loaded aerial" (stla) which might be considered a special form of the inverted-L and which appears to offer several characteristics of particular interest to the amateur: Fig 5(a).

Basic information on the stla can be found in a paper "Spiral top-loaded antenna: characteristics and design" by H. R. Bhojwani & L. W. Zelby, *IEEE Transactions on Antennas & Propagation*, May 1973, pp 293–298. But this paper is concerned primarily with the use of such aerials for vlf operation, rather than mf or hf. More directly applicable to the amateur is an article "Experiments with two novel compact antennas for mf broadcasting" by J. L. Marshall of the Canadian Broadcasting Corporation in *CBC Engineering Review*, Vol 12, June 1974. This includes an account of the use of an stla and also a helical wound radiator: first experiments with the stla were in the form of a model aerial 0·1λ high at 30MHz; this led to a full-size aerial 65ft high and tested at frequencies between 990kHz and 1,400kHz and thus roughly equivalent to about 30ft high for 1·8MHz. Comparison tests were made with an inverted-L aerial 55ft high and with the tapered helical-wound monopole having a conductor embedded in the wall of a tubular fibre-glass mast 80ft high, with a thin whip section at the top.

The basic difference between the stla and the inverted-L is that the top wire of the stla is wound as a single unbroken wire in a spiral, in this case using insulated "X" booms at the top: Fig 5(b). It differs from the normal cartwheel type of "top hat" loading which has a series of spokes which may or may not be joined at their extremities.

In practice the Canadian mf stla took the form of a mast with total height of 63ft fed 8ft above ground, but the vertical radiator was lengthened from 55ft to 68ft by winding the

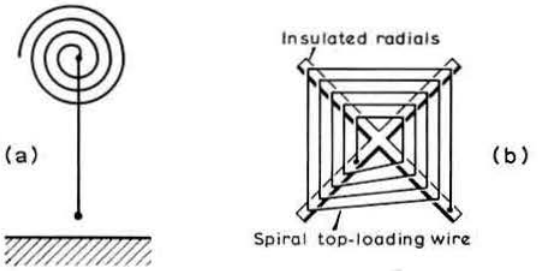

Fig 5. (a) Basic configuration of the spiral top-loaded aerial. (b) Practical arrangement of loading using insulated booms

down-lead around the wooden supporting pole in a helix, supported on small insulators. The top X structure was made of four 3in vinyl pipes, each pipe 8ft long. The top loading was then formed as a "pancake" type square-sided coil with an outer diameter of about 16ft and consisting of 135ft of wire.

The test site was on a dry sandy plateau with a few earth radials and an estimated ground resistance as high as 16Ω (ground conductivity estimated at 1mmho/m).

Various measurements made at a distance of one mile from the aerial showed that the spiral top-loaded aerial was a practical substitute for the helical-wound monopole although this was about 27 per cent higher, and was about 80 per cent as effective as the original (slightly lower) inverted-L. The author believes that if the ground resistance had been lower, the performance of the monopole and inverted-L would have improved more than the stla. On the other hand the relatively high radiation resistance of the stla is a feature of particular appeal to amateurs for whom extensive earth mats or radials are a major problem.

These practical results seem to bear out the conclusions of the *IEEE Trans* paper which suggests that the most efficient form of top loading is still the classic T or inverted-L, particularly if multiple-wire top sections are used, but that both these types require two supports and a fair amount of space. Next in order of efficiency is probably the umbrella-loaded aerial (see for example *TT* July 1974); and then the stla, which shows an improvement over the cart-wheel form of top loading and (for equivalent height) the helical-wound vertical element. The stla also seems suited to poor-earth locations.

Bhojwani and Zelby say: "The stla provides a welcome addition to the vlf antenna family with some desirable characteristics of relatively small size, low feed voltage and absence of tuning inductor."

So there we are. For the low-frequency bands, put up, if possible, a full ¼λ monopole; if this is impossible, go back to the age-old inverted-L or T using two or more spaced wires to form the top section. But if a single-mast form of construction is wanted, consider the folded umbrella or the spiral-top loaded systems as both being rather more efficient than the cartwheel top-hat. Thus, the stla is not a revolutionary breakthrough, but it does seem to provide another useful trick in the armoury of the aerial designer.

Balanced modulators

Carl Langley, G3XGK, suggests that before we blush too much and give up all thoughts of using a symmetrical transistor to form a balanced modulator (see *TT*, "Balanced modulator gone wrong", September; and "Balanced

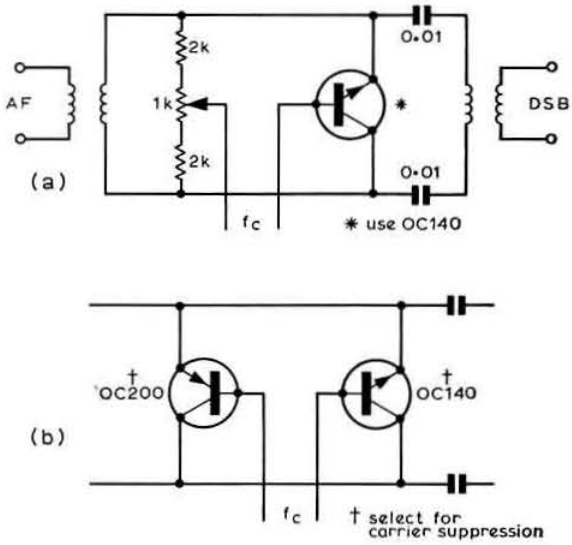

Fig 6 (a). The half-Cowan balanced modulator using symmetrical transistor as two diodes. (b) Full Cowan requires two selected symmetrical transistors, one npn the other pnp

modulator using symmetrical transistor", July) it is worth considering the use of the "half-Cowan" arrangement: Fig 6(a). With this circuit 20–25dB of carrier suppression can usually be obtained without any balance-adjustment potentiometer, and ⩾35dB with one. He also mentions that if two symmetrical transistors are used, one npn (eg OC140) and one pnp (eg OC200), a full Cowan arrangement can be formed but this requires careful selection of the transistors: Fig 6(b).

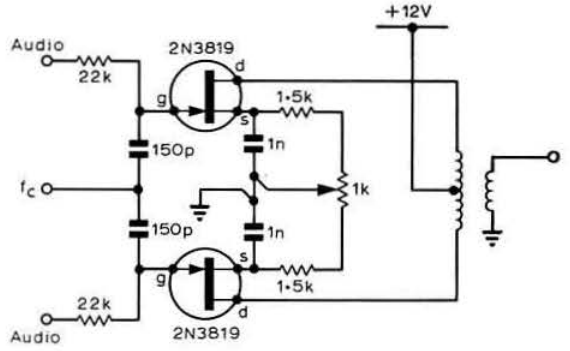

Fig 7. Balanced modulator based on two field effect transistors as used by G3XGK and providing relatively high output when used with 12V supply

His own favourite balanced modulator (Fig 7), however, uses two field effect transistors such as a pair of 2N3819s. This arrangement requires a 12V supply but provides more output than the lower-voltage bipolar arrangements. He uses this technique at 10MHz as part of his 144MHz ssb rig, so clearly it would also be useful for the popular 9MHz ssb generators.

XE1RV's junk-box multivibrator

In the February *TT* (Fig 7) we noted the two-transistor, inductorless, 100kHz crystal calibrator circuit used by SM0ACY. A basically similar circuit, but with some variations, will also be found in recent editions of *The Radio Amateur's Handbook* (Fig 17–18, p 518 of the 1974 edition).

This encouraged Bernard Randell, XE1RV/GW3ALE, to dig out a 100kHz crystal that had been removed from his SB100 because of lack of activity and try it in the SM0ACY circuit, using some old, unmarked pnp transistors. He found the oscillator worked well, providing harmonics up to at least 6MHz (and he is confident that with a crystal of normal activity they would be audible to 30MHz). However, anxious to calibrate the 14 to 85kHz band of his Marconi CR300, he lashed-up a simple multivibrator that could be adjusted to provide 5, 10, 20 or 25kHz outputs: Fig 8. This not only provided the required vlf calibration but was found equally useful as a general purpose calibrator, all made up on a small circuit board. In these days of ttl decade dividers it is worth remembering that the discrete-device multivibrator is still useful. Either npn or pnp transistors can be used with appropriate supply polarity; XE1RV also suggests that possibly 0·002μF capacitors might be more suitable than 0·005μF but it is not critical. In practice, for general purpose receivers he finds that 20kHz pips are more practicable than 10kHz.

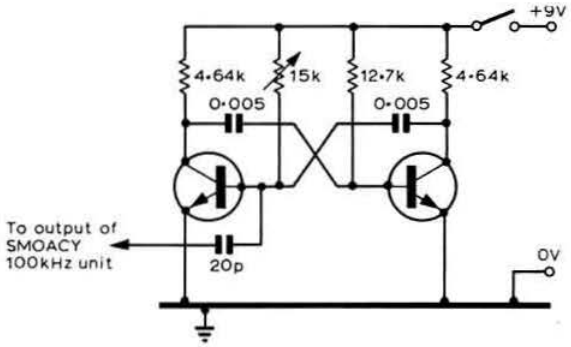

Fig 8. XE1RV's junk-box multivibrator for use with the SM0ACY 100kHz crystal calibrator providing 10 or 20kHz output pips

Incidentally, for those who may be thinking in terms of high-power solid-state transmitters and transceivers (and it is interesting to see such units as the Swan SS-200 and the Atlas 180 firmly established on the market), it may be of interest to know that XE1RV spends a good deal of his time in Mexico looking after an induction melting furnace whose power supply is an mopa transmitter, fully solid-state, with an output of 420kW! The output stage consists of 36 thryistors. From an amateur viewpoint there is the snag that the frequency range is 1·0 to 1·2kHz (fine perhaps for the elf dx of "Project Sanguine" mentioned in the July *TT*).

XE1RV reports that he has tried listening for GBR on 16kHz but with no luck. The Rugby station was converted for fsk/rtty a few years back but I wonder if it still transmits any A1 or A2? In the old days I used to receive GBR well on quenching coils from an old vhf super-regen, or alternatively with an aerial connected to an af amplifier that included an intervalve transformer.

Shack acoustics—are they important?

Offhand I cannot recall ever having seen reference in amateur journals to room acoustics and acoustic insulation and their effect on the quality and pleasantness of phone transmissions. I suppose most of us assume that with close-speaking microphones and limited bandwidth having bass and top cut, the acoustics have only minor practical significance.

Yet not all amateur phone communication is of this type; and certainly not all microphones and practical response curves are unaffected by echo or high ambient noise. Futhermore, the increasing interest in speech processing, which brings up the background noise during the many pauses that punctuate average speech, tends to emphasize the problem.

I must come clean and admit that my own interest in this question has arisen not from amateur operation but from making tapes for broadcast purposes. One finds that even professionally-built studios have sound insulation that can seldom cope satisfactorily with power drills or hammering on pipes (and you never realise just how much pipe-bashing goes on in large buildings until you need quiet). But where such recordings are made in rooms that have not been subjected to full acoustic treatment, the problem is accentuated many times over: equally devastating then is the problem of reflections from flat surfaces. Many rooms provide unacceptable echo and very high "noises-off" (which of course is why the design of studios is such a specialized matter). Yet we always assume that virtually any room makes a good amateur shack, regardless of size, shape, furnishings, traffic or aircraft noise, etc.

We are not suggesting that the amateur needs to operate from a carefully designed studio, but only that sometimes rather more consideration should be given to arranging curtains and carpets to reduce external noise and colourization of the audio. For example, a flat surface that has books or even cardboard file boxes piled up in front of it will have relatively little reflection. Acoustic performance of a small room is affected by the absorption coefficients of the building materials and furnishings, and by the resonances of the air contained in the room acting like a large organ pipe. The reduction of external sounds depends on the partition materials, their thickness and resonances, and is normally least at low frequencies: between 20 to 30dB reduction is not unusual but some of the special forms of sound insulating materials can give over 40 or even 50dB. The preferred reverberation time for a professional studio for speech recording is about 0·3s; yet the typical reverberation time of a furnished domestic room is between 0·4 and 0·6s; while an "unfurnished" room may be as high as 0·8s.

In close-range speech, account may have to be taken of the fact that there are four sound sources concerned: the mouth, the nose, the throat and the chest, the last two predominantly low-frequency sources. Then there are breath noises and explosive speech sounds (eg "p") to contend with. The spectrum of close-range speech differs quite appreciably from that of speech at normal distance, representing a problem for the amateur seeking good-quality, natural sounding speech on those bands where sufficient bandwidth is not antisocial.

The major reactions of a room apply in the main to frequencies between about 200 and 250Hz and thus are of limited consequence where, as should normally be the case for ssb, frequencies below 300Hz are deliberately attenuated. Any microphone more than a foot or so from the speaker will

pick up significant levels of reflected sound, although this can be reduced by making use of directional characteristics and sometimes acoustic damping pads.

On the general subject of room acoustics and microphone techniques some of the books on tape recording and hi-fi provide useful hints. For those who want to go deeper into the question it may be worth enquiring at local libraries for such books as *High Fidelity Sound Reproduction*, editor E. Molloy (this is a book written in the 'fifties but it does have a good chapter on room acoustics); *Electroacoustics: Microphones, Earphones and Loudspeakers* by M. L. Gayford (STC monograph published by Newnes-Butterworth, 1970); and *Acoustics for radio and television studios* by Christopher Gilford (Peter Peregrinus on behalf of IEE, 1972).

Audio for amateur communications is not often intended to be of high fidelity or broadcast quality but perhaps we could learn something from both of these fields.

Speech processing

On the general subject of rf clipping and speech processing, Dr David Tong, G8ENN, questions G3LLL's view (*TT*, August) that "fitting any rf clipper without using a microphone with a rising response just does not make economic sense".

G8ENN points out that this statement is true only of those rf clippers which operate on an ssb signal generated in an existing transmitter, but does not apply to clippers such as the Datong, Comdel and Magnum Six which generate their own ssb signal, and which contain their own microphone pre-amplifier which can be designed to take care both of the "rising response" and also the "high fidelity" aspects. He suggests that it makes better "economic sense" to tailor the response of the pre-amplifier *electronically* using an existing microphone, than for this reason to buy a new microphone with more costly *mechanical* tailoring built in.

An advantage of the "closed-circuit" type of clipper is that they can provide greater pre-clipper carrier suppression than the average ssb transmitter, apart from the fact that they can work also with a.m. and fm transmitters.

G8ENN also stresses that while a clipper does boost weak signals relative to strong signals, it does *not* do this when both are present at the same time, but rather the opposite. If speech with a hissy background is fed to a clipper, the hiss will be found to be heavily suppressed during speech syllables; this suggests that harmonic distortion in the af signal will be reduced rather than emphasized by rf clipping. While G8ENN suggests this may help speech transmission in a noisy environment, I suspect that for pleasant listening it would be sensible to try and reduce extraneous noises as suggested in the item on room acoustics.

10W solid-state transmitter

Several compact all-solid-state hf transmitters with power ratings of around 10W have been appearing recently in the Swedish and Norwegian journals, suitable both for fixed, mobile and "travelling" rigs. Indeed Jan Martin, LA8AK/G5BFV, mentioned a few months ago that he was surprised that so few British amateurs were taking advantage of the relatively low-cost hf power transistors that are now around, mentioning the BD230 and BDY92. A very neat little 3·5MHz transceiver for cw and phone was, for example, described in *QTC* Nr 5, 1974, by SM4DTL, using a BD131 output stage, but a little too complex to reproduce the full circuit diagram in *TT*. However, we include a cw vfo-transmitter for 3·5 and 7 MHz cw operation in Fig 9. This was described initially by Jan Löfqvist, SM3CFV, in *QTC* Nr 12, 1973, and has recently been reprinted in *Amator Radio* Nr 9, 1974, in translation by LA2II.

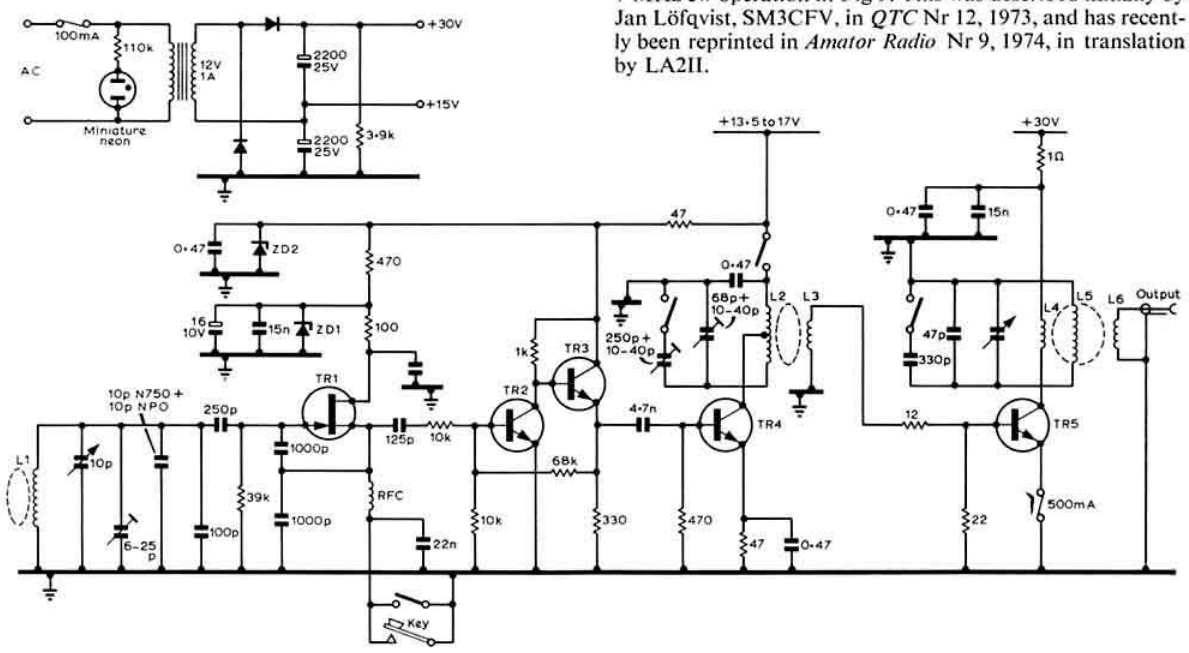

Fig 9. The SM3CFV 10W transmitter for 3·5 and 7MHz (the circuit is slightly simplified by the omission of the switched metering arrangement). TR1 2N5248 jfet or similar; TR2, 3 BC1108B; TR4 BC108B; TR5 BD135. L1 35 turns 0·4mm copper-enamelled on Amidon T-50-2 toroid. L2 31 turns, with ht tap 9 turns from cold end. L3 4 turns close coupling to L2 both on T-50-2 toroid. L4 7 turns. L5 28 turns. L6 6 turns over L5 all on T-50-2. ZD1 9V, 250 mW zener. ZD2 12V, 1W zener. Power diodes silicon 100V piv, 1A

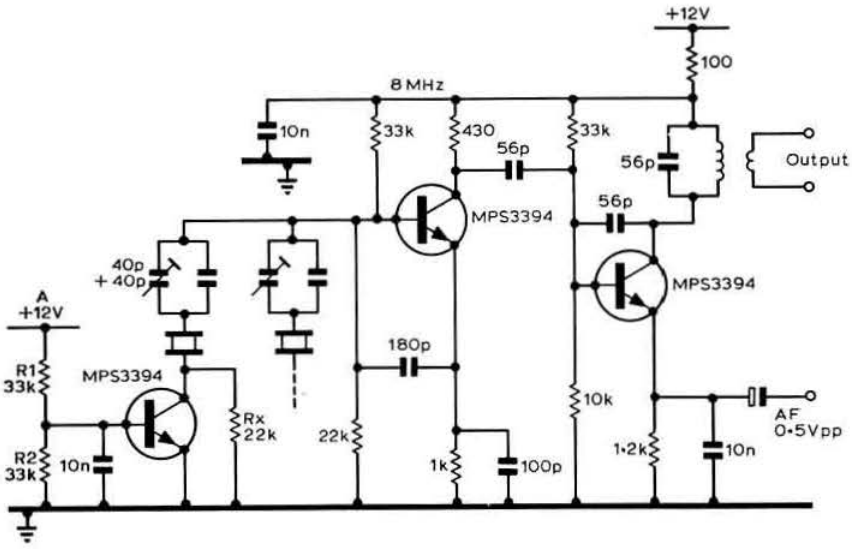

Fig 10. Electronically-switched crystal oscillator with phase modulator as used by G5BFV/ LA8AK

This has a single BD135 in the output stage and covers the two bands simply by switching in extra capacitance on the tuned circuits which are based on T-50-2 Amidon toroid cores which are readily available in the UK.

Phase-modulated crystal oscillator

Jan Martin, LA8AK/G5BFV, also sent along details of an electronically-switched crystal-oscillator/phase-modulator arrangement that he has successfully used for several years: Fig 10. The transistor switching principle, he points out, has been described before in *TT* but for rf applications he found the 2N708 did not work, whereas plastic transistors such as BC183K, MPS2926-3394 were very useful; it was found necessary to add resistors R_X (6·8Ω to 33Ω) to switch off the transistor. The phase modulator is a unity gain amplifier as originally described by OZ6NF and needs little comment.

Mechanical wobbulator

Ray Baldwin, G3WZ, has been using a simple mechanical wobbulator for about a year and feels that members may be interested in an outline of the idea: Fig 11.

Briefly the core of the apparatus is a Smith's clock motor which rotates once a second, driving a butterfly type of split-stator capacitor. The centre shaft is isolated by the polythene linking block to the motor. Into this block are placed, in opposite sockets, two small bar magnets. Mounted near them, at an angle to reduce induction from the clock motor, is a small hf choke. The induced emf in the choke coil is amplified and applied to the "x" plates of the oscilloscope. The butterfly capacitor forms part of the tuning capacitance of a Hartley transistor oscillator whose coil is wound on a standard ferrite rod and tapped so that besides about 465kHz it can be used at other higher intermediate frequencies. By rotating the setting capacitor the output from the final i.f. stage can be made central on the oscilloscope (the output of the oscillator being fed in after the frequency changer in the usual manner).

G3WZ says his unit has never achieved a neat appearance, being distributed over the bench for the half hour or so that it is required, but it does what is neede. To anyone trying the idea he cautions to remember to mount the motor well away from the capacitor and the "alternator coil" to avoid mains hum. The whole of the rf should be well screened, leads and all. The technique proved satisfactory for G3WZ who wonders if any commercial unit along similar lines is marketed.

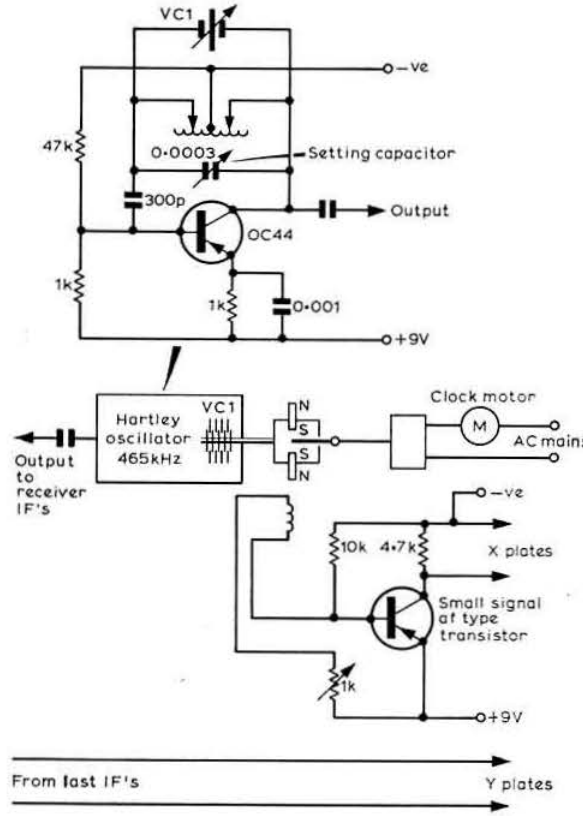

Fig 11. G3WZ's mechanical wobbulator

Building blocks for the novice

by SVEN WEBER, G8ACC

Diodes, diodes and diodes — and some experiments with them (Part 8)

RF characteristics

In the earlier parts, characteristics of certain diodes were investigated at dc and at a very low frequency (mains frequency) ac. However, with increasing input current frequency the characteristics change markedly, with some diodes more than others, due to the inherent properties of semiconductors. To recapitulate. The forward current increases exponentially (ie the rate of increase at any point is directly proportional to the value at that point) with voltage (Part 1, April), until the current is limited by the inherent resistance of the device when it tends (if it has not blown up by then) to become linear. The reverse current is approximately constant with voltage from about 1V (assuming constant temperature) until at some point, with many diodes, the resultant E/I value starts to decrease and then asymptotically approaches a distinct value of reverse resistance (Part 7, October). With all diodes, the reverse resistance falls fairly suddenly almost to zero at the breakdown voltage (Part 5, August).

With anything that carries current, the mechanism responsible for carrying this current takes a certain amount of time to cross the physical distance between any potential difference, and this applies no less to diodes than to anything else. With semiconductors, the current carriers ("holes" or electrons) take a measurable time to cross between the electrodes and, to put it crudely, the rectifying "junction" does not know immediately at what potential the ends of the semiconductor bar are. This means that if the potential across the diode is suddenly reversed, for a certain period of time the current carriers are flowing the wrong way and the charge associated with this is dissipated partly in the diode and partly in the circuit. Which also means that efficiency will go down with increasing frequency because the dissipation process does not have time to be completed.

This effect is called "charge storage" and has a similar effect to a lossy capacitance. It can be divided into two parts, a "forward switching transient" when the rectifying junction is suddenly biased in the forward direction from a reverse bias, and a "minority carrier storage charge" when conditions are the opposite (see Fig 53). These charge storage effects are difficult to quantify except when sophisticated test gear is used, and although they have a profound influence on the high frequency characteristics of a diode junction they will not be considered separately as a topic for experimentation.

Quite apart from charge storage, any diode that is biased in the reverse direction (ie in the high resistance state which, with small modern silicon diodes, can be anything above 1,000MΩ-1GΩ) would have a capacitance between its electrodes. This capacitance changes with reverse bias, but this topic will be left until later in the series. The diode capacitance can form a voltage divider with any other capacitance that is in series with it and would obviously have a frequency dependent effect. A diode would also have inductance, and this together with its capacity can resonate at a particular

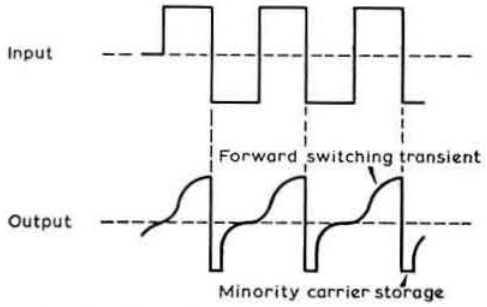

Fig 53. Charge storage effects with a diode

frequency and provide unlooked-for phase changes at other frequencies.

Taking a simple diode circuit as in Fig 54 and assuming a sine-wave source sufficiently big to make the diode voltage drop negligible, and R_L considerably bigger than the source impedance, the voltage across R_L would be about 32 per cent of the peak voltage (or $\frac{1}{2} \times \frac{2\sqrt{2}}{\pi} \times 100\%$ of RMS $-$ $V_{diode} = 45\% - V_d$) (see Part 3). The experiment in Part 3 can be tried again with a 1N4001 diode, R_L = 1kΩ and a 15V 50Hz ac source from a small mains transformer. Try the same experiment again with a small rf silicon diode (1S44 or 1N4148 or similar) and a germanium signal diode (OA90 or CG60 to 80 etc) that has a piv of at least 50V. The result should be about 6·25V, which is not very good. Note that the source impedance has been kept low in relation to the load and the input voltage high, and that the working frequency is only 50Hz.

If an audio generator that goes up to at least 100kHz and has an output of 10V rms (sine) is available, a similar experiment could be tried at this frequency. But here the source impedance probably would be more than in the previous experiment, maybe between 600Ω and 1kΩ, and any voltage indicated on the generator would only be correct for matched conditions. So the output voltage of the generator would have to be measured independently. Incidentally, there must be a complete dc path through the source for this experiment to work. If the value of R_L was much bigger than the value of R_{gen} (say, 100kΩ), the results would be comparable to the 50Hz experiment. Now repeat the experiments with the three diodes at 100kHz but with a capacitor (C) across R_L such that $R_L \times C$ (ohms × farads) has a time constant at least 10 times as long as one input cycle (ie at least 1,000pF). The result should be what one would expect, $V_{pk} - V_{diode}$; slightly less, therefore, with the silicon diode.

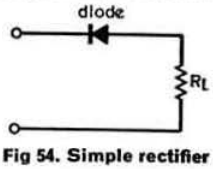

Fig 54. Simple rectifier

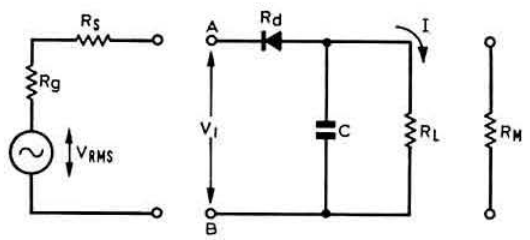

Fig 55. Circuit for determining damping resistance R_m

If the source resistance is made larger so that it approaches the load resistance value, a few awkward gremlins start appearing. The first of these is the value that is put on the diode, R_L and C as a complete unit of load (or damping) to the source (Fig 55). Analysing this diagram, the power dissipated in R_M (R_M is equivalent to the loading presented by the diode, R_L and C in combination) would be

$$\frac{R_m V^2}{(R_m + R_g)}$$

but the power dissipated in R_L, which must be the same, at 100 per cent efficiency, is

$$\frac{(V_1\sqrt{2})^2}{R_L} = \frac{2V_1^2}{R_L}$$

where V_1 is the loaded voltage across AB.

$$V_1 = \frac{R_m V}{(R_m + R_g)}$$

so that the power dissipated in R_L is

$$\frac{2(R_m V)^2}{(R_m + R_g)^2 . R_L},$$

therefore $R_m = R_L/2$. The difficulty about carrying out an experiment to prove this is that the current through the circuit is uni-directional but the voltage is not: V_1 cannot be measured normally with a meter as it consists of damped half-cycles in one direction and undamped half-cycles in the other. However, the voltage across R_L and the unloaded generator rms voltage can be measured and the source resistance would be known, although the diode resistance would have to be added to it.

Remembering from Part 3 that the average uni-directional voltage corresponding to a rectified ac was

$$\frac{V_{pk}}{\pi} \text{ or } \frac{\sqrt{2}}{\pi}\text{rms (0·45rms)},$$

the experiment comes down to a few measurements and some arithmetic. Assuming that the generator source resistance has been increased by R_s, R_m comes out to be

$$\frac{V_{av}}{I_{measured}} - (R_g + R_s + R_d).$$

Carrying out this experiment recently with a generator that had an output resistance of 850Ω, an extra R_s of 10kΩ and R_L the same, and with a germanium signal diode (CG60), an rf silicon diode (1S44) and a low power diode (1N4001) gave the author the results shown in Table 2. (The diode resistances were measured as in Part 1 of this series).

Table 2. Experimental figures to determine R_m (damping resistance)

Diode	Across R_L 10kΩ with C V_m	I_m	Diode fwd res at I_m R_{dm}	Across R_L 10kΩ without C V_L	I_L	Diode fwd res at I_L R_{dL}	R_s = 10kΩ, R_g = 850Ω, V_{rms} = 10V: $V_{dc\ av}$ = 4·5
CG60 germanium signal	2·68 V	0·268 mA	1·05 kΩ	2·03 V	0·203 mA	1·25 kΩ	$R_m = \frac{4·5}{0·268} - 11·9 = 4·89\ k\Omega$
1S44 silicon rf	2·51	0·251	2·0	1·92	0·192	2·65	$R_m = \frac{4·5}{0·251} - 12·85 = 5·08\ k\Omega$
1N4001 low power silicon	2·46	0·246	2·3	1·95	0·195	2·7	$R_m = \frac{4·5}{0·246} - 13·15 = 5·14\ k\Omega$

Although the results in this table cannot be more accurate than two per cent with the measuring instruments that were available, they do show that R_m is as near as makes no difference $R_L/2$. The germanium diode one is slightly under this value, but whether this is due to inaccurate instruments or some other cause is difficult to say. However, germanium diodes *do* load the circuit somewhat more heavily than silicon diodes because they let an appreciable reverse current through. The commonly accepted formula for loading with a diode that lets some reverse current through (ie a germanium diode) is

$$R_m = \frac{1}{2/R_L + 3/R_{rev}}$$

and this can be rearranged to give

$$R_{rev} = \frac{3R_L R_m}{R_L - 2R_m}$$

but the accuracy of the experimental figures given above would preclude them from being used this way. So the problem can be approached somewhat more pragmatically.

Take the germanium diode used for the experiment and plot its reverse resistance at various voltages, say up to 50, using a circuit like Fig 56. A vvm (minimum input resistance 10MΩ) will be necessary to cope with the high impedance measurements across AB and AC. Subtract the reading obtained across AC from that at AB to give the reverse voltage across the diode, and calculate the current going through the 100kΩ load resistor using V_{AC}, then finally calculate the value of R_{rev} from the diode voltage and load current and plot on log-log paper (Fig 57). Going back to Table 2 and the experiment that was carried out using the circuit of Fig 55, the rms source voltage was 10V and the voltage across R_L was 2·7 (2·68)V making 12·7V together. From Fig 57, R_{rev} would be about 3MΩ at this voltage, and this figure could be substituted in the expression for damping with a germanium diode (R_L = 10kΩ) but the difference it makes to the damping is only of the order of 0·5 per cent.

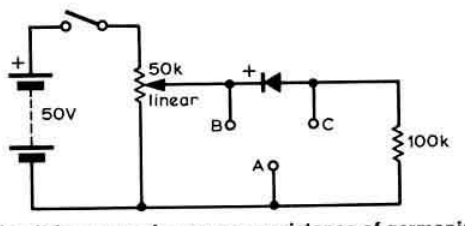

Fig 56. Circuit for measuring reverse resistance of germanium diode

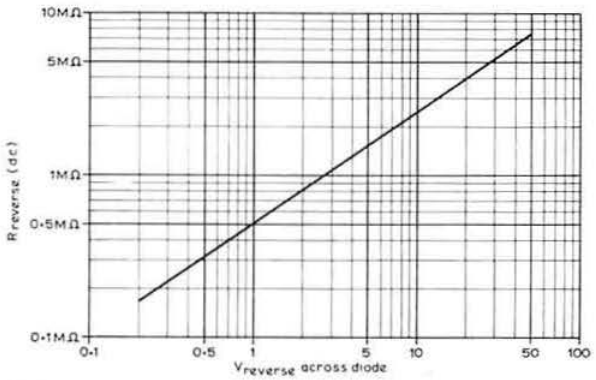

Fig 57. Typical reverse resistance plot with germanium diode

However, if the value of R_L were 100kΩ the damping would be 47·6kΩ, and here the difference is obvious, although still only five per cent.

It seems, therefore, that the load resistance should be much less than the reverse resistance (at the input voltage plus rectified voltage) and much more than the source impedance. If the ratios were 100:1, the output voltage would be of the order of 90 per cent of V_{pk}, but if the ratio were reduced to 10:1 the output (ie the efficiency) would be only 65 per cent of V_{pk} (Fig 58) and the damping due to R_{rev} increased. Note that this also applies when the source voltage is reduced: the diode forward resistance goes up and the reverse resistance goes down so the circuit becomes more inefficient. Efficiency, by the way, can be defined as the ratio of obtained dc voltage to the theoretical maximum:

$$\frac{V_{dc}}{V_{rms}\sqrt{2}} \text{ or } \frac{R_L}{(R_L + R_S)}.$$

Usually there is very little control over the value of R_S except in so far as the diode forward resistance forms part of it, and this can be small or large depending on the input voltage. The efficiency has a marked effect on the damping offered to the source and this can be seen in Fig 59 (here R_S is taken as being the diode forward resistance). Also if the frequency is increased the charge storage effect will become more noticeable and the lossy capacitor inherent in the diode will take its toll. An experiment to prove this could be tried, but it really needs an rf generator covering up to 100MHz with a couple of volts sine output, and this is an instrument

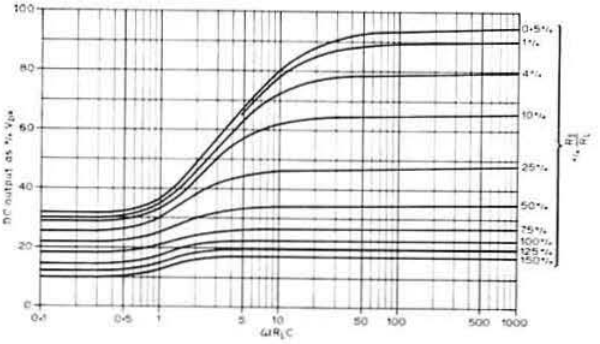

Fig 58. DC output as percentage of peak input ac with various load/source ratios as a function of frequency, load and reservoir capacity

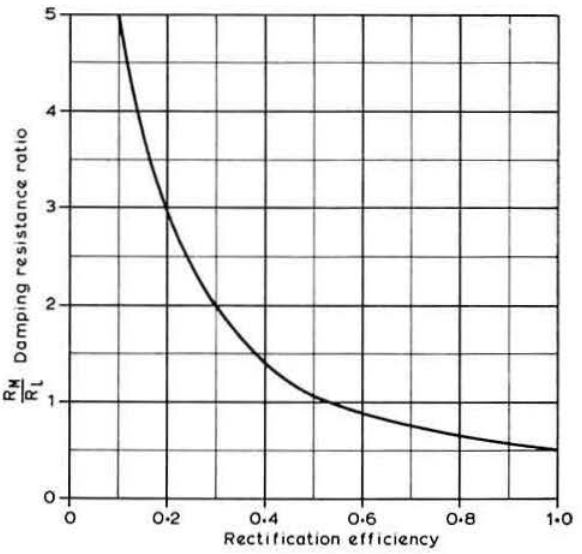

Fig 59. Damping factor against efficiency

which few people have. Lower rf voltages would be too small in proportion to the diode voltage drop to give a worthwhile result. To give some figures, a typical efficiency at 50MHz of a 1N3063 (high speed silicon diode) would be 45 per cent with a 2V rms input, 50Ω source resistance, R_L = 5kΩ and C = 20pF.

Nevertheless, with small modern silicon low-capacity diodes and with a reasonable input voltage, the effects of carrier storage are very small at a frequency of 1MHz or even 10MHz.

