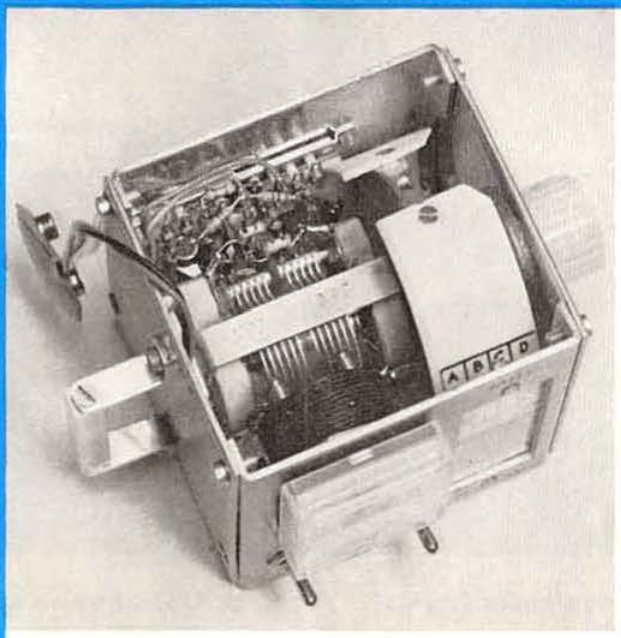
radio communication

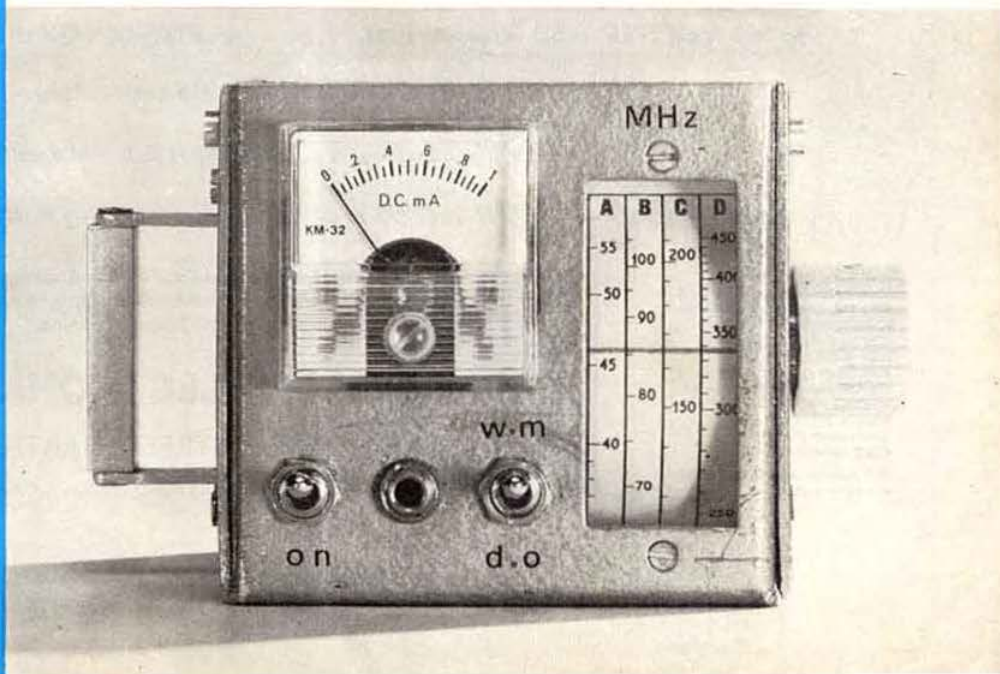
September 1970

Journal of the Radio Society of Great Britain



G3HBW's VHF FET DIP OSCILLATOR

page 597



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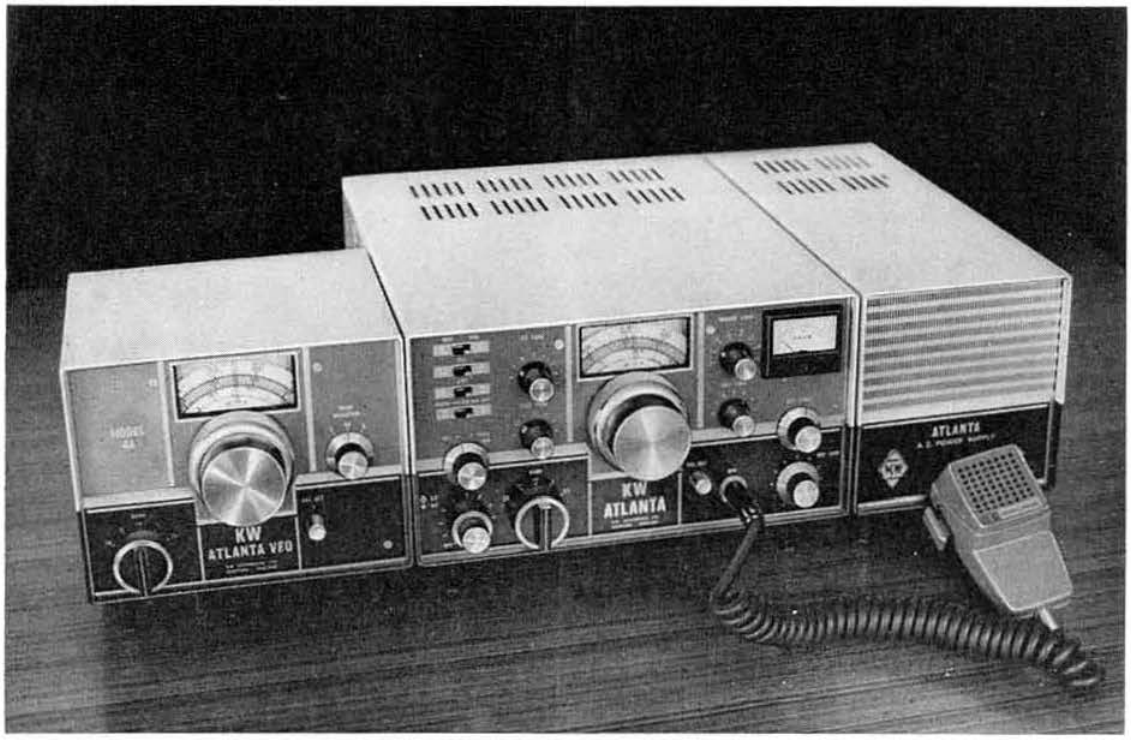
NOW RETAILS FOR £230



★ Extremely good audio (crystal filters fitted).

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September 1970

radio communication

Volume 46 No 9 Price 4s

CONTENTS

Radio Communication **(incorporating** *The RSGB Bulletin***) is published by The Radio Society of Great Britain as its official journal and is posted to all members of the Society on the first Tuesday of each month**

Contributions and all correspondence concerning *Radio Communication* should be addressed to: The Editor, *Radio Communication*, 35 Doughty Street, London WC1N 2AE. Tel 01-837 8688.
Closing date for contributions, unless otherwise notified: 7th of month preceding month of publication.

Advertising, other than Members' Ads, should be addressed to: Mrs P. D. Harvey, Sawell & Sons Ltd, 4 Ludgate Circus, London EC4. Tel 01-353 4353

AMATEUR ELECTRONICS G3FIK

ANNUAL HOLIDAYS 1970. We offer our apologies for any inconvenience occasioned to our customers during the absence of '3FIK but are pleased to advise that by the time this appears in print we should be back at full strength and all outstanding enquiries etc. will be speedily dealt with. At the same time may we apologise to those customers awaiting delivery of TRIO 9R59DE Receivers due to the diversion of supplies through the recent dock strike, but these have now become available and all outstanding orders will be quickly cleared.

At the time of going to press we still urgently require good quality used commercial equipment of all types and can offer a spot cash deal and the settlement of existing hire purchase accounts. Please state clearly the condition of equipment offered with the required price against each item and all letters will be acknowledged immediately upon receipt.

We have, of course, excellent stocks of the well established TRIO line and would once again draw our customers' attention to the first-class demonstration facilities available without obligation.

Quality used items are continually coming in and we shall be detailing our stock position in the usual way next month and in the meanwhile would draw to your notice the fact that we have shelf stocks of all items in the G-WHIP range, MEDCO high and low pass filters plus all accessories mentioned in our August advertisement. One new line just arrived is the ECHO DUAL IMPEDANCE HEADSET which merits special mention in our opinion. This is a lightweight padded unit in the modern manner but with the quite exceptional facility of switchable impedance from 8 ohms to 4k. This is accomplished by a tiny slide switch on one earpiece only and, without doubt, this headset fulfils a long-felt need for a unit which can be used around the shack with practically any piece of equipment. The construction, performance and finish of this new headset is truly first-rate and the price post paid is very reasonable at £5 12s. 6d.

Stop Press: Further supplies of brand new AR88D Receivers now in stock.

Adequate S.A.E.'s with all enquiries please. Full credit facilities on ALL sales.

AMATEUR ELECTRONICS, ELECTRON HOUSE, 518/520 ALUM ROCK ROAD, BIRMINGHAM, 8.

Telephones: 021-327 1497 021-327 6313

EMSAC

"Some weeks ago I purchased from you a Nuvistor 2 metre converter, and after using the device I feel I must write and congratulate you on producing such a good piece of equipment at a very reasonable price. The performance goes way beyond my expectations." G8- - - Orpington.

"The converter CN2 arrived safely two days ago. May I say it is a really nice job, pulling in f.b. signals. . . ." JPP Teeside.

". . . Nice to see such a good range of products available for the amateur. Keep up the good work!" GM3- - - Lincoln.

"Thought you would like to hear that the EMSAC CN2 which I collected from you on Sunday morning works very well indeed, just on a rod dipole. . . . I collected calls from Cornwall, Essex and France; not bad for a start." EJW Totton.

"After hearing the results I get from my EMSAC CN1 2 metre converter just using a 19' + 19' dipole a friend of mine said he was thinking of getting on to 2 m very soon, so will you please send details of the CN1 together with all your other products to . . ." WJP Kettering.

These are some of the nice things said by some of the many people who put pen to paper during the last few weeks. We continue to provide good value for money and our goods will be on display for your inspection at the Radio Engineering and Communication Exhibition. We will try to carry sufficient stock to satisfy the demands of those who wish to purchase at the Show. For those who prefer to order by post we can now offer a C.O.D. service as well as the usual C.W.O. At this time all goods advertised are ex stock for immediate delivery. We look forward to meeting you at the Show. (Stand 27.)

,Mike/G3IAR

CN1 **190/-.** P. & P. 4/6.
2 Metre converter. Double Nuvistor cascode design. Band-width better than 4db over band. Measured NF better than 3db. Complete with 38·666MHz crystal for 28–30MHz IF. Low Z cathode follower output. Well proven design.

CN2 **300/-.** P. & P. 6/6.
CN1 together with mains power supply in attractive case. Mains lead, pilot lamp, on-off switch, etc. Ready to switch on. The easiest possible start to VHF reception.

CN3 **190/-.** P. & P. 4/6.
A 4 metres converter similar to the CN1. Complete with 42MHz crystal for 28·1–28·7MHz output.