With very high resistance loads, even a diode like the 1N4001 can make a usable rf voltmeter at 100MHz if fed from a low impedance source (Fig 60), although obviously diodes specifically meant for rf service would be better. The efficiency of the circuit is reasonable, but if lower value loads are required it comes down with a bump.

So when a diode is used in conjunction with a tuned circuit it would pay not to forget the loading of R_L if a reasonable Q factor is required, and this explains why diodes are often tapped well down in such circuits. But due to this low tapping, a considerable voltage would be necessary across the tuned circuit so that the diode can run at a fair efficiency. With this aim in view, germanium diodes (or Schottky diodes —these will be mentioned later) are often used as "detectors" for low level rf because of their low forward voltage drop.

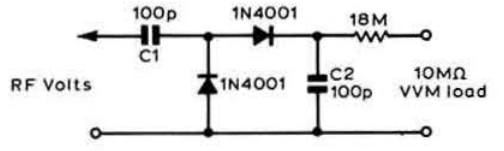

Fig 60. RF voltmeter

Now a puzzle: if, in Fig 60, C1 and 2 are replaced by 0·05μF (good ones!) and the output is left open circuit, the voltage across C2 climbs to many (six or seven) times the peak value even up to 100MHz. Why?

Part 9 will discuss modulation.

MICROWAVES

by DAIN EVANS, G3RPE*

More super-refraction on 10GHz

Following the propagation tests under near perfect conditions, described in the September issue, GW4AMV and GW3PPF carried out another test over a somewhat longer path during which the weather conditions appeared less ideal. For this 135km path over the Bristol Channel, GW4AMV operated from Brean Sands near Weston, where it was warm with a light breeze only. GW3PPF again operated from Freshwater East Beach in Pembrokeshire where it also was warm, but breezy with some strong gusts of wind. Both stations were 20ft asl.

Unfortunately a calibrated attenuator was not available for this test so the observations made are less precise. For the first few minutes of the 50min test, which started at 1735, the signals were extremely strong with an estimated 40dB in hand. Thereafter the signals showed strong rapid fading, the signals disappearing and reappearing within seconds. As in the previous test, the dish could be traversed in the vertical direction over several degrees without affecting the signal. The loss due to cross-polarization of the aerials was low, approximately 10dB.

The tests again show the practicability of propagation by this mode. Clearly the duct formed was much less stable than in the previous test, presumably because of the wind. Nevertheless it must be remembered that even for signals to appear just above the noise there must be considerable enhancement, 100dB at least.

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A 384/1,152MHz tripler

A design by G8ADP for a tripler for a microwave bands driver unit is shown in Figs 1 and 2. The BXY35A varactor employed, which is available on the surplus market, has a maximum input rating of 30W and as a tripler should generate 5 to 10W: for an input of 4W at 384MHz, G8ADP obtains just over 1W at 1,152MHz.

The original unit was built in an RS Components diecast box, type 993. The corresponding Eddystone box is about $\frac{1}{8}$in smaller all round, and if this type is used the dimensions of lines L4 and L5 can be shortened. If this is done it is possible that the unit may also be tuned up as a 432/1,296MHz tripler. The 4pF tuning capacitors used were type 82025-4E available from the Amateur Radio Bulk Buying Group.

G8ADP's 384MHz driver is the design given in the *VHF/UHF Manual*, 2nd ed, Figs 6.27 and 6.28; the only modification required being to add an extra turn to the idler coil L2.

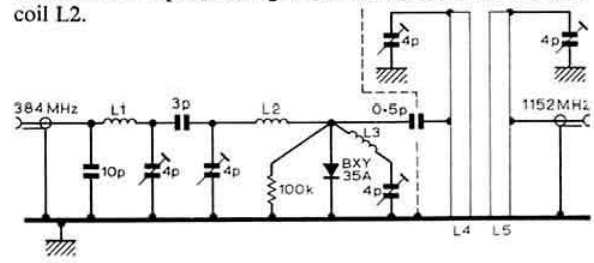

Fig 1. Circuit of a 384/1,152MHz varactor tripler

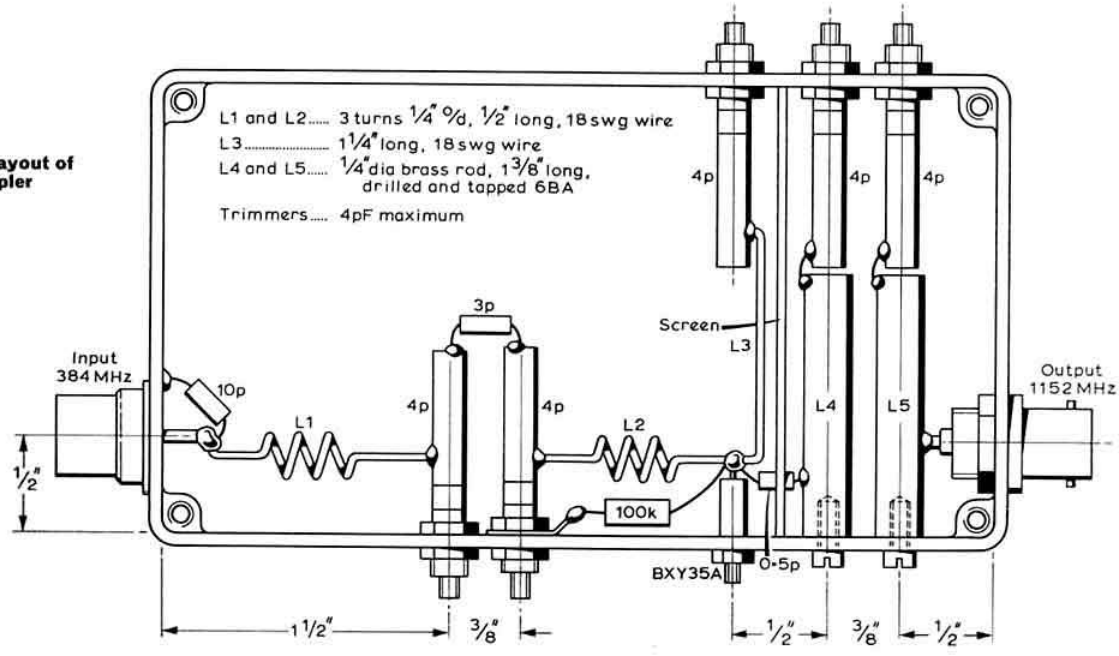

Fig 2. Layout of tripler

SWL NEWS

by BOB TREACHER, BRS32525*

10m activity

At the time of going to press 10m was in fine shape. During the whole of the daylight hours dx signals could be heard at good strength from stations in the southern hemisphere, and there were also numerous Europeans on the band. Over the last couple of years 10m has always seemed to spring to life around September and October: many put this down to the fact that there is a change in the equinox, others are just glad to see 10m open.

These good conditions occurred during our Set Listening Period which Dave Whitaker, BRS25429, got off the ground in the last *SWL News*. It is far too soon to have received comments from Dave, but your scribe listened when he could during the six-hour period on 6 October, and stations in Africa, the Middle East and South America were audible. Notable callsigns logged included TJ1EZ, JY3ZH, 5X5NK, FL8HM, plus of course one of our friendly "10m beacons", 9J2DT. It has been said that if you check 28,525 and Dave is on the air, the band is open to Africa!

It is hoped to include a fuller report on conditions during the event in the next *SWL News* scheduled for January 1975. If it proved successful perhaps we could stage two periods each year until conditions reach their peak again. It is possible that a world-wide 10m contest could be organized once a year on the lines of the one sponsored by the ARRL which takes place early in the year.

Contests: Good or bad?

Comments are quite free this time, complimenting the Cray Valley Radio Society on their annual swl contest, which is the only all-band listeners contest in the calendar for UK SWLs. Perhaps in the next issue Chris Henderson, who organized the event this year, may be able to give an idea of leading scores and a few comments on conditions during the event. Terry Vale writes from Abingdon about contests and the chaos and confusion they bring to the amateur bands. Admittedly there is much QRM when the big contests are being played off but how many weekends in the year is there a big contest?

Contests are events for those of us with flair and plenty of enthusiasm to sit beside a receiver and try to collect the rare stations which are more often than not enticed out of hibernation by these events. The main thing about contests is that they are there to be entered and won and we should thank the various organizations for providing them; without them there would be something missing in amateur radio . . . as well as all the QRM!

QRZ . . .

This time round we have received many queries regarding special prefixes heard on the amateur bands: hopefully the following information will prove useful. The country status of DL and DM is the first to tackle; these two countries became separate DXCC countries on 18 September 1973. PQ0 is a special prefix issued mainly for use in the world-wide contests and the ITU contest by stations in Brazil. There has of course been an expedition to Fernando de Noronha which used the callsign PQ0MI.

In which country is VQ9HCS? asks Kieron Murphy, A7317. This could take up quite a sizeable amount of space because Harry has been on Aldabra Island, Astove Island and Chagos, and at present he is on the Seychelles. If details are required as to when he was on which island, I suggest writing direct to Harry, c/o Box 193, Mahe, Seychelles, Indian Ocean.

XX6CC was a contest callsign for Angola; while PS7BDX was the contest call of PY7BDX.

These prefix problems come to light all the time but can be alleviated quite easily by reading the excellent dx commentary, *The Month on the Air* by John Allaway, in this journal every month.

. . . and yet more

Dave Whitaker, mentioned earlier, found band conditions most peculiar during September. One day there was dx for the taking and then the next day practically nothing to rave about at all. Two new ones found their way into Dave's log in the shape of AC3PT and FR7AG/G. Unfortunately A51PN had already been heard before, so it was not as rare as Dave first thought. In fact he heard Gus Browning, W4BPD, operating from Bhutan in 1964. I wonder how many listeners remember Gus Browning's expeditions when you could virtually be guaranteed a new country each week.

Our table leader, Keith Kerr, is now at Edinburgh University and is unable to find much time for radio. Before he took up residence there he added P29, FO8, 5W1, A35FX, YJ8BL and a dozen KH6s to his 20m totals, plus KS6DH on 15m; 10m provided HK0BKX and TI2AJF.

Deadline

Final copy date for comments, updates, photos etc is 1 December for the January issue.

Let me take this opportunity of wishing all readers a Merry Christmas, as the next time this appears we will be into 1975 . . . and the next countries table . . .

1974 HF COUNTRIES TABLE

Station	10	15	20	40	80	160	Total	Mode
A8482	91	186	220	131	149	0	777	ssb
BRS25429	63	127	201	111	123	9	634	ssb
BRS33211	60	114	191	100	110	9	584	ssb
A8606	55	140	206	82	93	3	579	ssb
A8312	53	137	171	85	90	21	557	ssb/cw
A8313	39	116	135	71	84	24	469	ssb/cw
BRS25901	10	83	161	71	85	5	415	ssb
A8538	4	57	142	80	109	2	394	ssb
A8431	27	69	147	51	93	3	390	ssb
A7317	9	86	126	44	62	6	333	ssb
A8320	0	56	122	59	70	6	313	ssb
A7460	25	73	79	78	41	14	310	cw
BRS34658	17	64	100	44	56	5	286	ssb
A8187	21	52	124	9	40	1	247	ssb
A8358	2	32	141	10	16	8	209	ssb
A8203	13	26	73	14	41	3	170	ssb
A8428	0	17	52	8	36	1	114	ssb

* 392 Rochester Way, Eltham, London SE9 6LH.

FOUR-TWO-SEVENTY

by MARTIN DANN, G3NHE*

Greetings from your new scribe—may our association be a long and happy one

THERE could be no more pleasant a way in which to begin the first *Four-Two-Seventy* than by paying tribute to Jack Hum's remarkable eight and a half years as writer of *Four Metres and Down*. His vast experience and great enthusiasm for vhf, together with his "easy-to-read" inimitable style, will be sorely missed by his many readers. On behalf of the vhf/uhf fraternity, thank you, Jack; and long may we continue to hear that distinctive signal from "five Uncle Mike"—four metres and down!

Happily for us all, Jack Hum continues to serve on the VHF Committee, and remains VHF Awards Manager. All claims and cards for FMD Awards should, therefore, continue to be sent to G5UM, QTHR, and not to G3NHE, or to RSGB headquarters.

It is hoped that all the many groups, majority or minority, that go to make up the vhf/uhf following will find their interests served by this feature. If anyone feels that his (or her) particular field is not being given the attention it deserves, why not pick up that pen and let the writer know? A column of this nature relies heavily on reader participation; it follows, therefore, that any news, views or points of topical interest concerning vhf/uhf would be most welcome.

"Force nine"

"Severe gale force winds . . . structural damage may occur . . .". Thus was VHF NFD 1974 heralded by the weather forecast for the weekend of 7-8 September. Tales of catastrophe and disaster are legion: tents flapping away into the night; aerials blown down, or stripped of their elements; even, in one case, a van being overturned by the wind. The fact that so many portables managed to keep going is a testimony to the devotion to duty of the operators and helpers involved (although one operator was heard to mutter repeatedly, "We must be *mad*!").

Regrettably, the appalling conditions were matched on 2m by a plethora of atrocious signals, most of which appeared to emanate from grossly overdriven ssb transmitters. It was obvious that in many cases it was over-enthusiasm of the operator, rather than any basic transmitter fault, that was the cause of the trouble. Transmitters that were perfectly clean when operated by more experienced hands, became splatter machines when turned over to types who found it necessary to raise their voices by a couple of hundred decibels —and by a couple of octaves! One felt that many of them would still have been audible at great QRB with the rig switched off.

Apart from making NFD gear as idiot proof as possible (for example, by properly adjusted speech processing, or tying the alc of the prime-mover to the pa), the answer would seem to lie in organization, preparation and control within the participating groups. Is every potential operator made aware of how to "drive" the transmitter? Is an experienced member on hand when the less experienced operator is given a go? Is there any means of monitoring to ensure that a decent signal is being radiated? It is easy to suggest that the adjudicators should be more severe on offenders—perhaps they should—but the responsibility for halting the deterioration of standards in portable contests surely lies with the groups and clubs concerned.

Still with contests, and VHF NFD in particular, one participating group's newsletter bemoans the poor standard of log keeping of its own operators. Portable stations logged as fixed; times omitted or logged in bst; QRA locators miscopied (showing stations in the sea!); incomplete information recorded; misspelling; too many duplicated contacts (no check log?); all these meant hours of detective work to make the log fit for submission as a contest entry. All credit to that group for not leaving it to the adjudicators to make some sense of the log, but there is a lesson to be learned there somewhere. Better luck next year!

From G3NHE's location, activity during the uhf/shf contest of 5-6 October was disappointing. Conditions were far from good, and deteriorated even further with the onset of rain on the Sunday. However, on 70cm ON4PB/P was just workable on Saturday evening, and 23cm supported contacts over the 250km mark. The continuing popularity of ssb on 432MHz was evident, and as a result fm and a.m. stations tended to congregate in the bottom few hundred kilohertz of the band.

Aurora!

There is something about an aurora that seems to make it a little more exciting than other propagational openings; perhaps it is the exotic sound imparted by the auroral curtain to the reflected signals. By all accounts, the event of 15 September was an extremely good one, producing strong signals from a very wide area. As on previous occasions the auroral opening occurred during a prolonged period of solar activity. The radio noise from this activity, associated with a large sunspot, was received and reported by Ron Ham as early as 6 September and news of it was broadcast by the RSGB news service on the morning of the 15th.

Three phases have been reported. The times of the first two phases vary considerably according to location, but generally they seem to have lasted from 1445 until 1900gmt, and 2300 until 0300gmt. Both these periods were productive of good dx, although some stations found the midnight session more intense but restricted in coverage. Beam headings for phase one were mainly north-east, although several contacts were made with beams almost due east. During the last few minutes signals tended to peak some 20° *west* of north. The second phase required a more northerly beam heading, with UR2RDR appearing from due north; while the third was of short duration around mid-day on the 16th.

* 49 Windermere Court, North Anston, Sheffield S31 7GJ.

A staggering 15 countries and 49 UK counties were worked via the aurora on 144MHz cw by GD3UMW/A, of Kirk Michael, who may well have achieved some GD "firsts". Alex Gartshore describes the event as "auroral dxtasy", and records contacts with UR2, OH, LA and DM, as well as all the usual stuff! Alex also reports that he observed a visible display between 2030 and 2100gmt against a clear, starry sky. Quite a few logs include SQ2DX in QTH locator JO43c. GW3NNF of Anglesey wonders whether his contact with the Polish station was the first GW/SP via aurora. A feature of the opening was its widespread nature. To the south, HB9 was heard (if not worked) in the UK; LX1SI and LX1DB feature in several logs, and G8EOP reports a contact with F5OA in locator DI21c. Countries known to have been worked from these islands include G, GC, GD, GI, GM, GW, EI, DL, DM, F, PA0, ON, OZ, LX, SM, LA, OH, SQ and UR2.

At the height of the first phase, GM8BKE was copying all active British beacons. He comments on a period between 1730 and 1755gmt when ssb became extremely difficult to copy. G3MWQ of Wellington found cw easier than ssb, preferring the better readability. He was surprised by the almost universal use of co-channel working on the key and assumes that this was due to the use of cw by ssb men with transceivers. G3HCW rated it high among the auroras he has experienced, working nine countries and 16 counties during the first phase. For G3JXN, however, it was his first taste of the phenomenon after some 20 years on vhf!

In Scunthorpe, G3CDF heard UR2RDR but was unfortunately unable to raise him. Further south, G3DIV found that the opening started later and finished earlier in Sussex. Despite this, he gave SM0FOB, near Stockholm, the G contact he had been unsuccessfully striving for via meteor scatter. The more limited timing of the event was confirmed by G3DAO, of Selsey, who also passes on information from SM6CEN describing what it is like up in the aurora belt during one of these affairs. His tally included OK, SP, UA1, 10 UR2s plus all the usual OHs, LAs etc.

No reports of any 70cm contacts have so far been received, but contacts were made on 4m. G5UM left the QRM on 2m and tried 4m, finding GM3ZBE pounding in at 58A. Jack gave 'ZBE his first ar contact on the band. By some immense effort of will, Mike Gibbings, G3FDW, left the shack to his son, G8ILI, to experience his first auroral opening on 2m. When signals faded on 2m, Mike, knowing he had about 10min left on 70MHz, executed a swift takeover and raised GM3ZBE on ssb. He comments on the inherently improved clarity of auroral sideband signals on 4m compared with those on 2m. He should know; it was back in 1966 that G3FDW made the first ssb contact via aurora on 70MHz.

Expedition trends

This year has seen a number of highly successful vhf/uhf expeditions, and several healthy trends seem to be emerging. One is the increasing use of 70cm, sometimes on an equal footing with 2m, or, as with the GM3UCB/P trip, being given pride of place. In that case 2m was used only to drum up custom for the higher frequency.

High-power ssb, high-gain aerial systems and first-class receiving set-ups are becoming almost mandatory for a serious expedition (we exclude the chap taking a 10W rig on holiday with him), and while a few well-known teams have been demonstrating the efficacy of this on 2m over the years, it is refreshing to find 70cm now being given the full treatment. Who knows, we may soon find some group taking 432MHz gear only to set up contacts for 23cm.

The 2m band has always had a share of the expedition traffic commensurate with its higher level of occupancy, but no harm can be done by the attention now being paid to 70cm, attention which the stations concerned will agree has been well rewarded. Unfortunately, 4m seems to be an altogether more difficult proposition. The lack of activity, caused by the absence of Class Bs and the self-perpetuating effects of low activity, make all but the most ardent devotees of the band think twice before committing themselves to night after night of fruitless CQing. However, the increasing use of ssb, the move away from vhf tv, and the persistence of the faithful few suggest that prospective expeditioners might keep this interesting band in mind.

One of those ardent devotees of 4m is Mike Gibbings, G3FDW, and with his son Andy, G8ILI, he was in the Scottish border counties to activate 4m during the first week of September. If Mike's ardour was not well and truly dampened by the abysmal weather experienced, it must be considerably more waterproof than the clothing they took with them. Apologies from the 'FDW team to those who searched for them in vain on several evenings, but on those occasions they were sensibly concentrating on survival, operating being entirely out of the question.

A couple of weeks later the GM3UCB/P 70cm expedition appeared to find conditions a little better, if not ideal. Activating eight Scottish counties, they were consistently workable in the south of England, and drew high praise from Cyril Hayward of Towcester. G4AHH felt that much credit was due to the excellence of the equipment used. He was also impressed by the trouble they took to get the information onto the grapevine, via the land line, when they suffered a vehicle breakdown.

From the GM3UCB/P team of G8DMJ, G4AJW, G4BRT and G8HZV comes confirmation of the quality of equipment used on 432MHz. A receiver overall noise figure of about 2·5dB, four 46-element multibeams, and 400W p.e.p. output. This enabled them to amass 131 contacts on the band, many of them over 400km.

Awards

From G5UM comes information of the latest FMD certificates issued, and a special plaudit to G5DF for achieving Supreme Award No 6. John Pinchbeck already held 144MHz Senior Transmitting No 48 dated October 1973, and 70MHz Senior Transmitting No 14 of the same date (itself probably the most difficult of the Seniors to attain). By earning himself 432MHz Senior No 22 he now qualifies for the Supreme.

70MHz Senior Transmitting. Certificate No 18 goes to one of the band's most enthusiastic protagonists, G3RWM. This follows hard on the heels of his 70MHz Ordinary No 111.

144MHz Senior Transmitting. G3AHB of Slough receives Certificate No 64, and in doing so wishes to pay tribute to the expeditioners who provided many of the rarer counties.

144MHz Transmitting. No 401 to G8DNF (21 of whose 30 counties were obtained on one day during the August 1973 ssb contest); No 402 to G8GXE; No 403 to G8ECT, and No 404 to G8HBQ.

432MHz Senior Transmitting. Certificate No 21 to G8EOP. Melvyn Jackson's location in Dewsbury, near Leeds, often

puts him just out of range of the dx being worked by stations only 30 miles or so to the south of him, so this Senior is a fine achievement.

Congratulations to all these certificate winners.

While on the subject of parchments, G2AYQ sends details of the Cornish Award, offered by the Cornish Radio Amateur Club for working Cornish stations. There are three classes in the vhf/uhf section, requiring 9, 6 or 3 points, and one point is earned for each station worked on each band. The award is available to SWLs and is free to the disabled (25p otherwise). Full details may be obtained from the CRAC Awards Manager, G2AYQ, QTHR.

Following that fine 144MHz Senior won by G3DAO using the key only, we hear of an attempt to earn a cw only Listener Award. Stan Forman, BRS34807, of Burton-on-Trent, will be confining his reports to cw stations, feeling that this will make the ultimate achievement all the more worth while. We wish him luck.

FM channel

GM8FM, in the Central Scotland FM Group newsletter, feels that not enough encouragement is being given to a.m. and fm stations to change frequency in order to comply with the new band plan. He also feels that a.m. stations may have been left in the dark with regard to the segment of the band in which a.m. operation is recommended. We commend to all users of the vhf bands who are unsure of which frequencies to use, the article on the new band plans by G3FZL, RSGB VHF Manager (*Radio Communication*, December 1973, page 846).

It is suggested to anyone still using a.m. above 145·5MHz, or between 145 and 145·225MHz, that they cast around for a crystal that will put them in one of the all-mode segments. We may not all agree wholeheartedly with the new band plans but they exist, and for the good of the majority should be adhered to.

From Julian Baldwin, G3UHK, comes news of a handy booklet, compiled and produced by G3UHK and Kris Partridge, G8AUU, entitled *The International VHF-FM Guide*. The booklet provides a source of information about vhf repeaters in many countries, and deals with British repeaters in some detail. It also provides up-to-date information about reciprocal licensing requirements. A useful accessory if you are contemplating mobile operation at home or abroad, the guide costs 30p including postage, and can be obtained from G3UHK, QTHR.

A proposal to establish a 2m repeater on a skycraper in Liverpool, to cover the whole of the Mersey estuary, comes from G3TXH. He invites all interested to get in touch with him QTHR, or to telephone him on 051-339 4930 with a view to forming an fm group before the repeater project goes forward.

Repeaters, for and against

More than 50 people turned up at a meeting organized by the Cambridge Club on the subject of vhf repeaters. The case "for" was put by G3VEH, and "against" by G8FBF, with G5UM in the chair keeping the peace. In the event, reports G5UM, the discussion, though candid, was extremely good tempered and an object lesson to those who choose to express their likes and dislikes in a less civilized manner. By the end of the meeting both sides accepted each other's point of view more readily than they had previously done; that while repeaters increase a band's potential, there is no more compulsion on anyone to use them than there is to use any other specialized mode, such as cw or ssb.

Similar discussion at clubs in areas where repeaters either exist or are planned would be extremely useful, and no doubt they would promote some of the feedback of information sought in the last paragraph of the G3FZL/G3COJ article last month on this subject.

South by west

Although no newcomer to amateur radio, as his call G2AYQ indicates, Ted Bowden is a new boy to vhf. He is thoroughly enjoying himself on both 2 and 4m, but urges stations in other parts of the country to beam towards his home county, Cornwall, more often. He lists 21 callsigns as being just some of the Cornish stations active on 2m—21 good reasons for turning the beam south-west.

Those "Es" again

Stephen Cole, GW4BLE, sends details of a letter from a listener in the Azores concerning reception of fm broadcast signals during the opening of 23-26 June. From a poor vhf location, with no beam aerial, bc stations in Germany, France, the UK and North America were heard, the greatest dx being WFPG-FM in Atlantic City, NJ, at a distance of 2,600 miles.

Miscellany

As the ubiquitous "black box" 10W sideband rig covers 50kHz of the cw allocation on 2m, why not make 144·1MHz the cw calling frequency, suggests G3HDQ, thus encouraging the use of this device on A1. He wonders whether anyone has modified this rig to enable it to be keyed, and if so, how? (144·1MHz is the spot frequency for random meteor scatter work, so if the idea of a cw calling channel were to be pursued, 144·12MHz would be better—*M. D.*).

G4CZP of Carnforth is another who is irritated by the no QTH brigade. It does seem a little silly that on a band where directional aerials are almost universally used, people do not get into the habit of announcing their county, if not their town, when calling CQ.

One time G3JLA of Hertfordshire, and better known for the last few years as EI6AS, Albert Latham now resumes his UK call with a move to Omagh, Co Tyrone, and, of course, with a GI prefix.

More news from Northern Ireland, GI3WTG is now regularly on 70MHz ssb from the county of Amagh.

Now that Peter Cutler, G3DAO, has got the 2m cw only FMD Senior award under his belt, what next? Work is already in progress on a 70MHz transmitter, cw only of course!

"Can't we forget this mode war?", is a recurring theme in this month's mail. What a good idea! This internecine squabbling can do the interests of vhf/uhf no good, so shall we say *pax* for the time being?

Finally, G5UM sends a "thank you" to all the well wishers, too numerous to reply to individually, who have written to him or spoken over the air following his retirement from *Four Metres and Down* last month. He hopes to be in touch with all of them via 4, 2 and/or 70cm.

COMMITTEES OF COUNCIL, 1973-4

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THE MONTH ON THE AIR

by JOHN ALLAWAY, G3FKM*

TROUBLE is again being experienced on 160m in the shape of interference caused to coastal and other stations by amateur signals. Perhaps it is not out of place to remind readers that we enjoy the use of this band as secondary users only and strictly on the understanding that we do not cause interference to the other stations. Frequencies requiring special care include 1,827, 1,834, 1,841, 1,848, 1,855, 1,856, 1,869 and 1,883kHz, and it is always wise to listen on any frequency before using it—remember that "fish phone" has priority.

A reminder from G2MI that the addressed labels issued for use on QSL cards being forwarded to the RSGB QSL Bureau are self-adhesive and do *not* need to be stuck on to the envelope with sticky tape!

News from overseas

Alan Papworth, G3WUW, has received the callsign 9M2RL for use in West Malaysia. He asks for QSLs to his home address (see *QTH Corner*). During his last visit to Syria he helped YK1AA to put up his beam, but Rashid still finds difficulty in working into western Europe because of a nearby mountain. The only other really active YK at that time was YK1KAS, the Army club station. Other stations, including Rashid's son YK1AM, had not had their licences returned. Alan hopes to return to VQ9AP for a few weeks later this year.

In a letter to BRS17567, ST2AY says that his QSL policy is to send cards in reply to those received without any postage via the bureau, but to answer by surface mail if one irc is enclosed, and by air if two IRCs are sent. Roger is now receiving about 100 QSLs each week and direct mailing for all these would cost him a great deal. Operation will cover all bands 1·8 to 28MHz and continue until November 1975.

5B4WR reports that the cards in the Famagusta bureau have been lost, plus some sent to PO Box 216, Famagusta. Those arriving at the latter address now are being re-directed to 5B4AC and will be dealt with in due course. Roland says that the beacon on 28,180kHz continues to operate, and that 5B4 stations are active—mainly centred around 14,250kHz at 1800 most evenings.

4X4CJ, Bob Avigor, of Tel Aviv, asked G2HKU to relay his best wishes to all friends in the UK. He has been off the air for three years but now has new Heathkit equipment and is looking for Gs. G2HKU also enclosed a note from EA4JL who wishes it to be known that he is not AC3PT's QSL manager.

Top band news

The **1974/1975 Transatlantic** "first timer's" series of dx tests will take place as follows: 0500 to 0730 on 17 November, 22 December, 12 January, and 9 February. W/VEs will transmit between 1,800 and 1,807kHz, and Europeans from 1,825 to 1,830kHz. W/VEs will call "CQ FT DX" for the first three minutes of each 15min period starting on the hour, and will listen for the next 12 minutes. Stations outside the USA and Canada should call during this 12-minute period. Regular operators on the band are asked to try to work newcomers only and to send reports to the organizer W1BB, Stew Perry, 36 Pleasant St, Winthrop, Mass, 02152, USA (and also to G3FKM). Transpacific tests will be held from 1330 to 1600 on 16 November, 21 December, 11 January and 8 February with similar routines except that ZLs will use 1,873kHz, VKs 1,800-1,805kHz, JAs 1,907·5-1,912·5kHz, KH6s 1,996-2,000kHz, and others 1,800-1,805kHz or the "dx window" (1,825-1,830kHz).

G3ORP finds interference on 1,801·3, 1,802·6, 1,803, 1,804·3, 1,806·1, 1,807 and 1,809kHz very heavy most evenings on his Drake R4C receiver, and asks dx stations to avoid these areas if possible.

DX news

There is another "approved" station on the air from South Vietnam. This is XV5DA, the operator of which is W6URP. QSLs go to the address in *QTH Corner*. Ken Ellis, G5KW, operated as second operator of HZ1AB until he was re-issued with his HZ1KE call. It seems that no new licences are being issued but that those who have held one before may apply for its re-issue.

Eric Lomax, G4DGR/5N2ABG, has received a letter from G8ILH who was formerly 5N2AAS (until 1966). The latter has returned to Nigeria with his KW2000E and is hopeful that he will get his call back. The ruling seems to be that 5N calls may not be kept valid if the owner is not in the country but will be re-issued on return (as in the case of 5N2AAN and 5N2ESH).

More special Russian callsigns celebrating the 30th anniversary of liberation from the Nazis will appear on 15

SV1CH (right) and SV1IL operating from SV1IFT

* 10 Knightlow Road, Birmingham B17 8QB

Martin Kumpost, OK1MCW ex-OL5ANJ, specializes in low power 160m working. His equipment consists of (l to r) HM1C electronic keyer, 160m converter, W-10-L receiver and HM10W transmitter. *W1BB photograph*

December from Kazan (UA30KA), Sverdlovsk (UA30SW), and Tashkent (UI30TA).

In a poll conducted among 157 dx enthusiasts throughout the world, Geoff Watts of *DX News Sheet* discovered that the 10 most "wanted" countries were Clipperton Is, Bouvet Is, S Sandwich, China, Iraq, 8Z4, Burma, Sikkim, Mellish Reef and the Kamaran Is.

9G1AR will be in Tchad in late November or early December and is hoping to acquire a TT8 call. TR8SS is attempting to obtain permission to operate from Guinea, but this seems to be a difficult objective to achieve.

VP8MS is returning to Antarctica and may visit S Georgia and the S Shetland Is. It is considered unlikely that S Sandwich will be on the itinerary.

A9XW has taken charge of the Bahrain ARA QSL bureau and may be reached at the address given in *QTH Corner*.

The Radio Amateur Union of Northern Greece had an amateur radio stand in the International Fair of Thessaloniki again this year. This is the second time that this has happened and the special call SV1IFT was used. Last year the station used the call SV1CH/IFT and it is hoped that next September it will be SV40IFT as it will be the 40th IFT. Those sending 10 IRCs with a QSL card confirming contact to PO Box 483, Thessaloniki, Greece, will receive a special diploma.

The possibility of amateur radio activity from Iraq seems remote as recent enquiries have revealed the fact that even commercial licences are difficult to obtain, no company is allowed external communications by radio, and security is extreme. Even the idea of a government club station under supervision has been turned down.

JA0CUV will be in Bangladesh in mid-November and hopes to be on the air in the 15-17 November period. He hopes to use the call C21DX/S2 but may have to use JA0CUV/S2. JA1MCU may also be with him. Afterwards Tack will go to the Maldive Is (20 to 29 November) where he hopes to take part in the CQ WW DX contest. He will visit Burma, Hong Kong and possibly Macao on his return journey, but has little hope of being on the air from the first mentioned. Frequencies to watch include 1,805/1,823kHz and 5kHz above band edges on cw, and 3,775, 7,075, 14,195, 21,275 and 28,600kHz ssb.

Dxpeditions

A group of six members of the S Jersey ARC are planning a trip to Navassa Is (KC4) which at the time of writing was expected to take place from 26 to 29 November. They intend to run two stations continuously and to cover all bands 3·5 to 28MHz on cw and ssb. QSLs will be sent out via W2KF.

John Cashen, W6KNC, who was with the ZK1TA expedition, expects to be on the air from Tonga from 29 October to 2 November, and then to be ZK1JC from 5 to 12 November from Raratonga. He may then visit another of the Cook Is. Equipment will consist of an FT101B transceiver and vertical aerial, likely frequencies to be used include 7,098, 14,210, 21,290 and 28,595kHz ssb.

VE3EZM is on a world trip and expects to be on the air for about a week from the following locations starting on the dates listed: 31 October, 3D2; 28 November, A35; 22 December, VK; 22 January, ZL; 22 February, ZK1/ZK1M/ZM7; 24 March, PJ2; 31 March, 8P6; 7 April, VP2A/E; 14 April, VP2K; 21 April, VP2V; 28 April, VP5. He will have an FT101B with him and will mostly use 14,150 or 14,195kHz with other bands as announced. QSLs should go to VE3GUS.

Contests

The OK DX Contest

0000 to 2400 10 November

1·8 to 28MHz, both phone and cw but no cross-band/cross-mode contacts allowed. Exchange RS/T and number of ITU zone (British Isles = 27). Contacts with OK count three points, with others one point (except with own country which only count for multiplier credit). The multiplier is the number of ITU zones worked on each band added together. Entrants may be single-operator all-band or single-band, or multi-operator multi-band. Use separate log for each band and show date and time, station worked, numbers sent and received, points, and if new ITU zone. Send summary sheet indicating how score was arrived at and a signed declaration that station was operated in accordance with contest rules and amateur radio regulations. Send logs to Central Radio Club, PO Box 69, 113 27 Praha 1, Czechoslovakia, before 31 December. Contacts in this contest may be used as credit for the 100 OK and S6S awards (see "*Awards*").

The All Austria Contest

1900 16 November to 0700 17 November.

1·8MHz cw only. Exchange RST and serial QSO number (from 001) and work only OE stations. Each contact counts one point and each OE district (OE1-OE9) a multiplier of two. Send log and signed declaration to "AOEC 1974", PO Box 999, A-1014 Vienna, Austria, before 15 December.

TOPS CW Contest

1800 7 December to 1800 8 December.

Call CQ CMF, 3·5 to 3·6MHz only, leaving low end for dx. Contacts with own country count one point, with others in same continent two points, and others five. Total score is QSO points multiplied by the number of different prefixes worked. Entries may be single or multi-operator. Post logs before 16 January to G3IRM, 14 Linton Gardens, Bury St Edmunds, Suffolk IP33 2DZ.

In the **DL/AG CW QRP summer contest 1974** contestants in 14 countries and three continents demonstrated that low sunspot numbers are no bar to QRP cw activity. The overall winner was IS0ATZ. Taking second place IS0BDO worked

QTH Corner

A9 QSL Bureau	John Garrett, A9XW, PO Box 780, Manama, Bahrain.
BV2A	via WB2UKP, 70 Silverbrook Rd, Shrewsbury, NJ, 07701, USA.
C21DX/S2	via JA0CUV, Box 22, Mitaka, Tokyo, Japan.
EA9FB	via EA6BL, Las Teresas 13, Palma de Mallorca, Balearic Is.
FO8RC, FO8RM	via W6JZU, 25215 La Loma Drive, Los Altos Hills, Cal, 94022, USA.
KC4NI	via K2FT, 17 Coles Av, Cherry Hill, NJ, 08034, USA.
OH0AL	via OH2AL, c/o Sorvali, Simakuja 3-A, SF-00720 Helsinki 72, Finland.
PE30NOS	VRZA, PO Box 400, Rotterdam NL 3005, Netherlands.
PJ9RT	via WA3IAQ, 11827 New Hampshire Av, Silver Spring, Md, 20904, USA.
SM7JZ/SU	via Vernamo Radioklubb, Box 2003, S-33102, Vernamo, Sweden.
WG4TWN	via WB4SIJ, 591, Cricklewood Drive, Lexington, Ky, 40505, USA.
VP2MMM, VP2MSO	via WA9JCO, 349 McHenry Av, Crystal Lake, Ill, 60014, USA.
VS6DB	Capt J. E. Grigsby, G3WNG, 8 Robertson Rd, Catterick Garrison, N Yorks.
XV5DA	MARS Amateur Radio Station, DAO-AOSCE-ST, c/o FPO San Francisco, Cal, 96620, USA.
VP7BA	G. J. Stuck, Casuarina Pt, Marsh Harbour, Abaco, Bahamas.
ZB2FX	via G3RFX, 8 Hill Rd, Theydon Bois, Epping, Essex.
ZB2WZ	via WA0VPK, 2185 Randy Av, White Bear Lake, Minn, 55110, USA.
ZD3U	via G3LQP, 56 Combe Rd, Tilehurst, Reading, Berks.
ZD9GD	via ZS6AO, Selbornelaan 261, Lyttleton, Verwoerdburg, Tvl, Rep of S Africa.
4W1ED	to GD3AAX, c/o RSGB QSL Bureau.
5R8SD	via F8US, 28 Rue des Poilus, 78 Mesnil-Le-Roi, France.
5W1AB	via W6DAB, 12661 Byron Av, Granada Hills, Cal, 91344, USA
5Z4MO	GM3TSL, Samburu, Kingston Rd, Neilston, Glasgow.
7P8AQ	PO Box 1266, Maseru, Swaziland.
9M2RL	A. Papworth, 25 Station Rd, Over, Cambridge.