CN4 **300/-.** P. & P. 6/6.
The 4 metre version of the CN2. Attractive case to match.

PR1 **95/-.** P. & P. 4/6.
State-of-the-art IG/FET preamplifier for 2 metres (RCA 3N128). Gains well in excess of 15db above noise level. Assembled and aligned in small aluminium box for the operating table top. Requires 11–14 volts at only 5mA. Complete with power plug/socket, switch, etc.

PS1 **70/-.** P. & P. 4/6.
Mains PSU for CN1 and CN3 giving 150 volts at 15mA and 6·3 volts at 1A. Can be easily modified to give up to 45mA if required.

KM1 **160/-.** P. & P. 4/6.
RF actuated keying monitor 50–70 ohms, plus morse practice oscillator. Audio mixing from receiver, phone jack socket, volume control, pitch control, loudspeaker. Smart case to match other EMSAC gear. Requires PP6 internal battery.

GV1 **92/-.** P. & P. 7/6.
All band vertical suitable for 1·8–30MHz. 7–23 ft fully adjustable.

GD1 **80/-.** P. & P. 4/6.
Multi band dipole 5RV type. 102 ft. horizontal (18g.). 110 ft. feeder, fibre glass encapsulations.

GD2 **60/-.** P. & P. 4/6.
Smaller version of GD1. 55 ft. top and 90 ft. feeder.

The EMSAC range also available from G3RYV, 20 Allenby Road Maidenhead Berks. Tel: Maidenhead 22551. Evenings/weekends. *SAE with enquiries please*

G3IAR **ELECTRONIC & MECHANICAL SUB-ASSEMBLY CO. LTD.**

Highfield House, St. Clere Hill Road, West Kingsdown, Kent. **Tel: West Kingsdown 2344**

LOWE ELECTRONICS

WELLINGTON STREET, MATLOCK, DERBYSHIRE

Matlock 2817, 2430 after 6 p.m. Bill G3UBO

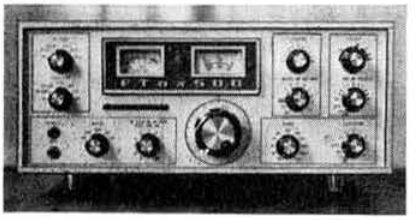
AGENTS

(Evenings and week-ends)

Alan G3MME 4 Southwick Street, Southwick, Brighton. Southwick 4887

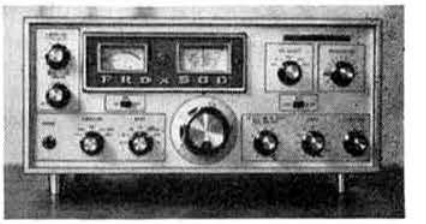
Sim GM3SAN 19 Ellismuir Road, Baillieston, Nr. Glasgow. 041-771-0364

FT 500



509W PEP
VOX, PTT, MOX. 100 and 25kHz marker RIT, Metered ALC. All the usual optional extras fitted as standard, £250. With extra 6 xtal CW filter £270.

FR 500

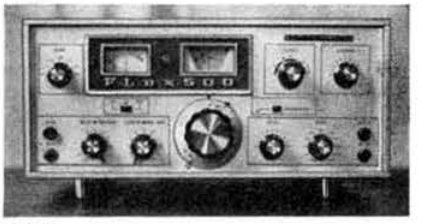


Top band to 2m.
The no compromise AM, FM, SSB and CW receiver for the man who wants the best. £160.

FT 250

240W PEP
VOX, PTT, MOX. 100kHz marker. RIT Metered ALC. Again, usual extras are standard. £160. psu £45.

FL 500

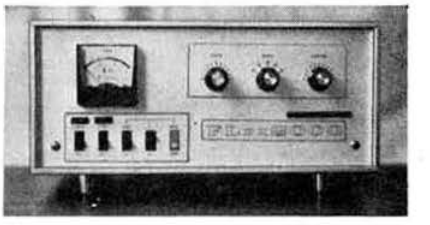


240W PEP
Companion to the FR-500 for transceive or split frequency. Matching it in quality and performance. £145.

FT 150

120W PEP
All transistor except driver and PA. Both AC and DC power supplies built-in. Specially designed for mobile. VOX, PTT, MOX, 100kHz marker, RIT. £215.

FL 2000



To complete the station, there is the FL-2000 linear. 1200W PEP. input. Comfortable legal limit output. Built-in SWR meter, etc. £110.

Hear them—any band, any part of the world, any time.

Try them—at Matlock, or any of the Agents.

SSB Communicating is an art with TRIO JR-310 artistry

SSB COMMUNICATION RECEIVER
JR-310

Communicating with TRIO's JR-310 is indeed a pleasure. But with this SSB receiver, communication has been elevated to never-before-reached artistic heights. Amateurs everywhere are enthusiastic over the suppression of distortion to an all-time, low-low level.

Premium tone reception ranks the JR-310 at the top of the SSB receiver list.

SPECIFICATIONS OF JR-310

* FREQUENCY RANGE 3.5-29.7MHz (7 Bands) * SENSITIVITY 1μV (at 10dB S/N) * IMAGE RATIO More than 50dB * FREQUENCY STABILITY ± 2KHz in 1–60 min after switching on; subsequently within 100Hz per 30 min. * DIMENSIONS 13"(W), 7-3/32"(H), 12-3/16"(D)

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RADIO SOCIETY OF GREAT BRITAIN

FOUNDED 1913, INCORPORATED 1926

MEMBER SOCIETY INTERNATIONAL
AMATEUR RADIO UNION

PATRON: HRH THE PRINCE PHILIP, DUKE OF EDINBURGH, KG

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G. R. Jessop, CEng, MIERE, G6JP
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R. F. Stevens, G2BVN
G. M. C. Stone, CEng MIEE MIERE, G3FZL
E. W. Yeomanson, G3IIR

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A. F. Hunter, GM3LTW
H. E. McNally, GI3SXG
C. H. Parsons, GW8NP
J. R. Petty, G4JW
W. A. Scarr, MA, FBIS, G2WS
F. C. Ward, G2CVV

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Region 4.—East Midlands	T. Darn, G3FGY, " Sandham Lodge " Sandham Lane, Ripley, Derbyshire.
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Region 11.—North Wales	P. H. Hudson, GW3IEQ, "Silhill" Dinas Dinlle, Llandwrog, Caernarvon.
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Region 14.—West Scotland	N. G. Cox, GM3MUY, 191 Maxwell Avenue, Westerton, Bearsden, Glasgow.
Region 15.—Northern Ireland	J. Thompson, GI3ILV, "Albany," Newry Road, Armagh, N. Ireland.
Region 16.—East Anglia	W. J. Green, G3FBA, Meadway, Links Avenue, Brundall, Norwich, Norfolk, NOR 86Z.
Region 17.—Southern	C. Sharpe, G2HIF, 20 Harcourt Road, Wantage, Berks.

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CERTIFICATES MANAGER (VHF)	J.H.B. Hum, G5UM, 27 Ingarsby Lane, Houghton-on-the-Hill, Leicester, LE7 9JJ.
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VHF MANAGER	G. M. C. Stone, G3FZL, 11 Liphook Crescent, Forest Hill, London, SE23.

QTC AMATEUR RADIO NEWS

Mobile operation abroad

RSGB headquarters frequently receives enquiries concerning the customs procedure relating to mobile installations in vehicles taken abroad, and members are advised that it is desirable to obtain an AIT Customs Carnet to facilitate customs clearance of the radio equipment.

The Automobile Association offers advice on this subject, and will also issue carnets to AA members as part of their five star service. Any queries should be addressed to Mr J. A. Yates, Automobile Association, Fanum House, Leicester Square, London WC2H 7LY. Telephone 01-837 8811, ext 456.

Mr Yates is not in a position to answer enquiries concerning reciprocal licensing and these should be addressed to RSGB headquarters.

Morse test fee

The Ministry of Posts and Telecommunications advises that as from 1 October 1970 the fee for the morse test for those persons wishing to obtain an Amateur (Sound) Licence A will be increased to £1. The present fee of 10s has remained unchanged since April 1956 but the cost of conducting the test is now more than three times that sum.

OBE for G2AH

We congratulate Mr H. K. Bourne, G2AH (formerly G2KB in the 'thirties), on the award of OBE which he received in The Queen's Birthday Honours List this year. He has been in the United Kingdom Scientific Mission in the British Embassy in Washington, DC, since 1956 and operates his station in the USA under the terms of the reciprocal agreement.

MUARS, G3VUM

The Manchester University ARS is a very active club, one of the largest in the university, and for all freshmen at Manchester who are at all interested in radio the 5s subscription is a bargain.

Operating on all bands 160m to 70cm—equipment includes a KW2000A, TW 2m transmitter, AR88D receiver, and other sets lent by members—G3VUM is a regular in the universities net.

Foundation for Amateur Radio Inc

This non-profit institution devoted to advancing the interest of amateur radio, with its headquarters in Washington, DC, has established a hospitality committee with the objective of providing visiting foreign licensed radio amateurs with an opportunity to meet local active amateurs and, if desired, visit a local amateur station. Any visiting foreign amateur can get in touch with the committee by calling 893-8383. It will be appreciated if calls are made between the hours of 0800 and 2000 daily. Arrangements can be made to greet the foreign visitor and give him an introduction to the USA capital as well as to local amateur radio.

RSGB Region 10 ORM

University College, Park Place, Cardiff
Saturday 26 September 1970

1pm	Meeting opens
3pm	Business meeting
5pm	Buffet
6.15pm	Regional lecture

Council will be represented by the Vice-President, Mr Brian Armstrong, G3EDD; Mr Roy Stevens, G2BVN; and the Zonal Representative, Mr Cyril Parsons, GW8NP. The chairman will be Mr David Thomas, GW3RWX, Regional Representative.

There will be an exhibition of commercial equipment; competitions for home-constructed equipment, best mobile installation; time of arrival prize for mobile visitors; a raffle. Talk-in stations will be in operation on top-band and two metres. Adequate car parking facilities exist on the site.

The regional lecture will be given by Mr Keith Winter, MSc, BMus (Wales), Leverhulme Lecturer in Music and Physics in the Department of Physics, University College, Cardiff. It will be entitled: "New sounds for music".

Tickets: 15s, obtainable from Mr Roy Morris, GW3HJR, 22 Millfield, Pontyclun, Glam.

Closing date for ticket applications: Tuesday 22 September.

Region 1 Regional Lecture

Welman House (NWGB Headquarters), Moss Lane, Altrincham

8pm 23 October 1970

"Why vhf", by T. P. Douglas, G3BA

Admission free by ticket obtainable from B. O'Brien, G2AMV, 1 Waterpark Road, Prenton, Birkenhead, Cheshire; or W. M. Furness, G3SMM, 16 Coniston Avenue, Sale, Cheshire. Applications must be accompanied by stamped addressed envelope.

Ample car parking facilities.

G3PDM leaving for the USA

Peter Martin, G3PDM, is emigrating to the USA this month and is temporarily unable to answer technical queries from readers. He hopes to be back in circulation shortly, and plans 14MHz cw/ssb activity from the Massachusetts area.

"With many thanks", G4PJ

Mr W. (Bill) L. Honeywill, G4PJ, of Salcombe, Devon, wishes to thank all friends and well-wishers for their cheery messages and for the many visits paid to him while in hospital in Plymouth.

He writes, "I never knew I had so many good friends."

RSGB Region 1 ORM

The Floral Hall, Southport
Sunday 27 September 1970

Council will be represented by Mr J. R. Petty, zonal representative; and Mr F. C. Ward.

Talk-in stations operational from 1100bst: G3SZV/A, 160m; G3VNQ/A, 2m; G3XIM/A, 4m.

Features will include the presentation of regional trophies, trade stands and an after-tea lecture.

There will not be a formal lunch, but places may be booked in advance via G2CUZ. Bars will be open as usual.

High tea will be provided and it is requested that bookings be made early.

Tickets 15s from G2AMV, 1 Waterpark Road, Prenton, Birkenhead; or G2CUZ, 34 Sandbrook Road, Ainsdale, Southport.

RAE Courses, 1970-1

Barking, Essex. Gascoigne Recreation Centre, Gascoigne School, Morley Road, Barking. Tuesdays 7.30pm commencing 22 September.

Bedford. Westfield School, Chester Road, Bedford. Details from the headmaster, J. B. Hodgson, BSc.

Birkenhead, Cheshire. Birkenhead Technical College, Thursday evenings. Enrolment 7–10 September.

Bridgnorth, Shropshire. Bridgnorth College of Further Education, Stourbridge Road, Bridgnorth. Thursdays 7–9pm commencing 24 September. Enrolment: 6.30–8.30pm 8 September at Main Building, Stourbridge Road; 6.30–8.30pm 9 September, Listley Street Annexe; 10am to 12.30pm 12 September, Dept of Employment & Productivity, Newmarket Buildings.

Colchester, Essex. Technical College, Seepen Road, Colchester. Commencing 6.30pm 29 September. Enrolment 14 to 16 September or at first class. Morse practice with radio club meeting each Wednesday.

Crawley, Sussex. Ifield Evening Institute, Lady Margaret Road, Ifield, Crawley. Mondays 7–9pm commencing 21 September. Enrolment 7–9pm 16 and 17 September.

Gosforth, Northumberland. Gosforth Evening Institute, Gosforth Secondary Modern School. Tuesdays 7–9pm commencing 15 September, 24 weeks duration. Details from school or G3BIK.

Grantham, Lincs. St Hugh's Secondary School, Dysart Road, Grantham. Mondays 6.45pm commencing 28 September. All enquiries and enrolment at the school or at the College of Further Education.

Grimsby, Lincs. Grimsby Adult Education Institute, Hereford Centre, Ely Road, Grimsby. Mondays 7–9pm. Enrolment 7–9pm 8, 9 and 10 September.

Scottish VHF Convention

The Scottish VHF/UHF RSGB Convention will be held at the Queen's Hotel, Dundee, on **Sunday 11 October**, commencing at 2pm.

Afternoon programme
"Latest developments at vhf", by G. M. C. Stone, G3FZL, CEng, MIEE, RSGB vhf manager.
"Cascodes, Q and you", by M. C. Hately, GM3HAT, BSc, MIEE.
"Space flight communications", by A. W. Smith, GM3AEL, RSGB regional representative for North-east Scotland.

Guest speaker at dinner
Group-Captain A. H. Dormer, G3DAH, CEng, MIERE, RAF (retd).

Tickets
Full convention; including dinner: 35s.
Afternoon session only: 7s 6d. Dinner only: 30s.
Tickets and information available from Mr G. C. Somerville, GM3KYI, 73 Balerno Street, Dundee.

Mullard Jubilee Exhibition

As part of their Golden Jubilee celebrations, Mullard Ltd are to stage a three-week public exhibition in the electronics centre of their London headquarters

Mullard House, Torrington Place, London WC1.

The exhibition opens on 5 October and will run until 24 October, opening every day (except Sundays) between 1000 and 1800 (2100 on Thursdays). Admission will be free.

The exhibition will trace the history of electronics—linked with the company's own history as pioneers in the field—over the past 50 years. Many interesting examples of vintage and modern electronic equipment will be shown.

One of the main attractions will be a radio transmitter built and operated by Mullard radio amateurs. Some of the company's earliest valves will be used in its construction, and it will be on the air daily on all bands, including two metres.

RSGB members will be very welcome.

Loughborough, Leics. Technical College, Radmoor, Loughborough. Tuesdays 6-7pm (morse), 7-9pm (theory), commencing 15 September. Fee £3 18s 6d.

Plymouth, Devon. Plymouth Polytechnic. Monday and Friday evenings, commencing mid-September. Further details from D. M. Webber, G3ENX, tel 73238.

Princes Risborough, Bucks. Princes Risborough Evening Institute, County Secondary School, Merton Road, Princes Risborough. Mondays and Wednesdays 7pm commencing 14 September. Enrolment 8–9 September.

Wembley, Middlesex. Wembley Evening Institute, Copeland School, Wembley High Road, Wembley. Mondays 7–8pm (morse) 8–10pm (theory) commencing 21 September.

A new approach to vhf/uhf receiver design

PART 2

by C. L. DESBOROUGH, G3NNG*

The main i.f. amplifier (Fig 9)

This is at 2·35MHz and comprises three dual-gate MOSFETS TR19, TR20 and TR21, with TR22 as emitter follower output to drive the detectors. AGC is applied to the three MOSFETS on each gate 2 which are at ac ground. AGC action is improved by the additional bias developed across R57, R61 and R65, which also act as stage decoupling in conjunction with their appropriate capacitors. Half lattice filter sections are used on the input and output of TR19 to determine the overall i.f. selectivity at about 3kHz. If the selectivity is increased beyond this value, tuning is made rather slow and difficult when dealing with a 2MHz tuning range. If greater selectivity is required, then a Q multiplier should be added externally. The filter loads are provided by the gate 1 return resistors (1k) of TR19 and TR20. The i.f. transformers have individual coil Q values of about 100 to give critical coupling on each transformer via the cut-away ferrite assemblies, and to achieve the necessary final signal level for correct detector operation. The age amplifier is driven from the penultimate i.f. stage to prevent bfo injection affecting the age and "S" meter.

The detector system

The detector system is unusual in that cw/a.m. switching is done by the action of a simple toggle switch, SW2, operating between 0V and −10V (Fig 9). In the a.m. position, 0V is selected by SW2 and this returns the "cold" end of the detector load resistor R7 to earth, thus allowing normal rectifier operation by D4. R70 C111 is the 2·35MHz smoothing and C109 is the reservoir capacitor. The output impedance of TR22 may be ignored at about 6Ω. Signal leakage via C110 is negligible as TR24 is cut off. The detected audio from D4 passes via C112 to TR23.

In the cw/ssb position of SW2, −10V is selected which biases off D4 and prevents a.m. detector section. At the same time, TR24 is driven into saturation and the i.f. signal is developed across L41, C116 and hence into the bridge comprising D4, D5 which is balanced at the bfo frequency and unbalanced by the i.f. signal. The resultant af difference is fed via C114 to TR23. By allowing the bfo (TR28) to be switched on with the −10V, this system removes the need for a multipole switch and several leads.

* 22, Westland Road, Faringdon, Berks.

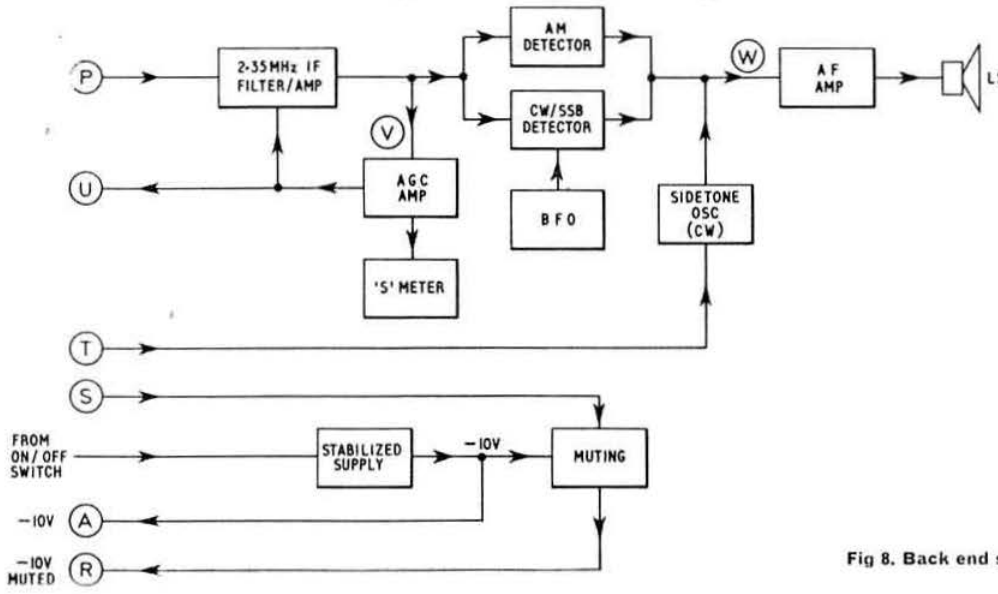
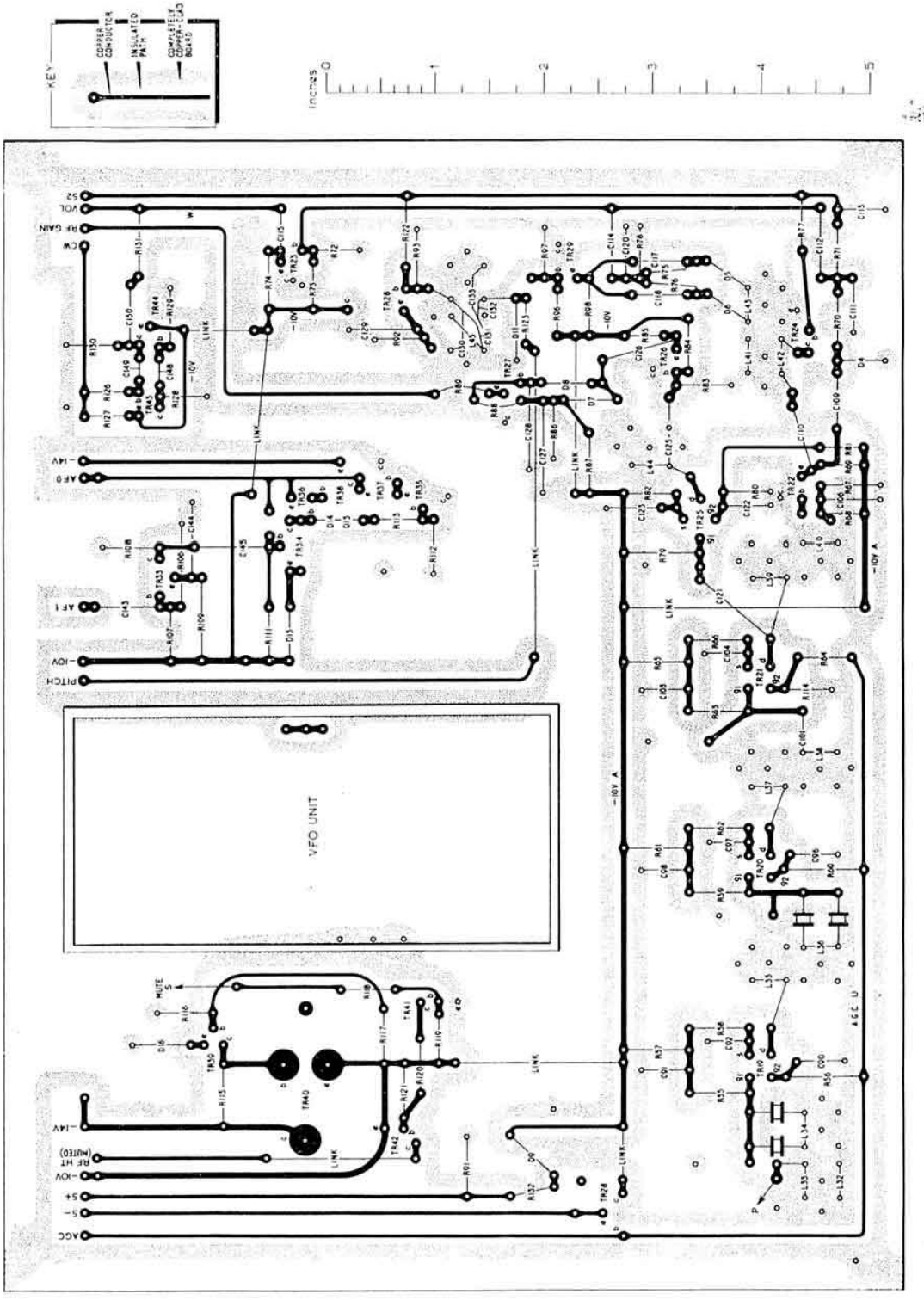