RSGB QSL Bureau, G2MI, Bromley, Kent BR2 7NH.

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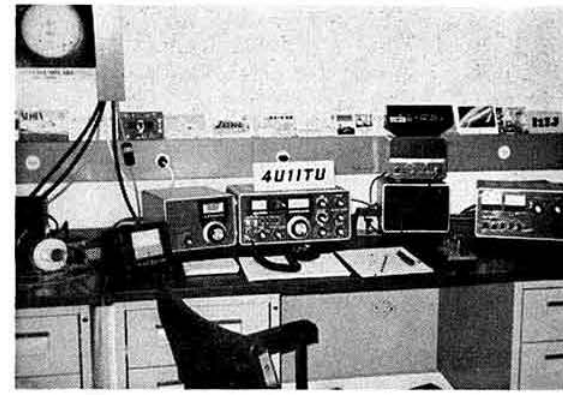
14 countries on the "dead" 28MHz band, and third place was won by G3DNF who had the highest 21MHz score. Other UK entrants were G8PG (6th), C31DV (op G3ZXK) (9th), G4AYS (33rd), and G4BWP (34th). There were six entries from the USA and five from Japan and the QRO section winner was DL8YT. The winter contest will take place on 11-12 January and rules will be the same as those published previously in *MOTA* except that the power limit to qualify for the handicap multiplier has been raised to 3·4W to admit the use of the HW7. UK logs and queries should be sent to G8PG, 37 Pickerill Rd, Greasby, Wirral, Merseyside.

HF BEACON STATIONS

Callsign	Frequency (MHz)	Location	Reports to
DL0AR	29·000	Hiddesen	DL6TC, Paul Nipkow Weg 5, 4930 Detmold, FR of Germany
DL0IGI	28·195	Mt Predigtstuhl near Salzburg	DJ5DT, Kollwitzweg 1, D 6100 Darmstadt, FR of Germany
GB3SX	28·185	Crowborough, Sussex	G3DME
VE3TEN	28·175	Ottawa, Canada	VE3QB, 59 Westfield Crescent, Ottawa 5, Ontario, Canada K2G 0T6
VP9BA	28·165	St Catherines	VP9BY, PO Box 73, Devonshire, Bermuda
5B4CY	28·180	Limassol	5B4AP Box 1267, Limassol, Cyprus
3B8MS	28·190	Signal Mount, Mauritius	3B8DG, PO Box 44, Port Louis, Mauritius

Reports for any of the above may be sent to RSGB HQ (Attn IBP). At present only DL0IGI switches to 28·200 at 00-05 and 30-35min past each hour.



Part of the station at 4U1ITU in the headquarters building of the ITU at Geneva. The equipment shown comprises an FT101, FV101 and FL2100, donated by the Yaesu Musen Co and Western Electronics (UK) Ltd through the IARU Region 1 Division to the ITU

Awards

The 100 OK Award

For confirmed contact with at least 100 OK stations since 1 January 1954. Endorsements are issued for 200, 300, 400 and 500 confirmed contacts.

The S6S Award

For confirmed contacts with six continents all on cw or all on ssb. Band endorsements are issued.

Applicants for the two certificates listed above may claim credit for contacts made during the OK DX contest provided that they have submitted a log and all eligible contacts were made during that event. Otherwise a list of QSOs, QSLs, and five IRCs should be sent to Central Radio Club, PO Box 69, 113 27 Praha 1, Czechoslovakia.

The OK SSB Award

For obtaining 25 points by confirmed contacts with OK ssb stations. Each OK/OM counts one point on 14, 21 and 28MHz, and two points on 3·5 and 7MHz. QSLs for all Czech awards may be certified by G5GH.

The P-100 OK Award

Issued to listeners on similar lines to the 100 OK Award. (This is the only Czech certificate available to listeners.)

Odds and ends

G4AMD has been receiving QSLs for stations who have contacted GD4AMD on 14 and 21MHz cw. He has not operated from the Isle of Man and at present is only active on 14MHz. Chris was formerly 8P6EK and VP2AZA and asks for patience from those awaiting QSLs; he promises that all cards received will be answered as soon as possible.

G6XJ (ZL2ACN/VK3AMM) arrived back in Britain on 1 September after two years in the Antipodes. He writes that his trip can well be summed up in the following sentence: "The wonderful hospitality of the Kiwis and the Aussies has to be experienced to be appreciated." Arthur will shortly be moving to Devon.

G2MI reports that his OH2AD/OH0 QSLs have been returned by ARRL as not acceptable for DXCC due to the

non-arrival of information concerning the expedition at Newington.

G3OCA would appreciate information on how to obtain QSLs from FR7ZD, 5U7AB or 5U7AR. He is also keen to join a dxpedition and may be reached at 1 Chesterton Rd, Derby DE2 7EN.

Band reports

An interesting feature of the past few weeks has been the activity on 28MHz. Due to an unfortunate omission the activity period organized by BRS25429 did not receive publicity in last month's *MOTA*, but it is hoped that the experiment will be repeated in the near future. Results are not yet known.

Many thanks for the information supplied by the following: G2HKU, G4RZ, G5JL, G6GH, G8MY, G3s GVV, LOL, NKQ and ORP, GM3TSL, G3XWZ, G4DFN, GM4DGE, G4DJY, BRSs 17567, 17991, 19682, 25429 and 31301, As 7056, 8312, 8428, 8431 and 8713.

Stations listed in italics were using cw, the rest ssb.

1·8MHz. 0000 *PY1RO, ZB2CJ.* **2200** *ZB2AY.*

3·5MHz. 0200 ZS6DW. **0300** EL7D, KP4EAX/HI8. **0400** *KV4BI.* **0500** YN1AM, *ZLs.* **0600** K6ERT, W6NLZ, W7KW, ZLs. **1800** JY9GR. **2000** SM7JZ/SU. **2100** *EA9EX*, PY1RO, TJ1EZ, *ZB2WZ*, ZC4AK, 6W8FP. **2200** DK6PN/A6 (QSL to DK3NK), VS6DO, 5Z4LW, 9G1DY, 9M2FX. **2300** A6XB, FP8DH, VP9AP, ZS5LB, 4Z4HF.

7MHz. 0000 *CX1AAC, 3A0AA.* **0100** *VU2IN.* **0500** PJ2MI, *VE7TT, VP2MSO, W7DZO.* **0600** PJ2JW, YN1DS, YVs, ZLs, *K9KGA/6W8.* **0700** VKs. **0800** *7X2AN.* **1900** *9V1BB.* **2000** TJ1EZ, TR8DG. **2200** *A9XU*, SM7JZ/SU, UK0AAB, *6W8FP*, 9L1JT. **2300** M1C, TR8SS, *ZB2CJ.*

14MHz. 0500 A7XA. **0600** KB6CU, KS6EZ, P29FV, ZLs, 5W1AL. **0700** KH6s, VKs, *5W1AB*, 5W1AN. **0800** A35FX, KL7s, KS6DH, KX6LQ, 3V8BD. **0900** PZ0AA, YJ8DE, 3D2CC. **1200** UA0YT. **1300** HL9KZ, P29KE, VS6, XV5DA, YJ8BL. **1400** DU, PA0IWH/S2, YB0ABS. **1500** A51PN, CR8AC, UA0YAE, VS5MC. **1600** AP2KS, FR7AE/G, ST2AY, YK1AA, 3B8DR. **1700** *KL7HIK*, VK9YV, VQ9D/D, 8Q6AC, *9M8HG.* **1800** AC3PT, KC4AAC, VP8s NP, NS, XT2AE. **2000** 5V7WT. **2100** CE3AK, CR3AX, WA6YLI/HR2, TR8MC, VP2s, ZL4BX. **2200** VP8HZ, ZD7FT. **2300** VE6JL/SU.

21MHz. 0800 CR5AJ. ZLs. **1000** 5N2ESH, 7P8AT. **1100** JAs, YB1KW, 3B8CV. **1200** FB8XG, *FR7AL*, JAs, VS5MC, VS6DO, *ZD8TM*, F5JD/5U. **1300** JAs, YB0ABO, *9A1FF* (QSL to OE5PV). **1400** ZD9GD (Gough Is), ZS1ANT, 5R8SB. **1500** *FR7AX*, HZ1KE, VU2LO. **1600** *HH2JF, ZD7PS*, 3D6AJ. **1700** KC4AAC, TJ1EZ, VP8ML, VQ9BP/D, 4W1GM, *7X5AN.* **1800** FY0BAB, VP2SQ, VP8s CZ, HZ. **1900** TR8SS, *VP8NU*, 5T5GS. **2000** CR4s, CXs, *HK0BKX*, LUs, PYs. **2100** CE3AY, HC2YL. **2200** HP1LC, W4s.

28MHz. 0900 DJ, HA, OE, YU etc, ZS. **1000** CR6, TR8DG. **1100** ZS, 3B8CV, 9J2. **1200** A2CJP, CT2AK. **1300** FH8CJ. **1400** VP8NX, ZE. **1500** CR6, CR7, LU, ZS, 9J2. **1600** CR6, CR7, CX, PY, TJ1EZ, VP8HZ, ZS, 7Q7DW, 9G1AR. **1700** EA8, EL, KC4AAC, TU2DO, ZD9GD, 3D6AW, 5U7BA (on a.m.). **1800** A2CAE, CE, CR6, LU, *PJ2VD*, PY, VP8HZ, W4SRN. **1900** I0IAI. **2100** *DL0IGI*, I2PZB.

Very many thanks for all correspondents, and also to the authors of the following for items used from their publications: **DX'press** (*PA0INA/PA0TO*), the **Ex-G Radio Club Bulletin** (*W3HQO*), **DX News Sheet** (*Geoff Watts*), the **29 DX Club Newsletter** (*George Allen*), **World Radio News**, the **DX'ers Magazine** (*W4BPD*), **Long Skip** (*Nick Sawchuk*), and the **West Coast DX Bulletin** (*WA6AUD*).

Please send all items for the **December** issue **to reach G3FKM** no later than **6 November**, and for the **January** issue by **4 December.**

Propagation Predictions

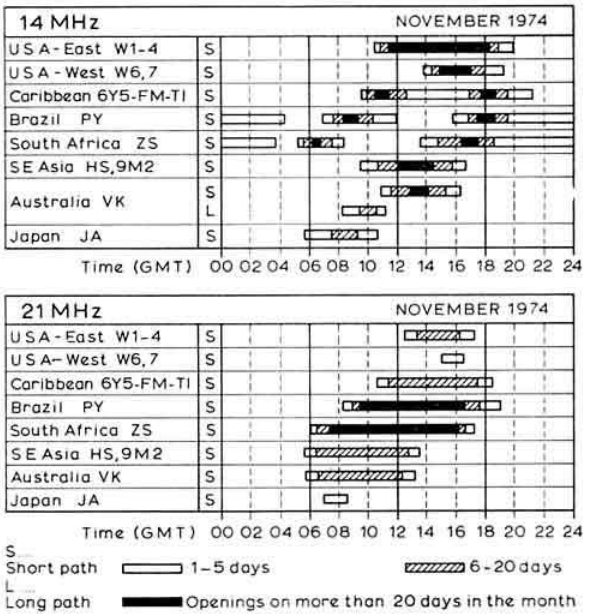
During November dx traffic is at its best, especially on the hf bands, although this will not be so noticeable this year as we are nearing the period of low sunspot activity. The days are already very short, so the dx bands will close down early.

There will not be many chances of dx on **28MHz** because of low sunspot activity. Now and again traffic with South America will be possible between 0945 and 1600gmt, and with Africa between 0745 and 1530 gmt. Conditions on **21MHz** will be much like the previous month, but the band will close much earlier. There will be little chance of short skip conditions on either 28 or 21MHz this month, as the time for this is mainly between May and September.

Winter conditions will also close **14MHz** early. DX should be possible under favourable conditions via the indirect path. These contacts, which in this period of the sunspot cycle favour 14MHz, occur when the great circle via the two stations lies in twilight. The twilight zone is the border between day and night. Under very favourable conditions contact with KH6 may be possible between 1640 and 1830gmt.

Decrease of static during the winter months improves dx communication on **7** and **3·5MHz**, which will basically always be possible when the greater part of the path lies in darkness. This is more important for 3·5 than for 7MHz. Traffic with North America will be interrupted during the latter half of the night because of low frequencies. Local traffic on 7MHz will sometimes be interrupted by the dead zone during daytime. During the latter half of the night 3·5 will be interrupted by the dead zone.

The provisional sunspot number for September 1974 from the Swiss Federal Observatory was 42·2, with the last week of the month showing little solar activity. This number compares with 33·7 for August. The predicted smoothed monthly sunspot numbers for January, February and March 1975 are 27, 26 and 25 respectively. These figures show a slight increase on those previously predicted.



Election of 1975 RSGB Council

Ballot forms for this election are being distributed to members of the Society with this issue of *Radio Communication*.

Personal details of the candidates

D. H. Adams, GW3VBP
Member of RSARS. Member of the RAE Advisory Committee of City and Guilds of London Institute. Founder member of the Barry College of Further Education Radio Society. Main interests lie on the dx bands, but recently active on 2m fm. Profession: lecturer in charge of electrical engineering at the Barry College of Further Education.

P. F. Jobson, G3HLF
Joined RSGB in 1944. Licensed in 1951. Member of ARRL, RAFARS. Member of RSGB Interference Committee. Interests: building equipment, operating on hf bands cw and phone in contests and for awards. Profession: tv service engineer.

M. Hearsey, G8ATK
Member of RSGB since 1959. Licensed 1966. QSL manager CCF/ACF wireless network 1958–1968. Winner 1962 VHF Committee Cup 1970. Founder member Farnborough and District Radio Society; chairman 1967 and 1970, committee member 1968–9, president 1971. Secretary Racal ARC 1966–70. Member Racal Mobilcar Amateur Club. Active on 144MHz and 432MHz. Profession: engineer with Racal Ltd.

G. B. Packer, G3UUS
Member of RSGB since 1961. Licensed in 1965. Chairman of South Anglia Repeater Group. Member of local Raynet group. Interested in amateur radio administration, particularly with regard to licensing conditions and interference problems. Profession: engineer, PO Research Department.

D. M. Pratt, BTech, CEng, MIEE, MIERE, G3KEP
Member of RSGB since 1952; licensed January 1955. Founder member of Bradford Grammar School Amateur Radio Society, and a former president and secretary of Bradford Radio Society. Has lectured for RAE and other subjects at Bradford Technical College for 10 years, and has been a member of the RSGB Education Committee since 1966 and its chairman since January 1972. Active on all bands 1·8 to 144MHz on a.m., ssb and cw; particularly interested in home construction and amateur radio training and recruitment. Has had many articles published in radio journals. Profession: engineering training consultant.

G. M. C. Stone, CEng, MIEE, MIERE, G3FZL
Member of RSGB since 1948. Council member since 1960. President 1964. VHF Manager since 1965. Chairman of the VHF and Scientific Studies committees. Member of the VHF Contests Committee and IARU Working Group. Represented RSGB at IARU Conferences at Opatija, Brussels, Scheveningen (Secretary of Committee B, VHF matters), in 1966, 1969 and 1972 respectively. Mainly active on bands above 30MHz, fixed, mobile and portable. Profession: electronics engineer, government service.

D. M. Thomas, GW3RWX
Regional Representative for Region 10, former Council member, member of Technical & Publications and Interference committees. Has given talks to Society members on technical aspect of amateur radio. Interests: design and construction of amateur equipment. Profession: senior communication engineer, BBC.

COUNCIL PROCEEDINGS

A brief report of the Council meeting held on 8 July 1974

Present: Mr G. R. Jessop (*President, in the Chair*), Messrs R. J. Baker, P. Balestrini, J. O. Brown, D. Byrne, W. J. Green, W. F. McGonigle, L. E. Newnham, J. R. Petty, W. A. Scarr, A. W. Smith, R. F. Stevens, G. M. C. Stone, (*members of Council*), D. A. Findlay, (*general manager*), and A. W. Hutchinson, (*editor*).

Apologies had been received from Dr J. A. Saxton, Dr E. J. Allaway, Mr R. W. Fisher and Mr F. C. Ward.

International Amateur Radio Club Convention
It was reported that although this convention had not been cancelled, it was likely that it would not take place as the response had been disappointing, possibly in view of the expense involved.

Future of the Society*
The President reminded members that "Future of the Society" had been an agenda item at the previous Council meeting. Subsequently all Council members had been sent a note asking for their comments, and in the discussion which followed all members of Council present expressed their views on the subject.

The outcome of the discussion appeared to be that the Society must now seriously consider the administrative and economic aspects of a move from London; there must be far greater encouragement to younger members to participate in the Society's affairs. The Society must do far more to publicise the work that it was doing.

It was agreed that a small committee of four or five members, not necessarily all members of Council, headed by the President and the Treasurer, should actively consider the movement of headquarters to another location.

With regard to the wide use by non-members of membership services it was agreed that some form of membership card was desirable.

Honorary Treasurer's report
The Honorary Treasurer reported that although the financial year had only just ended and therefore no yearly figures were available he was still hopeful that the accounts would show a surplus for the year to 30 June 1974.

In view of the possibility of a change in VAT rates it was desirable that the subscription be "VAT inclusive". This would avoid the difficulties that arise from changes in the rates of VAT, which would necessitate a change in the total amount payable for subscriptions under the present system.

Council agreed to the Honorary Treasurer's proposal that subscriptions for members should be VAT inclusive so that the corporate rate of £5 plus 50p VAT, would become £5.50 VAT inclusive; other rates would follow the same pattern.

Membership and affiliation
It was resolved:

(i) to approve the applications for membership, transfers and reinstatements for May and June and accordingly elect 221 new members;
(ii) to accept reduced subscriptions from seven members;
(iii) to waive the subscription of one member on the grounds of blindness;
(iv) to grant affiliation to the GEC Elliott Instruments Process Club (G8ESA), and the Glamorgan VHF/UHF Group.

President 1975
It was proposed, seconded and approved unanimously that Mr C. H. Parsons, GW8NP, Executive Vice-President, be appointed President for 1975. Mr Jessop mentioned that this would be the first occasion that the holder of a GW callsign had been President of the Society, and Council members joined with him in congratulating Mr Parsons. Mr Parsons replied appropriately.

Council members
It was reported that Mr G. M. C. Stone, G3FZL (Ordinary Council member) and Mr J. R. Petty, G4JW (Zone A Council member) will retire on 31 December and both indicated that they were willing to accept nomination for re-election.

The Honorary Treasurer, Mr J. O. Brown, G3DVV, would complete three years in office on 31 December next, and he also indicated that he would be prepared to accept re-appointment.

Scheme of Representation
The Membership & Representation Committee had considered the effects of the revision of county boundaries in England and Wales, and had agreed that the number of regions should be increased from 17 to 20. Proposals would be put to Council for discussion at its next meeting.

Official Regional Meetings
Council approved a proposal to hold a Region 1 ORM in Lancaster on 15 September. The regional representative had asked that the President and general manager should attend the meeting. It was suggested that other Council members might wish to be present at the ORM, and Mr Baker offered to attend.

Council approved a proposal to hold a Region 17 ORM in Southampton on 21 September. The regional representative had asked that the Council member for Zone B, Mr W. A. Scarr, and the general manager should attend the meeting. Mr Newnham said that he would also be attending the meeting.

Home Office meeting concerning repeaters
The Telecommunications Liaison Committee had asked that a meeting be arranged between the Society and the Home Office to discuss the attitude of the Home Office towards the licensing of further repeaters. It had been suggested that a meeting on an informal basis would be more satisfactory, and the chairman of the committee, Mr R. F. Stevens, and the general manager had attended a meeting on 4 July.

The Home Office were represented by Mr J. H. Ainley and Mr R. B. Schofield (Engineering), and Mr G. A. Wootton and Mr B. Griffin (Administration).

A report of the meeting was circulated to Council members.

Committee minutes and recommendations
Council received the minutes of the following committee meetings: Finance & Staff (2/4/74 and 14/5/74); Technical & Publications (18/4/74); Scientific Studies (22/4/74); Mobile & Exhibition (7/5/74 and 11/6/74); HF Contests (9/5/74); Raynet (11/5/74); Interference (17/5/74); Education (18/5/74 and 22/6/74); Membership & Representation (21/5/74); IARU Working Group (23/5/74); VHF Contests (23/5/74); VHF (26/6/74).

Amateur Radio Contests
It was reported that some members had expressed displeasure with the large number of contests, both hf and vhf, which were now taking place. Council viewed with concern this situation, and it was agreed that there should be further consideration of this matter.

* *At its meeting on 16 September, Council decided that the full minute of this agenda item should be published.*

Future of the Society

The following is an extract from the minutes of the Council meeting held on 8 July 1974 dealing with the agenda item "Future of the Society":

The President, Mr G. R. Jessop, reminded members that "Future of the Society" had been an agenda item at the previous Council meeting. Subsequently all Council members had been sent a note asking for their comments. It was disappointing therefore that only two replies had been received.

Mr Jessop said that he felt that in the last few years the Society had lacked positive leadership. There had been no guidance from Council as to policy. He pointed out that the next few years would be critical years for the Society and for amateur radio generally, but at present there appeared to be no coherent plan put forward by Council. He was anxious to change the Society's position from one of "going along" to one of "leadership".

The President therefore asked Council members around the table for their opinions and suggestions.

Mr Parsons, Executive Vice President, commented on the graphs that had been produced by the President prior to the previous meeting. These graphs indicated that the number of holders of Class B licences was increasing more rapidly than the number of holders of Class A licences. He felt that many of the holders of the Class B licences were not members of the Society. The percentage of the total holders of Class B licences who were not members would be higher than the percentage for holders of the Class A licence.

Mr Smith felt that the position of the Society had changed over the last few years; previously the first consideration of any radio amateur was that he should join the RSGB. Today, in his opinion, the first consideration of many amateurs was that they should join a local affiliated society or club, and this membership largely took the place of that of the RSGB.

Mr Newnham said that the young people whom we were endeavouring to attract were always seeking to get good value for their money. He felt that the Society provided more than sufficient value for money but that it was difficult to convince the younger generation of this fact. He believed that advertisements were not in the best media and that consideration should be given to this matter.

At this point Mr Stevens pointed out that the membership advertisements that had appeared in *Practical Wireless* did not seem to produce any worthwhile increase in the membership.

Mr Stone said that as one of the younger members of Council he was not so concerned with what could be described as the "good old days", and that matters now were not as bad as they were made out to be. He felt that the Society had now to earn its position against competition and that we were not selling the Society sufficiently well. Money was not the problem, but rather that new ideas were essential to show that the Society was progressive and ready to consider new ideas put forward.

One failing of the Society was that it did not publicise its achievements through *Radio Communication*, nor did it convince members that they were receiving value for money. He was of the opinion that *Radio Communication* was the best value for money in technical publications of the type.

In particular, sufficient publicity was not given to the work of the Society in its liaison with the Home Office, and although publicity in this matter would have to be most diplomatically worded there was no reason why we should not say what we were doing.

Many younger members were very enthusiastic but the Society did not channel this enthusiasm into its affairs; one way that this could be done would be to encourage younger members to serve on Council. Mr Stone said that he thought that there should be privileges of membership and particularly that members should be allowed to purchase publications at preferential rates.

Mr Balestrini said that he agreed with the points put forward by Mr Stone and emphasized that to most members it seemed that all the Society provided was contact with the Home Office and publications at a reasonable price.

Mr Baker felt that there was no instant formula for improving the image of the Society. He thought that we should consolidate the position that we had already achieved.

There had previously been discussions on the position of holders of Class A and Class B licences and he felt that holders of Class B licences lost interest more rapidly, but the change in licence figures was not too reliable an indicator of the position. Some form of incentive licensing would be a means of increasing interest in amateur radio but the matter must be approached rather carefully.

Mr Baker suggested that the point could well be made to members that they would be at a great disadvantage if the Society did not do the work on which it is at present engaged. He agreed with previous speakers that members must be encouraged to become more involved with the affairs of the Society, either at committee level or at Council level, and certainly the timing and location of meetings should be arranged so as to facilitate the attendance of committee and Council members at meetings. If necessary there should be a radical change in committee structures so that committee meetings could be held out of London.

Mr Byrne felt that there was a lack of publicity of the Society's activities. Previously the Society had had a PRO, but in recent years the tendency had been for the Society to avoid publicity rather than to boost itself. He thought that the younger generation should be impressed with the need for joining the RSGB, and to this end there should be a stand at all rallies at which information on the RSGB and advice on amateur radio generally could be available. There was a widely held belief that all the work of the Society was done in London and this was a belief that should be corrected as soon as possible.

During the discussion, comment had been made on the situation that existed in the immediate post-war years. **Mr Scarr** pointed out that during those years amateur radio was rapidly increasing in popularity and, by comparison with present day standards, the state of the art then could be described as primitive. Social habits had changed very considerably in the last few years, and a comparison of the present day situation with the situation that existed some 20 years ago was not valid.

Mr Scarr felt that this was the time when we should say what we proposed to do about the situation. He suggested that the Society should approach the Home Office again with regard to the "B" licence and ask that this should be limited to a period of two years only. A programme of visits and lectures to technical colleges and similar educational centres should be organized.

Mr McGonigle spoke of the conditions in Northern Ireland and he was optimistic that there was an increasing enthusiasm for amateur radio. New members were being enrolled quite regularly and there was great interest in amateur radio affairs at the present time.

Mr Green said that he had already sent a reply to the President setting out his thoughts on this matter. He was of the opinion that the Society benefited greatly by having representatives at as many rallies and meetings as possible. Only in this way could the many activities of the Society be made known to the members. He was disturbed that membership services, particularly the QSL Bureau, were used by non-members of the Society, and he was anxious to see this situation rectified.

Mr Stevens felt that some holders of Class B licences were not particularly interested in the technicalities of amateur radio and did tend to become "black box" operators. He had the impression that members tended to have a poor impression of the Society due to shortcomings of the headquarters organization. He felt that the Council were ineffective and did not show any responsibility to the amateur radio movement.

Mr Petty agreed with the sentiments expressed by most of the previous speakers, but he felt that the holders of Class B licences were mainly young people who wanted something for nothing and they did not see any reason to join the RSGB if the services could be obtained free of charge.

Mr Brown pointed out that inflation was causing a change in the pattern of the Society's existence. There was an acute staff problem at headquarters and it seemed that the only way to eliminate this was to move the headquarters to some location away from London. This would probably require a small administration office where costs could be reduced. Publications, including *Radio Communication*, could be dealt with at a separate unit, not necessarily at the administrative offices, and if the property of 35 Doughty Street were sold it was essential that the Lambda Debentures be repaid immediately. If satisfactory financial arrangements were made, the subscription rate could perhaps be pegged for some time and more funds might be available to increase the size of *Radio Communication*.

Mr Findlay, general manager, commented that for some considerable time there had been very serious staff problems at headquarters and these were aggravated by the rising level of salaries that staff were able to obtain elsewhere. There may be no alternative but to move away from London in order to effect economies.

The President suggested that one outcome of a move away from London and decentralization could be for the Society to be organized on a federal system with local councils or committees around the country dealing with certain aspects of the Society's business. The Council, as a central body, could then deal only with policy matters. Some action must be taken in the very near future as with the present inflationary situation the Society's cash position could deteriorate and may continue to do so until either subscriptions were increased or there was a reduction in expenditure.

Mr Scarr proposed that a small committee of four or five members, not necessarily all members of Council, headed by the President and the Hon Treasurer, should actively consider the movement of headquarters to another location. Council accepted this proposition.

Mr Parsons remarked that he felt that Society publications were priced at too low a level and this had been confirmed by comment that he had received from a colleague in another society.

The outcome of the discussion appeared to be that the Society must now seriously consider the administrative and economic aspects of a move from London; there must be far greater encouragement of participation in the Society's affairs by younger members; and the Society must do far more to publicize the work that it was doing.

With regard to the use by non-members of membership services, Council agreed that some form of membership card was desirable. This could allow special concessions to be granted to members on production of the card.

OBITUARIES

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

Mr E. Beat, GI3AV
Eddie Beat died on 30 August aged 74. A wireless enthusiast from an early age, he was a pioneer of aircraft to ground communication with the RFC in the first world war and an active amateur until his death. He was a founder member and vice-president of the City of Belfast YMCA Radio Club, and joint holder of thd club's first licence issued in 1926.

J. J. E. Black, GM6NO
James Black died on 2 June. His interest in amateur radio dated from his schooldays and he was a member of the Society for many years.

J. Christie, GM3FXM
Jim Christie died at the age of 55 on 27 September. He was a keen exponent of contest and NFD working, was an old member of FOC and TOPS, and will be remembered for his top band activity.

F. W. Hill, G3WDO
Mr Hill, who was secretary of the Wimbledon and District Radio Society, died in early October. He was active on the hf bands, mainly on cw, and was a very keen certificate hunter.

Mr D. G. Lomax, G8AHH
Don Lomax died on 20 August. He was a keen home constructor, and was a member of the Torbay RS and the RAFARS.

Mr R. Peach, G3AEQ
Roland Peach died on 17 September. He was a member of RAFARS, an honorary member of Axe Vale ARC and a former member of the Barnet ARC. He will be missed on the Sunday 80m Axe Vale net.

Mr W. Roxburgh, GM3NPR
Bill Roxburgh died while on holiday on 5 August. He was a former treasurer of the Ayrshire Radio Group and a staunch supporter of NFD and club activities.

Mr J. Wyatt, GW3NDB
John Wyatt died on 6 September at the age of 66. A radio engineer by profession, he was active on hf and vhf bands on ssb. He will be missed by Barry amateurs.

We have also been advised of the deaths of:
Mr J. Scott, G2SC, of Cleveden;
Mr H. N. Williams, G4CVH, of Broadstairs.

47th Annual General Meeting

Minutes of the 47th Annual General Meeting of the Radio Society of Great Britain held at the Royal Society of Arts, John Adam Street, Adelphi, London WC2 on Friday 7 December 1973 commencing at 6.30pm.

Present: *The President*, Dr J. A. Saxton, *in the Chair*; *the Executive Vice-President*, Mr G. R. Jessop, G6JP; *the Honorary Treasurer* Mr J. O. Brown, G3DVV; *the Immediate Past President*, Mr R. J, Hughes, G3GVV; Messrs B. D. Armstrong, G3EDD; P. Balestrini. G3BPT; E. G. Ingram, GM6IZ; W. F. McGonigle, GI3GXP; L. E, Newnham, G6NZ; C. H. Parsons, GW8NP; W. A. Scarr, G2WS; A. W. Smith, GM3AEL; R. F. Stevens, G2BVN; G. M. C. Stone, G3FZL; F. C. Ward, G2CVV, (*members of Council*); W. E. F. Corsham, G2UV, *Vice-President*; D. A. Findlay, G3BZG, *secretary*; and 68 corporate members of the Society.

The President welcomed the members to the meeting.

Notice convening the meeting

The secretary read the notice convening the meeting.

Minutes

The President asked if the minutes of the 46th Annual General Meeting held on Friday 1 December 1972 and published in the August 1973 issue of *Radio Communication* could be taken as read.

Mr H. W. Sayer, G3YJC, objected to this procedure as he was of the opinion that the minutes were not an accurate record, as they did not agree in every respect with the report published in the January 1973 issue of *Radio Communication*. Mr Stevens, G2BVN, replied to Mr Sayer and pointed out that in writing the report of the Annual General Meeting which had been published in *Radio Communication* he had stated quite clearly that it was an informal report and in no way constituted a formal report of the occasion.

Mr Yeomanson said that some confusion seemed to have arisen between the question as to whether the report could be taken as read and the resolution which would be proposed that the minutes be confirmed. Mr Sayer repeated that he did not think that the minutes were accurate.

In view of Mr Sayer's admission that he was not present at the 1972 Annual General Meeting the matter was not discussed further and Mr J. O. Brown, G3DVV, proposed that the minutes be confirmed. The proposal was seconded by Mr G. R. Jessop, G6JP, and accepted by 48 votes to 16, with 19 abstentions.

Annual Report of Council for the year ended 30 June 1973

It was explained that a report was required by statute but a more comprehensive report of the Society's activities during the year had been provided as part of the Annual Report and Accounts included in the November issue of *Radio Communication*. The meeting approved the Annual Report of Council while expressing the view that a detailed report should again be published for 1974.

Audited Accounts for year ended 30 June 1973

Mr J. O. Brown, G3DVV, Honorary Treasurer, said that he would propose the adoption of the audited accounts for the year ended 30 June 1973 but before doing so the report of the auditors must be read to the meeting.

After reading the report Mr Brown proposed the adoption of the audited accounts. Mr C. G. Powell seconded the proposal and Mr Brown agreed to deal with any questions on the accounts.

It was agreed that the item "Surplus on rallies" which had been shown as a deduction from Council and Committee Expenses would be shown separately in the accounts next year.

In reply to a question from Mr H. W. Sayer, G3YJC, Mr Brown explained that it was usual accountancy practice that property should be shown at cost and not at market value. Mr Brown went on to explain that the Balance Sheet item "Investment in and loan to subsidiary" was arrived at after consolidating the accounts of Lambda and the RSGB, and therefore included the value in the Society's books of the share capital of the subsidiary. This accounted for the difference of £100.

With regard to the "Quoted investments" it was explained that these were included in the Balance Sheet at redemption value and no further provision was required.

There was no further discussion and the Audited Accounts were adopted.

Council 1974

The President read a letter dated 30 November 1973 received from the scrutineers of the ballot for Council members.

The President announced that Mr R. J. Baker, G3USB; Mr P. Balestrini, G3BPT; Mr D. Byrne, G3KPO; and Mr R. F. Stevens, G2BVN, were elected to Council as Ordinary Members for 1974, and that Mr W. F. McGonigle, GI3GXP, was elected to Council as member for Zone G for 1974.

The President congratulated the members elected and thanked the unsuccessful candidates for taking part in the election.

The secretary said in reply to a question that approximately 12½ to 15 per cent of the eligible membership voted in Council elections and that two nominations for Council had not been in order and had not been accepted.

Honorary Members, Honorary Vice-Presidents

The President reported that Professor Sir Martin Ryle, FRS, G3CY, the Astronomer Royal, had accepted an invitation to become an Honorary Member of the Society. The President also reported that Mr William Edward Frederick Corsham, G2UV, had accepted an invitation to become a Vice-President of the Society.

Auditors

It was reported that the Society's auditors, Edward Moore & Sons, Chartered Accountants, would continue in office. The Honorary Treasurer proposed that the remuneration of the auditors for 1974 be fixed at £325. The motion was seconded by Mr C. G. Powell and duly passed.

Other business

The President asked if there was any other business that could properly be discussed at an Annual General Meeting. He pointed out that no items had been notified for inclusion in the agenda but that after this meeting had been concluded there would be an opportunity for members to raise matters informally.

Mr Sayer asked the President to give guidance as to which items could be discussed at an Annual General Meeting. The President explained that the Annual General Meeting was a formal meeting required by statute and only those items which affected the legal position of the Society and of which due notice had been given in the agenda could properly be dealt with. To overcome the restrictive nature of an Annual General Meeting it had been the practice for several years to hold an informal meeting immediately afterwards.

There being no further business the meeting was declared closed.

After the Annual General Meeting the President pointed out to the members that at the end of 1973 three members, Messrs B. D. A. (Brian) Armstrong, G3EDD; R. J. (Tim) Hughes, G3GVV; and E. J. (Ted) Ingram, GM6IZ, would no longer be serving on Council. He felt that the members would wish to join him in thanking them for their services to the Society.

(*Applause*).

Brian Armstrong in thanking the President for his kind remarks pointed out that Dr Saxton had now completed a second term of office as President during which time the Society had benefited greatly from his guidance. Next year Dr Saxton would be Immediate Past President and Council would still have the benefit of his advice. Mr Armstrong said that he was sure that the members would wish to join him in offering congratulations to Dr Saxton on being appointed CBE in HM The Queen's Birthday Honours List.

(*Applause*).

It was suggested by Mr J. W. Swinnerton, G2YS, that the presentation of trophies should take place after the informal discussion. On a show of hands this was rejected and the President proceeded to present trophies to those winners who were present.

After presentation of trophies an informal discussion took place.

(*Report on page 33 of January 1974 issue of* Radio Communication).

Scottish VHF Convention, 1974

THE 1974 Scottish VHF Convention and Region 12 ORM was this year held on Saturday 28 September 1974 at the University of Dundee, with 201 people attending. The organization was carried out by Frank Hall, GM8BZX, ably assisted by members of Dundee Kingsway Technical College Radio Club. Talk-in was by GM4BIP and GM4ATI. It is said that despite the talk-in facility some members managed to get lost in Dundee.

During the forenoon a Zone G Representatives Conference was held under the chairmanship of Sandy Smith, GM3AEL, the zonal manager, at which many Zone G matters were discussed at great length. During this period the University Electronics Laboratory was open to members: this department of the university is internationally known for the excellent work done with the tracking of weather satellites and launch vehicles, and it has produced excellent weather photographs from satellites.

Before the afternoon session started at 2pm, the ladies were whisked off by bus for a conducted tour of the new Dundee Ninewells Hospital. It is said that more was seen than was expected by the ladies, but none appeared to suffer any after-effects.

The convention opened with the Region 12 ORM at which Council was represented by the President, George Jessop, G6JP; Zone Manager Sandy Smith, GM3AEL, and VHF Manager Geoff Stone, G3FZL. At the ORM many questions were put to the chairman, Regional 12 Representative Sandy Oliphant, GM3SFH, and ably answered by the Council members.

After the ORM, Geoff Stone spoke on vhf/uhf affairs. He was followed by Dr Keith Slinn of Andrews Antenna Corporation who gave a talk on line of sight aerial systems, with slides showing the actual manufacture and installation of microwave aerial systems.

The convention then split up; some attended a lecture given on the sun and its effects on the earth and radio propagation by Sandy Oliphant, GM3SFH; and the others attended a lecture and demonstration on microwaves by George Burt, GM3OXX, and Tom Holbert, GM3DXJ.

Due to the interest shown in the various lectures and the number of questions asked, the convention ended half an hour later than scheduled.

The convention dinner was held in the nearby Angus Hotel, with 139 members, wives and guests attending. After dinner, the President spoke on the Society, and Tim Hughes, G3GVV, on the pressures about to be placed on our various frequency allocations. The chairman was Findlay Baxter, GM3VEY. The toast to the visitors was given by Sandy Smith and the reply by Tom Douglas, G3BA. The toast to the ladies was given by Sandy Oliphant, and replied to by Mrs Mitchell, wife of GM3FRI.