Fig 8. Back end schematic diagram


KEY
COPPER CONDUCTOR
INSULATED PATH
COMPLETELY COPPER CLAD BOARD
INCHES
0
1
2
3
4
5
VFO UNIT
S2
VOL
RF GAIN
CW
AFO
AF1
PITCH
MUTE
RF HT (MUTED)
S+
S-
AGC
-14V
-10V
-10V A
LINK

Upper board

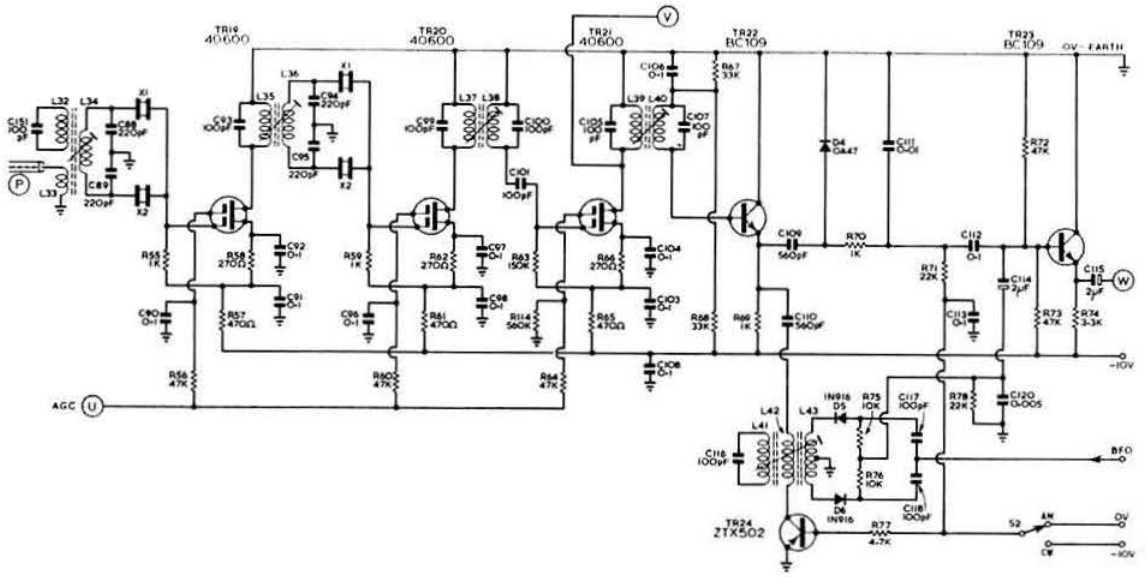


Fig 9. 2·5MHz i.f. and detectors

AGC amplifier (Fig 10)

The agc amplifier is a standard dual-gate amplifier, but with reduced input level from TR20 output via the relatively low value coupling capacitor C121. This stage is followed by an emitter follower TR26 to drive the detector diode D7 and, as with the a.m. detector (Fig 9), C126 forms the reservoir capacitor and hence it has a low value. The rectified negative agc voltage is added to a standing negative dc level determined by R86 and R87 to enable the agc voltage produced to override the manual setting of the rf gain control R90 and reduce the gain of all i.f. amplifiers by reverse agc action.

Variable frequency oscillator and bfo (Fig 11)

It is unfortunate that the lowest frequency that may be used for the vfo without producing any harmonics in at least the 144MHz band and still allow a 2MHz swing in frequency is relatively high and must be within the limits 18·25–20·57MHz. Even so, the 22nd and 23rd harmonics still fall in the 432MHz band but they are adequately filtered and screened out. Although the vfo runs at this high frequency the overall stability is more than adequate provided a good mechanical construction is used. The frequency chosen is 18·30 to 20·30MHz, but if a different lower limit is chosen then obviously different filter crystals would be required in the 2·35MHz i.f.

A bipolar device, TR30, is used as the active element as the fet offers little advantage and is more expensive. The base and emitter are tapped into the tuned circuit at an impedance determined by C139, C140 and the combination C137, C138 (temperature compensation), while C135 is a frequency coverage adjustment in association with L46. Two emitter followers are used to give complete isolation of the oscillator from the output, and the circuit delivers a 300mV peak signal at a low impedance. A second output is taken to a rear socket for use with possible add-on units.

The bfo, TR28, is a similar type oscillator to TR30, but at 2·35MHz and with a few kHz swing in frequency either side of the i.f. being provided by D11 acting as a variable capacitance diode. It is, in fact, a junction rectifier, as this provides a large capacity change for a given reverse bias change and hence the resultant frequency swing will tend to be more linear over the very small voltage change used. The reverse bias is provided by R95 from the −10V supply via R123 to prevent damping the tuned circuit. R94 is essential to prevent the bias from reaching too low a value such that D11 is taken into conduction by the signal. The level of output from the emitter follower TR29 is determined by C133, and is a nominal 300mV. The more temperature sensitive components, C130, C131, C132 and C133, are mounted inside the oscillator can.

Main audio amplifier (Fig 12)

This is the conventional transformerless output stage with the output transistors taken to the full supply voltage. If the supply voltage is unsuitable (eg unsmoothed) then the ht for TR37 TR38 may be taken from the −10V rail with reduced audio output. D15 provides a reference emitter voltage which enables the voltage at TR37 emitter to be preset to −6·5V by R110 and R111, and hence ht voltages of up to −15V may be accepted without modification or adjustment. The diodes D13 and D14 compensate for the e/b volts drop of TR35 TR36 TR37 without loss of af signal. The dc blocking capacitor C147 may be conveniently located in the speaker unit or mounted on the rear panel as it is rather large. With an ht of 13·5V applied to TR38 and TR37 then 1W of audio is available.

Power supply system

This is shown in Fig 12 and will accept a dc input between 11 and 15V at approximately 120mA and with positive earth. D16 provides a reference voltage for the amplifier

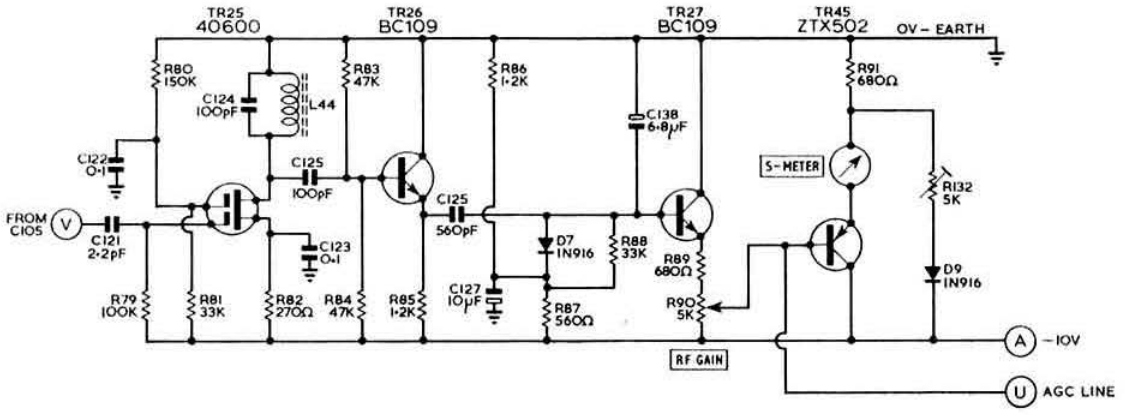


Fig 10. AGC amplifier and "S" meter. The 560pF capacitor shown as C125 should be C126

TR39, and the error signal from variations in the −10V line is applied to its base. TR39 then drives the emitter follower TR40, which is a germanium device for cheapness although the silicon MJ2267 could be used as it has an equivalent low saturation voltage.

Muting circuit

The muting circuit comprises two transistors, TR41 and TR42, which are biased hard on so that only 0·1V of ht is lost across TR42. Application of an earth potential at the mute terminal will cut both transistors off, thus removing the −10V muted ht from the receiver front end.

CW monitor

A cw monitor (Fig 13) comprising a simple 1kHz multivibrator may be used as a tone oscillator by allowing the key to earth point X. The output is connected to the af gain control (point W) via a suitable volume controlling resistor, R131, which may be altered as desired.

Construction

Very little need be said of construction, as the receiver is designed on two printed boards, each with a copper plane on the non-printed side. Some limited experience in vhf construction is expected.

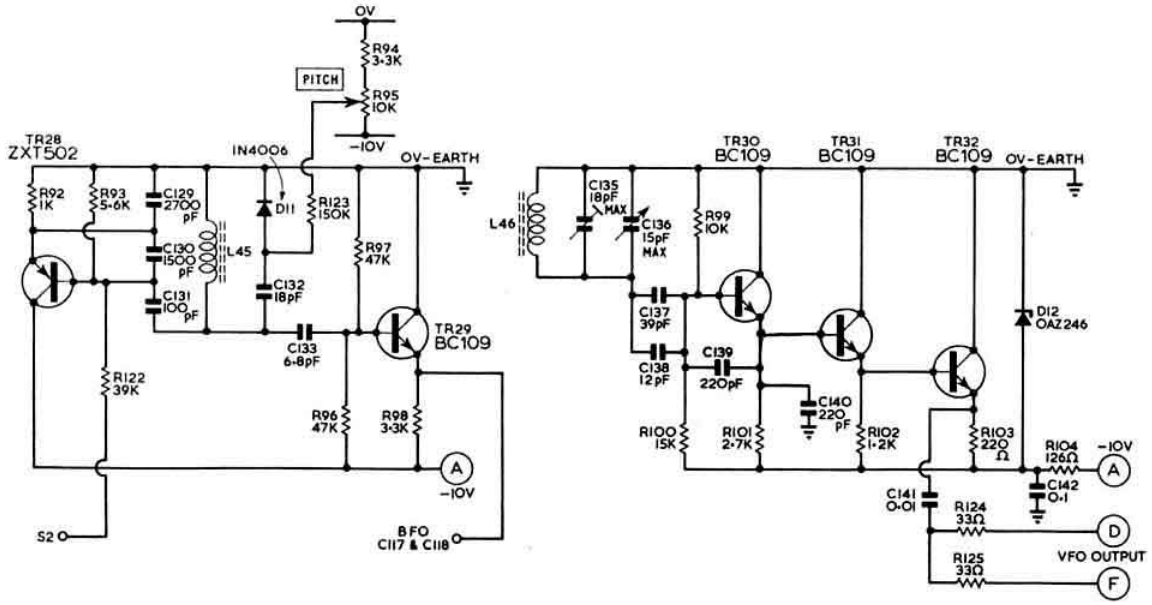


Fig 11. BFO (TR28) and vfo (TR30) oscillators

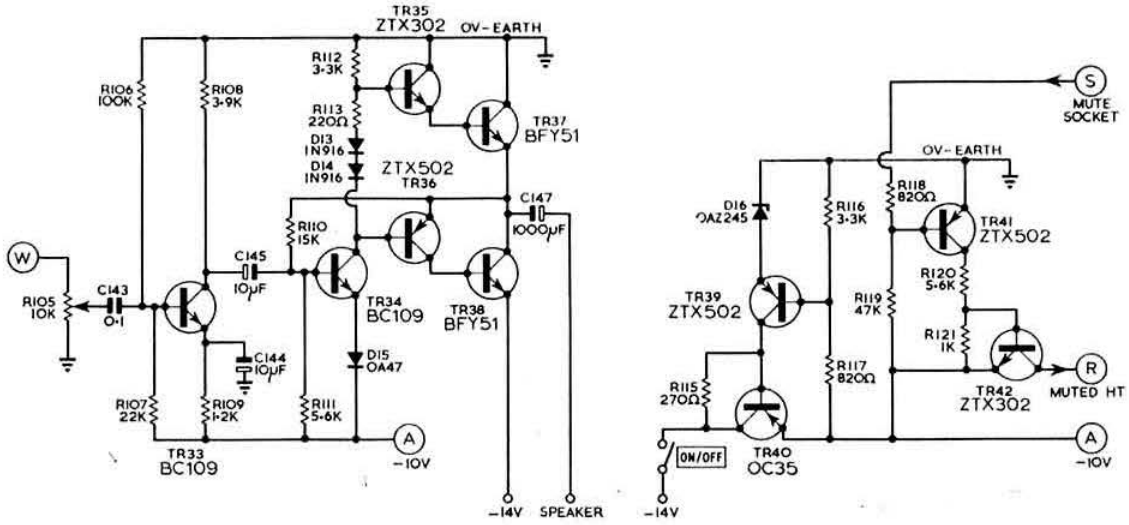


Fig 12. Audio amplifier (TR33 TR38), stabilizer (TR34 TR40) and muting (TR41 TR42)

The main points to remember are:

(1) Keep all leads as short as possible at frequencies above 2·35MHz (especially decoupled points such as emitters and sources).

(2) The neutralizing coil, L17 and RFC1, RFC2 (Fig 4) should be mounted at least ¼in clear of the earth plane.

(3) All wires from both boards to the front panel or from board to board should be taken to either side of that board and made into a cable loom held to the box to prevent stray pickup and detuning circuits by trailing wires.

(4) All aerial input sockets are mounted directly on to the printed board.

(5) All components (other than a few coupling capacitors) are mounted on the copper plane side of the boards and, where indicated on the layout diagram, capacitors are mounted inside i.f. cans.

(6) All signal leads are small coaxial cables.

Mechanical details of a suitable box or case are not described in detail but left to the constructor's own taste. A suitable case would be 10½in by 10½in by 6in high, with the rear panel split lengthwise at half height and hinged to allow the upper board to be raised clear of the lower board for access. All screens are 1¼in high of double copper-clad board, with the exception of the vfo box which is 1½in high. The vfo circuit has not been made in printed form yet and the components are mounted on a small board in the vfo box with the main tuning capacitor C136. The outputs D and F (Fig 11) are coaxial and the vfo unit must have a cover.

Constructors may also like to add a safety diode (any device with a 250mA capability) in series with the 12V input to prevent damage by applying wrong polarity input supplies.

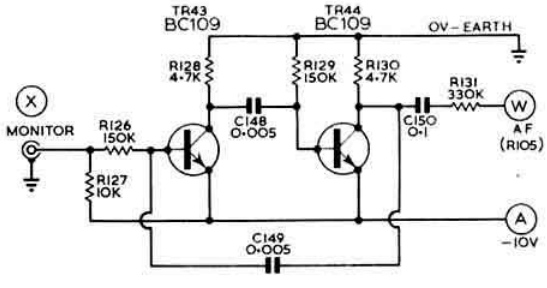


Fig 13. CW monitor

Setting up instructions

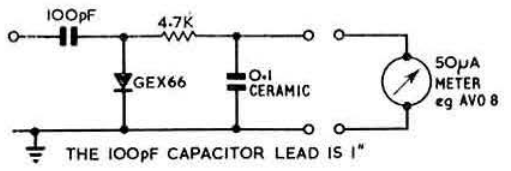
Assuming the receiver is wired correctly, apply a correct polarity input supply of between −12V and −15V and check that the −10V line is correct and that the potential at TR37 emitter is approximately −6·5V.

The 32MHz oscillator is set by inserting the slug in the "cold" end of L1 until the circuit oscillates and drive appears at TR2 input as measured by the voltage across R5. C5, C8 and C11 are adjusted for maximum voltage across the emitter resistor of the next stage. Table 4 gives typical figures for drive, and any large variation on these should be taken up by adjusting the tapping point of the coupling capacitors (C6, C9, C12) on the preceding tank coil. C14 and the spacing of L6 are set for maximum dc voltage across R28. Tune both C64 and C65 for maximum oscillator current and set C65 finally for maximum signal strength on a 1,296MHz signal.

The vfo should be set by L46 and C135 so that the main variable, C136, will allow coverage of the range 18·35 to 20·35MHz.

If a suitable absorption wavemeter for 100–400MHz is not available, then the ht to the vfo is disconnected and the following procedure may be adopted. Firstly, the circuit shown on Fig 14 should be constructed—the values given were those used to give the Table 4 readings on an AVO 8 50μ range, although the actual reading is not too critical.

Fig 14. If a suitable absorption wavemeter is unavailable, construct this circuit



For the purpose of initial setting up, a small loop should be added for rf pickup.

Set the band switch, S1, to 144MHz and tune C20, 21, 24, for maximum rf output (96MHz) as indicated by the pickup loop, then switch to 432MHz and tune C30, 31, 35, for maximum output (384MHz). Give all six trimmers an extra ½-turn towards minimum capacity and reconnect the vfo supply voltage. Reduce the value of C30, 31 and 35 in turn to give the correct output peak at the local oscillator injection frequency of 403MHz and stagger tune them to give a uniform output from 402·3 to 404·3MHz. Select the 144MHz band and repeat to give an output of 114·3 to 116·3MHz.

For those unable to acquire the loan of a signal generator the problem of setting up the IFs is not so easily solved. However, the 2·35MHz i.f. chain and agc amplifier may be aligned by tapping off a portion of the bfo signal which may be set to the i.f. frequency by L45 and swung through the passband with R95.

It is also possible to roughly align the 29·65MHz i.f. by setting for a slight increase in noise at the correct frequency and finally adjusting them on a 144MHz signal. It should be stressed, however, that an accurate signal generator is the best method.

The 144MHz amplifier is set with C50 peaked at 145MHz, C53 at 144·2MHz and C54 at 145·8MHz to give an even response over the band but a sharp cut off outside the band. C49 is set at about 1·8pF for optimum signal to noise ratio and not maximum signal strength.

The 432MHz amplifiers are similarly set with C57, 60, 63, for bandpass, and C56, 61, at approximately 1pF for correct matching.

The broad band i.f. amplifier comprising TR15, TR16 is used as first i.f. amplifier for the 1,296MHz band and is run at low Q values to achieve a uniform response over 2MHz bandwidth. C67 should be peaked at 144·6MHz and C70 at about 145·4MHz. C72 should be about 3pF for correct matching.

Should agc begin to be produced on very low signals, then C121 should be reduced, but, as the value is only 2·2pF, it may be found easier to slightly detune L44. The "S" meter circuit is not meant to be an accurate measuring system, but with an extra potentiometer in series with the 1mA meter a reasonable calibration is possible if so required. R92 is used to set the 1mA meter to full scale reading with the gain control R90 backed off.

Choice of components

Constructors undertaking a project of this nature do not do so lightly, and cheap components are false economy. To achieve full performance capabilities only good quality components should be used—especially at the front end. The feedthroughs used have been the CFT3000, but equally good results have been obtained with discoids. The 40600 mosfet may be replaced by the more expensive 3N140 with no changes, and the 144MHz mixer TR10 may be changed to a TA7153, as discussed earlier, for a very small improvement in overall noise figure, in which case R32 should be reduced to 68Ω.

TABLE 2

Top board components

R55, 59, 69, 70, 92, 121	1kΩ	All resistors ¼ watt
R56, 60, 64, 72, 73, 83, 84, 96, 97, 119	47kΩ	10 per cent eg Erie type
R57, 61, 65	470Ω	15
R58, 62, 66, 82, 115	270Ω	
R63, 80, 123, 126, 129	150kΩ	
R67, 68, 81, 88	33kΩ	
R71, 78, 107	22kΩ	
R74, 94, 98, 112, 116	3·3kΩ	
R75, 76, 99, 127	10kΩ	
R77, 128, 130	4·7kΩ	
R79, 106	100kΩ	
R85, 86, 102, 109	1·2kΩ	
R87	560Ω	
R89, 91	680Ω	
R90, 132, 105	5kΩ pot	
R93, 111, 120	5·6kΩ	
R95	10kΩ pot	
R100, 110	15kΩ	
R101	2·7kΩ	
R103, 113	220Ω	
R104	126Ω	
R108	3·9kΩ	
R114	560kΩ	
R117, 118	820Ω	
R122	39kΩ	
R124, 125	33Ω	
R131	330kΩ	
C88,89, 94, 95, 139, 140	220pF	Suflex 63V 10 per cent
C90, 91, 92, 96, 97, 98, 103, 104, 106, 108, 112, 113, 122, 123, 142, 143, 150	0·1F	STC PMA 0·1/100
C93, 99, 100, 101, 105, 107, 116, 117, 118, 124, 125, 131, 151	100pF	Suflex 63V 10 per cent
C109, 110, 126	560pF	Suflex 63V 10 per cent
C111, 141	0·01F	Hi K type PAZ
C114, 115	2F	15V
C120, 148, 149	·005F	Hi K
C121	2·2pF	
C127, 144, 145	10F	15V
C128	6·8 F	15V
C129	2700pF	Suflex 63V 10 per cent
C130	1500pF	Suflex 63V 10 per cent
C132	18pF	
C133	6·8pF	
C135	18pF max	CO04EA/18E
C136	15pF max	double bearing type
C137	39pF	Suflex 63V
C138	12pF	Ceramic Erie P100/ZD 10 per cent
C147	1000	20V
TR19, 20, 21, 25	40600	
TR22, 23, 26 27, 29, 30, 31, 32, 33, 34, 43, 44	BC109	
TR24, 28, 36, 39, 41, 45	ZTX502	
TR35, 42	ZXT302	
TR37,38	BFY51	
TR40	OC35 or similar	
TR46	OC29	
D4, 15	OA47	
D5, 6, 7, 8, 9, 13, 14	IN916	
D11	IN4006	
D12	OAZ246	
D16	OAZ245	
X1, 2·3500MHz X2, 2·3475MHz		