When the after dinner speeches and toasts were completed, Mrs Jessop presented the Jock Kyle trophy to GM3OXX, GM3DXJ and GM8HEY, in recognition of the work done by them in recent months on the microwave frequencies. Mrs Kelly, wife of the secretary of the Kingsway Technical College Radio Club, then presented Mrs Jessop with a bouquet of flowers.

Mrs Jessop presenting the Jock Kyle Trophy to GM3OXX and GM3DXJ who, with GM8HEY, were awarded it for their work on microwaves

GM4CAU receiving a prize from Mrs Jessop for winning the home-brew equipment competition with his solid-state keyer for the beacon station GB3LER

One would assume that with the end of the convention and dinner, that was the end of the proceedings; however, this was not so. A surprise visitor was Geoff Kennedy, VE2AIO, and on the Sunday morning following the convention those who had stayed overnight met in Geoff's bedroom and had a very interesting discussion on vhf topics relative to Canada. Geoff produced many interesting tape recordings of tropo, auroral, and sporadic-E contacts. The fact that on a number of occasions he had received BBC Band 1 transmissions in Canada was of great interest to Tom Douglas and the others who were present.

Welsh Amateur Radio Convention, 1974

ORGANIZED by the Blackwood and District Amateur Radio Society, GW6GW, the first-ever convention to be held in South Wales attracted 250 visitors to the Oakdale Community College on Sunday 22 September.

During the morning and early afternoon, visitors were able to browse around the trade stands and have eyeball QSOs with old and new friends alike. Dealers present included Lowe Electronics, J. Birkett, ANTEC, Wrap Resistors, T. R. Wiltshire, and Cambrian Communications. Displays were provided by the Gwent BATC Group and the Bristol Channel Repeater Group, while Strumech Engineering very kindly provided a 60ft trailer-mounted Versatower for the dx contest. The RSGB bookstall, as usual, conducted a brisk trade in Society publications.

The afternoon lecture session was opened by "Antenna design techniques", a most interesting talk being given by Roy Powers, G8CKN, from ANTEC. After a short break, two lecture streams started. Stream A catered for the vhf enthusiasts, and Graham Packer, G3UUS, gave a highly professional talk on the subject of "FM and repeaters in the UK and USA", which, judging from the applause at the end, was much appreciated. This was followed by "Amateur television" by Bob Robson, GW8AGI—GW6AGR/T, of the Gwent BATC Group.

Stream B on the other hand catered for the hf fanatics, and this opened with a tape/slide lecture by Van Fair, W4GIW, on the subject of contest operation as PJ9GIW in the 1973 CQ WW Phone Contest from Curacao. The next lecture, "Armchair trip to Africa", was also a tape/slide package, by OH2BH, concerning a dxpedition to the island of Anabon. The final film was a colour and sound production by the ARRL, which has been shown to millions of

R. B. Davies, GW3KYA, secretary of the Blackwood ARS introducing RSGB Executive Vice-President C. H. Parsons, GW8NP, who opened the convention

people in the USA through the medium of television. This film, which included a guest appearance by Senator Barry Goldwater, described practically every amateur activity from field days to the Oscar satellites.

The organizing committee of this initial venture: Stephen Rees; Stephen Cole, GW4BLE; Brian Davies, GW3KYA; Mike Jones, GW3WTZ; Dave Toombs, GW8FXM, and Roy Lucas, GW8GKF, thanks all those who attended this event, especially those who travelled considerable distances, and hopes to see them all again next year. In the meantime, to help the committee, observations would be most welcome. Please send them to the Blackwood ARS, Oakdale Community College, Oakdale, Gwent.

View of one part of the trade display

S. R. Cole, GW4BLE, operating club station GW6GW during the dx contest

On 15 August the RSGB Membership & Representation Committee held a meeting at Peterborough. Afterwards, members of the committee met local amateurs for a general discussion at the Bull Hotel.
Seen here are: l to r standing, G2NJ, G4OO, G3GGK, GM3AEL, R. Mann, G8FBF, GI3GXP, G3VPR, G3KPO, G5UM, G3MFG, G3HXR, G8BOA, G3LQD and G3TGO; seated, G2WS, G6JP, G4BBA, GW8NP, G2CVV and G3FBA

CONTEST NEWS

Jubilee VHF/UHF Contest results

This event seems to have firmly established itself in the calendar. For fixed stations this is the only vhf/uhf multi-band contest of the year, and for portable stations it can be used as a trial run for VHF NFD.

Tropo conditions were reasonable throughout the contest period but alert operators found 2m open by auroral reflection during the first half-hour, and sporadic-E on 4m brought in ZB2VHF in the last hour.

A total of 77 entries was received, the small difference from last year being almost entirely due to fewer fixed stations in Zone C submitting logs. Almost without exception the logs were of a high standard and the correct paperwork had been submitted with them.

Scores have doubled since last year. Most of these extra points have come from higher 2m QSO rates but it is evident that the other bands still play an essential part in a good overall score. However, 23cm was not used successfully outside England.

Certificates will be awarded to the leading stations in each zone and to the runners-up in Zones A, B, C and D, for which more than 10 entries were received. The scores in the Listeners Section go towards the Listeners Championship. *W.J.M.*

ZONE A—NORTH

		Points in each band				
Posn	Callsign	70MHz	144MHz	432MHz	1,296MHz	Total
1	G3SEK/P	486	3,038	—	—	3,524
2	GD8EXI	—	2,786	—	—	2,786
3	GD2HDZ	466	1,257	650	—	2,373
4	G3NJN/P	748	1,038	450	—	2,236
5	G3NME	628	590	840	—	2,058
6	G4BCQ	—	—	1,420	—	1,420
7	G3AMW/P	432	789	105	—	1,326
8	G2SU/A	—	854	85	—	939
9	G3NTJ/P	124	711	—	—	835
10	G8HHI/P	—	781	—	—	781
11	G4BTS/P	196	449	—	—	645
12	G8FRR/P	—	483	—	—	483
13	G8EEM/P	—	428	—	—	428
14	G8HOX	—	415	—	—	415
15	G4BYP	—	403	—	—	403
16	G8DAZ/P	—	390	—	—	390
17	G8EOP	—	86	255	30	371
18	G4BMO	—	263	—	—	263
19	G4AGQ	96	—	20	—	116

ZONE B—MIDLANDS

		Points in each band				
Posn	Callsign	70MHz	144MHz	432MHz	1,296MHz	Total
1	G3JQA/P	700	775	775	337	2,547
2	G3LRS/P	306	1,383	440	—	2,129
3	G3XDY	318	1,028	250	—	1,596
4	G4AJE/P	—	1,209	—	—	1,209
5	G3XTT/P	184	1,016	5	—	1,205
6	G8CZW/P	—	1,184	—	—	1,184
7	G8FBL	—	1,113	—	—	1,113
8	G3EEO/P	112	891	95	—	1,098
9	G8IUT	—	717	—	—	717
10	G3ZYC	708	—	—	—	708
11	G8GJV	—	641	—	—	641
12	G4CIK	—	545	—	—	545
13	G3UOS/A	540	—	—	—	540
14	G4AZS	32	207	—	—	239
15	G8FDL/P	—	59	—	—	59

ZONE C—EAST AND LONDON

		Points in each band				
Posn	Callsign	70MHz	144MHz	432MHz	1,296MHz	Total
1	G4DDP/P	104	1,951	1,185	—	3,240
2	G8BQX/P	—	2,604	—	—	2,604
3	G8GCP/P	—	1,387	240	335	1,962
4	G8APB/P	—	1,594	65	—	1,659
5	G3DY	—	1,588	—	—	1,588
6	G3ISO/P	40	1,100	240	—	1,380
7	G3WHK	—	1,041	—	—	1,041
8	G3FZL/P	—	865	—	—	865
9	G4BPO	—	742	—	—	742
10	G8DRS/P	—	739	—	—	739
11	G6GS	102	482	50	35	669
12	G3LVP	406	—	—	—	406
13	G3YQW	206	—	25	—	231
14	G3PGN	94	—	—	—	94

ZONE D—SOUTH AND WEST

		Points in each band				
Posn	Callsign	70MHz	144MHz	432MHz	1,296MHz	Total
1	G3SOU/P	44	1,896	915	945	3,800
2	G3WOI/P	240	350	725	660	1,975
3	G8HVY/P	—	1,330	—	—	1,330
4	G4CRC/P	—	1,183	—	—	1,183
5	G3ULT/P	134	470	320	—	924
6	G3WOA/P	—	847	—	—	847
7	G5DF	232	154	255	200	841
8	G8FAT/P	—	600	—	—	600
9	G4COA/P	—	562	—	—	562
10	GC3YIZ	—	523	—	—	523
11	GC3YJI	—	515	—	—	515
12	G3CDG/P	470	—	—	—	470
13	G3NPI	372	—	—	—	372
14	G3SZS	—	320	—	—	320
15	G3TAL	12	—	5	—	17
16	G4BKY	—	3	—	—	3

ZONE E—WALES

		Points in each band				
Posn	Callsign	70MHz	144MHz	432MHz	1,296MHz	Total
1	GW3WAS/P	660	2,298	830	—	3,788
2	GW3OXD/P	—	2,909	25	—	2,934
3	GW3FEC/P		2,121	600		2,863
4	GW4ALE/P	426	1,632	605	0	2,663
5	GW8ACG/P	—	1,155	185	—	1,340

ZONE F—NORTHERN IRELAND

		Points in each band				
Posn	Callsign	70MHz	144MHz	432MHz	1,296MHz	Total
1	GI8HXY	—	675	—	—	675

ZONE G—SCOTLAND

		Points in each band				
Posn	Callsign	70MHz	144MHz	432MHz	1,296MHz	Total
1	GM3ZSX/P	1,198	3,580	—	—	4,778
2	GM4CDN/P	2	2,772	245	—	3,019
3	GM3OUR/P	—	2,340	—	—	2,340
4	GM3PXK	—	1,068	—	—	1,068
5	GM8EOJ/P	—	869	40	—	909
6	GM4AOR	34	213	—	—	247
7	GM3YOR	—	10	—	—	10

Check logs received from G3JFO/P, G8GOX, G8HVV and OK1-15835.

LISTENERS

			Points in each band			
Posn	Number	Zone	70MHz	144MHz	432MHz	Total
1	A8016	C	204	512	125	841
2	BRS34348	C	156	651	—	807
3	BRS26431	B	—	717	—	717
4	BRS28005	C	—	528	—	528
5	BRS31038	E	—	474	—	474
6	BRS15822	C	40	416	10	466
7	A8552	B	—	351	—	351
8	BRS32525	C	—	259	—	259
9	BRS33823	C	—	220	25	245
10	A8163	C	—	203	—	203
11	A8324	C	74	23	50	147
12	BRS35038	C	—	135	—	135

RSGB HF Contests Championship 1973-4 results

Posn	Callsign	1	2	3	4	5	6	Total
1	G3VMW		40	50	50	35		175
2	G3MXJ		60				90	150
3	G6CJ		50				70	120
4	G3TR	70		30	0			100
5	G2QT	40		20			20	80
6	GM3OLK				0	50		50
	G3WHK	10		40				50
8	G3ORP				25	20		45
9	G4BJM				10	15		25
	G4BUE			25		0		25
11	G3XWZ		0		15			15
12	G3GC				0	0	10	10
13	GM3YOR				0	5		5

Contests

1 21/28MHz Telephony Contest 1973.
2 7MHz CW Contest 1973.
3 7MHz Telephony Contest 1973.
4 Second 1·8MHz Contest 1973.
5 First 1·8MHz Contest 1974.
6 BERU 1974.

Awards

The G2QT Trophy to S. Wilson, G3VMW.
Runner-up certificate to D. J. Andrews, G3MXJ.

July 70MHz Open Contest results

A good entry with most of the well-known 4m enthusiasts taking part. Conditions were moderate and scores lower than usual. More stations are using ssb and a large proportion vfo or vxo. SSB, however, did not produce either the highest score or the best dx.

The 427 forms contained a good deal of comment, much of it interesting. This will be collated, together with suggestions from letters received by the adjudicator, and presented to the VHF Contests Committee at its next meeting, when the 1975 programme will be drafted. Certificates go to the winners and runners-up in both sections.

G5HD

PORTABLE SECTION

Posn	Callsign	Score	QSOs	Cnty	Best dx	Km	Power
1	GC3WMR	766	68	JY	G3TDM/P	570	19
2	GW4ABR	665	87	RN	GI4DBB/P	365	40 p.e.p.
3	GW3WRA	649	87	BR	GI4DBB/P	423	50
4	GW4KF	499	65	MH	GI4DBB/P	425	10 p.e.p.
5	G4BGG	477	37	ND	G3DAH	530	30
6	GM4CVI	469	41	PB	G3DAH	540	50 p.e.p.
7	G3TDM	450	54	YS	GC3WMR/P	568	15
8	GI4DBB	347	46	LY	G3VPK	611	15*
9	G2SU	254	42	YS	G3DAH	315	75 p.e.p.
10	G3BPM	231	57	SY	G4BGG/P	490	7
11	G3VPF	207	29	DT	G3TDM/P	430	35
12	G3LCH	187	65	SY	G3TDM/P	350	30
13	GM3ZSX	106	14	AY	G3ZYC	323	50 p.e.p.
14	G3VPS/M	53	13	SX	GW4ABR/P	265	40
15	GM4AWB	30	8	SG	G3JYP	203	8

* Output

FIXED STATION SECTION

Posn	Callsign	Score	QSOs	Cnty	Best dx	Km	Power
1	G3JYP	443	48	WD	G3DAH	430	50 p.e.p.
2	G3NHE	428	66	YS	GC3WMR/P	447	13
3	G3XBY	355	61	WK	GI4DBB/P	460	100 p.e.p.
4	GD2HDZ	327	33	IM	GC3WMR/P	570	50
5	G3ZMD	293	57	BD	GM4CVI/P	430	45
6	G5DF	270	40	BE	GM4CVI/P	510	40
7	G3RDQ	245	41	BS	G4BGG/P	440	60 p.e.p.
8	G3NPI	231	49	BE	GM4CVI/P	460	45
9	G3YQW	203	40	SX	G4BGG/P	508	30
10	G5UM	177	34	LR	GM4CVI/P	325	20
11	G3TWG	173	45	BS	G4BGG/P	440	18
12	G4BWG	166	34	LD	GM4CVI/P	503	50
13	G4CFK	160	54	SY	G3TDM/P	385	6
14	G3TBK	158	26	NM	GM4CVI/P	307	60
15	G3SHY	119	23	NM	GM4CVI/P	311	23
16	G4CTY	117	41	HF	GC3WMR/P	305	28
17	G3VHH	107	25	EX	GC3WMR/P	310	50
18	G4BZD	96	18	YS	G3DAH	296	30 p.e.p.
19	G3HBG	94	20	SY	GC3WMR/P	265	30

Check log received from A8324.

July 432MHz Open Contest results

Only nine portable and 14 fixed station logs were received for this contest. However, at least another 12 or 15 contestants confused the "Open" with the "Summer Cumulatives" and sent their logs to the wrong address. The level of activity was, therefore, not quite as bad as the results table suggests. Nevertheless the VHF Contests Committee is disappointed at the response, and in spite of the incessant clamour for more events they must consider the possibility that the calendar is becoming saturated.

The eight-hour contest was very popular with those who took part and, while there were a couple of requests to start and finish earlier, the majority seemed content to accept the 0900gmt starting time.

Although about half the stations active during the event used ssb regularly, the cw/a.m. only stations presented a serious challenge on this occasion. The tide is turning, however, and it only requires the advent of a Liner 2 for 70cm to establish the ssb monopoly of high scores.

Conditions were average throughout the contest with any lift occurring during the first hour. Only an occasional Continental callsign appeared in the logs and few best dx distances exceeded the 350km radius.

The 70cm band again lived up to its reputation of being the gentleman's band, with no reports of bad operating or wildly spurious signals.

Certificates of merit will be awarded to the leading fixed and portable stations and to the runner-up.

C.S.

Posn	Callsign	Score	QSOs	Best dx	Km	Cnty	Pwr(W)	Rx 1st stage
1	G8AGU/P	489	55	G3XDY	370	DN	300 p.e.p.	BFR91
2	GW8AWM/P	361	63	G3DAH	325	RN	140	BFY90
3	G3NHE	225	41	G8AGU/P	305	YS	15 p.e.p.	AF239
4	G3JQA/P	220	47	G3DAH	295	ST	300 p.e.p.	—
5	G3KMS	193	33	G3DAH	360	LE	350 p.e.p.	BF180
6	G3WDG/P	186	34	G3UUT/P	325	ST	10 out	BFR90
7	G3UUT/P	171	27	G3WDG/P	325	YS	5 out	BFY90
8	G4BCQ	164	40	G3JVL	300	YS	300 p.e.p.	2 × BF180
9	GW4ACG/P	153	37	G8AGU/P	232	CY	100 p.e.p.	AF239
							10 out	BF180
10	GD2HDZ	141	19	G8BGQ	385	IM	40 p.e.p.	—
11	G8BGQ	140	34	GD2HDZ	385	HF	300 p.e.p.	K6001
12	G4BBR	126	28	GD2HDZ	285	GR	400 p.e.p.	BFR91
13	G8AYY/P	100	29	G8AGU/P	250+	SD	45	—
14	G8ACB/P	70	20	G8AGU/P	180	SE	1 out	—
15	G5DF	67	15	G3UUT/P	310	BE	80	—
16	GW8ADP/P	65	20	GC2FZC	230	GT	8 out	GM290
17	G4BWW	62	12	G8AGU/P	300	LE	10 p.e.p.	BF180
18	G3XDY	50	10	G8AGU/P	365	LN	12 p.e.p.	BF262
19	G5UM	47	13	G3UUT/P	138	LR	15	AF186
20	GC2FZC	42	6	GW8ADP/P	200+	GY	6	—
21	G3ZSS	23	9	GW8ACG/P	110	SD	10 p.e.p.	40673
22	G3SHY	19	8	GW8AWM/P	180	NM	25	2N5245
23	G8BKR	13	7	GW8AWM/P	97	GR	20	GM029a

Check log: G3MOT.

144MHz QRP Contest results

The second annual QRP Contest was generally approved for the longer duration, and many entrants expressed their thanks to the VHF Contests Committee for organizing the event.

Despite low overall conditions, the scores are marginally higher than last year, with ssb again collecting the points. A minimum use of cw was noted. The GMs appear to have had a separate contest north of the border.

High level p.e.p. seems to have caused concern either on the band or in the spirit of the contest. The VHF Contests Committee stresses that this is a QRP contest and the power and device should be declared on Form 427. Six stations used valves as the pa final.

Check logs are acknowledged from G2DUP and G3UFO/P.

G8ACJ

Posn	Callsign	Points	QSOs	Cnty	Best dx	Km	Mode
1	G4CIZ/P	551	126	BE	G3RHE/P	362	A3J
2	GW4BXD/P	333	73	MG	G8GEZ/P	275	A3J
3	G3RHE/P	297	55	CD	G4CIZ/P	350	A3 & A3J
4	G4CXL	283	121	SY	—	—	—
5	G4BRA/P	263	78	OX	GW8FOL	310	A1 A3 & A3J F3
6	G8CKZ	242	65	HE	G3XDY	312	A3J
7	GM8FVC/P	252	37	IS	G8ASI	671	A3J
8	G3NHE	233	57	YS	G8GEZ/P	275	A3J A1
9	G8GEZ/P	227	59	SX	G8BCL	340	A3J
10	G8ELO/P	179	53	NH	GW3KGD	240	F3 A3J
11	G3JVJ/P	173	49	SX	G3PMH/P	162	A3J
12	G8CFZ/P	166	54	SX	G4BMC/P	170	A3 A3J
13	G4BTS	136	44	YS	G4CIZ/P	254	A3J
14	G8IXM/P	124	54	SY	G8CGG/A	210	A3J
15	G8GHZ	114	32	NR	G4CJG	275	A3J
16	G8GLM/P	88	33	YS	G8INL/P	147	A3
17	G8FKI	85	29	EX	FIBKM/P	156	A3J
18	G8HAK	82	33	BD	G8CFZ/P	115	A3
19	GM8HHC/P	81	20	PK	GM4CXP	150	A3J
20	GM4AOR/P	76	42	MN	GM8HHC/P	153	A3
21	G4ALG/P	72	34	OX	G8FUF	120	A3
22	G8IDZ	68	38	LD	—	—	A3
23	G4AEZ	66	20	MX	GW4BXD/P	240	A3J
24	G8ENR/P	51	23	LN	G8INL/P	123	A3
25	GM3ZVL/P	44	29	MN	GM8HHC/P	120	A3
26	G8FDJ/P	38	15	LE	G3MOT	260	A3J
27	G8FBQ/P	36	14	—	G3NEZ	118	A3
28	G3USE/P	34	14	WR	G8FAS	147	A3J
29	G8DYC/P	6	4	DY	G8GLM/P	85	A3

Correction

In the results table of the May 144MHz Listeners Contest, the score of BRS28005 was wrongly tabulated. It should read: Score, 420; QSOs, 82. This places Mr Cooper in third overall position.

SSB Field Day 1974 results

Once again, abysmal weather conditions made SSB Field Day a trial of endurance for operators and equipment for the great majority of the participants, with several entrants reporting tents, aerials and other equipment blown away or waterlogged. Nonetheless, the entry of 24 stations provided plenty of competition for those determined enough to stick to their guns. HF conditions generally were not the best, with only the top few stations finding more than 300 Ws, and, in general, noise levels were too high to permit real dx working. The lf bands provided the bread-and-butter contacts for most competitors, with 40m proving surprisingly productive after the blank logs of the last two or three years.

Congratulations to the Channel Contest Group, G4DAA/P, on its first-time victory by a very convincing margin over the Southgate Radio Club. G3SFG/P. Close behind, in third place, comes the Northumbria Radio Club, G4AAX/P.

Congratulations also to Derek Poulter, G3WHK, who once again claims the certificate awarded to the non-competing station providing most points to entrants. Thanks to GC3HFN/P for their check log, which although containing more QSOs than that of G3WHK, is ineligible for an award since the operation was from a multi-operator station.

Certificates of merit will be awarded to G4DAA, G3SFG, G4AAX and G3WHK.

Posn	Callsign	Points	Posn	Callsign	Points
1*	G4DAA/P	11,371	13	G3WJN/P	4,823
2*	G3SFG/P	8,409	14	G4BDF/P	4,305
3*	G4AAX/P	8,039	15	G3WTP/P	3,970
4	GW4NZ/P	7,817	16	G3XEP/P	3,799
5	G3AFT/P	7,020	17	G3FJE/P	3,420
6	GW5ZL/P	6,291	18	G6YB/P	3,375
7	GW6GW/P	5,908	19	G3VCP/P	3,345
8	G3YDD/P	5,798	20	G3UER/P	2,814
9	G8FC/P	5,650	21	G3WQK/P	2,664
10	G4ALE/P	5,452	22	G4BKW/P	2,616
11	G3AMW/P	5,406	23	G3WOI/P	2,399
12	G4CTF/P	5,286	24	G4BEM/P	2,242

Check logs

G3WHK*	39 QSOs
G3NKS	13 QSOs
LA5KO	5 QSOs
PY1DBU	1 QSO
GC3HFN/P	44 QSOs

*Certificate winner.

Affiliated Societies Contest 1975 rules

1. **The General Rules for RSGB HF Contests,** as published in the January 1975 issue of *Radio Communication* will apply.
2. **When.** From 1800gmt to 2200gmt on Saturday 12 January 1975 and from 1800gmt to 2200gmt on Sunday 13 January 1975.
3. **Eligible entrants.** All fully paid-up affiliated societies.
   - 3·1 As the contest is to encourage club activity, it is not in the spirit of the contest that a competing station should be operated by only one operator for all, or nearly all, of the time. Entries which indicate this method of operation may be disallowed.
   - 3·2 All entries will be classified as multi-operator.
   - 3·3 Entries will only be accepted from stations operating within a 10-mile radius of the normal meeting-place or HQ of the affiliated society.
   - 3·4 Callsigns which have been issued to affiliated societies must be used.
   - 3·5 More than one entry will be accepted from an affiliated society providing that where a club callsign has been issued, that callsign is used by the "A" station.
4. **Contacts.** CW(A1) only in the 1·8–2MHz band. Competing stations only (as defined in Rule 3) must send AFS to identify themselves after the report-serial number group, eg 579001 AFS. Repeat contacts may be made during the second session.
5. **Scoring.** Fifteen points for each contact with an AFS station, and one point for all other contacts.
6. **Logs.** Column (5) must be headed "Enter AFS if received". Entries must be sent to the HF Contests Committee, c/o E. C. Hodson, 20 Spencer Avenue, London N13 4TR.
7. **Trophy.** The Edgware Trophy will be awarded to the affiliated society submitting the highest checked score. To encourage participation, each entrant will receive a certificate.

Dartford Heath DF Qualifying Round results

The start of this, the last qualifying event in 1974, was at Beechen Wood, near Chelsfield, where 12 teams assembled in very unsettled weather. By the time of the first transmissions very heavy rain was falling and this continued for most of the afternoon.

Good signals were heard from both stations, and most competitors made for station A, G4BDF/P, manned by G4CPN and partner. Situated about eight miles away in a southerly direction, the station was hidden in undergrowth adjacent to the bed of a stream. If the rain had not made a good job of thoroughly wetting the hunters, the stream did! The first competitor arrived at 1444.

Station B was about eight and a half miles distant in an easterly direction on a plateau overlooking the countryside around Birling and Ryarsh, the terrain being once-cleared woodland now covered with young chestnuts interlaced very thoroughly with brambles. By the time competitors arrived at the site, the heavens had opened and G4CXS was having difficulty in keeping the modulation tamed owing to a saturated microphone.

Eight teams found both stations; two found one, and two failed to find either.

Sincere thanks are due to all who made the event possible, particularly the transmitter crews who kept the stations on the air throughout the afternoon in really appalling conditions: no mean achievement this. They must have been really depressed when they received the request to extend the contest by an extra half hour to get the necessary qualifiers!

Thanks are also due to the ladies for the catering which was very much appreciated by the 40 or so wet but cheerful contestants who took tea at the end of the afternoon.

The event was organised by P. G. Wells on behalf of the Dartford Heath Direction Finding Club.

			Time of arrival	
Posn	Name	Club	Station A	Station B
1	B. Bristow	Oxford	1448	1542
2	P. Tyler	Oxford	1445	1544
3	A. Butcher	Chelmsford	1449	1545
4	T. Gage	Oxford	1610	1517
5	M. Hawkins	Chelmsford	1516	1618
6	B. North	Chiltern	1517	1628
7	G. Foster	Stratford	1645	1515
8	C. McEwen	Crawley	1535	1700
9	P. Woollett	Dartford Heath	1444	—
10	W. Blanchard	Dorking	1518	—

Subject to confirmation, G. Foster and C. McEwen qualify for the final.

144MHz Fixed Station Contest rules

Date: 8 December 1974
Times: 1000–1800gmt
All entries and checklogs to: VHF Contests Committee, c/o G3XHU, 94 Hermon Hill, South Woodford, London E18.

The following General Rules, published in the January 1974 issue of *Radio Communication*, will apply: 1, 2, 3, 4c, 5a, 6a, 7a, 8b, 9a, 10a, 11–26.

RSGB HF Contests Championship 1974-5 rules

1. RSGB HF Contest General Rules do not apply.
2. No entries for the championship are required.
3. The championship will be decided on the basis of RSGB hf single-operator contests held between 1 October 1974 and 31 March 1975.
4. Points will be awarded to the leading 10 UK stations in the results tables published in *Radio Communication* as follows:

	Position									
Contest	1	2	3	4	5	6	7	8	9	10
21/28MHz Phone	80	70	60	50	40	30	20	15	10	5
7MHz CW	70	60	50	40	30	25	20	15	10	5
7MHz Phone	70	60	50	40	30	25	20	15	10	5
2nd 1·8MHz 1974	60	50	40	35	30	25	20	15	10	5
1st 1·8MHz 1975	60	50	40	35	30	25	20	15	10	5
BERU 1975	100	90	80	70	60	50	40	30	20	10

5. Points gained by stations using the same callsign entering two or more of the six individual contests will be totalled and a table published in *Radio Communication*.
6. **Club stations.** To be eligible for inclusion, a club station must be operated by the same single operator during each contest. In the case of a club station meriting an award, the award will be made to the operator concerned and not to the club.
7. **Awards.** The winner will receive the G2QT Trophy. A certificate will be awarded to the runner-up.

Verulam ARC Transmitting and Receiving Contest 1974 rules

Section 1. 2m 0900 to 1300gmt Sunday, 24 November.
Section 2. 160m 0900 to 1300gmt Sunday 1 December.
Contacts. To consist of an exchange of reports, serial numbers beginning at 001 and name of county (as at 1 January 1974) or country (if outside UK); using any permitted mode. Contacts via repeaters will not count for points.
Entry. The contest is open to all licensed operators and SWLs. Portable, mobile and fixed stations may take part.
Scoring. 1 point per contact. 10 points per contact with G3VER, the Verulam club station.

The total score in each section of the contest is to be multiplied by the number of UK counties worked in that section. Countries outside the UK count as additional counties.

Only one contact with a specific station in each section of the contest will count for points.
Logs. Logs must include the following information: date, time, callsign, RS(T) and serial number sent; RS(T), serial number and county received; points claimed.

Any convenient logsheet containing the above information may be used. The location of the entrant's station, if different to his normal address, must be stated.

Separate logs for each section of the contest should be sent to H. Young, G3YHY, 93 Leaford Crescent, Watford WD2 5JQ, postmarked not later than 16 December 1974.
SWL entries. Scoring, etc, wil be as for the transmitting sections but the following differences should be noted.

Only contacts made by stations taking part in the transmitting sections of the contest will count for points.

Logs must include: date, time, callsign of station heard; report (RS(T)) by swl on station heard; report, serial number, and county sent by station heard; callsign of station being worked; points claimed.
Awards. Certificates will be awarded to all entrants, specially endorsed for the winners and runners-up of each section in both the transmitting and swl classes.

Contests calendar

9-10 November	—Second 1·8MHz (Rules in September issue)
23-24 November	—CQ WW DX (CW)
24 November	—Verulam ARC 144MHz (Rules in November issue)
1 December	—Verulam ARC 1·8MHz (Rules in November issue)
8 December	—144MHz Fixed (Rules in November issue)
1975	
12-13 January	—Affiliated Societies (Rules in November issue)

YOUR OPINION

The Editor
Radio Communication
Sir—Once again the summer comes to an end, and with it the vhf portable season. Having taken part in most of the 70MHz contests from a reasonable location as a portable, I feel that I must comment on what I can only describe as "the case of the unheard sideband".

After each 70MHz contest we read reports which lead us to believe that ssb is "the thing" and some stations seem to claim that most of their contacts were made on ssb. It is true that these statements never indicate if it is meant that the contacts were cross-mode or true ssb affairs in the two-way sense, but the inference is that a.m./fm is fading rapidly out of the picture.

During the 1974 events to end September I have used a.m. in all but the September NFD when our group had an ssb capability. Although ssb stations were active, their numbers seemed very low and a check of the log indicates that ssb contacts are in the minority and that most stations heard on ssb have usually been worked with two-way a.m. In fact, during VHF NFD, although the station was basically designed for ssb, it was necessary to resort to inserting the carrier in order to work the greater percentage of stations and, if anything, the ssb was a handicap, with only about five stations worked who could not have been contacted with equal ease using "ancient modulation". To make matters worse the few stations using ssb all seem to want to use the same frequency, leaving wide-open spaces where QRM-free contacts could be made with ease.

Having found in practice that ssb on 70MHz is not very popular but that published reports indicate the reverse, I am becoming convinced that either people are using highly selective ssb receivers and tuning a.m. signals, truly believing them to be ssb (this can easily be done on, for example, an FT101) or, and I am more inclined to this view, it is purely that they are attempting to encourage the use of sideband on 4m by biasing reports to indicate its increase in use.

If this latter is correct, I believe it to be a most unwise course of action. There is already a mode war on our 2m band which means that we have groups of amateurs who are unable to talk to one another due to their equipment being non-compatible and it would be a disaster if this was to spread to other bands. Nobody can really believe that this is a good thing, and the emphasis in reports on one particular mode is liable to cause a similar happening on 70MHz. Let us not fall into the trap but, rather, report on the cross-mode contacts made on the band and encourage its use by reporting the results obtained with the simpler style of equipment.

If we are to encourage the use of the 4m band it is essential that we make it acceptable to the home constructor who has, perhaps, not too much technical knowledge or is limited in the amount of time he can spend on construction. If we drive him to technical heights where his only way out is to buy commercial equipment, his interest will not be satisfied and we will perhaps lose him to hf cw or the radiotelephone style of amateur radio now to be found on 2m.

M. Pharaoh, G3LCH

The Editor
Radio Communication
Sir—Having just read the results of, and comments on, NFD 1974, I feel that some comments are called for. During the next few months there will undoubtedly be the usual spate of complaints of unfairness of the rules and outmoded nature of the contest, but the answer to all these charges is that no fewer than 120 UK stations (with two exceptions) were entered and operated in accordance with the rules. Hardly a sign of an unfair contest run under impossible rules!

Maidstone YMCA Group is unable to find a sensible answer to the question "Why QRP on the hf bands?" A look at the overseas check log results gives a very positive answer—9J2CL/P gave 588 points to G stations. An input of less than 30W produced RST 579 reports from this station, to say nothing of W6, W7, VE6 & 7, VS5, VK7 etc.

There are plenty of contests for high power stations using all modes of emission but there is only one for QRP cw men operating from tents, without the benefit of mains power supplies. Long live NFD! Please resist all pressures to change the rules any further.

B. A. Toms, hon secretary, Ariel Radio Group

The Editor
Radio Communication
Sir—As a result of a number of enquiries by people who have thought otherwise, I wish to make clear that the disqualification of the Cheltenham Amateur Radio Society, G5BK/P, in HF NFD was not due to a defective signal, use of excess power or any infringement of licensing regulations, but to an oversight on the part of the secretary who omitted to send in an entry form before the closing date because of a late entry by the Cheltenham ARS.

The number of points obtained was 765.

J. Pickles, G4CWM, hon sec, Cheltenham ARS

Looking ahead

25 November—RSGB lecture at the IEE.
6 December—RSGB AGM, Royal Society of Arts, John Adam Street, Adelphi, London WC2.
17 January 1975—RSGB Presidential Installation, Cardiff Castle.
27 April 1975—NRSA Convention, Belle Vue, Manchester
10-11 May 1975—21st VHF Convention, Winning Post, Whitton, Middlesex.

CLUB NEWS

RSGB Affiliated Societies and Clubs, and RSGB Groups, are invited to submit items for inclusion in this section to their Regional Representatives (not direct to the editor), whose addresses appear on page 745 of this issue, for inclusion in the appropriate regional section.

Items of news and dates of forthcoming events should reach RRs by the following dates: 25 November 1974, 1 February 1975.

REGION 1 **RR B. O'Brien, G2AMV**

Ainsdale (ARC)—Thursdays fortnightly, 8.15pm. 7, 21 November. Ainsdale Scout Headquarters. Further details from N. Horrocks, G2CUZ QTHR.

Blackburn (ELARC)—First Thursday in each month, 7.30pm. YMCA, Shearbank Road, Blackburn. Visitors always welcome. Sec W. E. Baxendale, G8FDG, "Juverna", Westland Ave, Darwen Lancs.

Blackpool (B & DARS)—Mondays, 8pm. Pontins Holiday Camp, Squires Gate. Morse tuition 7.30pm.

Bolton (B & DARS)—3rd Wednesday in each month, 8pm. Clarence Hotel, Bradshawgate. Sec S. Macdonald, G4AQB, 8 Archer Avenue, Bolton.

Bury (B & RRS)—Second Tuesday in each month; informal meetings other Tuesdays. Morse and RAE classes in progress. Mosses Community Centre, Cecil Street, Bury. An 18AVT/WB aerial has been purchased, so the club station should soon be on the air. The club put a station in Holcombe Hill for VHF NFD but it was blown off; the tent being torn to shreds.

Carlisle (C & DARS)—Mondays, 7.30pm. Currock House, Lediard Avenue, Currock, Carlisle. A very full programme of lectures and demonstrations has been arranged for the coming months. Full details from G8DVD QTHR.

Cheshire (M-C ARC)—Wednesdays, 7pm. Technical Activities Centre, Winsford Verdin Comprehensive School, Grange Lane Winsford. Nets on 160m, 7pm Mondays; on 2m, 7pm Tuesdays; on 10m, 7.30pm Thursdays. On Tuesdays RAE classes and slow morse transmissions are available. Please see sec G3SIQ for details. Chairman is G3JWK.

Chester (C & DARS)—Tuesdays, 8pm; except first Tuesday in each month, which is a net night on 145·08MHz and 433·15MHz. YMCA, Chester. Further details from G8AYW, G6AHC/T QTHR.

Douglas IoM (D & DARS)—Sec GD3YUM will be pleased to hear from any member who intends to visit the island.

Eccles (E & DARC)—Tuesdays, 8pm. Bridgwater School, Worsley, Manchester. Club 2m net, 11am Sundays on 145·66MHz. All visitors and prospective members welcome. Sec G4AEQ QTHR.

Lancaster University (UoLARS)—Wednesdays, 7pm. Furness College. RAE and morse classes. The society is active on the hf bands and 2m using G3ZBY and G8DOU. Skeds and visits welcomed; enquiries please to Colin Pegrum, Department of Physics.

Leyland Hundred ARG—2nd Monday in each month, 7.30pm. Rose & Crown, Ulnes Walton, Leyland. Net night Saturdays 2000 gmt on 145·8MHz. Details from F. Harrison, G3XII, 78 Lancaster Lane, Leyland Lancs.

Liverpool (L & DARS)—Tuesdays, 8pm. Conservative Association Rooms, Church Road, Wavertree. Sec G3WCS.

Liverpool (NLRC)—Tuesdays 8.30pm. Informal meetings. "Nags Head", Thornton, Crosby, Liverpool 23. Visitors welcome. Sec R. B. Porter, 11 Cranmore Avenue, Crosby, Liverpool L23 0QD.

Liverpool University (UoLARS)—Meetings have now started. Details from sec J. M. Pagett, G8IAV, c/o Students Union.

Manchester (M & DARS)—Wednesdays, 7.30pm. All meetings include morse classes. 203 Droylesden Road, Newton Heath, Manchester 10. Sec G3IOA.

Manchester (SMRC)—Fridays, 8pm. Sale Moor Community Centre, Norris Road, Sale, Cheshire. VHF and df lads meet on Mondays, 8pm at the club shack, "Greeba", Shady Lane, Manchester 23. 8 Nov ("Experiments with thermodynamics" by W. L. Seddon, G3VIW), 15 Nov ("The early days of radio"—with slides, by P. Stewart), 22 Nov (Technical discussion), 29 Nov ("Aerials" by F. J. H. Charman, G6CJ), 6 Dec (Club quiz), 13 Dec (DX night on the air), 20 Dec (Xmas party), 27 Dec (No meeting). Visitors always welcome. Hon sec G3WFT QTHR.

Manchester University (MUARS)—The aerial system at G3VUM has suffered wind damage but should now be active again on 160-10m, and G8FUM on 2m. 25 Nov (Visit to ICL at Gorton). New members are always welcome, particularly to fill committee positions. Sec G. T. Phelan, G8EPS, c/o University Union.

University of Manchester (UoM—IoS & TARS)—G3CXX is active on all hf bands and G8FOT on 2m and perhaps 2cm. Items for club magazine/newsletter or letters from intending members gratefully received by G8GOS, 66 Howard Road, Kings Heath, Birmingham B14 7PQ.

Preston (PARS)—7.30pm. Windsor Castle (private room), St Paul's Square, Preston. Morse practice 7.30pm, main feature 8pm. 7, 21 Nov; 5, 19 Dec.

Salford (DHRS)—Wednesdays 5pm. Dial House, Chapel Street, Salford. Members assemble in canteen and proceed to club room on roof. Sec G3WFW QTHR.

Stockport (SRS)—2nd and 4th Wednesdays in each month, 8pm. Blossoms Hotel, Buxton Road, Stockport, Sec G. R. Phillips, G3FYE, 6 Ross Avenue, Davenport, Stockport.

Thornton Cleveleys (ARS)—1st and 3rd Wednesdays, 8pm. morse practice from 7.30pm. St John Ambulance Brigade HQ, off Fleetwood Road North (near Gardeners Arms), Thornton, Thornton Cleveleys. Full details from F. Hill, G3YWH, 45 Preston Old Road, Blackpool FY3 9PR.

Warrington (W & DARS)—Tuesdays, 8pm. Thames Board Mills Social Club, Alford Hall, Manchester Road, Warrington, Sec G. H. Read, 2 Princess Avenue, Great Sankey.

Wirral (WARS)—1st and 3rd Wednesdays in each month, 7.45pm. Sports and Recreation Centre, Grange Road West, Claughton, Birkenhead. Sec G3YGL QTHR.

Wirral (WDXA)—Last Tuesday in each month at members' homes. Visitors are welcome. Please inform sec G3XJZ, QTHR beforehand.

Merseyside members meet for lunch on first Monday of each month. It is essential to book beforehand and obtain details of the venue from either G3VQT or G2AMV.

REGION 2 **RR J. E. Agar, G8AZA**

Hull (H & D ARC)—Fridays, 7.30pm. 592 Hessel Road, Hull. 8 Nov ("Starting from scratch" by G8EAH), 15 Nov ("Radio Scrabble" by G3PQY), 22 Nov ("Synthesizers" by G4BHF), 29 Nov ("Starting a station" by T. Watton). 6 Dec ("UFOs"—Unidentified Flying Objects—by C. Watson), 13 Dec (Construction competition), 20 Dec ("Amateur tv" by G3PQY), 27 Dec (No meeting). *G3PQY.*

York (YARS)—Thursdays, 7.30pm. 61 Micklegate, York. Visitors are most welcome. Hon sec K. R. Cass, G3WVO, QTHR.

REGION 3 **RR B. Kennedy, G3ZUL**

Birmingham (MARS)—Birmingham and Midland Institute, Margaret Street, *G8GOC.*

(Slade)—Alternate Fridays, 8pm. The Committee Room, Church House, Erdington. *G4BRT.*

(South)—6 Nov (AGM), 4 Dec (Surplus equipment sale plus Christmas celebrations). Hampstead House, Fairfax Road, West Heath, Birmingham 31. *G8GDZ.*

Bromsgrove (BDARC)—Second Friday in each month, 8pm. Avoncroft Art Centre, Stoke Rd, Bromsgrove. 8 Nov (Amateur electronics demonstration by G3FIK), 13 Dec (Not notified). *Mr J. Harvey, 22 Elm Grove, Bromsgrove.*

Coventry (CARS)—Fridays, 8pm. Baden Powell House, St Nicholas Street, Radford Road, Coventry. *G3TFA.*

Dudley (DARC)—12, 26 Nov; 10 Dec, 7.45 pm. Central Library, Dudley. Visitors most welcome. *G8HHK.*

Hereford (HARS)—First and third Fridays in each month. Civil Defence HQ, Gaol Street, Hereford. 1 Nov (Tape and slide lecture "The human machine as a radio operator). *G4CNY.*

Lichfield (LARS)—First Monday and third Tuesday in each month. The Swan Hotel, Bird Street, Lichfield. 4 Nov ("Piped television" by G4CFP), 2 Dec ("The recent G8FQE, G3NAS, G3NLY 144MHz Scottish counties dxpedition" by G3NLY). *G3NLY.*

Solihull (SARS)—Third Tuesday in each month, 7.30pm. The Manor House, High Street, Solihull. 19 Nov ("The theory of df working" by G. A. Whenham, G3TFA). *G4AEJ.*

Stourbridge (STARS)—Third Monday in each month, 7.45pm. Longlands School, Brook Street, Stourbridge. Informals at Shrubbery Cottage, Heath Lane, Stourbridge. 5 Nov (Informal), 18 Nov (Annual surplus sale), 3 Dec (Informal), 16 Dec ("Some Merchant Navy experiences" by G4CLX). *G3ZVK.*

Sutton Coldfield (SCRS)—Alternate Mondays, 7.30. Central Youth HQ, Clifton Road, Sutton Coldfield. 11 Nov (AGM), 25 Nov (Microwave Modules talk and demonstration), 9 Dec (Natternite). *G8ALO.*

Telford (TDARS)—Wednesdays, Ketley Bank Youth Centre, Nr Oakengates, except first Wednesday in each month when at Walker Technical College, Nr Wellington. 6 Nov (Films), 18 Dec (Club basket meal social). *G4ANZ.*

Willenham (W & DARS)—Alternate Wednesdays. The Three Crowns, Stafford Street, Willenhall. More classes at end of each meeting. *G4CFR.*

Wolverhampton (WARS)—Neachells Cottage, Stockwell End, Tettenhall, Wolverhampton. *G3UBX.*

Worcester (W & DARC)—The Old Pheasant Inn, New Street, Worcester. 4, 16 Nov; 1, 21 Dec. *G8ASO.* Tel Worcester 29208.

REGION 4 **RR T. Darn, G3FGY**

Derby (DADARS)—Wednesdays, 7.30pm, 119 Green Lane, Derby. 6 Nov (Surplus sale by auction), 13 Nov ("Experiments" by Ken Young), 20 Nov (Film show), 27 Nov (To be announced), 4 Dec (Surplus sale by auction), 11 Dec (Constructors contest), 18 Dec (Christmas party in the clubroom), 25 Dec (Club net 12 noon 1,930MHz), 1 Jan (Junk sale). Visitors are always welcome. Meetings are also held on Monday evenings for club projects and preparation for future events. Club net every Saturday at 7.30pm on 1,930MHz. *G2CVV.*

Derby (NHCAARG)—7.30pm. Nunsfield House, Boulton Lane, Alvaston, Derby. 8 Nov (Technical film show), 15 Nov ("Converters and your receiver" by Alan Roberts, G3VKH), 22 Nov (Preparation for CQ WW DX Contest), 23-24 Nov (CQ WW DX Contest from the clubroom), 29 Nov (Amateur television, the club's next project), 6 Dec (Night on the air), 13 Dec ("A 2m synthesized ssb tx" by Dave Temple, G8EIH), 20 Dec (Cartoon film show), 27 Dec (No meeting).

Mansfield (MARS)—First Friday in each month, 7.45pm. The New Inn, Westgate, Mansfield. Visitors always welcome. *G3XWZ.*

Melton Mowbray (MMARS)—7.30pm. St John Ambulance Hall, Ashfordby Hill, Melton Mowbray. 15 Nov ("Electronic keys" by G3KHZ), 20 Dec ("50 years of radio tape" by G6JQ). It is hoped to arrange visits to Radio Derby, the Post Office repeater at Leicester, the caves at Nottingham, etc in the new year. Top band net 1115am, Sundays, 1,960MHz. VHF nets, 1145am Sundays and 8pm Tuesdays and Thursdays. *G3NVK.*

Nottingham (ARCON)—Thursdays. Community Centre, Mansfild Rd, Sherwood, Nottingham. All welcome. *G4AFJ.*

The RR would like to hear from other clubs in the region, ie Grimsby, Scunthorpe, Worksop, Spalding, Leicester, Lincoln etc. Copy by 25 Nov. *G3FGY.*

REGION 6 **RR L. W. Lewis, G8ML**

Cheltenham RSGB Group—First Thursday in each month, 8pm. Royal Crescent Hotel, Clarence St, Cheltenham. *G3KII.*

Cheltenham (CARS)—Wednesdays, 8pm. St Marks and Hesters Way Community Centre, Brooklyn Road, Cheltenham. *G8DVA.*

Gloucester (GARS)—G4AYM. First Thursday in each month, 8pm, Oddfellows Club, Barton Street, Gloucester. Other Thursdays, 7.30pm, Leisure Centre (Drill Hall), Painswick Road, Gloucester. *G3MA.*

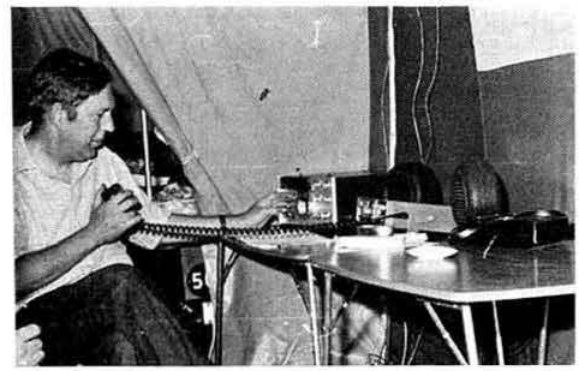
Milton Keynes (MK & DRS)—Second Monday in each month, 8pm. Lovat Hall, Silver Street, Newport Pagnell, Bucks. 11 Nov ("Becoming a radio amateur" by G3HIU—open to the general public), 6 Dec (Social evening at the "Old George", Stony Stratford. All members, XYLs and YLs welcome), 9 Dec (Mullard film show). *G8HUH.*

REGION 7 **RR R. S. Hewes, G3TDR**

Acton, Brentford & Chiswick (ABCRC)—19 Nov ("Using the TAA570 ic" by G3CCD), 17 Dec (Trio TS515 demonstration). 7.30pm. Chiswick Trades & Social Club, 66 High Road, Chiswick W4. Hon sec W. G. Dyer, G3GEH, QTHR.

Addiscombe (AARC)—Tuesdays, 9pm. "Prince George", High Street, Thornton Heath. Hon sec S. F. Knowles, G3UFY, QTHR.

Ashford, Middlesex (Echelford ARS)—11 Nov (Surplus equipment sale), 28 Nov ("Stereo and quadrophony" by T. Pacey of Rank Radio International), 9 Dec ("Receiver appreciation" conducted by John Barker, G3SAZ), 26 Dec (No meeting). Visitors very welcome. 7.30 for 8pm. St Martins Court, Kingston Crescent, Ashford. Hon sec Alan Wenham, G3ZXA, QTHR. Tel Sunbury-on-Thames 86440.



G3LJB operating the vhf station of GB3SRC at the Silverthorn Radio Club's annual camp at Lambourne End, Essex

Barking (BR & ES)—Mondays (Constructional), Tuesdays (Morse Classes), Thursdays (alternate) main and informal meetings, 7.30pm. Westbury Recreation Centre, Westbury School, Barking, Essex. Visitors very welcome. Further details from hon sec R. Clark, G4DDP, QTHR.

Burnham Beeches (BBARC)—First Monday in each month, 8pm. Hedgerley Scout Hut, Hedgerley, near Slough, Bucks. Hon sec E. Brown, 20 Balmoral Close, Cippenham, Slough.

Cheshunt (CDRC)—First Friday in each month, 8pm. Methodist Church Hall, opposite Theobalds Station. Hon sec Richard Ludwell, G3ZZQ, QTHR.

Chingford (Silverthorn RC)—Fridays, 7.30pm. Friday Hill House, Simmonds Lane, Chingford E4. 15 Nov (Annual G3NJL construction contest). Visitors very welcome. Hon sec C. J. Hoare, G4AJA, QTHR. Tel 01-529 2282.

Cray Valley (CVRS)—First and third Thursdays in each month, 8pm. Eltham United Reformed Church Hall, 1 Court Road, SE9. Hon sec Peter Vella, G3WVP, QTHR.

Croydon (Surrey Radio Contact Club)—Third Tuesday in each month, 8pm. "The Ship", 47 High Street, Croydon. Further details from hon sec Sid Morley, G3FWR, QTHR. Tel 01-657 3258.

Crystal Palace (CP & DRC)—Saturdays, 8pm. Emmanuel Church Hall, Barry Road, SE22. 16 Nov (Technical film show), 21 Dec (To be announced). Hon sec Geoff Stone, G3FZL, QTHR. Tel 01-699 6940.

Dartford Heath DF Club—15 Nov; 6, 23 Dec; (Club nights), 13 Dec (Club hunt—details later). 8pm. Broomhill Road, Dartford, Hon sec Alan Burchmore G4BWV, QTHR.

East London RSGB Group—Third Sunday in each month, 3pm. Wanstead House, The Green, Wanstead, E11. Buses: 10, 20, 66, 101, 167. Underground: Wanstead Central Line. Refreshments available. All SWLs, transmitting amateurs and friends welcome. 17 Nov ("Generation of ssb at vhf/uhf" by G8FQM), 15 Dec (AGM and junk sale). Hon sec Peter Hull, G4DCP, QTHR. Tel 01-432 6122.

Esher (Thames Valley ARTS)—6 Nov ("Repeaters" by G3BPM) 4 Dec ("Amateur tv" by G8AAI/G6OPB/T). 8pm. King George's Hall, Esher (next door to fire station). Hon sec Rod Blasdell. Tel 01-432 2343.

Edgware (E & DRS)—14 Nov ("TV aerial topics" by Pat Hawker, G3VA, of the IBA), 28 Nov (Informal), 12 Dec (Junk sale), 26 Dec (No meeting). Watling Community Association, 145 Orange Hill Road, Edgware. Hon sec Alan Masson, G3PSP, QTHR. Tel 01-950 6827.

Farnborough (Bromley RC)—Third Monday in each month. Rear of Farnborough (Kent) Village Hall (opposite "The Woodman" public house). Details from Derek Morgan, 59 Bassetts Way, Farnborough, Kent.

Gravesend RSGB Group—Mondays, 7.30pm. "Windmill Tavern", Shrubbery Road, Gravesend, Kent. Area representative P. F. Jobson, G3HLF, QTHR.

Guildford (G & DRS)—Second and fourth Fridays in each month, 8pm. Model Engineering HQ, Stoke Park, Guildford, Surrey. Hon sec Dave Coltart, G3SYM, QTHR.

Harlow (H & DRS)—Tuesdays, 8pm. Mark Hall Barn, First Avenue, Harlow, Essex. Hon sec Vic Heard, 106 Vicarage Wood, Harlow, Essex.

Harrow (RSH)—8 Nov (Junk sale), 15 Nov (Club project—practical discussion), 22 Nov ("Shadow masks" by Jim Barfoot, G8BJO), 6 Dec (Talk, to be arranged), 13 Dec (Practical night), 20 Dec (Christmas party), 27 Dec (No meeting). 8pm. Sea Cadet Headquarters,

Woodlands Road, Harrow. Hon sec Les Light, G3KDL, QTHR. Tel 01-902 2570.

Havering (H & DARC)—6 Nov ("Teleprinters" by G4CAF), 20 Nov (Film show—a selection from G3JVZ's collection), 4 Dec ("Printed circuit boards" by G3PCA), 18 Dec (Christmas party; XYLs/YLs welcome). Natter nites on alternate Wednesdays, 8pm. British Legion House, Western Road, Romford. Hon sec K. S. Hutchinson, G4ALN, QTHR. Tel 01-597 1068.

Holloway (Grafton ARS)—Fridays, 7.30pm. Archway School Annexe, Whittington School, Highgate Hill, N19. 8 Nov ("Receivers and short wave listening" by B. C. Bond, G3ZKE), 15 Nov (Visit to IBA transmitting station, Croydon. Limited numbers, by arrangement), 22 Nov ("Radio Amateur Emergency Network" by T. I. Lundegard, G3GJW), 29 Nov (Illustrated talk—Field Days), 6 Dec (Discussion of contest activities), 13 Dec ("Aerials and matching for optimum performance" by J. Groom, G8FQM). Hon sec. H. D. Ashcroft, G8AYU, QTHR.

Ilford RSGB Group—Thursdays, 8pm. Mortlake Road (off Ilford Lane), Ilford, Essex. Hon sec Derek Sapsworth, G3YMW, QTHR.

Kingston (K & DARS)—13 Nov (AGM), 11 Dec (Junk sale). 8pm. Tolworth Scout HQ, Stirling Walk, Raeburn Avenue, Surbiton, Surrey. Acting hon sec Norman Smith, G3HFO, QTHR. Tel 01-399 9526.

London (UK FM Group)—Second Tuesday in each month, 8pm. Abbey Hotel, North Circular Road (between Western Avenue and Abbey Dale Road). PRO Kris Partridge, G8AUU, Apartment 10, 74 Woodlands, Wimbledon, SW19. Tel 01-946 7843.

Loughton (L & DRS)—Second and fourth Fridays in each month, 8pm. Loughton Hall, near Debden station. Hon sec P. J. Lawler, G4CMD, QTHR.

New Cross (Clifton ARS)—Fridays, 8pm. 224 New Cross Road, London SE19. Details from hon sec R. A. Hinton, 48 Cammilla Road, Bermondsey SE16.

Northolt (British Airways, European Division ARS)—First Monday in each month, Trident Club, Western Avenue, Northolt, Middlesex. This club is open to non-BA employees by invitation. Contact David Evans, G3OUF. Tel Amersham 21573 for details.

Purley (P & DRS)—First and third Fridays in each month, 8pm. Lansdowne Hall, Lansdowne Road, Purley, Surrey. Hon sec N. A. Marshall, 122 Goodenough Way, Old Coulsdon, Surrey.

Reigate (RATS)—19 Nov (Lecture—to be announced), 17 Dec (Constructional contests), 8pm; St Marks' Church Hall, Alma Road, Reigate. Informal meetings on first Tuesday in each month, 8.30p,m; "Marquess of Granby", Hooley Lane, Redhill. Hon sec F. H. Mundy, G3XSZ. Tel Reigate 43130.

St Albans (Veralum ARC)—20 Nov (Talk by Dave Corsi, G3IKG, on the restoration of old communication receivers, particularly Continental military types), 18 Dec (AGM). 7.30 for 8pm. Market Hall, St Albans. Visitors very welcome. Hon sec Hugh Young, G3YHY, QTHR.

Southgate (SRC)—14 Nov (G6QM constructors trophy and film show), 12 Dec (AGM). 8pm. The Green, Winchmore Hill, N21. Hon sec Brian Oughton, G4AEZ, QTHR. Tel 01-336 7166.

South Kensington (Baden Powell House Scout ARG)—Third Tuesday in each month, 8pm. Baden Powell House, Queensgate, S Kensington SW7. Hon sec Alf Watts, G3FXC, QTHR.

Sutton & Cheam (SCRS)—20 Nov (Junk sale), 17 Dec ("A few uses for valves" by G3LCH) 7.30pm. "The Library", Cheam, Surrey, Hon sec Alan Keech, G4BOX, QTHR.

Welwyn (Mid-Herts ARS)—Second Thursday in each month, 8pm, Welwyn Civic Centre, Prospect Place, Old Welwyn. Details from PRO, Maurice A. Pyle, G2BLA, QTHR. Tel Welwyn 4685.

Wimbledon (W & DRS)—8 Nov ("Carribbean dxpedition" by G3TXF), 29 Nov (Project night—visitors welcome), December meetings to be announced. 8pm. St John Ambulance HQ, 124 Kingston Road, Wimbledon SW19. Hon sec F. W. Hill, G3WDO, QTHR.

REGION 8 **RR D. N. T. Williams, G3MDO**

Canterbury (EKRS)—First Thursday in each month. Westgate Hall, Canterbury. Details of future meetings from G3XDV, QTHR.

Medway (MARTS)—Fridays, 7.30pm. Aurora Hotel, Gillingham. Details of future meetings from C. R. Blackmur, G8FHN, QTHR.

Tunbridge Wells (WKARS)—Alternate Fridays. Adult Education Centre, Monson Road, Lamberhurst, Tunbridge Wells. Tel Lamberhurst 393. 15 Nov (Junk sale), 29 Nov ("Synthesized solid state equipments" by a speaker from Redifon).

Horsham (HARC)—First Wednesday in each month. Civil Defence HQ, Moons Lane, Brighton Road, Horsham. Details of meetings from G3NPF, QTHR. Tel Horsham 66290.

Mid-Sussex (MSARS)—Marle Place, Leylands Road, Burgess Hill. Details of meetings from G3RXJ, QTHR.

Eastbourne (SARS)—First Monday in each month. Victoria Hotel, Latimer Road, Eastbourne. PRO G3JFM.

Worthing (W & DARC)—Rose Wilmot Youth Centre, Littlehampton Road, Worthing. Details from G8ETL, QTHR.

Maidstone (MYMCAARS)—"Y" Sports Centre, First and third Fridays devoted to the beginners.

Crawley (CARC)—Fourth Wednesday in each month. United Reform Church Hall, Ifield, Crawley. Details from G3MGL, QTHR.

REGION 9 **RR H. W. Leonard, G4UZ**

A Happy Christmas and Bright New Year to All in Region 9.

Bath (B & DRG)—Mondays, 8.30pm. Church of the Ascension, Claude Avenue, Oldfield Park, Bath. Further information from John Noden, Flat 4, 30 Paragon, Bath BA1 5LY.

Bristol RSGB Group—10 Nov (MARS/Bristol contest), 25 Nov (Equipment auction), 16 Dec ("VHF VFOs" by Cedric Marshall, G3YRN). 7pm. Becket Hall, St Thomas Street, Bristol 1. *G3ULJ.*

Bristol (BARC)—Tuesdays, 7.45pm. 24 Bright Street, Barton Hill, Bristol 5. *G4BZZ.*

Bristol (Shirehampton ARC)—Fridays, 7.30pm. Twyford House, Shirehampton, New members most welcome. *G4BOL.*

Bristol (University ARS)—Most Saturdays during term time, 2.30pm. Dept of Physics, Royal Fort, Tyndall Avenue, Bristol 8. Full details from G3WDG.

Cornish (CRAC)—7 Nov (Natter session and sale of surplus equipment), 5 Dec ("Operating procedure" by G3VWK and G3XFL also "Safety in the shack" by G3XFL), 2 Jan ("Crime prevention" by Sgt Watmore). 7.30pm. SWEB Clubroom, Pool, Camborne.

West Cornwall (CRAC)—Alternate Wednesdays, 7.30pm. The Guildhall, Penzance. Full details of Cornish and West Cornwall Clubs from G3NKE, QTHR, Tel Camborne 2419.

Exeter (EARS)—Second Monday in each month. 7.45pm. ATC hut, Colleton Hill, The Quay, Exeter. Full details from Jack Bawden, 232 Exwick Road, Exeter EX4 2BA.

Newquay (N & DARS)—Alternate Wednesdays, 7.30pm. Treviglas School, Newquay. Full details from G3THT, QTHR.

North Devon (NDRC)—Second and fourth Wednesdays in each month, 7.30pm. "Crinnis", High Wall, Barnstaple EX31 2DP. *G4CG.*

Plymouth (PRC)—First and third Tuesdays in each month, 7.30pm. Virginia House, Bretonside, Plymouth. 16 Nov (Annual dinner), 17 Dec (Film night). Hon sec S. E. Croft, 2 Crozier Way, Mutley, Plymouth. Visitors always welcome.

Saltash (S & DARS)—First and third Fridays in each month, 7.30pm. Burraton Toc H Hall, Saltash. *G3XWA.*

South Dorset (SDRS)—First Tuesday in each month, 7.30pm, Lecture Hall, South Dorset Tech College, Newstead Road, Weymouth. 7 Nov (Technical film), 3 Dec (Open meeting). *G3WAO.*

Taunton (T & DARS)—Fridays, 7.30pm. Jelalabad Barracks, The Mount, Taunton. Hon Sec G. Swetman, "Little Copse", Monkton Heathfield, Taunton. Tel West Monkton 298.

D. Chivers, G3XNX, of the Torbay Amateur Radio Society, helping a resident, John, in the radio room of the Cheshire Home at Brixham, Devon. John is being coached for the RAE by members and by means of tapes. The equipment was purchased from a fund set up from part of the proceeds of rallies, socials etc during the past few years

Torbay (TARS)—Tuesdays with special meeting on last Saturday in each month. 7.30pm, rear of 94, Belgrave Road, Torquay. 30 Nov (RSGB film—"Aerials and Propagation"), 14 Dec (Christmas party). 28 Dec (No meeting). Visitors most welcome. *G3UIQ*.
West Dorset (WDARG)—First Friday in each month, 8pm. Dorset Assn of Youth clubs, York Road, Dorchester. Hon sec Mrs Val March, 27 Great Western Road, Dorchester.
Weston-super-Mare (WsMRS)—Second Friday in each month, 7.30pm. Room Lewis M2, Worle School, New Bristol Road, Worle. *G3PQE*.
Yeovil (YARS)—Thursdays, 7.30pm. The Youth Centre, 31 The Park, Yeovil. *G3NOF*.

REGION 10 **RR D. M. Thomas, GW3RWX**
Send items for inclusion to Deputy RR, GW8HEZ, QTHR
Barry (BCoFE ARS)—Thursdays, 8pm. Barry Rugby Club, Reservoir Road. Details from sec GW3VPB.
Blackwood (BARS)—Fridays, 7pm. Oakdale Community Centre, Blackwood. Details from sec GW3KYA.
Cardiff RSGB Group—Second Monday in each month, 7.30 pm. BBC Social Club, 118 Newport Road, Cardiff. 11 Nov ("Digital techniques" by D. M. Thomas, GW3RWX), 9 Dec (Film). Details from GW3GHC.
Glamorgan VHF/UHF Group—19 Nov, 17 Dec, 7.30pm. NCB Social Club, Tonddu, Nr Bridgend. Details from sec GW3ZTH.
Merthyr (HARC)—Mondays, 7pm. Hoover Social Club, Pentrebach, Merthyr. Details from sec GW3RNC.
Monmouth (MARS)—Details of meetings from GW8GPX.
Pembroke RSGB Group—Last Friday in each month. Defensible Barracks, Pembroke Dock. Details from sec GW3AKO.
Pontypool RSGB Group—Tuesdays, 7pm. Educational Settlement, Park Hill Road, Pontypool. Details from sec GW3JBH.
Port Talbot (PTARS)—Thursdays, 7.30pm. First Thursday in each month is a general meeting. BSC Sports and Social Club, Margam, Port Talbot. Details from sec GW3ACF.
Rhondda (RARS)—Every other Thursday, 7.30pm. Transport Employees Club, Porth. Details from sec GW3PHH.
Sully (S & DSWC)—Tuesdays, 7pm. Sully Bowls and Social Club, 59 South Road, Sully. Details from GW4CJC.
Swansea (SARC)—Fortnightly, 5, 19 Nov, 3, 17 Dec, 7.30pm. The Commercial Inn, Killay, Swansea. Details from sec GW4BIQ.

REGION 11 **RR P. H. Hudson, GW3IEQ**
Rhyl (R & D ARC)—12 Nov (Not notified), 10 Dec (TVI, bci and the amateur). Lecture room of the Ambulance Station, Coast Road, Rhyl.
Conway Valley (CVARC)—Second Thursday in each month, 7.30pm. The Quaries, Llandulas, Colwyn Bay.
Bangor (UCoNWARS)—5.30pm. Small lecture theatre, School of Engineering Science.

REGION 13 **RR V. W. Stewart, GM3OWU**
Berwick (BARS)—Last Sunday in each month, 3pm. Tweed View Hotel. Further details from G. Shankie, GM3WIG, 8 Ettrick Terrace, Hawick, Roxburghshire.
Dunfermline (DRS)—Second Wednesday in each month, 7pm, Queen Anne High School (TV studios). Further details from D. G. L. Anderson, GM8HEY, 10 Cairneyhill Road, Crossford.
Edinburgh (LRS)—Second and fourth Thursdays in each month, 7.30pm. Adult Education Centre, Riddles Court, High Street. 14 Nov (Tape lecture), 28 Nov ("3cm"), 12 Dec (Quiz). Hon sec GM8GEC.
Glenrothes (G & DARC)—First Sunday in each month, 7.30pm. Old Nursery Buildings, Leslie, Fife. Special meeting for project groups every Wednesday, 6 Nov (Open night especially for RSGB members in the Fife area, but open to all interested, 7.30pm. Laurel Bank Hotel, Markinch, Fife). Further details from GM3YOR, QTHR.
St Andrews (UStAARS)—Details from R. Marchant, GM3ZCQ, Dept of Physics, North Haugh, St Andrews.

REGION 14 **RR M. A. Comrie, GM3YRK**
Ardeer (ARCARS)—Thursdays, 7.30pm. Ardeer Recreation Club, Stevenston, Ayrshire.
Ayrshire (ARG)—Every second Sunday. YMCA, Howard Street, Kilmarnock. Further details from hon sec R. D. Harkness, GM3THI, 55 Woodend Road, Alloway, Ayrshire.

Some members of Forfar & D ARC. Left to right: Colin Smith, GM4BVO; Jim Grant, GM2FVR; Frank Hall, GM8BZX; Walter Robertson, GM6RI; and J. B. MacPhee, GM3VNW

Falkirk & D RSGB Group—Temperance Cafe, Lint Riggs, Falkirk. Further details from J. Ramsay, GM3OQI, 78 Wheatlands Avenue, Bonnybridge, Stirlingshire.
Greenock (G & DARC)—GM3ZRC. Tuesdays and Fridays, 7.30pm. Watt Library, Union Street, Greenock. Enquiries to hon sec N. C. Henderson, GM3LYI, QTHR.
Glasgow (GURC)—George Service House, University Gardens, Glasgow. Details from hon sec, c/o Dept of Engineering.
Mid-Lanark RSGB Group—Fridays, 7.30pm, with alternate meetings informal. Wrangholm Hall Community Centre, Motherwell. Details from GM3KMG, tel Hamilton 28759. RAE classes 7pm every Wednesday, details from GM8DRQ, tel Hamilton 26446.
West of Scotland (ARS)—Fridays. 81 Virginia Street, Glasgow. Details from sec GM3RHR. QTHR.

REGION 15 **Deputy RR H. J. Campbell, GI8FOK**
Bangor (B & DARS)—First Friday in each month, 8pm. Redcliff Hotel, Seacliff Road, Bangor. 8 Nov (Junk sale at Good Templers Hall), 6 Dec (Annual dinner/dance at New Imperial Hotel, Donaghadee), 13 Dec ("Underwater communications" by the Sub-aqua Group). Hon sec N. S. Newell, GI3YMY, QTHR.
Belfast RSGB Group—Third Wednesday in each month, 8pm, 90 Belmont Road, Belfast. New members and visitors made most welcome. Interesting winter programme arranged. Further information from H. J. Campbell, GI8FOK, QTHR.
Belfast (CoB YMCARC)—Saturday afternoons, 2.30pm. New QTH Brunswick House, 7 Brunswick Street, Belfast. Hon sec GI8EWM, QTHR.
Belfast (QUoBRC)—Tuesdays 8pm. 37 Fitzwilliam Street, Belfast. Everyone welcome.
Mid-Ulster RSGB Group—First Sunday in each month, 3pm. At GI4BAC, QTHR. All welcome. Hon sec R. F. S. Sinton, GI3ONF QTHR.

REGION 17 **RR L. Hawkyard, G5HD**
Basingstoke (BARC)—First and third Saturdays in each month. Chineham House, Popley, Basingstoke. Sec R. H. Oakley, G8FKT.
Bournemouth (Wessex ARG)—First Friday in each month and the Monday 17 days later, 8pm. Cricketer's Arms, Windham Road. *G8BBN*.
Bracknell (BARC)—Mondays, 7.30pm. Cooper's Hill Community Centre. *G3YMC*.
Fareham (F & DARC)—Wednesdays, 7.30pm. Porchester Community Centre, Room 9. Details from G8FFI, QTHR.
Farnborough (F & DRS)—Second and fourth Wednesdays in each month, 7.30pm. 8th Air Scout's Hut, Rectory Road, Farnborough. Sec G8ECO or PRO G8ATK, both QTHR.

Harwell (AERERC)—Third Tuesday in each month, 7.30pm; also informal meetings every Friday lunchtime. Social Club, AERE, Harwell. *G3NNG.*
Maidenhead (M & DARC)—7 Nov ("The development of satellite communications "by R. Eaton of the Post Office), 19 Nov ("25 years on the air" by E. C. Palmer, G3FVC), 5 Dec ("Electronics in education" by a representative of Griffin & George), 17 Dec ("Presentation of home construction cup and hf/vhf operating awards). 7.30pm British Red Cross Hall, The Crescent, Maidenhead. *G3FVC.*
Portsmouth (P & DRC)—Wednesdays, 7.30pm. Portsmouth Community Centre, Malins Road, Buckland, Portsmouth. *G3NCO, QTHR.*
Reading (RARC)—Alternate Tuesdays, 8pm, "White Horse", Emmer Green. *G4BLT.*
Southampton RSGB Group—Saturdays 9 Nov and 14 Dec at the Lancaster Building. Southampton University; Wednesday evenings at the clubroom, Kent Rd, both at 7.30pm. *G4AEU QTHR.*
Southampton (SUARC)—Tuesday evenings, also informal meetings every lunchtime during term in the clubroom, Old Union Building. Hon sec I. Mercer, G3ZER.
Swindon (SDARC)—Wednesdays, 7.30pm. Penhill Junior School, Swindon. *G3YKC, QTHR.*

GB2NM—6 October 1974
The Chichester & DARS ran a special event station at "Tidewaters", Old Bosham, the former QTH of the late Gerry Marcuse, G2NM, on 6 October to commemorate the achievements of G2NM in the early pioneering days of amateur radio. Some 137 contacts were made on 3·5MHz and many old-timers called in with personal reminiscences of Gerry and several very interesting QSOs resulted. One item which caused much amusement was a letter from the GPO dated 1927 informing Gerry that his signals had been received in the Far East and asking for technical details of the transmitter. It went on to say that if the permitted power had been exceeded they would be pleased to grant a new licence legalising the equipment!

Gerry's widow, Irene, still retains an active interest in amateur radio, having very much shared in all Gerry's work, and she still keeps all his old log books QSLs and press cuttings. It was a most pleasant day for all members of the club, who enjoyed Irene's generous hospitality, and the only pity was that the weather prevented more people from visiting the station. *G4AET*

Proposed RSGB regional boundaries

The following shows the composition of the proposed new RSGB regions as outlined on the map included with the October issue of *Radio Communication*.

Region 1	Cheshire, Cumbria, Greater Manchester, Isle of Man, Lancashire, Merseyside.
Region 2	All that part of Humberside north of River Humber, North Yorkshire, South Yorkshire, West Yorkshire.
Region 3	Hereford and Worcester, Salop Staffordshire, Warwickshire, West Midlands.
Region 4	Derbyshire, all that part of Humberside south of River Humber, Leicestershire, Lincolnshire, Nottinghamshire.
Region 5	Bedfordshire, Cambridgeshire, Northamptonshire.
Region 6	Berkshire, Buckinghamshire, Oxfordshire.
Region 7	Greater London south of River Thames, Surrey.
Region 8	Kent, East Sussex, West Sussex.
Region 9	Cornwall, Devon.
Region 10	Dyfed, Gwent, Mid Glamorgan, Powys, South Glamorgan, West Glamorgan.
Region 11	Clwyd, Gwynedd.
Region 12	Grampian, Highlands, Orkneys, Shetlands, Tayside, Western Isles.
Region 13	Borders, Fife, Lothian.
Region 14	Central, Dumfries and Galloway, Strathclyde.
Region 15	Northern Ireland.
Region 16	Essex, Norfolk, Suffolk.
Region 17	Isle of Wight, Channel Islands, Dorset, Hampshire, Wiltshire.
Region 18	Cleveland, Durham, Northumberland, Tyne and Wear.
Region 19	Greater London north of River Thames, Hertfordshire.
Region 20	Avon, Gloucestershire, Somerset.

Note: The regions in England and Wales are based on the counties as set out in the schedules to the Local Government Act 1972.

The Channel Islands and the Isle of Man are not dealt with by that Act.

The regions in Scotland are based on the county boundaries to become effective on 1 April 1975.

RAYNET

by S. W. LAW, G3PAZ*

Due to the vagaries of our climate, the flood problem is one that is foremost at present, and in the south we have examples in the Avon, Thames and Medway areas, to mention only a few. Regarding the Thames, members in this area are well aware of the potential hazards of the tidal area, as are the authorities from the estuary up.

Exercise Canute 1 will be remembered as a very successful demonstration of the possibilities of Raynet co-operation with the authorities. Now Exercise Canute 2 has once again proved what can be done by united and well-organized inter-group working. On 13 October no less than five groups set up coverage as follows; NE London/SW Essex own areas and N Thames riverside Tower Bridge to Thamesmead (G4DDP), SE London own area and S Thames riverside as above (G3FZL), NW Kent inland terrain and S Thames from Thamesmead to Dartford tunnel (G8EZM), Mid-Kent inland terrain and S Thames from Dartford tunnel to Cliff Marshes (G3YCN), E Kent inland terrain and S Thames from Cliff Marshes to Faversham (G3TDP). Overall control from Mid-Kent G3GJW. Frequencies were various on 4m and 2m (a.m. and ssb). Interested controllers may obtain fuller details from G3GJW, QTHR; large sae please.

The Kennet and Loddon group did not have the best of the weather for their exercise on 6 October. The user services had asked for co-operation as only two St John ambulances were equipped with radio, and Raynet controller G3OWF had visualized that some 20 mobile units would be desirable to cover the proposed exercise. Surrey group was therefore invited to participate and W Surrey was able to assist. Since the full complement could not be made up, some younger members were pressed into service as messengers on cycles and mopeds, thereby demonstrating that all members of a Raynet group can be of use even when not yet licensed transmitters.