TABLE 3

Coil details

L1	15 turn 24swg enam on 722/1 former, F16 core, Tap 1t from "cold" end.
L2	8½ turn 20swg, ¼in id $\frac{5}{16}$in long. Coil tap 3½t from "hot" end.
L3	4 turn 20swg ¼in id ⅜in long. Coil tap 1½t from "cold" end.
L4, L5, L6	1 turn 20swg ¼in id ⅜in long. Coil and C28 ½t taps.
L7, RFC1, 2	7 turn 24swg enam ⅛in diam.
L8, 9, 10	5½ turn 20swg ¼in id. All taps 1½t from "hot" end.
L11, 12, 13	1½ turn 18swg ¼in id ½in long. All taps mid-point.
L14, 15	16½ turn ¼in id 18swg. Drain 3½t from "hot" end, o/p is 2½t from "cold" end.
L16	4 turn 18swg ¼in id ½in long.
L17	10 turn 24swg enam on F16 core.
L18, 19	5 turn 20swg ¼in id ½in long. Drain tap 1t from "hot" end. "Cold" ends of coils ¼in apart.
L20, 21, 22	½ turn of ¼in copper strip 1½in long. C58 tap half turn.
L25, 26	4½ turn ¼in id. D2 tap 2t from "cold" end.
L27, 28, 29	16½ turn 18swg ¼in id. Drain and G1 taps 2t from "hot" end. Q and C80 taps 2t from "cold" end.
L30, 32, 34, 35, 36, 37, 38, 39, 40, 41, 44, 45	32in of 42swg cotton-covered, wave wound (by hand) over ¼in. L30, 44, are Neosid Assembly type A—remainder are Assembly type B. All coils use cup cores (open wall) 1073/F16 and cores type F16.
L31, 33	6 turn 42swg cotton-covered wound close to L30, L32.
L46	16 turn 24swg enam on 722/1 former (as in Assembly A) with F16 core.
L23, 24	4¼in long ¼in od copper tube mounted in printed board box 4¼in by 2in by 1in high and with centre screen. 0BA bolts form C64, C65. The centre screen has aperture to take D2. A piece of board ¼in square to form a holder for D2 is insulated from the box by 10thou terylene or polythene to form C66.
L42	5 turns } 42swg cotton-covered close wound to L41.
L43	7+7 turns } 42swg cotton-covered close wound to L41.

TABLE 4

Typical readings for drive to oscillator sections

(i) Crystal chain
Voltage across R5 approximately 1·0V.
Voltage across R7, R9 approximately 0·6V.
Voltage across R7 approximatley 0·5V.
(ii) G2 of mixers TR10, TR11 approximately 15μA (this low value is due to the shunting effect of test circuit).
(iii) VFO output (loaded by mixers) approximately 23μA.
(iv) BFO output at junction of C117, C118 approximately 35μA.

Note. Readings (ii), (iii) and (iv) were taken using the test circuit of Fig 14.

Results

A total of three receivers have now been built and all showed almost identical performance. Although no "frigs" have been necessary to get them working, this is no guarantee that all others built will go first time. It does mean, however, that if the layout given is followed, a minimum of trouble should be experienced.

The receiver has been successfully used portable on several contests, as well as the home station receiver, with excellent results. Tests have been conducted on the same sites as high power fm BBC and ITA transmitters with no spurious responses or strange effects, and, of course, breakthrough is eliminated.

I should like to thank the members of the AERE Radio Club for all their valuable ideas and assistance, and especially Cliff Sharpe, G2HIF, with whom the project was started and whose contributions and ideas have been very considerable.

The RSGB News Bulletin Service

The RSGB News Bulletin, callsign GB2RS, is broadcast every Sunday morning. This bulletin can be received on either vhf or hf, which gives almost complete coverage of the British Isles. It keeps radio amateurs up-to-date about happenings in the world of amateur radio and gives information on coming events, supplementing and bridging the gap between successive issues of *Radio Communication*

SCHEDULE

Time (bst)	Frequency (MHz)	Location of station
0930	3·6	SE England
1000	3·6	Severn area
	145·1	SE England (Farnham, Surrey, beaming NW)
	145·8	Aberdeen (beaming W)
1015	145·8	Belfast
	145·8	Belfast (beaming S)
1030	3·6	N Midlands
	145·1	SE England (Farnham, Surrey, beaming SW)
	145·93	NE England (Bishop Auckland, beaming N)
	145·8	Aberdeen (beaming SW)
	145·3	Birmingham area (beaming NW)
1045	145·93	NE England (Bishop Auckland, beaming E)
1100	3·6	NW England
	145·3	Birmingham area (beaming SW)
1130	3·6	SW Scotland
	145·5	Leeds (beaming N)
1200	3·6	NE Scotland
	145·5	Leeds (beaming E)

Exhibitions—Beacons—Conventions—Contests—Local events
Rallies—Scientific projects—Meetings—Licensing—Clubs
Propagation reports—Lectures—Field days—Expeditions

EVENTS DIARY

As all organizers of events such as Mobile Rallies, Conventions, Official Regional Meetings etc know, the choice of a date which will not clash with that of some other major function is something of a problem, and there have in the past been occasions where due to lack of communication the dates of quite important events have clashed—with unfortunate results.

With this difficulty in mind, and at the request of a number of RSGB groups and affiliated societies, the Council of the RSGB has agreed to maintain a master **Events Diary** in which it is proposed to enter details of all functions and to which any person planning an event can have access.

It will be realized that the success of this scheme will depend entirely upon the dates and details of functions being registered with the diary keeper well in advance and that, at the outset, it will probably be a month or more before the diary will contain much detail, but it is hoped that the system should be in full swing for the 1971 season.

Members wishing to register a date should send details, in block letters, to the diary keeper giving the name of the function, the date and time, and the organizer's name and address. Do NOT send the information to RSGB headquarters, but if the sender indicates that he also wishes it to be published in *Radio Communication* it will be passed to the editor at the appropriate time.

Members wishing to enquire whether a date is "free" should write to the diary keeper enclosing an sae for a reply. Alternatively, a telephone call will obtain the information immediately. Do NOT phone RSGB headquarters as the information will not be available there.

The Society cannot be responsible for wrong information being given where a date has not been registered or has been changed without notification.

The diary will be kept by E. W. Yeomanson, G3IIR, at 32 Gaynesford Road, London SE23, telephone 01-699 2661, to whom all communications concerning it should be addressed.

A vhf fet dip oscillator

by A. L. MYNETT, BSc, G3HBW*

THE dip oscillator described here covers the band from 29 to 460MHz in four overlapping ranges with plug-in coils or loops as tuning elements. It was designed to provide, in conjunction with the hf dip oscillator featured in the April 1966 issue of the *RSGB Bulletin* (and in the *Radio Communication Handbook* and the *VHF-UHF Manual*), complete coverage from 0·6 to 460MHz.

The ranges of the two instruments overlap from 29 to 150MHz, but the new model provides more satisfactory operation than the original one from 80 to 150MHz.

The dip oscillator employs two Texas 2N5245 (TIS88) junction-gate FETS in a Kalitron circuit, tuned with a split-stator 43pF capacitor (Fig 1). A balanced diode detector is used, to avoid introducing non-symmetrical loading on the oscillator, and this feeds a BCY70 dc amplifier which has a 1mA meter in its collector circuit. In common with the lower-frequency model, the oscillator dc supply may be switched off to convert the instrument to a sensitive wavemeter or, when phones are plugged into the collector-circuit jack, to a modulation monitor.

An internal PP3 battery provides the 9V at 6mA required by the unit.

* 10 Prior Grove, Chesham, Bucks.

Construction

A small aluminium box with a flanged lid serves to house the fdo, the battery being clipped inside the lid (Fig 2).

An attempt has been made to design the instrument so that it is possible simultaneously:

(*a*) to observe the meter and the dial,
(*b*) to operate the tuning knob, and
(*c*) to point the coil at the circuit under test,

without either performing acrobatics or dislocating the shoulder. This has been achieved by mounting the tuning capacitor laterally with a drum type of dial which may be viewed through a rectangular window at the front, where the meter is of course also situated. The tuning capacitor is operated via a 6 to 1 ball-drive by a knob on the right-hand side of the box. There is a small handle on the left-hand side and the coils are plugged into a socket on the back. It is possible to reverse the whole arrangement to suit a left-handed operator.

The dc amplifier transistor and the main components are mounted on a miniature 10-way ceramic tag-strip, with one tag removed to clear the dial-drum. This tag-strip is placed directly above the coil socket at the back of the unit, and, for those without the use of miniature soldering irons, it may to a certain extent be pre-wired. Two 18swg aluminium brackets support the ends of the tuning capacitor (Fig 3). The 6 to 1