W Surrey of course had been put on alert the previous day by the double bomb incident in the town centre at Guildford, but the authorities were able to cope and a few Surrey mobiles took the opportunity to conduct a snap traffic observation exercise with our control, thus ensuring their immediate availability if called upon. G6SC and G3PAZ, N Surrey, were on listening watch on 70·4MHz.

The preceding item must appear a part of life in these troubled times to our groups in N Ireland who appear to manage the most praiseworthy exercises in conjunction with each other and the Red Cross and St John Ambulance services. GI3YFY and GI3RNY of the Mid-Antrim group even organize RAE classes at Ballymena radio club, which moots well for future Raynet membership.

Our remarks above re listener members can be further amplified by the report that Essex member Colin Walker, BRS34888, has had a Raynet article published in the Ambulance Service Journal. Coupled with the participation in the Conference on Major Accidents at Chelmsford in July, this shows what can be done with liaison. Other groups please note.

Hon Registrations Secretary; Mrs L. A. Crane, "Greta Woods", Bromley Road, Ardleigh, Colchester, Essex.

* 130 Alexandra Road, Croydon, Surrey CR0 6EW

RSGB SLOW MORSE PRACTICE TRANSMISSIONS

These slow morse practice transmissions are sponsored by the RSGB. Alterations and additions to this list should be sent to the honorary organizer, Mr M. A. C. MacBrayne, G3KGU, 25 Purlieu Way, Theydon Bois, Essex.

Clock time	Callsign	MHz	Mode	Town
Sundays				
1000	G3HZL	144·160 to south-west	A1/A3J	Isleworth, Middlesex
1015	G3CGD	1·875	A1/A3	Cheltenham, Glos
1030	G3NPB	1·875	A1	St Ives, Cornwall
1030	G3LR	1·810	A1	Accrington, Lancs
1030	G3ZNW	144·520 to east	A2/A3	West Molesey, Surrey
1100	G2FXA	1·900	A1/A3	Stockton-on-Tees
1115	G3ZNW	144·520 to north	A2/A3	West Molesey, Surrey
1200	G3HVI	144·100 omni-directional	A2/A3	Stoke-on-Trent, Staffs
1330	G3FWW	1·880	A1	Burnham-on-Sea, Soms
1815 †	G3VTY	1·915	A1/A3J	Leeds, Yorks
	G3YEE	1·910	A1/A3J	Bradford, Yorks
1830	G3NCZ	1·920	A1/A3	Blackburn, Lancs
Mondays				
1800	G3YEE	145·510	F2/F3	Bradford, Yorks
1800	G3SWR	1·980	A1/A3	Birmingham
1830	G3VBI	1·910	A1/A3	Goole, Yorks
1930	G3RAF	1·910 3·590 144·024	A1	Locking, Soms
2000	G3IBJ	1·910	A1/A3	Southampton, Hants
2000	G3XWZ	1·910	A1/A3J	Mansfield, Notts
2000 †	G3YJI	1·845	A1/A3	Walton-on-Thames, Surrey
	G3YZB			East Molesey, Surrey
2030	G3ASR/A	1·875	A2/A3	Harrow, Middlesex
2030	G3KGU	1·915	A1/A3	Theydon Bois, Essex
2130	G3LQI	1·980	A1/A3J	Lancing, Sussex
2230	G3HZL	144·160 to south-west	A1/A3J	Isleworth, Middlesex
Tuesdays				
1100	G3EBU	1·952	A2/A3J	South Woodham, Essex
1800	G3SWR	1·940	A1/A3	Birmingham
1830	G4BNA	3·590	A1	Swindon, Wilts
1930	G3RAF	1·910 3·590 144·024	A1	Locking, Soms
2000	GM3UWX	145·890 omni-directional	F2	Bishopton, Renfrewshire
2000	G4AEU	1·910	A1/A3	Southampton, Hants
2000	G3LEQ	1·815 144·250 to north 145·550 to north	A2/A3 A1/A3J F2/F3	Knutsford, Cheshire
2045	GM3CRY	3·550	A1/A3J	St Andrews, Fife
2130	GM3UAG	145·800 to south		Ellon, Aberdeenshire
Wednesdays				
1930	G3RAF	1·910 3·590 144·024	A1	Locking, Soms
2000	G8QU	1·970	A1	London N22
2000	G3BPE	1·975	A1/A3	Bexley, Kent
2000	G3SWP	1·920	A2/A3J	Doncaster, Yorks
2015	G3WVJ	1·845	A1/A3	Staines, Middlesex
2100	G3HVI	144·100 omni-directional	A2/A3	Stoke-on-Trent, Staffs
2230	G3HZL	144·160 to south-west	A1/A3J	Isleworth, Middlesex

† Alternately

Clock time	Callsign	MHz	Mode	Town
Thursdays				
1800	G3SWR	1·980	A1/A3	Birmingham
1830	G4BNA	3·590	A1	Swindon, Wilts
1830	G3NC	1·968	A1	Swindon, Wilts
1900	G3YEI	1·850	A1	Fleetwood, Lancs
1915	G3ZNW	144·520 to north	A2/A3	West Molesey, Surrey
1930	G3RAF	1·910 3·590 144·024	A1	Locking, Soms
2000	G3WGD	1·840	A1	Leicester
2130	GM4CAU	145·800 to north		Aberdeen
2130	G3LOI	1·980	A1/A3J	Lancing, Sussex
Fridays				
1800	G3SWR	1·940	A1/A3	Birmingham
1900	G3NPB	1·875	A1	St Ives, Cornwall
1930	G3PQF	144·360 to north-east	F2/F3	Farnborough, Hants
1930	G3RAF	1·910 3·590 144·024	A1	Locking, Soms
2000	G3LEQ	1·815 144·250 to north 145·550 to north	A2/A3 A1/A3J F2/F3	Knutsford, Cheshire
2015	G3SAZ	1·845	A1/A3	Ashford, Middlesex
Saturdays				
0930	G2FNK	1·930	A1/A3J	Staines, Middlesex
1000	G3HZL	144·160 to south-west	A1/A3J	Isleworth, Middlesex
1115	G3HZL	144·160 to north-west	A1/A3J	Isleworth, Middlesex

G3BZU morse proficiency transmissions at 20, 25, 30, 35 and 40wpm are made at 2000 clock time on the first Tuesday of each month on a frequency of 3·520MHz. For 100 per cent copy at 20wpm a certificate is awarded, and endorsement stickers are available for 100 per cent copy at the higher speeds. A charge of 10p or two IRCs is made for the basic certificate, and 2½p or one IRC for each endorsement sticker claimed. All claims should be sent to—The QRQ Manager, RNARS, HMS *Mercury*, Leydene, Petersfield, Hants.

INTERFERENCE PROBLEMS

Members accused of causing interference or who suffer interference from external sources are invited to seek the assistance of the Interference Committee in solving their problems.

Enquiries should be addressed to: The Chairman, Interference Committee, RSGB, 35 Doughty Street, London WC1N 2AE.

MEMBERS' ADS

These subsidized flat-rate advertisements are accepted as a service to members of RSGB. They must be submitted on the Members' Ads order form printed in each issue of *Radio Communication*, or on a postcard similarly laid out. Each **must** be accompanied by a **recent** *Radio Communication* wrapper addressed to the advertiser, as proof of membership, and a remittance by postal order or cheque for 40p (stamps not accepted). They will not be acknowledged. Those not clearly worded or punctuated will be returned. No correspondence concerning this service can be entered into.

The closing date for each issue is the 4th of the preceding month, but no guarantee of inclusion in a specific issue can be given. Valid advertisements not published in the issue following receipt will be held over until the next issue.

Trade or business advertisements, even from members, will not be accepted for Members' Ads but should be submitted as classified or display advertisements in the usual way.

The RSGB reserves the right to refuse advertisements, and accepts no responsibility for errors or omissions or for the quality of goods offered for sale. Advertisements may be edited or abbreviated as necessary.

Members are advised to enclose a stamped addressed envelope when replying to advertisements.

Post to: MEMBERS' ADS. "RADIO COMMUNICATION", 35 DOUGHTY STREET, LONDON WC1N 2AE

FOR SALE

80ft UR67, new £2.50. 18-el 70cm J-Beam, used, £4. "Papst" blower, ac mains, new, £2.50. New valves, sae list. 70cm varactor tripler, new, £3. Quantity alloy tubing, couplers, brackets. Bowhay, 20 Park Road, Bracknell. Tel Bracknell 22169.

Class D wavemeter with manual, transformer and spare valve, good cond, £5; carriage at cost. G3EBA, QTHR. Tel Milton Keynes 72864.

Cambridge AM10DV dash mounting on 145MHz, £18. Philips LFH0084 dictating machine with foot-control and phones, no mic, £5. G3ZZK, QTHR. Tel 01-476 4050.

Eddystone 770S rx, 500-1,000MHz a.m./fm, 30 valves, xtal calibrator, S-meter, int spkr, 110/240V 50/60Hz, table cabinet, slide-rule dial, comp manual. Buyer collects or will deliver to 50 miles, £40. A. Cockle. Tel Bookham (Surrey) 58439.

MSK-5 squeeze-key, electronic keyer, built-in monitor, mains or battery operation, with manual, £15.50, post included. G3LHJ, QTHR. Tel Newton Abbot 4437.

Mosley Mustang tri-band aerial in use less than one year. GI3XCZ, QTHR. Tel Omagh 44321.

BRT402E (superb) gen cov rx, £50. G3YHC. Tel 06077-2081.

Sommerkamp FRDX500 rx 160-2m with spkr, as new, £150 ono. 18AVT vertical aerial, new in box, £25. R. McAllister, 18 Smelterwood Way, Sheffield S13 8RT. Tel Sheffield 399487.

Pye Vanguard AM25B, handbook, modified for 2m, full metering, high/low power, fully tunable rx, rx alignment required, exc cond, £25 ono. 2m homebrew tx a.m./fm, requires attention, any offers over £10. G8HGL, QTHR. Tel 01-428 5725.

Gem quad vgc, £35. Echo-8 vertical, £10. Asahi twin meter swr bridge, £5. Avo CR bridge £3. Electro voice ceramic cardioid mic, never used, £5. G3VUS. Tel 0229 25728.

RA1 rx with calibrator and Heathkit spkr, prefer buyer collect, £20 ono. P. Allman, Clydesdale, Saughall, Chester. Tel Saughall 296.

IC2F c/w 144·4, 144·48, 144·8, 145, 145·2, 145·6, handbook in English, and G-whip, £80 ono. G2FNK, QTHR. Tel Staines 54828.

Yaesu FR400SDX, mint, £145. *Wanted:* SB220 or Drake R-4B. Hughes, 94 Penygroes Road, Blaenau, Ammanford, Dyfed SA18 3BZ.

Sentinel 2m converter 9-11MHz, i.f., £10. Eddystone 670 rx suit swl, £6. Radio and tv servicing manuals vols 1-5 1955-57, 1958-63, £5. Two wireless sets type 38, one comp believed ok, £4. *Wanted:* cheap EC10 11 Lafayette HA600. G8IAO. Tel Bedford 64143 evenings.

Xtals HC6U 5·000MHz, 75p. HC18U 8·950MHz, send 4½p sae with remittance and order to R. Bowell, G3LRL, 16 Margarite Way, Wickford, Essex.

Trio 9R59D rx, xtal cal, stabilizer, near mint, with Heath Q-mult atu, £35. Tatty B28 (CF100) rx, £5. Solartron pu 100-200V reg 200mA, £7. G4BNB, QTHR. Tel 01-504 3260.

Sommerkamp FR100B ham band rx inc top band and full 10m, exc cond, £80. Tel Droitwich 4806 after 6pm.

American air system sockets for 4CX250Bs etc, new in makers sealed packs, silver plated contacts ideal for linear Sept *Radcom*, £2.20 each post paid. F. B. Jones, 85 Woolsbridge Road, Ashley Heath, Ringwood, Hants.

Eddystone 730/4 with manual, professionally checked and aligned last November, first-class cond, £75. Ouseley, 23 Cromer Close, Little Gaddesden, Herts. G8IRU. Tel 044 284 3474 weekends.

Linear amplifier built-in power supply takes two QY4-400s only one supplied, offers? G4BNQ, QTHR. Tel Leeds 665831.

Collector's piece. ARI 5206 with manual. Aerial unit rx/tx mod unit, air gunners control unit, with cables, comp, offers. G3ZLN, QTHR. Tel 55200.

2m a.m. transistor tx/rx part-built from SDARC kit which includes metalwork and xtals, ideal for portable work, £16 the lot. G8ERF, QTHR.

Heathkit SB101 tx/rx plus home-built pu, £120, SB200 linear, £100. 2m transverter in matching cabinet, £40. G3JTQ, QTHR. Tel 01-894 7249.

TR44 rotator 12 months in use, as new. Reason for sale, buying larger model. GI3XCZ, QTHR. Tel Omagh 44321.

KW2000 + ac psu, £95. Sig gen type 49, 21-72MHz, includes output meter, modulator, leads, £6.50. Sig gen/wavemeter WT1649, 140-240MHz + psu, £6.50. *Wanted:* Creed 75 with keyboard and dual-speed gearbox. G4AFQ, QTHR. Tel Ashford Middx 54307 after 7pm.

Marconi FM3 deviation test set, £3. Stabilized psu 300V 500mA also 6·3V 6A, £3. Homebrew sweep gen 1 to 200MHz, £5. BC906 vhf wavemeter, £5. Buyers collect. Cook, Old Lodge, Seven Hills Road, Cobham, Surrey. Tel Cobham 3117.

Trio JR500SE rx with manual, immaculate, hardly used, £40. Eddystone 680X, good cond, and Heathkit Mohican in exc cond, offers. Panda PR120V tx, immaculate, 150W 80 thru 10, atu and lpf, £30. G8DUK, QTHR. Tel Hereford 65931.

Heath DX60B tx, prof built, 10-80, ideal cw, hardly used, with vfo, £30. Elbug, internal paddle, mains, diecast box, output changeover reed, £10. 2m converter, 4-6 i.f., SSM, £10. Tel 01-648 5895.

FL2100 linear mint cond. 1 year old, £130, offers. Echo 8 trap vertical 40-10, £12. Shure mic 401A, £4. Hanson fsm swr meter, £2.50. Pair 6HF5s, new £2. Yaesu 846 mic, £3. Pair 6KD6s, new, £2.50. 7360, new, £1.25. 5924. G3SIO, QTHR.

Telford TC9 Mk2 tx, a.m./fm vfo control 144-146MHz, plus xtal on 145·075MHz, £65 ono. G8HGN, 46 Rush Green Road, Romford, Essex RM7 0P5. Tel Rom 60325 after 5.30pm or at weekends.

Xtals, 145MHz rx, 51·9MHz, ie (51·9 × 3) — 10·7 = 145MHz, HC6U, suit Westminster Cambridge etc, 60p incl pp. Also other freqs near 145MHz, eg. 51·9333 (145·1) 51·8583 (144·875), 35p incl pp. Sae for list. J. B. Hodgson, 234 Gillingham Road, Gillingham, Kent ME7 4QT.

E-Zee match, £15. KW swr meter, £6. Dummy load 50Ω, £8. KW tvi filter, £5. RF field indicator, £5, Class D wavemeter mains, £10. Shure mic 444, £10. Joystick, £9. Joymatch, £14. Stolle automatic rotator, £25. All as new, G3WUY, QTHR.

AR88D good cond with S-meter, spkr and spare valves, £35. Bridge megger 500V, leather case, good cond, £10. BC221 original charts, £14. Help with delivery. G3VLH, 4 Benhams Close, Horley, Surrey. Tel Horley 6732.

Heathkit tx type DX100U good cond 160m to 10m, £25. J. M. Pearson, 291 Cumberworth Lane, Denby Dale, Huddersfield, Tel Skelmanthorpe 3489.

Codar station complete AT5, T2B ac/psu dc/psu control unit spkr G-whip mic black mounting cabinets for compact portability, £40. Mosley RV4 trap vertical, £12. G3URE, QTHR. Tel 089426-5311 daytime, 3044 evenings.

Tx/rx 10m 2W 3-channel Swiss-made, retails at £56 brand new, £25. Digital clock components 8 × 7490 1 × 7400 4 × 7447 4 × Minitron MVR5 ps Globe case 17 sockets, all new, £13. 4CX250B, £6. 4X150D, £5. Hi-fi spkrs medium size in teak cabinets, £30 ono. Tel 01-954 6529 evenings.

2m converter in diecast box, handbook design A2521/A2599/ECC85/ECC85 i.f. 24-26MHz, works well, £7.50. G3MDQ, 5 The Grove, Little Aston, Sutton Coldfield, Tel 021-353 3608.

Xtals 2m, 4m, many frequencies, 7,791 to 8,106, FT243 or CR1A/AR (10XJ), £1 each; stamp for list. UHF transistors BF378 FT 2·3GHz NF 2·5dB 500MHz, £1.25; 2N3866, 50p. G. Elliott, "Oatlands", Southend Road, Howe Green, Chelmsford, Essex.

Sinclair Cambridge calculator, £18. Wyndsor Vanguard tape recorder, £25. Tech sig generator, £10. SSM Spitfire 2m tx, £15. SSM dual gate mosfet 2m converter, £10. HE30, £16. Lots of bits and pieces, sae to Jones, G8DTG, QTHR.

Yaesu FT501 digital with psu, six months old, little used, absolutely mint, genuine reason for sale (pse ring to arrange 80m sked), £390. Heathkit SB610 monitor scope, mint, £55. G3XTN, QTHR. Tel Kenilworth 56828.

Scope CTR103 plus cathode follower probe 68 and power unit 675, Auto sync added, comp £9.50. Buyer collect. G3JNM, QTHR. Tel Bolton 0204-43999.

Xtals HC6/U 4·0133 8·048 8·053 8·0555 8·058, £2 each. QQV06/40A little use, £6. Circular polarization phasing harness, £2.50. G8FVZ, QTHR.

Pye Cambridge AM10B, five xtals wkg all mod data and circuits included—not interested in vhf, £17.50. G3MZE, Tel Stevenage 57803.

160m tx can double to 80m, 10W a.m. with ppe speech processing, stable vfo, valves and solid state, manual included, £26. Phone or call, trials welcome. G8ITH, 16 Lee Close, Charlbury, Oxon. Tel 8143.

KW Viceroy Mk4, good cond, fitted with extra ½-lattice filter, £75 or offer. Yaesu FR50B, good cond, no mods, 100kHz calibrator xtal marker, £52 or will exchange both for KW2000B plus cash. G3OKY, QTHR.

Heathkit HW17A 2m tx/rx, vgc., £35. Heathkit valve gdo as new, £10, Pye Vanguard professionally converted for 2m, tunable rx a.m., vgc, £25 ono. Securicor delivery on any item, £4. V.P. Hill, GW8FTA, QTHR.

Comp hf station. Sommerkamp FTDX500 tx/rx. FV400S vfo matching spkr and mic, plus TA33jnr 3-el beam, all in £225 ono. Prefer buyer collects, may consider split. Also other misc items. G3KYF, QTHR. Tel Wigston 6473.

Trio 9R59DS rx, good cond, with voltage stabilizer, £40. Minimitter tx a.m./cw 150W 80-10m, £10. Buyer collects. G4AJM, QTHR. Tel Mundesley 720689.

Trio JR500SE with 160m, as new, £45. KW amateur band converter 4·6MHz i.f. unmarked and hardly used, £15, carriage extra. GW3TMP, QTHR. Tel 035287846.

GEC BRT400 gen cov rx 0·5 to 30MHz, good cond, £55 ono. Koyo KTR1664 bfo 8-band solid state portable rx, good cond, £22. R. C. Ebden, 2 Rolleston Close, Petts Wood, Kent. Tel 467 5908.

QTH Thatcham Berkshire 3-bed chalet style semi full gas c/heating, brick extension/shack, fitted carpets some rooms, good access Newbury/Reading/London via A4/M4/BR, quiet location close shops, schools, doctors etc. G3SVD, QTHR.

Xtals HC6U 12·125(2) 12·1125(2) 12·120833(2), £1 each. Other types, frequencies, sae. GW8BPG, QTHR.

Trio 9R59DS gen cov rx orig handbook and packing, immaculate, buyer collects, £43. G3HKH, QTHR. Tel Weybridge 47112.

Heath SB100 tx/rx hb p/p, £95. Viceroy Mk2, £50. GW3ACF, QTHR Tel Briton Ferry 812475.

Sony TC630 reel tape recorder with built-in amp spkrs sos reverb mics etc, brand new only used few hours, bargain at £119. Mike Rowlands, G3NKR, 13 Watery Lane, London SW20. Tel 01-542 9101.

KW2000A, ac psu, mint cond, £140. D. Dunn, 106 Everest Road, Ashby, Scunthorpe, S Humberside.

Grundig Stenorette valved portable dictating machine, mic spkr two tapes, carrying case, dust cover, £10. Carriage paid. GM3XON, QTHR.

2m converter, DL6SW type, works well, spare board and parts, £6.50. Q-max gdo, needs attention, all coils, £4. TTC transistor psu, needs attention, £4. General Radio 606-B sig gen, superb, £7.50. Collect or carriage extra. G3UML, QTHR. Tel 01-550 0882.

Trio 9R59DS rx, stabilizer xtal calib, SP5DS spkr, t/r skt, extra anl for dx, perfect cond in original box. Homebrew 160m a.m. df set. Russell Stanners, 41 Carlton Avenue, Worksop, Notts, S81 7JY. Tel 0909 3233.

KW77, vgc, a bargain at £55 ono, buyer collects. G3KUG, QTHR.

Heath SB301-cw filter—SB600, SB401 with xtal kit, 6146Bs, spare ssb filter, valves etc, £225. HW32A-HP13A, Tavasu ae, £80. Cotswold spkr, £18. Two Vanguards, £15. Teletype 19 set comp with loads of spares, £30 ono. G3LDI, QTHR.

"Electronics" book by Olsen at £5, usual price £7. Reason for sale, a double gift. Would consider exch with cash adjustment for new gdo, atu or rx to tune down to 60kHz. Hill, 19 Station Road, Tadcaster, Yorks. Tel 2253.

Power supply, 230/240 ac in, outputs from 10V at 5A to 24V at 8A regulated, fully variable, ex computer, new cond, £10. Computer panels, containing transistors, resistors, diodes etc 10p each. Elliot tape reader type 25G/203, £10. Numerous valves and transistors for sale, also loads of junk. For callers only. Hodges, 46, Plantation Road, Leighton Buzzard, Beds. Tel 66958.

Quad Hy-Gain comp 10–15–20 gamma matched each band, wx-proofed bamboo, ali spiders and 8ft × 2in boom, cut to length elements and insulators, Hy-Gain manual, weathered but good, £21 + carriage at cost, prefer collect. G3JEI, QTHR. Tel 056-286 3157.

Joystick VFA and atu Joymatch LO-Z, £6.50. G4DHE, 27 Longworth Avenue, Coppull, Chorley, Lancs PR7 4PJ.

Bicycle getting wet. Must clear all components in my shed. Relays, knobs, capacitors. Sae for list of very cheap, new and unused components. G3NJQ, QTHR.

Potted mains transformer with conservatively rated secondaries 330–0–330V at 80mA 6·3V at 3·2A, 6·3V at 1·4A, 5V at 2A, £2.50. Potted lf choke 10H 120mA, £1.50. Carriage included in prices. Sae with enquiries. Hayward, "Sunnyfields", Lighthouse Road, St Margarets Bay, Dover, Kent.

Disposal gear late G3DEW. Osker power meter, £12. Avo model 7 Mk2, £14. KW E-Z match, £13. Plus postage or buyer collects. G2YS, QTHR. Tel 76864.

Geloso front end 10 to 160, £12.50. Codar preselector PR3OX, £5. Valves for CR100, 15p each. All pp. GM2HCZ, QTHR. Tel 084–82–345.

Mullard high speed valve tester, £20. Peto Scott broadcast camera, with vidicon, lens, needs attn, £15. Pye colour monitor panels, chrominance and PAL filter/delay, £12. P. Bolton, G4CXE, 32 Fakenham Road, Tittleshall, Kings Lynn, Norfolk. Tel Tittleshall 364.

Ekco 5-digit timer MS220 mains, new, £15 ono. Type P40 rx fixed freq (85–95MHz), £2 ono. R208 10–80MHz, £3 ono. Two early breadboard radios, need renovating, offers. Utah radio wire recorder 110V less motor, offers. Early valves, some new boxed, offers. G4ALC, QTHR.

Comp station, FT-101 Mk2, 80m G-whip, Hustler bumper mount, KW Z-match, Heath GD-IU gdo, KW dummy load, TTC C3005 swr bridge, Heath HD-20 xtal calibrator, 40ft vertical aerial comp in canvas bag, Shure 201 mic, offers? G4ASZ, QTHR. Tel 0638 2392.

2m a.m. rig based on Pye Vanguard tunable rx, two xtals for tx, easily portable rig, comp with meter spkr and mic, £20 ono. *Wanted:* HW12A or other 80m ssb rig. G8IBA. Tel 07357 (Pangbourne) 2119.

3cm waveguide components including waveguide switch, variable attenuators circulator, rx front-end, bends, flanges, Cutler feed, magic T, thermistor mount, 2K25 klystrons, N-type manual coaxial switch, N-type connectors, Marconi TF895 spectrum analyser/sig gen freq range 8·5GHz–10·1GHz, Ferguson recorder. G3OAD, QTHR.

Few Pye base tx rf-af chassis. QQVO3-20A pa, 40W input, EL34 modulators, need 400V ht and 6·3V lt set up on 2m, £16.50 each inc p and p. G3LGK, QTHR.

HRO, coils, manual, psu, £15. R1475 1·8/20MHz, psu, £12. R209 a.m./fm, no bfo, £8. Codar PR30 preselector, self-powered, £5. BCC69D 4m mobile, psu, tunable, ditto 2m, £5 each. All ono. Prefer buyers collect. G3KTA, QTHR. Tel Burgh Heath 58758.

FT200, about 1 year old, good cond, £140. Will send by Securicor up to 150 miles no extra cost. G4BWH, QTHR. Letters only please.

Homebrew linear amp using pair 4CX300s, sprayed metallic blue, separate 2kV psu, needs new bandswitch but will operate on 20m/15m as it stands, £28 plus carriage write or phone (evenings or weekends) Brighton 504634. G4BVH, QTHR.

9R59DS rx gen cov, £43. Joymatch atu, £5. 1934 Halcyon five-valve rx, offers? G8JKW, 3 Churchill Road, Chipping Norton, Oxon. Tel 2352 after seven.

Yaesu FT401, SP400, YD846, FL50B 1pf, £260. Hy-Gain 18AVT/WB, £26. All 18 months old, vgc. BCC69, mains, Shure mic, 4m, £10. Command rx, 160m, £6. All ono. Going 2m. Buyer arranges collection. G3OJI, QTHR. Tel Ware (0920) 4316.

KW Vanguard 160–10m, good wkg order, £25 ono. Class D wavemeter, phones, built-in mains power unit. G4BYJ, QTHR. Tel Bristol 422452 between 1700 and 1900.

9R59DS + SP5D, exc cond, £40. 88 set, £5. Elliott high band QQZ03-20 output, 95 per cent comp, £8. Ekco low band QQV03-20 output, £4. Hudson FM106, needs attention, £5. Fantavox cassette recorder, £9. T1154, £5. Sae for details. N. Hammersley, 5 Rymers Green, Formby, Liverpool.

KW Valiant KW76 rx, Dependapac dc/psu, Minimitter 80/160 mobile whips, £30. AT5 tx T28 rx ac/dc PSUs 12RC unit, £30. Collect. Carriage extra. G3PHK, QTHR. Tel Eastbourne 53233.

Tavasu base-loaded whip all coils 10m–160m and fittings, £10. C4 vertical (Mini-Products) with coaxial, as new, £10. G3HSC morse

records advanced beginners and test record, £3 or exchange 2m or 160 tx/rx equipment. G4BHM, QTHR. Tel Leeds 664833.

Codar AT5, T28, mains and mobile PSUs, £32.50. Liner 2, pre-amplifier, only two months old, £130. Trio TS510, new pa valves just fitted, £135. Class D No 2 wavemeter comp with cables, £8. G4BQE, QTHR. Tel Goldthorpe 3575.

Racal CT488 freq digital counter, good cond, tested wkg, £130 ono. Prefer buyer collect or carriage at cost. Smith, Tonn Marr, Welshpool, Powys SY21 7NQ. Tel 2068.

Marconi TF144G, £8. Cossor 343 alignment oscillator, £4. VHF rx R1132A, £2. PSU, £1. Valved fm tuner chassis, £1. Collaro auto-change turntable, £1. CRT VCR138A, £1.50. Oscilloscope chassis 50Hz with VCR139A, £3.50. Cooper, 45 Nightingale Crescent, Bracknell, Berks. Tel Bracknell 4168.

LG300 Labgear tx in good cond, no modulator, £10. 1,000V psu and other heavy-duty PSUs, £5. G3FQP, QTHR. Tel Sheffield 301481.

Pye 27AM base station, clean, unmodified, £30. Eddystone 640, perfect, £16. Joystick and tuner, £6. Buyer collect or carriage extra. *Wanted:* Mini tri-band beam and rotator. GM3GJB, QTHR. Tel Falkirk 23608.

70W 2m tx (less psu, mod), £5. 2m mobile whip, £4. Transformer UM2, £2, Three chokes 8H at 150mA, 50p. 1,200V 250mA ct, £2. 1,000V 200mA ct, £2. 2in aerial sleeve, 50p. QQV03–10s, 50p. Buyer collect. G8CRP, QTHR. Tel 01-654 1761.

KW Victor 130W a.m./cw fair cond, £25. AR88D first-class cond with Q-mult, £50, HW7 first-class cond, £40. All letters answered, prefer buyer collect or pay post. G4ABE, QTHR.

FTDX560 ssb tx/rx 80–10m, 560W input unmodified and literally unmarked cond, £225. *Wanted* for French swl, handbook or circuit of B3B/R20B for copy or purchase. Clayton, G3XZS, 11 Lyall Way, Rainham, Kent. Tel Medway 362730 (evenings and weekends).

Yaesu FT2F, £60 ono. J. P. Jones, 111 Hoole Road, Chester. Tel 0244 28095.

Telford TC9 2m a.m./fm vfo tx, £65. Telford TC7 tunable i.f. band-searcher G4BBP 2m converter, £45. First reasonable offer secures comp station. New cond. Delivery 50 miles. Connah, G8IMF, 27 Lismore Road, Highworth, Wiltshire. Tel Highworth 762995.

Sommerkamp/Yaesu 500SD 160m-2m fm-a.m.-ssb, rx (can be seen wkg), with automatic channel master rotator, £120 ono. KW E-Zee match, as new, £12. Vanhoffelen, 89 Stockshill Road, Scunthorpe. Tel Scunthorpe 4760.

Racal RA66 Panadaptor, as new, offers. BAY96, £2.50. BAY66, £1.50. CWY11 £1. BAV46, 75p. Want to communicate with any RA17 rx user. *Wanted:* Manual for sig gen AN/URM26B, and AN/URM25 or similar sig gen. G3RNV, QTHR.

Redifon GR286/STR28 marine band vhf radiotelephone (private deck), switched a.m./fm 10W, immac cond, circuits and full tech data available, carriage free 200 miles, £30. Racal 1·4MHz ssb filters lsb and usb, £8 each. G3JMJ, QTHR. Tel 073-271 3467.

Eddystone EC10 Mk 1, vgc, £40. G8GWA, QTHR. Tel Eastbourne 32777.

Several Creed 7B page teleprinters, 24V, wkg, also spare carriages and keyboards, £12.50 each. G4BLT, QTHR, Tel Upper Basildon (Berks) 293; or G4CCC, QTHR, tel Reading 471761.

Koyo 11 band mains battery portable rx bfo S-meter fine-tune, makers 3-year guarantee 1 year old in mint cond, £37.50 or vno. Foster, 10 Rosecroft Way, Shinfield, Reading. Tel (0734) 882648.

KW2000A + ac psu, £130. KW107 Supermatch, as new, £40. G3NRU, QTHR.

Pair low imp KF SGB stereo phones, brand new, rubber muffs, boxed, bargain at £2. *Wanted:* R1155 L or N with trawler band plus psu, good wkg cond. For old age pensioner; any kind offers. H. Stephens, 46 Burgh Old Road, Skegness, Lincs.

Top/band and 80 cw/a.m. tx with vfo, 10W, £5. HRO power supply (suit above), £1. Murphy Rover 15W, a.m., 2m tx/rx 12V with 145MHz xtal, £14. All in wkg order. Roller coaster atu, £1.50. G8JKA, 95 Agnew Road, Fleetwood, Lancs. Tel 4094.

Heathkit HW17 2m tx/rx with HG-10B vfo and mobile power supply, vgc, £40. Cambridge AM10D, wkg on 2m, fair cond, £18. KW2000A, exc cond, £140. G3YIP G8HZH, QTHR. Tel Dudley 50718.

Shack clearance. TXs, RXs, PSUs, transformers, capacitors, valves, mostly ex-equip but ok. SAE for list, state any wants. Darragh, 44 Jervis Cres, Streetly, Sutton Coldfield, West Midlands B74 4PW.

FM Cambridge LC10FM, fully tunable with external vfo a.m. detector. 10-channel xtal with 144·48, 145·00, 145·32, rtr, £50. G4DAW, 479, Wellingborough Road, Northampton. Tel. 37944

Barlow Wadley XCR30 Mk2 rx with fm tuner and nicads, £75. Heathkit HW7 cw QRP rig, £25. ITT Stereo 73 cassette tape unit, £40. All with handbooks. P. V. Knight, G4CEC, Rm 663, Selkirk Hall, Princes Gardens, London SW7.

Mullard ssb tx/rx 2–20MHz less xtal drive but comp with ssb filters 1·5MHz, auto or manual tuning, all modular plug-in unit construction, £20 or exchange RC model aircraft. G3ZDB, QTHR. Tel Epsom 24814.

Tiger TR100 tx suitable for spares, 888A rx wants overhauling, R208 rx, Codar PR30 rf preselector, Panda 150 atu, Tiger Z-match atu, Panda lp filter, £30 the lot. Buyer collects with help. G5PK, QTHR.

Sommerkamp/Yaesu FTDX-500 ssb tx/rx with cw filter and handbook, 3·5–28MHz, immac cond, £185 ono. G3LGQ, QTHR. Tel 01-863 1174.

QTH s/d chalet 3/4 beds overlooking open country. 3 miles Chippenham, 2 miles M4, spacious McLean house, gas central heating, small development, 7 years old, good decorative order, £11,800. *Wanted:* B5F valve base. G3TSO, QTHR. Tel Kington Langley 393.

Heathkit HW101 plus HP23 ac psu and mic, £150. G3ZJF QTHR. Tel Windsor 68364.

12V generator, £10. EC10 battery and mains psu, £40. Microwave Modules converter 4–6MHz, £12. 2m pre-amp, £7. VFO controlled 2m transmitter QQVO6–40 output. Offers. G8EZM, QTHR. Tel 01-467 6030.

Eddystone 888A, Codar PR40 preselect. Pye tx/rx spkr unit, the lot £70 ono. Could part exch for oscilloscope double-beam and access. Vg w/order. Mantovani, 88 Llwynhendy Rd, Llwynhendy, Llanelli, Dyfed, S. Wales.

Trio 9R59DS voltage stabilizer, brand new, exc cond, £45 offers. Telford TC7 Mk2 28–30MHz exc cond, £35 offers. Collins TCS12 1·6–10MHz needs slight attention, suit beginner, £5. 113 Charles Street, Stockport, Cheshire SK1 3JT.

HRO c/w 8 g/c coil packs, mains psu, fitted new xtal, spare valves and manuals, £25 ono. WS62 c/w manuals, £10 ono. G4CCW, QTHR. Tel 01-651 1410.

Heathkit DX-100U tx, 160–10m, good cond, recent overhaul, 120W, handbook, Will deliver in London otherwise buyer collect. £30 ono. G4RG, QTHR.

Hudson FM208 lo-band with xtals for 70·48MHz. Complete with mic, vgc, £15 ono. Also FM208 lo-band rx needs attn, £7 ono. (No xtals). Conv to 2m? G3ZRM, QTHR. Tel Aldershot 26108.

Sommerkamp TX1608G 28MHz transceivers, 3 channel, handheld or mobile, 2W output, as new, cost £165, £120 ono the pair. G2AFD, QTHR. Tel 06845 3242.

Pair of Pye Bantams, highband, both xtal on 150MHz a.m. Exc cond, comp with leather cases, 3 batteries and charger, £65 each; charger £10; or £120 for the lot. GW8FBU, QTHR.

Telford TC7 Mk2 28–30MHz with bandsearcher and manual, vgc, scale unmarked, £40. Pellett, G3RZC. Marlmead Marlpits Lane, Ninfield, Sussex TN33 9LD.

Teleprinter Creed 7E, bent keyboard, suitable spares, £6 offers; P/EX *Radio Electronics* 63–74 why? Tel 01-590 5042 (evenings) 590 2339 (day).

Philips 4-track recorder, £20. QQVO3/10 2m rf unit, £6. 4m Ranger, £4. 160 a.m. tx, £5. Two PSUs, £2.50 each. G3LGK 2m converter, £6. HRO-JR, psu, gc coils, £10. Marconi 52 rx, 1·75MHz–16MHz, psu, handbook, £7.50. G2FRO, QTHR. Tel Draycott 2598.

Garex 2m fm mobile, perf cond, £85 ono CR100, good cond, £15. 2m 10W base transmitter, £12. 4X150 including base and chimney, £5. Knight kit vvm, £15. Knight kit signal generator, £15. G8EOL. Tel 01-959 5051.

Comp ssb station, KW Viceroy series 2, new spare matched 6146Bs, G2DAF type rx, BC221, lpf, swr meter, Joystick, 4:1 balun and 80m folded dipole, all in good wkg order, £95 complete. G3ZMY, QTHR. Tel Berkhamsted 2880.

Drake R-4B rx, 160m xtal and WWV (2·5MHz) xtal, with matching Drake MS4 spkr, manual, original packing, exc cond and performance. Reason for sale going transceive, £195. Buyer inspects and collects. G4CQK, QTHR. Tel Walton-on-Thames 27199.

Exchange a reasonable condition RCA AR88LF with circuit and description for similar cond Heath RA1 or HR10 rx. New transistors 2N3866, 40p. 2N3553, 60p. Harrison. G3TMQ. 30 Highview Road, Farnborough, Hants.

"Radio Constructor" "Surefire" 4m tx, £6. 38·8 XL HC6U with socket, new, 75p. Various potentiometers cheap, sae list. 25V meter, new, £1.50. Turner 500Ω meter fsd 1ma, 50p. H. H. Seymour, 74 Harold Estate, Pages Walk, London SE1 4HW.

Equipment cabinet, floor standing, accepts standard 19in panel width, with lockable rear access door, finished in grey hammer, overall size 5ft 6in × 1ft 10in × 1ft 6in, £7.50 ono. G3TIR, QTHR. Tel Crawley 23826.

National NCX3 tx/rx, ac psu, spkr, compact rig, 80/40/20m, 200W p.e.p., very good audio reports on air, good cond, going separates, bargain, £95. Jones, G4CMF, S London. Tel 01-764 3881 (office) 01-920 8587.

Murphy 821 2m tx/rx fet pre-amp xtals for 145 comp, £10. Storno CQM13C-12 fm high-band tx/rx comp with cable and control box, £10. G4BKF QTHR. Tel 051-677 4134.
Heath GR78 rx, factory built, mint cond, £52. Class D wavemeter No 2, mains or 12V dc, working well, £6, buyer must collect this item. N. Richardson, 2 Edna Road, Ringlestone, Maidstone, Kent.
Modern semi dormer bungalow, 3 bedrooms, lounge, kitchen dinette, bathroom, wc, laundrette, study ham shack, central heating, double glazing, 2-car garage, 32ft tower, beams for vhf, uhf and hf, £11,700, with planning permission. G3LIS QTHR. Tel Aughton Green 423283.

WANTED

"QST" April 1973 loan or buy. G4CGV, QTHR.
Info/man/circuits Admiralty rx B40, also AP5208 "rx" makers code H.E. Ltd., has t/p tu appearance and three sets of filters. Will photostat and return. G3JEI, QTHR. Tel home 056 286 3157, office 021 550 3121.
Grid dip oscillator also high impedance dynamic mic insert. Doyle, 4 Wricklemarsh Road, London SE3 ONF. Tel 01-856 7478.
Eddystone 898 dial by student of limited means. Can offer about £5. A. Mountfield, 18 Moat Drive, Gosport, PO12 2SR. Tel Gosport 85455.
Circuit diagram and info on Eddystone 358X rx, to buy or borrow. R. Rubins, 28 Dudley Road, South Harrow, Middx. Tel 01-864 3537.
Circuit, first i.f. coil, any other details for Minimitter tx/rx 1·8-2·0 MHz. G3URG, QTHR. Tel Nottingham 291985.
AR88LF in good cond in exchange for AR88D in similar cond with handbook. Smith, The Old Forge, Brinkley. Tel Newmarket 76230.
Marconi Electra rx, good price offered. Brady, EI9CG, 26 St. Assams Park, Raheny, Dublin, Tel 314285.
Linear SB200 or similar, home-brew considered. G6BZ, QTHR. Tel Woking 60277.
Mains transformer 600V 350 to 500mA no heater windings. *For sale:* few 4X150As, £2.50 each, postage extra. Parker, 133 Station Road, Cropston, Leicester LE7 7HH.
4X150As with bases, Tx variables 250pF and 100pF ¼in min spacing, transfmr 850-850V 500mA or near, 5-way single-pole heavy-duty ceramic switch. G3GHB, Tanglewood, Kingston, Flyford Flavell, Worcs.
Cambridge AM10D hi-band tx on 2m, rx unmodified, with gen for full modifications, and service manual. Exchange for Heathkit HW17A 2m tx/rx, or portable 2m tx/rx, plus £10 cash adjustment. External cond not important. G8GYN, QTHR.
Mountain rescue team in Lakeland urgently requires secondhand Bantams, Pocketfones, Westminsters or similar transportable equipment. Must be in good wkg order. We are a.m. 86·325MHz. Tony Richards, Ferndale Lake Road, Ambleside, Cumbria.
Tx Heath DX40U plus oscillator, cond not too important but comp. Tel Belfast 644688.
2X B5F valve bases, Codar 250/S psu, any 10m tx inc h/b gear, twin swr-power meter, any suitable meaty comps for hf linear, TW160m rx, cse tx, rx, and aerial. Any meaty components. Jenkins, 30 Gainsborough Road, North Finchley, London, N12 8AG.
Circuit/manual for Collins TC5 13 (46159) rx/tx to purchase or loan (will copy), expenses re-imbursed. Also have for disposal several hundred valves, mostly new and all ok, sae enquiries please. G3OEI, QTHR.
To correspond and have 20m contacts with amateurs who are also employed on trains as guards or drivers, also will trade USA electronic magazines for *Practical Wireless.* Frank Sonnek, WA0JUM, PO Box 59, Mobridge, S Dak, USA.
Circuits: Sony TR911 "Super 9 Sensitive", MW, 3-24 MHz. "MCR1" miniature wartime rx. Simon "Minstrelle" recorder, buy or borrow. XCR30 rx, mint cond, no mods with handbook, consider TR801 fm tuner if available. Shepherd, 66 Westerland Ave, Canvey Island, Essex SS8 8JS.
AR88D, good cond, no major mods, with manual if possible and spares. J. Wood, 18 Kennedy Avenue, Long Eaton, Notts. Tel Nottingham 254831 ext 392, 0830-1230, 1330-1730.
FT75, FP75, DC75 and FV50, can collect reasonable distance. G4ADE, QTHR. Tel 09762 77838.
Any English-speaking French or German swl or amateur about 16 years old wanting a pen-friend in England. I have "O" level French and German. Moyes, 23 Ellenbridge Way, Sanderstead, South Croydon, Surrey, England.
Tx/rx SB102 with HP23B and SB600 spkr or FT101, TR4, etc. Must be in first-class cond. Also Heath filter SBA-301-2, gdo GD-IU, wattmeter HM-102, or HM-2103, Tech-Te15 gdo. G3WY. Tel Evesham 45497 6 to 8pm any day
Drake tx or tx/rx with psu and h/b, state cond and price. GM2HCZ, QTHR. Tel 084-82 345.
ASR33 or ASR390 any cond. G8AEN QTHR.
Codar T28 or similar 160m rx. TW Communicator or other 160m tx/rx. Codar AT5, ac/dc PSUs for Codar. Class D wavemeter. State prices. King, 24 Southfield Gdns, Twickenham, Middx. Tel 01-892 7641.
Tx/rx FT200, KW2000A/B or similar. Dorset. G3AJZ, QTHR.
Gen cov rx like SX100 SX122 940 730/4 Drake or similar. Also require ½ or ¾ size billiards table, can collect. *For Sale:* Hammarlund HQ100, £62. CR70, £16. Grundig SW, £16. All excellent. 12 Malton Way, York. Tel York 59035.
9MHz ssb filter QC1246AX with carrier xtals or XF9B with xtals. *For Sale:* Collins 455kHz mechanical filter, 2·1kHz bandwidth at 6dB, 5·3kHz at 60dB, £14 ono. P. Smith, 49 Hucknall Avenue, Ashgate, Chesterfield, Derbyshire, S40 4BZ.
LG300 manual or handbook on working details. G6HQ, Williams, The Croft, Upper Raby Road, Neston, Wirral. Tel 051/336/2033.
HF beam TH3 or similar, FV101 vfo and KW107 supermatch. *Selling:* EA12 with plinth spkr, £120. G4DGM, 106 Goldthorn Hill, Wolverhampton.
XF9A or XF9B or similar 9MHz ssb xtal filter, with or without usb carrier xtal. G4CFX or G8FEL, 6 Bincleaves Road, Weymouth, Dorset DT4 8RL. Tel Weymouth (03057) 6149.
Uher 4000 Report-L or IC portable tape recorder or similar by EMI, Fi-Cord etc. Also AKG C12A/B, C414, D202E, or D224 mic or similar Neumann, Calrec etc. Please give any details and price required. G8HMF, QTHR.
Manual or circuit diagram for Ferrograph series 3 tape recorder. Buy or borrow. Emery, GC8IRM, La Conchee, Perelle, Guernsey.
Private weekly tuition by qualified teacher for RAE. N. Goldstone, 7 Lanchester Court, Seymour Street, London W2. Tel 262/5994 or 640/4161.
For HB linear 200pF wide-spaced variable. All letters answered. McArdle, G4CRI, 3 Vyvyan Place, Helston, Cornwall. Tel 2260.
Mains plug and socket standard to country of Austria. Two pins plus sliding earth connection on side, 250V. M. Reekie, 34 Polmont Road, Laurieston, Falkirk FK2 9QT. Tel Falkirk 23860.
Honda or similar petrol or diesel generator around 500/1,500W 230V 50 cycles essential easy starter in good wkg order. 16mm zoom or telephoto lens "C" mount fixing. Part exchange ssb linear available. G3HSC, 45 Green Lane, Purley, Surrey. Tel 01-660 2896.
Pye Cambridge dash rx tunable 2m band, good cond. D. Barwood, 41 Wingfield Rd, Knowle, Bristol 3. Tel Bristol 772804.
Vibroplex or similar American bug key in mint cond. Price etc. G2BS, QTHR.
Buy or borrow circuit diagram or manual for Labgear topbander E5051. Tel (Evenings) Ampleforth 483.
"Radio Electronics" 63-74, or reference to same/info on American/Continental design of Alphaphone/meter, for brainwaves. Tel 01-590 5042 (evenings) 590 2339 (day).
DX100 spares, or tx if in reasonable order considered. 174 Minstead Road, Erdington, Birmingham B24. Tel 021 327 5937.
Oscilloscope gen purpose type. Telomast 40 or 50ft. Selling bandspread coils for HRO, 40m, 10m, £3.50 each. 456kHz i.f. xtal for HRO, £2. Xtals 70·270MHz, 70·450MHz. 8,064kHz (145·152) 38·666MHz, £1.50 each. White, 24 Staplehall Road, Bletchley, Bucks.
TC9. G8FOD, QTHR, West Midlands.

BURNS

ELECTRONICS

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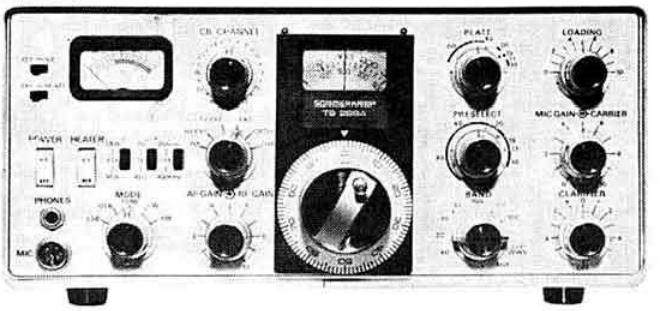

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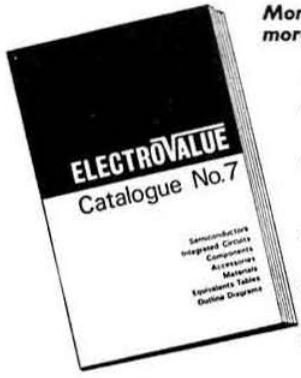

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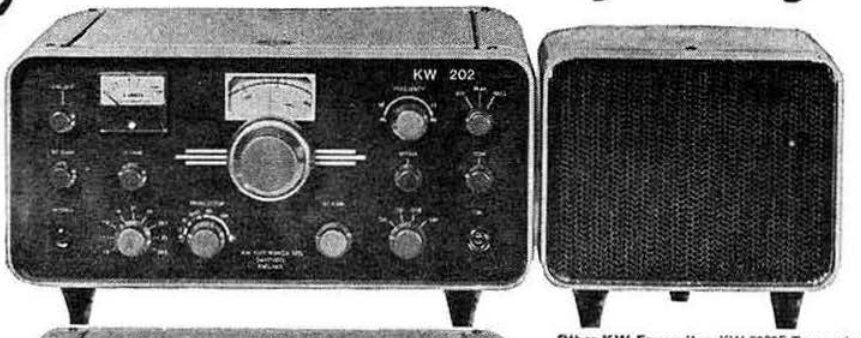

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This unit was developed to meet the heavy demand for a converter suitable for use with receivers having better performance at lower frequencies. It uses two dual-gate mosfets mixers, both fed from the output of a 70 or 71MHz crystal oscillator. Selectivity is obtained at the first I.F. in the 74MHz range, thereby overcoming the usual problems associated with low-I.F. single conversion converters.

144MHz DUAL OUTPUT PREAMPLIFIER

This two-stage mosfet preamplifier has two separate isolated outputs, for feeding two receivers, for example. The gain is 18dB, and the noise figure is 2·8dB. The noise figure is individually optimised on each unit using our new automatic noise measuring equipment. Price inc. VAT **£9.72**

70MHz MOSFET CONVERTER

I.F.s available: 4–4·7, 14–14·7, 18–18·7, 28–28·7MHz. Price **£16.42** inc. VAT

70MHz CONVERTER FOR SSB

I.F. 28–28·7 with 42MHz osc. output (similar to 144MHz version above)
Price **£17.60** inc. VAT

SOCKETS

All our equipment (apart from 1296MHz) is fitted with Belling-Lee sockets. Optionally all equipment can be supplied from stock fitted with BNC sockets (50 or 75 ohms). Extra charge per BNC socket **40p** inc. VAT

432MHz POWER SOURCE

A simple and efficient method of producing power is provided by the use of our MMV432 varactor tripler. This unit, when driven by a 144MHz transmitter (AM, FM, or CW), converts this power with high efficiency to 432MHz. A pi-network in cascade with an L-network matches the input impedance to the low impedance of the diode. A similar circuit is used as the output network to provide optimum filtering of harmonics.
Spectrum analysis of other varactor tripler designs leave us in no doubt that our unique design concept alone achieves the necessary high degree of unwanted harmonic rejection as specified below.

MMV432 Price **£18.90** inc. VAT

MMV432 SPECIFICATION

Output Power at 432MHz: 14 watts typical (for 20 watts drive at 144MHz)
Bandwidth: 430–440MHz at −1dB
Typical Harmonic Performance:

Fundamental	−30dB
288MHz	−50dB
576MHz	−40dB
Others	−60dB

432MHz MOSFET CONVERTER

I.F.s available ex-stock: 14–16, 18–20, 24–26, 28–30, 144–146MHz.
Price inc. VAT **£19.55**

This unit uses a dual-gate mosfet mixer for excellent strong-signal performance preceded by two BFY90 transistor RF stages for high sensitivity. All UHF tuned circuits are printed using Microstrip technology, and a crystal in the 100MHz region is used in the oscillator chain to overcome unwanted beats in the tuning range.

1296MHz CONVERTER

This converter has been developed using an extension of the microstrip techniques that have been well proven in our 70cm converter design. Two versions of the design are available using either a 96MHz or 105·666MHz crystal to produce I.F.'s of 144–146MHz or 28–30MHz respectively, corresponding to the 1296–1298MHz band. We are using crystals of a very tight tolerance to minimize the offset that would otherwise be very noticeable when using a high-performance 28–30MHz tunable receiver. The multiplier chain uses three BFY 90 transistors and the mixer is fabricated using a pair of MA 4882 Schottky diodes in a balanced hybrid ring configuration. The I.F. head amplifier uses a selected low noise dual-gate mosfet to give an overall noise figure which is typically better than 8·5dB, and a gain of 25dB. Microstrip UHF circuitry ensures repeatability of this high performance design. The unit is housed in the same small die-cast box as the rest of our range of converters and is fitted with 50 ohm BNC connectors of optimum UHF performance. The converter operates from a nominal 12V supply and is available in negative earth version only. Price inc. VAT **£25.92**

1296MHz VARACTOR TRIPLER

Maximum input power at 432MHz: 24 watts. Typical output power (at maximum input): 14 watts. Price inc. VAT **£27.00**

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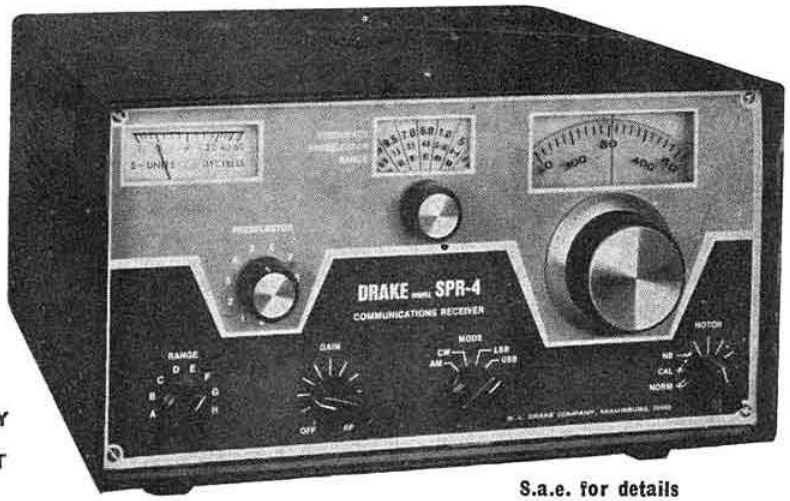

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SPECIFICATIONS

Frequency Coverage	Can be programmed with accessory crystals for 23 ranges (each tuning a 500kHz band) from 0·5 to 30MHz plus 150 to 500kHz. Crystals supplied with the receiver allow coverage on these ranges: 150-500kHz, 0·5-1·0MHz, 1·0-1·6MHz*, 6·0-6·5MHz, 7·0-7·5MHz, 9·5-10MHz, 11·5-12 MHz, 15-15·5MHz, 17·5-18MHz, 21·5-22MHz.
Modes of Operation	AM, CW, LSB, USB, (RTTY with RY-4 accessory installed)
Selectivity	AM: 4·8kHz @ -6dB, 10kHz @ -60dB SSB: 2·4kHz @ -6dB, 7·2kHz @ -60dB CW: 0·4kHz @ -6dB, 2·7kHz @ -60dB
Intermediate Frequencies	1st IF 5645kHz four pole crystal lattice filter, 2nd IF 50kHz four pole Hi-Q Ferrite LC filter.
Frequency Stability	At room temperature, drift for all causes (including ± 10% change in supply voltage) is less than ± 100Hz.
* Generous overtravel gives additional 50kHz or more off each end of range.	
Sensitivity	SSB and CW: 0·25microvolt for 10dB $\frac{S+N}{N}$, AM: 0·5microvolt with 30% modulation for 10dB $\frac{S+N}{N}$
Calibration	Dial is accurate to better than ± 1kHz when calibrated at nearest 100kHz calibration point.
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4·0312 in HC6/U (145·125-R5) ..	£2.10	8·7825 in HC6/U (70·26) ..	£2.10
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GREENPAR PTFE SO239 SOCKETS, brand new, **54p each** or **5 for £2.50.**

GREENPAR PTFE PL259 PLUGS, brand new, **54p each,** or **5 for £2.50.** Reducers to fit above, **10p each** (only supplied with plugs).

CURLY LEADS, 4 core telephone type, 18in. closed, approx. 5ft extended, **2 for 20p.**

BECKMAN, DUODIAL, Min, counting turns dial, ¼in dia. with locking lever, 0–100 on main dial, with 0–14 on hundreds dial, for standard ¼in spindle, Sorry, sold out.

AS ABOVE... 1¾in dia. dial, ¼in spindle. **£2.00** each.

MULTITURN POTS (for use with counting dials above) 2kohm, 400kohm, 10-turn, available only, linear, ¼in spindle, brand new, **£1.00** each.

SELF-TAPP SCREW PACK, mixed sizes, **30p.**

4BA HANK BUSH PACK (ideal for making aluminium cases, just drill ¼in hole, push in, and hammer over reverse side), **30p.**

SILICON RECT. BLOCKS, bridge type, 50V at 6A, **£1 each.** 100V at 10A, **£1.50 each.**

HIGH QUALITY SPEAKERS
6in × 4in elliptical, 2in deep, 4ohm, **90p each, 2 for £1.70.**
8¼in × 6in elliptical, 2in deep, 4ohm, recess magnet, rated up to 10W, **£1.50 each, 2 for £2.75.**

REELS OF 16 STRAND COPPER WIRE, Pink PVC covered, 0·5mm, ideal for long wire antennae, 100m. **£1.10** per reel.

TWIN HEAVY DUTY CABLE, PVC covered, 50/0·25mm, ideal for mobile LT supply leads, **15p** per metre, or **£11** 100m reel (carriage £1).

Please enclose SAE for all enquiries

TERMS OF BUSINESS cash with order.

Callers welcome by appointment.

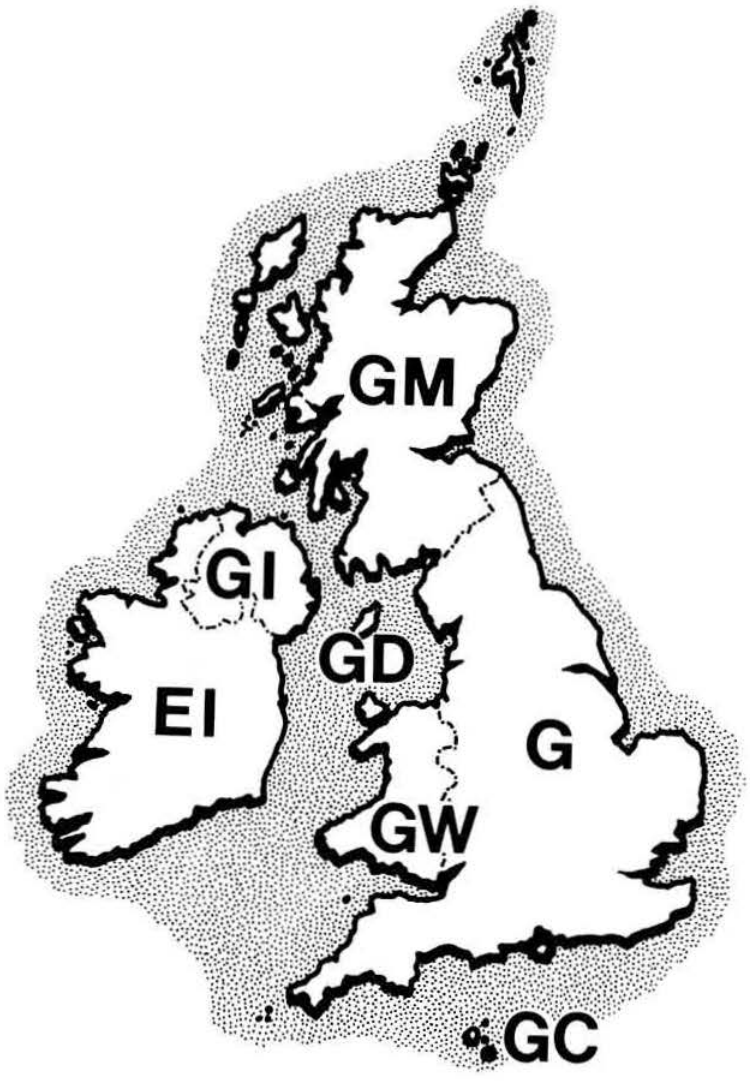
PLEASE NOTE THAT ALL PRICES INCLUDE VAT AT CURRENT RATE.

POST/PACKING: Orders under £10.00, 50p, (except where stated). **Orders over £10.00 Post Free** (except where stated)

RADIO SOCIETY OF GREAT BRITAIN

and

LAMBDA INVESTMENT COMPANY LIMITED



Report and Accounts

for the year ended

30 June 1974

Radio Society of Great Britain

35 DOUGHTY STREET, LONDON WC1N 2AE

5 November 1974

NOTICE IS HEREBY GIVEN that the FORTY-EIGHTH ANNUAL GENERAL MEETING of the Society will take place at the Royal Society of Arts, John Adam Street, Adelphi, London WC2, at 6.30pm on Friday 6 December 1974, for the transaction of the undermentioned business:

1. To receive and, if approved, confirm the Minutes of the Forty-Seventh Annual General Meeting as published in the November 1974 issue of *Radio Communication*.
2. To receive and, if approved, adopt the Annual Report of the Council for the year ended 30 June 1974.
3. To receive and, if approved, adopt the Audited Accounts of the Society for the year ended 30 June 1974.
4. To consider and, if thought fit, pass the following *Special Resolution*.

   Special Resolution

   To amend the Articles of Association so that the following Article be substituted for the present Article.

   9 Associates

   Candidates to be eligible for election as Associates must be under 18 years of age. Associates shall have no vote. On attaining the age of 18 years an Associate must apply for transfer to Corporate membership. An Associate under the age of 18 years on obtaining the permission of a competent authority to install and operate an amateur radio transmitting station may apply for transfer to Corporate membership.

   Explanatory note

   The present Article provides that an Associate who obtains the permission of a competent authority to install and operate an amateur radio transmitting station *must* apply for Corporate membership. The amendment provides that transfer to Corporate membership is obligatory only on attaining the age of 18 years. On the acquisition of an amateur radio licence before attainment of this age transfer to Corporate status will be optional.
5. To consider and, if thought fit, pass the following *Special Resolution*

   Special Resolution

   To amend the Articles of Association so that the following Article be substituted for the present Article.

   26 Composition of Council

   No member shall be eligible for election as a Council member, other than as President, until he shall have been a corporate member for a period of not less than three consecutive years immediately prior to the date of his nomination. All Council members except the President and Immediate Past President shall serve for three consecutive years commencing on 1 January following the annual general meeting at which they were elected. A retiring council member not excluding the Immediate Past President shall be eligible for re-election for a further term of three years provided he complies with this article after which he may not seek re-election until after a minimum period of one year.

   Explanatory note

   The present Article does not provide any limit to the time that a member (excluding the President and Immediate Past President) may serve on Council. The amendment provides that a member may only be elected to serve on Council for a period of six consecutive years after which there must be a break for a minimum period of one year.
6. To announce the names of members to serve on the Council for the year 1975.
7. To report that the auditors, Messrs Edward Moore and Sons, have expressed willingness to continue in office, and to fix their remuneration for 1975.
8. To transact any other business which may be properly transacted at an Annual General Meeting.

A member entitled to attend and vote at the above meeting may appoint a proxy to attend. A proxy need not be a member of the Society.

By order of the Council
D. A. FINDLAY
Secretary

Notes

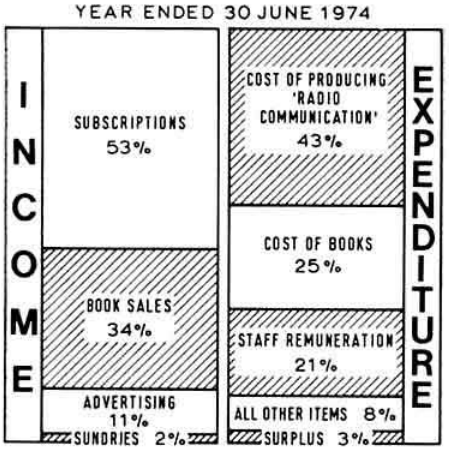
(*a*) Forms for the appointment of proxies may be obtained from the Secretary upon request.
(*b*) The instrument appointing a proxy shall be deposited at the office of the Society not less than 48 hours before the time appointed for holding the meeting.
(*c*) The explanatory notes relating to the proposed amendments to the Articles of Association do not form part of the Special Resolutions and are given only for the information of members.

Radio Society of Great Britain

35 DOUGHTY STREET, LONDON WCIN 2AE

Patron: HRH THE PRINCE PHILIP, DUKE OF EDINBURGH, KG

Chart showing comparisons of different sources of revenue with expenditure



REPORT OF COUNCIL TO THE MEMBERS OF THE SOCIETY

THE Balance Sheet at 30 June 1974 and the Income and Expenditure Account for the year ended on that date, as set out on pages iv to vii, are submitted for approval of the members.

The Society has had a successful year in spite of the pressure of outside forces, particularly world inflationary problems. The figures shown in the accounts came very close to the original forecasts and there were no unpleasant surprises during the year, largely as a result of the forecasted figures allowing for large increases of most overheads. Unfortunately in an attempt to keep our wages bill in line with the Society's income we have experienced acute staff shortages and other difficulties during the year, and these are still continuing. So much so that consideration of viable solutions to the problem has included investigating the possibility of moving headquarters.

One or two points in the accounts are worth singling out:

Subscription income comes out at a satisfactory figure, and a special thank you is due to members for their support of the Society in spite of the discouragement of Value Added Tax.

Advertising revenue, which has increased from £11,550 last year to £16,073 this year (not shown separately in the accounts), reflects the success of dealing with this ourselves instead of through an agency.

Sale of publications, which represents 34% of the Society's income and helps to keep down the cost of subscriptions, shows an increase over the previous year's figure. However, the prospects are not so promising for the current year as stocks of some of the best sellers are running low, and new editions which are in the pipeline are often delayed and are costly to produce.

"Radio Communication", which is the Society's largest single outgoing (and so it should be) would cost more if it were not for the considerable savings achieved by forward purchasing of paper, combined with judicious juggling of paper weights and pages per issue to make the most economical use of postal rates.

Balance sheet. There is one unusual item which requires comment and that is the refund of Value Added Tax of £4,802. This represents a satisfactory outcome of negotiations with HM Customs and Excise (at the time of writing, the refund is still awaited!) resulting in the cancellation of this tax on that part of the subscription covering our magazine. Most of the refund belongs to the members but it is hoped that they can see their way to leaving it with the Society which plans to use this surplus to good advantage; for example, a bigger *Radio Communication*.

With regard to the current year, the budgets allow for the usual inflationary growth rate but after taking into account the increase in the subscription (which is the effect of reducing the rate of VAT and of partial zero-rating for VAT), there appears to be no need to ask the members to pay more. Council hopes you will find the position encouraging.

RADIO SOCIETY OF GREAT BRITAIN

(COMPANY LIMITED BY GUARANTEE)
AND ITS SUBSIDIARY COMPANY

CONSOLIDATED INCOME AND EXPENDITURE ACCOUNT
for the year ended 30 June 1974

1973			1974	
£	£		£	£
		INCOME		
64,111		Subscription income		70,653
17,481		Profit on sales of publications		16,547
316		Quoted investment income (gross)		316
—		Bank interest		422
81,908		**Total income**		87,938
		EXPENDITURE		
	2,550	Headquarters rates, lighting, heating and cleaning	3,403	
	21,378	Staff remuneration	24,753	
	200	Pension	200	
	6,380	Telephone, postage, printing & stationery	5,474	
	310	Insurance	318	
	367	Repairs and maintenance	2,084	
	120	Hire of equipment	70	
	1,446	Depreciation of equipment (No depreciation has been provided on the freehold property)	1,332	
	566	Bank charges	481	
	325	Audit fees	450	
	442	Legal and professional fees—provision for costs on behalf of members	1,000	
	671	Sundry expenses	603	
	350	Provision for doubtful debts	—	
	1,141	Debenture interest of Lambda Investment Company Limited (gross)	1,141	
36,246			41,309	
35,895		*Radio Communication*—distributed free to members—cost including staff remuneration and after deducting advertising revenue	36,558	
	312	Membership certificates, Awards, Trophies, etc	266	
	1,832	QSL Bureau, Beacons and Intruder Watch	1,679	
	636	Contributions to IARU Region 1	843	
2,780			2,788	
	261	General meetings	301	
	1,895	Council and committee expenses (after deducting surplus on rallies)	1,971	
2,156			2,272	
—		Provision towards cost of international conferences	1,000	
—		Taxation on investment income and on bank interest	300	
77,077		**Total expenditure**		84,227
£4,831		**SURPLUS FOR THE YEAR (all of which arises in the Society)**		£3,711

RADIO SOCIETY OF GREAT BRITAIN

(COMPANY LIMITED BY GUARANTEE)
AND ITS SUBSIDIARY COMPANY

BALANCE SHEETS 30 JUNE 1974

1973 The Society & Subsidiary £	1973 The Society £		Notes	1974 The Society £	1974 The Society & Subsidiary £
		FIXED ASSETS			
41,675	—	Freehold property at cost	(1) (2)	—	41,675
2,502	—	Sinking Fund Policy, premiums paid, (Surrender value £2,890)		—	2,918
4,060	*4,060*	Furniture and equipment, at cost less depreciation	(3)	3,161	3,161
—	*25,412*	Investment in and loan to subsidiary	(4)	26,176	—
9,055	*9,055*	Quoted investments at cost less amount written off (Market value £7,750 [1973, £8,114])	(5)	9,055	9,055
57,292	*38,527*			38,392	56,809
		NET CURRENT ASSETS			
18,565	*18,565*	Stocks at lower of cost and net realisable value		18,582	18,582
9,482	*9,482*	Debtors, and payments in advance		13,658	13,658
3,119	*3,109*	Bank balances & cash in hand		12,676	13,067
31,166	*31,156*			44,916	45,307
16,933	*16,523*	**Less** Creditors & accrued charges	(11)	16,212	16,655
14,233	*14,633*			28,704	28,652
£71,525	*£53,160*	**NET ASSETS**		£67,096	£85,461
		Financed by:			
12,522	*12,460*	**ACCUMULATED FUND** Balance at 1 July 1973		17,291	17,353
4,831	*4,831*	Surplus for the year ended 30 June 1974, as shown in the Income & Expenditure Account		3,711	3,711
17,353	*17,291*			21,002	21,064
(722)	—	Less preliminary expenses of the subsidiary		—	(722)
16,631	*17,291*			21,002	20,342
—	—	**Value Added Tax** suspense account	(8)	4,802	4,802
35,869	*35,869*	**SUBSCRIPTIONS IN ADVANCE**		41,292	41,292
19,025	—	6% **DEBENTURE STOCK** of Subsidiary (Redeemable at par on or before 30 June 1997: Secured on the assets of that Company)		—	19,025
£71,525	*£53,160*			£67,096	£85,461

(The notes on pages vi and vii form part of these accounts)

G. R. JESSOP, *President*
J. O. BROWN, *Treasurer*

NOTES ON THE ACCOUNTS

1. Accounting policies:
   (*a*) Subscriptions—cash received in respect of subscriptions for the year is apportioned on a time basis.
   (*b*) Depreciation—no depreciation has been provided on the freehold property. Furniture and equipment has been depreciated as is considered appropriate by the management.
   (*c*) Life subscriptions are credited to Income & Expenditure Account over a period of 10 years.

2. The Council is of the opinion that the present market value of the Society's freehold property (which is held in the subsidiary company) is in the region of £100,000.

3. Furniture and equipment:

Cost 1 July 1973	£10,111
Additions during year	431
Cost 30 June 1974	10,542
Accumulated depreciation	7,381
Book value as shown in Balance Sheet	£3,161
Accumulated depreciation to 30 June 1973	£6,051

4. The share capital of the subsidiary, Lambda Investment Company Limited, is £100 in shares of £1 each and all the shares are held by the Society or its nominees. The debenture stock has been subscribed for or purchased by individual holders in their own right.

5. **Investments**

		Cost less amount written off
		£
£5,000	3% Savings Bonds 1965/75	5,000
£4,145	British Transport 4% Guaranteed Stock 1972/77	4,055
		£9,055

Both investments are charged to Barclays Bank Ltd as security in case the Society requires overdraft facilities

6. The sales of publications during the year amounted to £45,010 (1973—£41,409), and advertising revenue amounted to £16,073 (£11,550) before deducting commission.

7. At 30 June 1974 there were no commitments for capital expenditure.

8. HM Customs and Excise have agreed that 60% of the subscription from UK members should be zero-rated for VAT. The resultant credit arising from this as at 30 June has been held in the VAT suspense account in the foregoing Balance Sheet.

9. The Society administers the following prize and memorial funds:

	£	£
(*a*) **The Pilot Officer Norman Keith Adams Prize Fund**		
At 30 June 1974 the fund amounted to		165
Accumulated income at 30 June 1973 was	23	
Income for the year to 30 June 1974 was	11	34
		£199
Which was invested in: 7% British Savings Bonds		165
Cash in general funds of the Society		34
		£199

No prize was awarded in respect of the year.

(*b*) **The J. Fraser Shepherd Prize Fund**		
At 30 June 1974 the fund amounted to		300
Accumulated income at 30 June 1973 was	17	
Income for the year to 30 June 1974 was	22	
	39	
Less: Cost of prize awarded	20	19
		£319
Which was invested in: £506.62 3½% War Loan		200
6% Debenture Stock Lambda Investment Company Limited		100
Cash in the general funds of the Society		19
		£319

(*c*) The fund of **The Bevan Swift Memorial** amounted to £23 at 30 June 1974, and is represented by £23 held in the general funds of the Society. £8 was paid out as a prize during the year.

(*d*) The subscribed fund of **The J. Clarricoats Memorial** amounted to £46, held in a separate bank account and there was no distribution during the year.

(*e*) The fund of **The Thomas Memorial** now stands in the books at £1 recording the obligation of the Society to supply miniature cups from its own resources.

(*f*) The fund of **The L. N. Goldsbrough Memorial** amounted to £50 and is represented by £50 held in the general funds of the Society.

10. The surplus on rallies which has been deducted from Council and committee expenses in the attached accounts, amounted to £685. Included in total sales (note 6) are sales of publications at exhibitions which amounted to £2,500.

11. Creditors and accrued charges includes £2,000 in respect of provisions shown in the Income and Expenditure account.

REPORT OF THE AUDITORS TO THE MEMBERS OF THE RADIO SOCIETY OF GREAT BRITAIN

In our opinion the Accounts set out on pages 4 to 7 give a true and fair view of the state of the Society's affairs at 30 June 1974 and of the Surplus for the year ended on that date and comply with the Companies Acts 1948 and 1967.

4 Chiswell Street, London EC1Y 4XB.
24 October 1974

EDWARD MOORE & SONS
Chartered Accountants

LAMBDA INVESTMENT COMPANY LIMITED

The directors have pleasure in submitting their report for the year ended 30 June 1974. The company is a wholly-owned subsidiary of the Radio Society of Great Britain (a company incorporated in England) and was formed to acquire the freehold property, 35 Doughty Street, London WC1, which is the headquarters of the Society. The directors are of the opinion that the market value of the property is in the region of £100,000.

The directors are Messrs L. E. Newnham (Chairman), R. F. Stevens, G. R. Jessop and J. O. Brown (Secretary); the first two named hold one share each as nominees of the Society and Mr Newnham holds £300 Debenture Stock. Mr. L. E. Newnham retires by rotation at the Annual General Meeting and, being eligible, offers himself for re-election.

The auditors, Messrs Edward Moore & Sons, have intimated their willingness to continue in office.