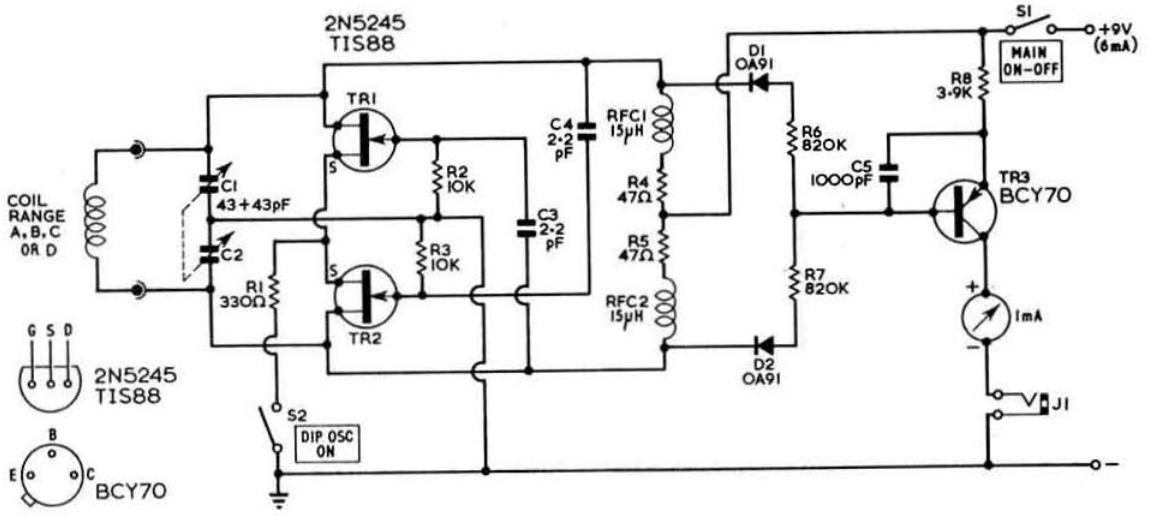


Fig 1. Circuit diagram

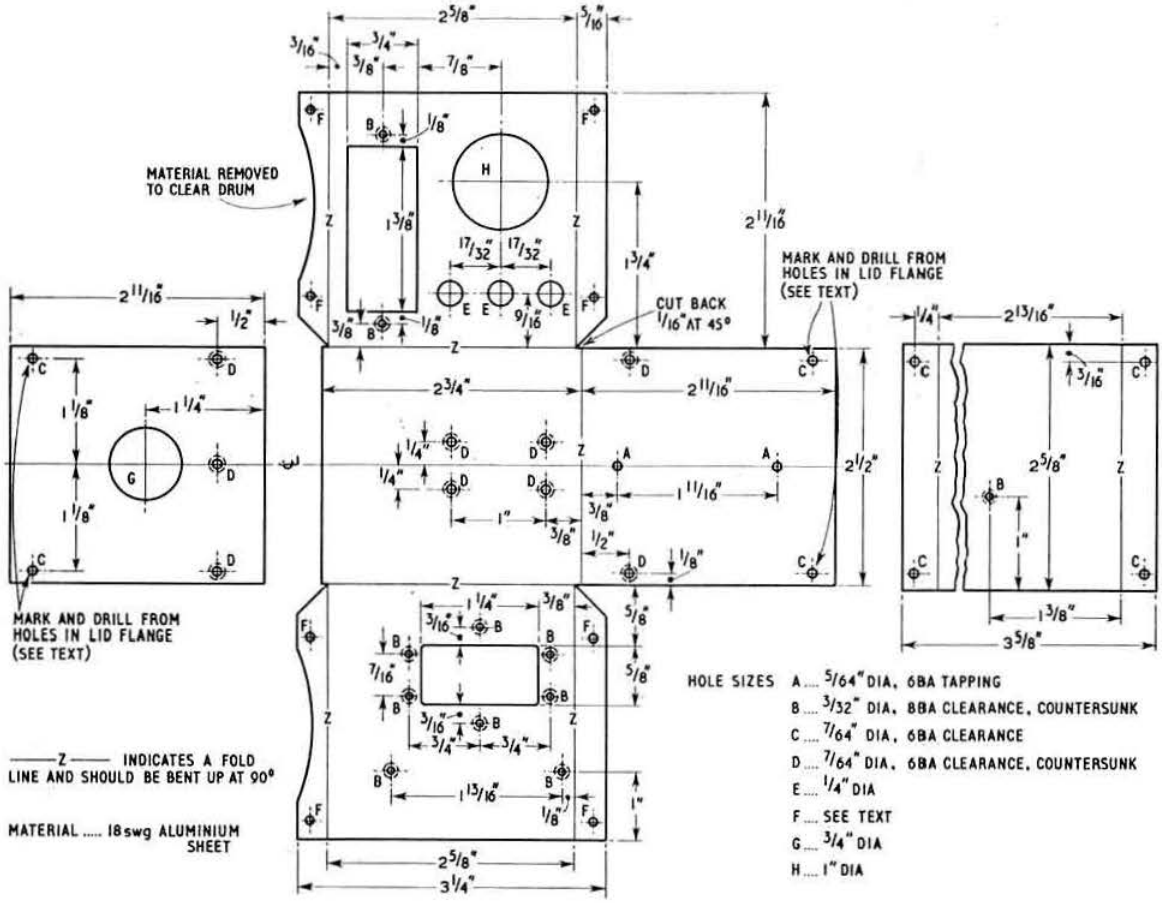


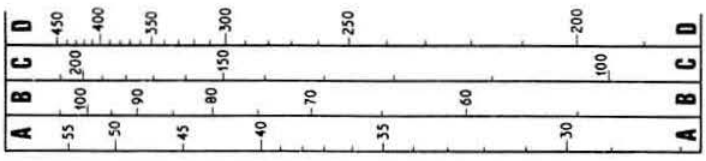
Fig 2. Box and lid

reduction drive is bolted to the side-wall of the box. This particular side-wall is not made part of the box proper in order that the drum and drive may be more easily fitted to the tuning capacitor.

The four holes required for clamping the lid against the box should be drilled 6BA clearance in the lid first, and then marked through on to the box and drilled 6BA tapping size through the box and the flange behind it (Fig 2). The holes in the box should then be very carefully drilled No 6BA clearance, leaving the 6BA tapping size holes in the flange, which should then be tapped. A similar procedure should be followed with the holes in the bottom of the box, resulting in four No 6BA clearance holes in the box and corresponding 6BA tapped holes in the flange behind each of them.

The coil socket and the coil mounting strips are made from $\frac{1}{8}$in-thick PTFE sheet, although polythene or even polystyrene are acceptable (Fig 4). Two OZ-type wander-plug sockets are mounted on the socket strip. It is probably best to remove most of the plastic material at the open end of each socket by cutting carefully around it with a fine hacksaw and then cleaning up the remainder with a file. Two nuts will then be required per socket to fix it. The two fixing holes at the rear of the socket strip on the drum side of it should be countersunk to accommodate the 8BA nuts so that they do not foul the drum. Slightly undersized holes are drilled or reamed in the four coil-mounting bases and then the suitably-shortened OZ plugs are "self-tapped" into these holes. In the prototype model, one 3mm and one 4mm plug and socket were used to obviate inadvertent reversal of the coils, but this precaution is not now thought to be absolutely necessary as the resulting difference in calibration is very small, even on the top range. In addition to the four screws and nuts holding the ends of the coil socket, the centre is held firmly by stretching a length of 18swg wire between two soldering tags fixed to the box; the upper one of these is also used as an earthing point for the gate resistors.

The coil for the lowest frequency range, "A", is wound on a short piece of $\frac{1}{2}$in-diameter polystyrene rod and then cemented in place (Table 1). Connecting and supporting legs each $1\frac{3}{4}$in long are made from 13swg enamelled copper wire. The next range, "B", is self-supporting and wound directly with 13swg wire, also with extension pieces $1\frac{3}{4}$in long.



Range "C" has a simple rectangular loop of 13swg enamelled wire, and the highest frequency range, "D", requires the two plug sections to be still further shortened (see Fig 4), and then a strip of copper or beryllium copper sheet is soldered straight across their ends.

The scale drum is a standard 2⅛in-diameter type, with a bush drilled ¼in diameter, and is intended for cord drives. However, for this application a ⅜in-wide strip of white plastic sheet or card is glued around its periphery (Fig 5). A couple of 8BA countersink screws in holes tapped in the edge of the drum assist in holding the scale strip in place while the glue is setting and may of course be left in place permanently. The writer used $\frac{1}{16}$in thick Ivorine sheet for the scale and then, when the glue had set hard, the drum bush was held in a lathe collet and the scale was very carefully skimmed to true it up, which also helped to make a good surface for writing upon in Indian ink. (*A full-scale reproduction of the strip with the scale printed on it is given at the top of this page. The reverse side carries no print so that it can be cut out by constructors.*)

Components and wiring

It is essential in most cases that the miniature components specified should be used (Table 2). This applies particularly to

(*a*) the two drain-gate 2·2pF capacitors, C3 and C4;
(*b*) the two gate-leak 10kΩ resistors, R2 and R3;
(*c*) the two OA91 diodes; and
(*d*) the two 15μH rf chokes, RFC1 and RFC2.

The wiring in the main rf circuit should, of course, all be kept very short (Fig 6). This applies especially to the oscillator common-source lead (no more than ¼in long), the wires to the 2·2pF feedback capacitors, and the leads from the fet drain terminals to the tuning capacitor upper tags. The upper and lower stator connections of the tuning capacitor are strapped together with a $\frac{3}{16}$in-wide piece of copper foil. Also, the tuning capacitor main rotor terminal is connected to an 8BA soldering tag on the fixing bracket by means of a similar copper foil strap.

It cannot be too strongly emphasized that the above-mentioned points and the wiring scheme shown in Fig 6 and in the photographs must be rigidly followed if satisfactory operation up to the top of range "D" is to be obtained. The intrinsic problem of covering the top range with this type of design can perhaps better be appreciated if one thinks about making a gdo for 46MHz with a split-stator tuning capacitor 1ft 3in long. In the prototype, the top frequency could not be raised above 410MHz while simultaneously achieving satisfactory operation over the whole of the range until the strapping of the tuning capacitor stators

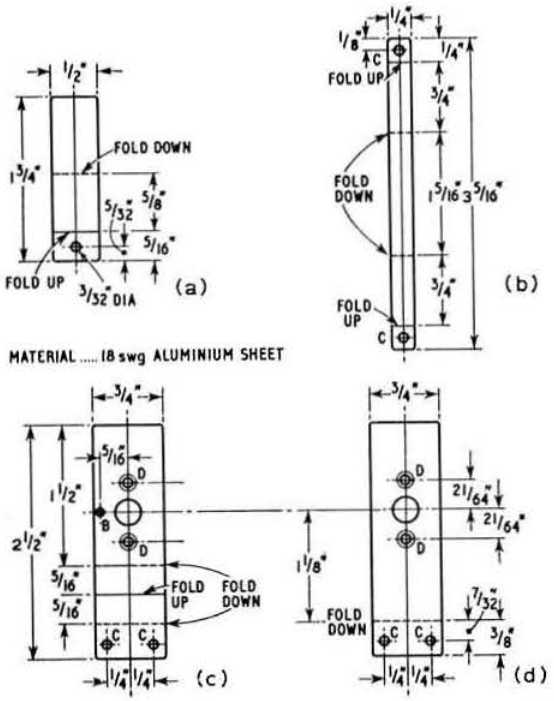


Fig 3. Top, left, battery clip; right, handle. Bottom, drum side and other side of capacitor mounting brackets

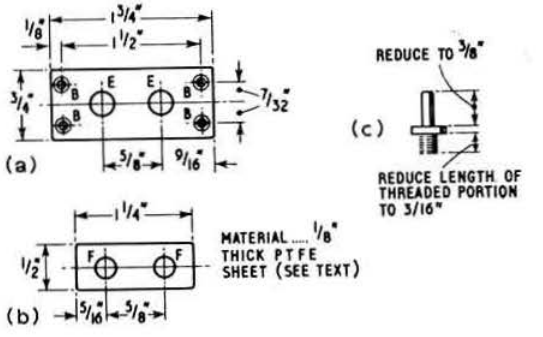


Fig 4. Left, top, coil socket; bottom, coil plug base. Right, modifications to OZ plugs required for range D