By order of the Board
J. O. Brown,
Secretary

24 October 1974

BALANCE SHEET 30 June 1974
and
REVENUE ACCOUNT for the year ended on that date

1973				1974	
£	£	£		£	£	£
			ASSETS			
41,675			Freehold property at cost			41,675
2,502			Sinking Fund Policy, premiums paid (Surrender value £2,890)			2,918
241			Preliminary expenses			241
481			Debenture Issue expenses			481
10			Bank balance			391
44,909						45,706
			LIABILITIES			
	410		Sundry creditors		443	
	25,312		Loan from the Radio Society of Great Britain		26,076	
25,722						26,519
£19,187			**NET ASSETS**			£19,187
			Financed by:			
			Authorised and Issued Capital			
100			100 shares of £1 each fully paid			100
			Revenue Account			
62			Balance at 1 July 1974			62
	1,235		Rent receivable in the year to 30 June 1974		1,196	
		1,141	*Less:* Debenture interest	1,141		
		58	Bank interest	30		
		11	Sundry expenses	—		
		25	Audit fee	25		
—	*1,235*				1,196	—
19,025			6% **Debenture Stock** (redeemable at par on or before 30 June 1997—secured on the assets of the Company).			19,025
£19,187						£19,187

L. E. Newnham
J. O. Brown } *Directors*

Report of the Auditors to the Members of Lambda Investment Company Limited

In our opinion, the accounts set out above give a true and fair view of the state of the Company's affairs at 30 June 1974 and of the result for the year ended on that date and comply with the Companies Acts 1948 and 1967.

4 Chiswell Street, London EC1Y 4XB.
24 October 1974

EDWARD MOORE & SONS
Chartered Accountants

THE YEAR IN REVIEW

Being a report on some of the activities of the Radio Society of Great Britain during the 12 months ended 30 June 1974

The review on the happenings of the year which accompanied the annual report and accounts for the year ended 30 June 1973 was welcomed by members, and this year a further review, up-dating some of the items mentioned last year and reporting new developments, has been compiled.

A short verbal report covering the last few months of 1973 was read at the Annual General Meeting in December 1973. For completeness, items already dealt with verbally have been included in the current review.

Council

In December 1973 Dr J. A. Saxton completed his year as President and Mr G. R. Jessop, G6JP, took office on 1 January 1974.

Mr Jessop was welcomed as the 40th President of the Society at a social function held at the Bonnington Hotel, Southampton Row, on Friday 4 January 1974 at which more than 100 members and guests were present.

Eight members of Council retired at the end of 1973. Three ordinary members of Council, Messrs B. D. A. Armstrong, G3EDD, E. G. Ingram, GM6IZ, and R. F. Stevens, G2BVN, retired, and Messrs Ingram and Stevens were willing to accept nomination for re-election; Mr Armstrong did not wish to seek re-election. Mr R. J. Hughes, G3GVV, Immediate Past President, completed his term of office at the end of the year.

The four zonal members of Council who retired were Messrs R. W. Fisher, G3PWJ, Zone B; C. H. Parsons, GW8NP, Zone E; W. F. McGonigle, GI3GXP, Zone F, and A. W. Smith, GM3AEL, Zone G. Messrs McGonigle, Parsons and Smith retired by rotation; Mr Fisher retired in accordance with Article 28 of the Articles of Association, having been appointed to fill a casual vacancy in Zone B. All four zonal members were willing to accept nomination for re-election.

Nominations for election as ordinary members of Council were accepted from Messrs R. J. Baker, G3USB; P. Balestrini, G3BPT; S. R. Boakes, G3HXN; D. Byrne, G3KPO; A. D. Foss, G8EAY; M. Hearsey, G8ATK; P. F. Jobson, G3HLF, and R. F. Stevens, G2BVN.

In the subsequent election Messrs Baker, Balestrini, Byrne and Stevens were successful.

In Zone F, Mr W. F. McGonigle, GI3GXP, and Dr L. C. Waring, GI3WUO, were nominated, and Mr McGonigle was successful in the election.

There were no nominations in Zones B, E or G apart from the retiring members, and Messrs Fisher, Parsons and Smith were therefore returned unopposed.

The President and Mr J. R. Petty and their respective ladies had the honour of an invitation to attend a garden party given by HM The Queen at Buckingham Palace on 25 July 1974.

It was with great regret that Council heard of the death of three former Council members, Les Goldsbrough, G3ERB (September 1973), Arthur Williams, GW5VX (October 1973), and Leslie Cooper, G5LC (June 1974).

On 26 July 1974 at the London Postal Headquarters Building, a tablet was unveiled to commemorate the first public wireless transmissions from that building to a building on the Victoria Embankment by Marconi on 27 July 1896.

The unveiling was performed by the grandson of Marconi, Guglielmo Marconi-Giovanelli by means of a radio signal transmitted from Rome.

The President had the pleasure of attending the ceremony and the social occasion afterwards.

Honorary Members and Vice-Presidents

Council may elect as Honorary Members persons who have rendered outstanding service to the Society or have made acknowledged contributions to radio research, experimentation or communication, or a related subject. Council may also elect as Vice-Presidents corporate members who have rendered outstanding services to the Society.

An invitation was extended to Professor Sir Martin Ryle, FRS, G3CY, the Astronomer Royal, to become an honorary member of the Society. Members will be pleased to know that Sir Martin accepted this invitation.

An invitation was also extended to Mr William Edward Frederick Corsham, G2UV, to become a Vice-President of the Society. Mr Corsham, better known to most as "Uncle Vic", was one of the participants in the transatlantic tests in December 1921. He was also one of the first members of the British Wireless Relay League in September 1922 and was a member of the committee which arranged for the league to merge with the RSGB and form the nucleus of the Transmitter and Relay Section. Since then Mr Corsham has always been most active in furthering the interests of radio amateurs in general and the RSGB in particular. The Council was pleased that Mr Corsham accepted this invitation.

Representation

The three-year term of office of the regional and area representatives will be completed at the end of 1974.

During the year all regional representatives have continued in office, with the exception of Mr D. F. Beattie, G3OZF, who was no longer resident in Region 16. Council were pleased to accept the offer of Mr E. T. Jacobs, BRS32513, to act as representative for Region 16 for the remainder of the term of office.

On 1 April 1974 the revision of county boundaries in England and Wales became effective and it is therefore necessary to re-define the various RSGB regions for the purposes of the scheme of representation. The Membership & Representation Committee has considered the effect of this revision and has proposed that the number of regions should be increased to 20 (from 17 at present), and that the regions should be arranged so as to reduce the amount of travelling that is required of a regional representative if he is to visit all parts of his region.

A map showing the proposed boundaries was included in the October 1974 issue of *Radio Communication*. Members have been asked to comment on the proposed regions, and subject to any amendments thought necessary the revised regions will be effective from 1 April 1975. The revision of county boundaries and formation of districts in Scotland will also be effective from 1 April 1975.

Council meetings

During the year to 31 December 1973, Council met seven times; meetings were held in the council room of the Institution of Electrical and Radio Engineers at 8 Bedford Square, London, by kind permission of the director.

Meetings have been held in the afternoon, although Council is aware that this is not convenient for some members. Consideration is being given to alternative meeting arrangements so that younger members of the Society will not be discouraged from undertaking Council service.

It is expected that Council will have met seven times during the year to 31 December 1974.

Committees of Council

The committees of Council, chairmen and members, who have served during the year to 30 June 1974 are set out on page 777 of the November 1974 issue of *Radio Communication*.

Council again expresses appreciation of the advice and assistance so freely given by the members who serve on committees.

Committee meetings were restricted during December 1973 and January 1974 due to the prohibition on the use of electricity on certain days.

Official Regional Meetings

Region 10 (South Wales) Diamond Jubilee ORM and Dinner

The Region 10 Diamond Jubilee Dinner and ORM were held at University College, Cardiff on 22 September 1973.

More than 100 members attended the meeting and the three Council members present dealt with a variety of matters concerning the amateur service.

After the meeting a most successful dinner was held in University College.

Region 13 (South-East Scotland) ORM and VHF Convention

About 180 members attended the Region 13 ORM and VHF Convention held at the Pollock Halls of Residence, Edinburgh, also on 22 September 1973. Three Council members were present on this occasion and reports from the region indicated that both the convention and ORM were most successful.

Region 7 (London) Diamond Jubilee ORM and Dinner

On 6 October 1973 a Region 7 ORM was held at Whitton, Middlesex. Council and committee members dealt with numerous questions raised during the meeting.

In the evening a successful dinner was held and the winners of the Diamond Jubilee Contest were announced.

Region 9 (South Western) ORM

Plymouth was the venue for the Region 9 ORM held on 3 November 1973 at which members from all parts of the region gathered to discuss Society matters with two Council members and the general manager. The meeting was very well attended and the arrangements reflect great credit on the regional representative, Mr H. W. Leonard, G4UZ.

Region 15 (Northern Ireland) ORM

There was a most enthusiastic meeting of members in Northern Ireland at the ORM in Holywood, Co Down, on 11 May 1974. The President, the zonal Council member and the general manager attended this meeting at which most reassuring reports on amateur activity in Northern Ireland were given.

After the meeting more than 60 members and their guests sat down to an informal dinner at the Windsor Hotel.

Special events and exhibitions

The RSGB National Mobile Rally was held on Sunday 5 August 1973 at Woburn Abbey. There was a record attendance despite the inclement weather. A full report appeared on page 628 of the September 1973 issue of *Radio Communication*.

The Midland National Amateur Radio and Electronics Exhibition, organized by the Amateur Radio Retailers' Association, was held in Leicester over the period 25-27 October 1973. The RSGB stand attracted considerable interest and was very successful financially.

The 20th VHF Convention was held at Whitton, Middlesex, on Saturday and Sunday 6-7 April 1974. More than 670 vhf enthusiasts attended the lectures, and some 200 members and guests attended the dinner in the evening when Mr Ray

Hills, G3HRH, chief engineer, transmitters, Independent Broadcasting Authority, was guest of honour.

The convention was even more successful than that of the previous year, although this very success is posing a problem of accommodation for future conventions.

The celebrations of the 75th Anniversary of the Marconi-Kemp Bristol Channel experiments were brought to a conclusion by a luncheon given on 9 November 1973 by the Barry College of Further Education Amateur Radio Society. The luncheon was attended by a very distinguished gathering including civic representatives from Barry, representatives of the Barry College of Further Education, Trinity House, and the Post Office.

On Sunday 18 November 1973 the South-East Counties HF Convention took place at the Airport Hotel, Crawley. This was a successful innovation and the organizers are to be congratulated on the choice of programme and the venue.

1973 President's Committee

During 1973 the then President, Dr J. A. Saxton, formed a committee of Council members to review the organization and administration of the Society and to report thereon to the Council.

The committee recommended to Council that the Articles of Association be amended to permit a change in the Council organization. The proposed amendments are explained by the Honorary Treasurer fully in his notes which accompany the details of the relevant resolution.

Education Committee

The committee is responsible for material and projects designed to encourage an interest in amateur radio among the younger generation still at school or college.

The Radio Amateur's Examination, subject 765 in the City & Guilds of London syllabus, was held in November 1973 and May 1974. The Society organized an examination centre at the University of London on both occasions.

Arrangements are being made for a lecture at the Science Museum, London, in January 1975. The theme will be "The World of Amateur Radio" and this will again be intended for the younger generation.

Various points have been considered in connection with the Radio Amateur's Examination and suggestions made to the advisory committee.

Education has a very important part to play in the future of amateur radio and the committee wishes to further increase its effectiveness.

Finance & Staff Committee

The accounts for the year to 30 June 1974 show a surplus and this is a reflection of the interest that the members of the committee take in the affairs of the Society. The year under review has been one of continued inflationary pressure and even with the increased subscription rates which came into force at the beginning of July 1973 the income of the Society is only just able to keep ahead of expenses.

In April 1973 VAT was introduced and although this tax had been under discussion for many months the rate to be applied was not known until March 1973. It was not practicable to alter the subscription rates at 1 April 1973 but the revised rates were applicable from 1 July 1973. For the three months of April, May and June 1973 the Society accepted subscriptions as being VAT inclusive, although this meant that the full amount of each UK subscription was not available to the Society.

From 1 July 1973 the subscription rate was increased to £5.50 including VAT for corporate members, and other rates were adjusted accordingly.

The committee considers financial aspects of numerous items including publications, *Radio Communication*, headquarters expenses, advertising, salaries etc, several of which are dealt with in other sections of this review.

HF Contests Committee

The contests calendar for 1974 lists only 12 contests to take place on the hf bands, as the Diamond Jubilee Contests, phone and cw, were for 1973 only.

Six formal committee meetings have been held during the year but this is no indication of the time that has been spent on committee work, as all of the routine checking of contest entries is carried out at members' homes and many additional hours are spent in this way.

Rules for each event are reviewed each year, comments from previous contests are considered and, if necessary, amendments are made.

In the summer months direction finding events are organized by local clubs or societies on behalf of the Society and a committee member is responsible for co-ordinating these events. Arrangements are then made for the final event held in September each year.

A notable change in the NFD rules was made for the 1974 event. The long-standing power limitation of 10W input to the final stage was deleted (except 1·8MHz) and rated anode dissipation to the final valve(s) or device(s) was the limiting factor.

IARU Working Group

In April 1975 there will be an IARU Region 1 Conference in Warsaw and the working group has been involved during the year with the preparatory work for Society participation in this conference.

In April 1974 there was a World Administrative Radio Conference, convened to deal with maritime mobile affairs (WARC/MM), and although the terms of reference of this conference precluded any reference to amateur matters it was felt that representatives of IARU should be present at the conference. In the event there were no discussions concerning the amateur service, although a matter which could affect the amateur service (channelization of the band 1·605–4·000MHz) was referred forward for consideration at the World Administration Radio Conference (WARC) in 1979. Decisions made at the Warsaw

conference will be of the utmost importance as these will form the basis of the matters to be put forward at WARC 1979.

The constitution of IARU has remained unaltered since 1925 and for some years it has been thought that a revision was necessary. A revised draft of the proposed terms, based mainly on the work carried out by the late Win Dalmijn, PA0DD, has now been submitted by the Society to IARU headquarters for inclusion in the IARU Calendar and consideration by all other member societies.

The Working Group has considered international licensing matters, particularly in view of the advisability of formulating a licence with terms common to all countries of the EEC.

Through IARU, the Society is co-ordinating vhf beacon frequencies in Region 1, and A. Taylor, G3DME, was appointed chairman of the International Beacon Project at the 1972 Scheveningen conference.

All committees of the Society have been asked to provide papers for submission to the Warsaw conference. The working group acts as co-ordinator for these papers. It is expected that papers will deal with a variety of subjects including microwave allocations above 40GHz; radiation hazards; hf beacons; international standards for rtty, and vhf predictions by reference to beacons.

Intruder Watch

The Intruder Watch organizer, C. J. Thomas, G3PSM, continues to submit monthly reports on the results of the worked carried out by the monitoring organization. A summary of the activities of the Intruder Watch during 1973 has been prepared by Mr Thomas and copies of the summary and report had been circulated to administrations in any way involved in frequency allocations.

The summary showed that there were reports of 1,170 intruders in the exclusive amateur bands and more than 60 per cent had been identified as coming from 44 different countries. The intruders as related to the amateur bands were: 40m, 194; 20m, 590; 15m, 265; 10m, 121.

Interference Committee

The committee met six times during the year and considered details of cases of alleged interference submitted by members. At 1 July 1973 the committee were aware of 31 cases which had not been satisfactorily cleared. At the end of June 1974 there were 27 cases outstanding, including new cases reported during the year. On many occasions there is no reply to requests from the committee for further information and many of these cases have therefore been regarded as closed.

Committee members have attended meetings during the year to give advice and information on interference problems. Meetings included the Region 10 (South Wales) ORM, South East Counties HF Convention at Crawley, and club meetings at Basingstoke, Edgware, Farnborough, and in the Midlands and West Kent. Arrangements are being made to visit clubs at Bracknell, Kingston and Maidenhead.

Committee members have co-operated to produce the interference chapter for the fifth edition of the *Radio Communication Handbook*, and the article "Practical braid breakers using stock materials" by Ian Jackson, G3OHX, published in the November 1972 issue of *Radio Communication* was awarded the Louis Varney Trophy.

Membership & Representation Committee

During the year the committee met six times; four meetings being held in London to coincide with the date of Council meetings. It was felt that the regional and area representatives would become more involved with the work of the Society if they could meet the members of the committee for discussion and accordingly the meeting in March was held in Bristol and that in May was held in Manchester. Although not all local representatives were able to attend these meetings it was felt that the experiment had been successful and future meetings should be held in other provincial centres.

In addition to its primary responsibility to encourage membership of the Society, the committee deals with membership services, makes recommendations to Council or to other committees on such matters as the RSGB News Bulletin Service (GB2RS), subscription rates, appointment of representatives, trophies and awards, etc.

Consideration was given during the year to ways of providing members with more essential information about the Society. Council was asked to ensure that space would be available in successive issues of *Radio Communication* for a series of short articles setting out various aspects of the Society's activities.

The committee feels that membership of the Society will only increase if amateur radio as a worthwhile hobby is brought to the notice of a wider circle of the population and in particular to the younger generation at schools, technical colleges and universities. It is hoped to have available a library of lectures, films, slides and other publicity material so that students will be encouraged to take an interest in amateur radio and in the Society.

Mobile & Exhibition Committee

The committee was engaged in the organization of the Society's stand at the ARRA Exhibition held at Leicester from 25 to 27 October 1973. Committee members remained at Leicester for the three days of the exhibition, and the organization and manning of the RSGB stand was very effective. Results were most satisfactory and reflect great credit on the committee members involved.

A major project during the year was the 1973 Woburn Abbey National Rally in August. Preparation for the 1974 rally started early in the year, and although this rally was probably not so well attended as that of 1973 this can be attributed to the most inclement weather.

Committee members were also in attendance at a rally at Harlow (September 1973), Region 7 ORM at Whitton

(October 1973), VHF Convention at Whitton (April 1974), Meopham BARTG Rally (May 1974), and arrangements were in hand to attend the Anglian Mobile Rally in July 1974.

The committee has also considered mobile operating and has accumulated information on techniques for vehicle interference suppression.

Raynet Committee

The services of the Radio Amateurs' Emergency Network (Raynet) were not required for emergency communications following any major disasters during the year, but the Mid-Thames Group was active following an incident that occurred at Didcot.

The organization was maintained in a state of readiness and to this end exercises have been carried out nationally or locally, including: "Skylark"—North Walsham, "Oil-Pollution"—South Anglia, "Delta"—Teesside, "Stop-Gap"—Bromley, Sutton Coldfield (four exercises), "Caws"—Deeside, "Silica"—Norfolk.

Thankfully, major disasters are rare in the UK and the committee is therefore to be congratulated in maintaining enthusiasm and efficiency in an organization whose services are required only very infrequently.

At the end of December 1973 there were 1,159 registered members of Raynet. Consideration has been given to various aspects of the Raynet organization, including the utilization of frequencies, the effect of repeater operation, extension of user services and the 2m band plan.

Scientific Studies Committee

Regular meetings were held during the year, and reports from the corresponding members were considered.

Studies in accordance with the CCIR programme have continued.

Study Group 8—Mobile radio propagation. This subject had been suggested as an area in which radio amateurs could participate, and preliminary work has been carried out.

Study Group 5—Microwave propagation over mixed land sea paths. The terms of reference of this project were subsequently changed to study propagation over all-sea paths, but prior to this consideration had been given to the use of a 10GHz link from the Isle of Wight to Brighton.

Study Group 2D—Amateur space communication. This was the subject of a paper prepared by a member of the committee. The paper was presented to a meeting of vhf managers held in Germany and had been accepted as a contribution for IARU Region 1.

The International Beacon Programme was dealt with during the year and reception reports considered for beacons in Mauritius, 3B8MS, and Germany, DL0IGI, and for Radio Canada broadcasts. Discussions had taken place with local amateurs to establish beacons in Brazil (Rio de Janeiro), New Zealand and South-West Africa.

The committee is of the opinion that a study of hf propagation, particularly at 28MHz, would be of interest, and observations on a regular basis are being made by the Tonbridge School Amateur Radio Society. Consideration has been given to the encouragement of receiving stations to submit reports of propagation conditions in the 28MHz band, referring particularly to the IARU beacon programme.

Telecommunications Liaison (formerly MPT Liaison) Committee

In April 1974 the Ministry of Posts and Telecommunications ceased to exist and the functions of the Radio Regulatory Division were taken over by the Home Office. The officers of the division were transferred en bloc and the division is still at the same location.

It was decided that the committee's title was no longer appropriate and it was accordingly changed to Telecommunications Liaison Committee.

Discussions with the MPT/Home Office have taken place frequently. In July 1973 a meeting was arranged to discuss certain specific licensing matters: although the officials of MPT were willing to consider the points put forward it was not felt by the RSGB representatives that the meeting was wholly successful. Further meetings to discuss this subject will be arranged.

The committee, in conjunction with the IARU Working Group, is actively progressing matters that will affect the amateur service at the WARC in 1979. It is a source of gratification that a member of the Society will be included as an adviser on amateur matters in the official delegation to this conference.

Matters considered this year have included repeater licensing, beacons, extension of Raynet user service, interference (80m band), reciprocal licensing, sstv, maritime mobile licensing, ITU frequency allocations (2m band), GB2RS services, shf allocations, and Channel Island prefixes.

The committee provides information in connection with the Town and Country Planning Act. Recently it has become evident that there is a wide divergence of opinion among local councils as to the scope of the Planning Acts. It is, therefore difficult to put forward a favourable decision in one locality in support of an appeal by a member in another locality.

Technical & Publications Committee

The committee has ensured the successful production of three publications during the year. *Test equipment for the radio amateur*, by H. C. Gibson, G8CGA, was published in February 1974 and the *Teleprinter Handbook*, by J. G. Denny, G3NTT, and D. J. Goacher, G3LLZ, was published in the autumn of 1973. The 1974 edition of the *RSGB Amateur Radio Call Book* was available in time for the ARRA Exhibition at Leicester at the end of October 1973, and

compilation of the 1975 edition has continued during the year with a view to publication at the end of October 1974.

Further progress has been made with the fifth edition of the *Radio Communication Handbook*. Although the original estimate of the publication date has not been achieved it is expected that publication will be in the spring of 1975. This edition of the handbook will be considerably increased in size and scope and, like its predecessor, is expected to be the standard UK reference work for amateur radio. A new publication by two committee members, *NBFM Manual* by R. S. Hewes, G3TDR, and G. R. Jessop, G6JP, has been completed.

The *VHF/UHF Manual* by G. R. Jessop, G6JP, first published in 1969 with a revised printing in 1971, is now out of print and a new edition is in course of preparation. *Amateur Radio Techniques* by Pat Hawker, G3VA, has been revised and enlarged and the new edition will be available at the end of October 1974.

Consideration has also been given to a new edition of *Guide to amateur radio*.

During the year 48 articles were submitted for publication in *Radio Communication* and they were scrutinized by members of the committee and, if necessary, suggestions and advice offered to authors. At all times the committee must ensure that technical accuracy is assured, that equipment described is varied to provide for the wide spread of interest of members, and that authors are not discouraged from submitting articles.

Commercial equipment has been reviewed by members of the committee and reports published in *Radio Communication*. Reviews include: Trio TS515 ssb transceiver (September 1973); Heathkit HA202 144MHz amplifier (October 1973); Heathkit HM2103 dummy load and rf wattmeter; Heathkit HW202 2m fm transceiver (June 1974).

The committee is responsible for recommending to Council the award of certain prizes and trophies.

Although there were only six committee meetings in the year this is no indication of the time spent by members on committee business.

VHF Committee

The work of the committee has fallen under four main headings during the year: band planning, repeaters, beacons and the VHF Convention. However, the committee has also dealt with, among other topics, microwaves, operating awards and operating standards.

The vhf managers meeting in Germany in October 1973 considered the vhf/uhf/shf IARU band plans and had accepted certain amendments. The revised band plan came into effect on 1 February 1974, and despite an initial amount of opposition it now seems to be accepted by most vhf operators.

The first UK repeater, GB3PI, at Barkway, initially licensed in August 1972, was relicensed for a further year and has continued to operate successfully. Operation has been continuous from the Barkway site apart from a short period when structural alterations required the removal of the equipment to Cambridge. The opportunity was then taken to install the Mk2 version when the equipment was returned to Barkway.

Specifications of repeaters for operation in other parts of the UK were submitted to the committee, and after consideration and amendment, where necessary, to conform with the RSGB/IARU recommendations, these were submitted to the MPT/Home Office with requests for licences. During the year the approval was given for repeaters in the following areas: South Wales/Bristol Channel (GB3BC at Mynydd Machen); South London (GB3LO at Crystal Palace)—temporarily on test in the Epsom area, and Hampshire (GB3SN at Four Marks, Alton, Hants).

Applications have also been submitted for Upper Severn Valley (Malvern Hills), Barnsley, Sheffield, Martlesham Heath, Central Scotland, and for a repeater to operate in the Cambridge area in the 70cm band.

A beacon to operate in the 23cm band, GB3DD, was put into operation by the Dunstable Downs Amateur Radio Society in June 1974. The beacon at Shooters Hill, GB3LDN, is unfortunately not now operative due to maintenance problems. After a prolonged absence the 70MHz Crowborough beacon, GB3SX, is again operational with a temporary aerial system. Other vhf beacons have continued to operate satisfactorily, and act as very useful indicators of conditions to band users.

The VHF Convention was held at "The Winning Post" at Whitton on 6–7 April 1974. The venue was the same as in previous years, although additional space was available in nearby Whitton School for the afternoon lectures. The convention was considered to be most successful. A full report appears in the May 1974 issue of *Radio Communication*.

Interest in microwaves is increasing and has been encouraged by a regular monthly contribution in *Radio Communication*. The 21GHz amateur band was withdrawn on 1 January 1972, but an alternative band at 24GHz is now available and there is activity on this band and on the lower microwave bands. To encourage microwave experimental operation a sub-committee has been formed and this will consider such matters as standards, band plans and licensing conditions in addition to technical work.

Of particular interest was the activity on 10GHz which resulted in Four Metres and Down Microwave Certificates Nos 11 and 12 being awarded to G3KSU and GC3WJG respectively for their contact over a distance exceeding 150km on this band at the end of March 1974.

This achievement was followed by expeditions in Wales and Scotland when distances of 130 and 165km respectively were covered, and during May a record 243km contact took place between GM3OXX on the Cairnsmore of Carsphairn and GW4BRS on Snowdon.

VHF Contests Committee

There are 20 contests, vhf, uhf and microwave, listed in the contests calendar and the committee is responsible for drawing up the rules, adjudicating, and submitting the results

and report for publication. Several of these contests have more than one section—notably VHF NFD, and there is much work involved in checking and tabulating. The committee has had the services of 10 members during the year and all have been actively engaged in checking contest entries.

In July 1973 the VHF/UHF Diamond Jubilee Contest took place and the rules for this contest included innovations which proved very popular. Only one callsign could be used, so allowing operation only on one band at a time, and the results were judged solely against other stations operating in the same geographical areas—the RSGB electoral zones. The contest was most successful and has been repeated in 1974.

Operation on the microwave bands is increasing and activity is being encouraged by the organization of more microwave contests.

At the IARU VHF Managers' Conference held in Germany in October 1973 it was decided that member societies were not required to organize multiband contests on IARU rules, and these contests are no longer included in the calendar.

Representation on outside committees

Once again Council would like to express its appreciation of the assistance given to the Society by the following members who serve on various outside committees.

D. A. S. Drybrough, G8HEV	BSI Committees
R. S. Roberts, G6NR	BSI Committees
R. F. Stevens, G2BVN	BSI Committees
D. A. Findlay, G3BZG	Frequency Advisory Committee
R. G. Flavell, G3LTP	CCIR UK Study Groups
R. F. Stevens, G2BVN	CCIR UK General Purposes Committee
R. J. Hughes, G3GVV	City & Guilds Radio Amateurs Examination Advisory Committee
L. E. Newnham, G6NZ	City & Guilds Radio Amateurs Examination Advisory Committee
W. A. Scarr, G2WS	City & Guilds Radio Amateurs Examination Advisory Committee

Certificates and awards, hf

The steady decline in the sunspot cycle index is affecting the level of activity on the hf bands, but interest in the Society's awards and certificates is maintained. During the year 760 claims were dealt with and, in addition, some 300 certificates have been signed on behalf of UK stations making claims for other awards. The Society's primary award (hf) is the Commonwealth DX Certificate (CDXC) which is the successor to the Empire DX Certificate. Since CDXC was inaugurated in 1965 only 129 certificates have been issued to the end of June 1974, a measure of the skill and patience that is needed to be successful in pursuit of this award.

The RSGB also issues certificates for the British Commonwealth Radio Transmission Award (BCRTA), Worked British Commonwealth (WBC), British Commonwealth Radio Reception Award (BCRRA), the DX Listeners' Century Award (DXLCA) and the IARU Region 1 Award. The latter award is available to listeners on a "Heard" basis as well as for two-way contacts. The RSGB also processes on behalf of IARU Headquarters claims for the "Worked All Continents" (WAC) award.

During the year the Society published *Amateur Radio Awards* by C. R. Emary, G5GH, which gives details of certificates and awards on a world-wide basis.

At the suggestion of the Awards Manager (HF) consideration has been given to the terms of an award to take the place of CDXC. With the change in status of former Commonwealth countries, the achievement of CDXC under the present rules is likely to become impracticable in a few years' time.

Certificates and awards, vhf/uhf/shf

The awards manager has issued 121 Four Metres and Down certificates in the 12 months to 30 June 1974 in recognition of operating achievements on the vhf/uhf/shf bands. As mentioned in the section dealing with the activities of the VHF Committee, three special certificates have been issued for achievements on the 10GHz band.

There is an increase of 22 in the number of certificates issued in 1973–4 as compared with 1972–3. This is attributable to the great increase in ssb operation. The total number of FMD certificates is now 769.

Trophies and awards

The Society has 45 trophies, awards and prizes which are presented annually.

The Founders' Trophy—for distinguished services to the Society—was awarded to R. G. Flavell, G3LTP, a member of the Scientific Studies Committee, for his studies on propagation conditions.

The Calcutta Key—for outstanding service to the cause of international friendship through the medium of amateur radio was awarded to Frank Fletcher, G2FUX.

The HF Contests Committee recommends the award of 19 trophies for contests ranging over all the hf bands. The two premier trophies are the NFD Shield and the BERU Rose Bowl, but there are, in addition, trophies for the 1·8, 3·5, 7·0, 14, 21 and 28MHz bands.

The VHF Contests Committee recommends the award of six trophies for vhf/uhf contest achievements; the Surrey Trophy for VHF NFD being the most widely contested. There also also trophies for the 70, 144 and 432MHz bands.

Operating awards, four in number, are the Braaten, Milne and Rotab trophies and the G2QT Cup Winners' Cup. The last-named was recently presented to the Society by Mr F. H. Cooper, a contest operator of very considerable ability. This cup is awarded for achievements in a series of single operator RSGB hf contests.

The Technical & Publications Committee recommends six awards for meritorious technical articles published in *Radio Communication*.

The VHF Committee recommends four awards for technical achievement on the vhf/uhf/microwave bands.

Home-constructed equipment accounts for three awards: The John Rouse Memorial, Horace Freeman Cup and the 1962 Committee Cup.

The RAEN Trophy is awarded annually by the Raynet Committee.

A complete list of trophies, awards and prizes with terms of reference is scheduled to appear in the December 1974 issue of *Radio Communication*.

GB2RS news bulletin service

The news bulletin service has continued throughout the year with hf transmissions in the 80m band and vhf transmissions in the 2m band. There have been a few occasions when, due to the postal delays, the script has not been received by newsreaders in time to transmit the news. Alternative arrangements have, however, been made wherever possible.

The IARU 2m Band Plan provides for beacon frequencies to be in the lower part of the band and the frequency of the Wrotham beacon, GB3VHF, has been changed to 144·15 MHz. The opportunity has been taken for all the GB2RS vhf news transmissions to be made on 144·50MHz, the frequency formerly used for GB3VHF. The changeover should be completed during the autumn.

The October 1974 issue of *Radio Communication* includes an outline map of the UK which shows the location of newsreaders, and details of the transmission are shown on the reverse of the map.

Slow morse practice transmissions

During 1973 the honorary organizer, Mr M. A. C. MacBrayne, G3KGU, carried out a survey of all the stations listed as participating in the scheme. As a result the schedule has now been amended and at the end of March 1974 69 practice transmissions were listed.

To adhere to a schedule of practice transmissions throughout the year is a most difficult undertaking and inevitably members find that they have other commitments. The Society is very appreciative of the efforts of the organizer and the members who devote spare time to the service and, although as mentioned last year reception reports are infrequent, it is known that these transmissions are listened to by many amateurs who wish to increase their code proficiency.

"Radio Communication"

Volume 49 of *Radio Communication* (January–December 1973) contained 904 pages compared with 856 pages for the previous volume.

Commercial advertising revenue has increased very considerably this year and this is largely due to the revised arrangements made for the handling of advertising.

The high standards of *Radio Communication* have been maintained and it continues to be the leading UK journal dealing with amateur radio matters.

QSL Bureau

The number of cards handled during the year by the bureau is still around 1·75 million. Practically all UK incoming cards and all outgoing cards are distributed in bulk by the QSL Manager, G2MI, and there are 22 sub-managers who then sort and distribute UK cards.

The service has maintained its high level, and delays are infrequent. The ever-increasing postal charges are a source of great concern to the Society and Council appreciate the efforts made by the manager to alleviate these charges as much as possible.

Oscar 6 and Oscar 7

Oscar 6 continued to operate throughout the year but it has been necessary at times to restrict the operating schedule to three days each week. Continued use of unnecessary power by ground stations has resulted in premature deterioration of the solar batteries although the expected life of one year has been exceeded.

Regular orbital information has been given in the GB2RS News Bulletin and the Society is grateful to the Director of the Appleton Laboratory (formerly the Radio Space Research Station) for providing these predictions.

Oscar 7 should have been launched early in the year but due to acceptance requirements and variations in the NASA space programme the launch date is expected to be in October 1974.

RSGB lectures

More than 100 members were present at the Institution of Electrical Engineers on 8 November 1973 when Mr L. Moxon, BSc, ACGI, G6XN, spoke on "Aerial facts and fallacies". A report on this lecture was published in the December 1973 issue of *Radio Communication*.

A lecture is planned for 25 November 1974 at the Institution of Electrical Engineers when Mr R. J. Harry of the Directorate of Radio Technology of the Home Office will discuss methods of investigation and suppression of interference. Andrew Holloway, G3VUQ, and Ian Jackson, G3OHX, of the RSGB Interference Committee will then discuss problems affecting the radio amateur.

Repeaters and beacons

Included with the October 1974 issue of *Radio Communication* is an outline map of the UK which shows the location of the existing and projected UK repeaters, details of which are given on the reverse of the map. The map also shows the location of the RSGB hf and vhf beacons, and details of these are also shown on the reverse of the map.

In a report which can only be a summary of some of the many activities of the Society, inevitably some aspect may be omitted. If this has happened Council asks the indulgence of the members.

RSGB PUBLICATIONS

Technical books

Amateur Radio Awards	£1·50
Amateur Radio Techniques (5th ed.)	£2·25
Guide to Amateur Radio (15th ed.)	95p
Morse Code for the Radio Amateur	25p
NBFM Manual	£1·00
RSGB Amateur Radio Call Book 1975	£1·20
Radio Amateurs' Examination Manual	95p
Radio Amateurs' Examination Revision Notes	35p
Radio Data Reference Book (3rd ed.)	£1·20
Service Valve and Semiconductor Equivalents	40p
Teleprinter Handbook	£5·40
Test equipment for the radio amateur	£2·15
TVI Manual	£1.00
World at their Fingertips (Paperback)	90p
" " " " (De-Luxe)	£2·60

Log books

RSGB Standard Log	65p
RSGB Receiving Station Log	50p
Mobile Mini-Log	30p
RSGB De-Luxe Log	£1·35

Maps and charts

Countries List	5p
Great Circle DX Map	65p
" " " " (in tube)	70p
QRA Locator Map (Western Europe) (*in tube*)	50p
QRA Locator Map (Western Europe (*on card*)	10p
RSGB Amateur Radio Prefixes (World) Map	20p
VHF/UHF Band Plan (not available on card)	5p

Members' sundries

Lapel badge (RSGB or RAEN emblem, pin fitting)	20p
Tie (Maroon or Blue)	£1·30
Radio Communication Easi-binder	£1·50
Ham Radio magazine binder	£1·60
Car window sticker (RSGB or RAEN). (Self-adhesive)	10p
Members' headed notepaper (50 sheets) quarto	40p
" " " " " octavo	25p
Radio Communication bound volume, 1971, 1972 or 1973	£3·20

USA PUBLICATIONS

American Radio Relay League

Antenna Book (13th ed.)	£1·70
Course in Radio Fundamentals	£1·20
FM and repeaters for the radio amateur	£1·70
Hints and Kinks	65p
Radio Amateur's Handbook (Paperback)	£3·35
Radio Amateur's Handbook (Hardback)	£4·15
Radio Amateur's Operating Manual	£1·00
Single sideband for the Radio Amateur	£1·70
Understanding Amateur Radio	£1·60
VHF Manual	£1·60

CQ (Cowan Publishing Corporation)

Amateur Radio DX Handbook	£2·10
Antenna Handbook Vol 1	£1·70
Antenna Roundup	£1·70
Mobile Handbook	£1·40
RTTY A-Z	£2·10
RTTY Handbook	£1·70
Shop and Shack Shortcuts	£1·70

Radio Publications Incorporated

Beam Antenna Handbook	£2·30
Better Short Wave Reception (3rd ed)	£1·90
Cubical Quad Antennas	£1·90
Simple, Low-cost Wire Antennas	£2·30

Radio Amateur Callbook Inc

American Callbook (USA listings) 1975	£5·90
American Callbook (DX listings) 1975	£5·50
Prefix Map of the World	60p
World Atlas	£1·15

Magazine subscriptions

QST (including ARRL membership) (Per annum)	£4·60
CQ (Per annum)	£3·75
73 (Per annum)	£3·90
Ham Radio (Per annum) (Until December 1974 only)	£3·05

USA publications are normally in stock, but when out of stock and deliveries are not expected within four weeks orders will be returned.

MORSE INSTRUCTION AIDS

G3HSC Rhythm Method of Morse Tuition— Complete Course (two 3-speed lp records and one ep record plus books)	£4·95†
Beginner's Course (one 3-speed lp record and one ep record plus books)	£3·65†
Beginner's lp (0-15 wpm) plus book	£3·05
Advanced lp (9-42 wpm) plus book	£3·05
Three-speed simulated PO test 7in ds ep record	£1·00

† *Overseas orders: add £1.*

OTHER PUBLICATIONS

Basic Electricity	£2·10
Basic Theory & Application of Transistors	£1·10
Counties Map (New boundaries)	50p
Dictionary of Electronics	60p
Foundations of Wireless	£2·10
Guide to Broadcasting Stations	90p
Ham Notebook	£1·90
How to Listen to the World	£2·00
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