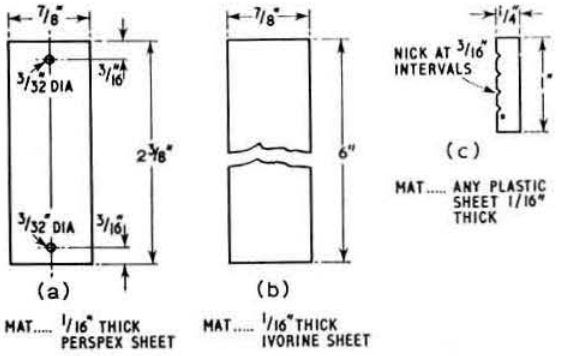


Fig 5. Left to right, dial cursor, scale strip, scale marking cursor

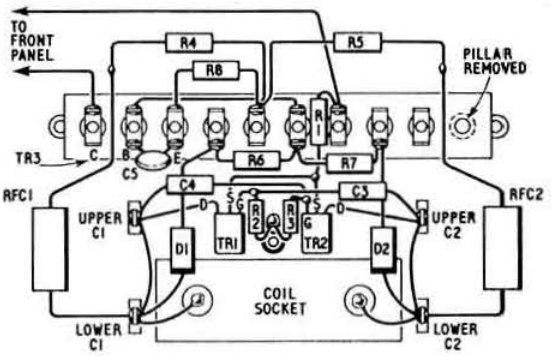
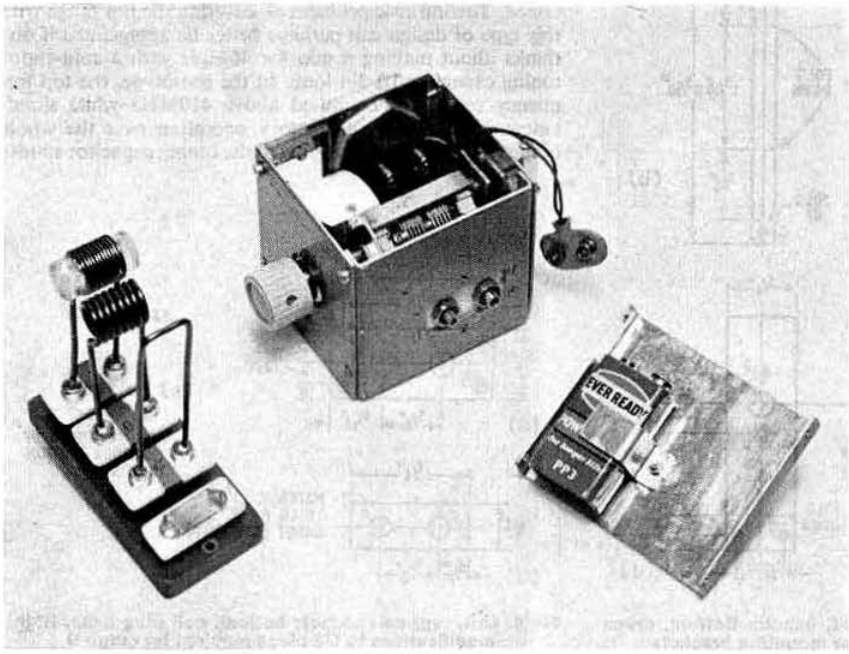


Fig 6. RF wiring diagram

was introduced. Incidentally, the oscillator circuit alone, without the tuning capacitor and with a fixed tuning loop, has been made to work well at over 650MHz.

The existence of spurious dips and "suck-outs" in the various ranges is, in this design, very much bound up with the quality of the two rf chokes. If troubles of this kind are experienced, other chokes should be tried. It is very difficult to find components with no strong resonances over the whole of such a wide band but, nevertheless, the prototype instrument using the chokes specified and with the two 47Ω series-damping resistors shows only a couple of very slight flickers on the top range, and no such effects lower down.



The unit with lid (carrying battery) removed. On left are the plug-in coils in storage holder. See front cover for other photographs of unit

Testing and calibration

No difficulties should be experienced in getting the dip oscillator to perform satisfactorily if all of the precautions mentioned have been taken. With both switches "on", the meter deflection should be between $\frac{1}{3}$ and $\frac{3}{4}$ scale at all points on all four ranges. The deflection may be accurately adjusted by changing the value of the 3·9kΩ resistor R8.

Calibration may be done by means of the usual combination of amateur band, television and broadcast fm receivers. The author cheated and did his own instrument in about half an hour on a Polyskop! To prepare for calibration, remove the perspex cursor and fix the marking cursor inside the box in the appropriate position with sticky tape. The centres of the notches should be placed respectively $\frac{1}{16}$in, $\frac{1}{4}$in, $\frac{7}{16}$in and $\frac{5}{8}$in from the left-hand side of the scale strip. Using Indian ink and a Uno "0" pen for preference, but a ball-point pen or even a pencil if these are not available, the four scale-marking circles may be marked on the strip. Two cross-lines should also be drawn, with the capacitor vanes respectively fully in and fully out. The actual calibration can then proceed in the normal way, being faintly pencilled in at first and then, after removing the drum, being finished in ink. When it is dry, a final spray with polyurethane varnish will protect the scale markings.

Substitution of components

If the full frequency coverage is required, the Motorola MPF106 should be capable of replacing the 2N5245 (TIS88) in the oscillator, although it has not been tested. Similarly, the TIS88A, which only differs from the TIS88 in its connections, should be satisfactory. If the 2N3823, 2N3819, MPF102 to 105 or BFW10, 11 or 61 are used, it is unlikely that correct operation will be obtained on the top range, unless exceptionally good samples of these devices are employed. However, all should be well up to 220MHz.

The BCY70 used in the dc amplifier may be replaced by almost any other silicon pnp device, provided, of course, that the value of the resistor R8 is adjusted to suit the gain. Suitable replacement transistors include the BCY71 and BCY72. Germanium devices are likely to exhibit excessive leakage and thermal drift, but carefully selected rf types may well work satisfactorily.

Any small point-contact germanium diode will probably work in the detector position, provided that its capacitance is sufficiently small. For this reason, gold-bonded types such as the OA7 and OA47, and whiskerless diodes like the BAX16, are to be avoided, but the OA90, GEX54 and probably the GEX34 will be acceptable. The GEX66 has rather too low a reverse impedance to perform properly in this circuit.

Sufficient comment has already been made on the subject of rf chokes and the use of miniature components in the critical positions.

Some constructors may desire to use one of the more normal sizes of miniature meters, such as the MR38P. If this is to be done, the box must be enlarged. This extension should be made in width and not in depth as, otherwise, it will probably not be possible to position the scale drum correctly. Any change in the size or shape of the box is likely to affect the ranges covered, particularly at the high frequency end.

Table 1. Coil details

Range A	29 to 55MHz	12t 22swg enam c/w on $\frac{1}{4}$in polystyrene rod (1in long), $1\frac{1}{2}$in legs (13swg)
Range B	50 to 109MHz	8t 13swg enam wound on $\frac{3}{8}$in drill, $1\frac{1}{4}$in legs.
Range C	97 to 220MHz	$\frac{3}{8}$in wide, $2\frac{3}{8}$in long loop of 13swg enam wire.
Range D	190 to 460MHz	$\frac{7}{16}$in wide, $\frac{11}{16}$in long 26swg (or near) copper or beryllium copper strip soldered directly across plug ends.

Table 2. Components

1	Jackson type C808 split-stator capacitor (3·5 to 43pF per section)*	
1	Jackson type 4511, 6-to-1 ratio ball-drive (no flange needed)	
1	Jackson $2\frac{1}{4}$in diameter drum for cord drive	
1	$1\frac{1}{4}$in square 1mA meter (1in hole, single nut fixing) (Japanese)†	
1	3·5mm miniature jack socket (Japanese)	
2	miniature spst (or dpdt, etc) toggle switches	
1	miniature 10-way ceramic tag strip	
1	4mm OZ socket	
1	3mm OZ socket	
4	4mm OZ plugs	
4	3mm OZ plugs	
1	PP3 battery connector	
2	2N5245 field-effect transistors (TIS88)‡	
1	BCY70 transistor	
2	OA91 diodes	
2	47Ω ¼W resistors	
1	330Ω ¼W resistors	
1	3·9kΩ ¼W resistors	(may have to be adjusted)
2	10kΩ ¼W resistors	(must be miniature)
2	820kΩ ¼W resistors	
2	2·2pF miniature ceramicons (the smaller the better)	
1	1k disc ceramic	
2	15μH miniature encapsulated rf chokes (Electroniques type IDC-2)§	

* Home Radio. †Smiths of Lisle Street.
‡Texas Instruments Supplies Div, 165 Bath Road, Slough.
§Electroniques or Smiths of Lisle Street.

New Products

Testing device

The DAVI is a new development in non-contact testing with many uses in the electrical and electronics fields. A small hand-held device which is sensitive to the electrical field surrounding any conductor connected to ac mains, it will identify immediately whether an appliance is earthed correctly and will detect a break in a cable. It will also show whether switches and plugs are correctly poled and will indicate blown fuses.

The presence of an ac voltage is indicated by the lighting of a lamp in the front of the DAVI, and it is not necessary to open up any insulation and have physical contact with the conductor or appliance. The unit is powered by a small 9V dry battery (PP4 or equivalent) which should have a life corresponding nearly to its shelf life.

The DAVI is obtainable from Davi Marketing Ltd, 37 Great James Street, London WC1, at a cost of £4 19s 6d.

TECHNICAL TOPICS

A monthly feature by PAT HAWKER, G3VA

"EXPERIMENT. *n.* procedure tried on the chance of success, or as a test. *v.i.* make an experiment." So proclaims *The Little Oxford Dictionary*, and this is a definition which deserves to be considered, even though it is now over 30 years since the transmitting licences in this country were officially "experimental" rather than "amateur". Note especially that "chance of success", with its overtones that the experimental amateur must be prepared to suffer disappointment rather than certain results—and that confident repetition of what has already been amply proved cannot be considered as genuine experimentation. It is by probing into ideas before they have become firmly established practice, or by applying ideas from other fields "as a test" in amateur communications that progress is made. It was Einstein who considered that: *Imagination is more important than knowledge.*

Unfortunately such attitudes are out of step with modern commercial trends. As an amateur who has never had any particularly strong views on the old "factory-built versus home-built" controversy, nevertheless I recognize that marketing today depends on creating and filling a standard need. The odd-man-out must be gently discouraged and encouraged instead to conform. For example, if 70 per cent of us have come to want an ssb transceiver, then you will look in vain, in a relatively limited market, for anything other than an ssb transceiver. Al Brandt, WA3KOI, complained recently (*CQ*, June 1970): "Just show me one ad for a vfo-controlled cw transceiver designed for the cw man and running at least 50W . . . I am penalized because the mode I have chosen happens not to be in vogue with a few vocal ssb gentlemen and the equipment manufacturers."

This is not a situation unique to hf cw but just one example of the market forces which insist that the amateur, if he wishes to use factory equipment, must keep in line with the others, rather than follow an individual line. So there is the pressure always to "turn when father says turn", to want what others want, to choose what others choose . . . and, more pertinently, to ignore whatever is not fully proven and commercially acceptable.

In putting together *TT*, I come across plenty of evidence that there are still many experimentally and individualistically minded amateurs; but, increasingly, they are in danger of being swamped by those who are satisfied to clamber aboard the appropriate bandwagon. To be an experimenter and a seeker after new techniques is first and foremost a state of mind. And surely this is a state of mind we need to foster and preserve. Why not, this coming winter, resolve to pursue at least one *experimental* project?

Synchrodyne transceiver ideas

Last month we included an outline of the Ten Tec PM2 synchrodyne transceiver. Joe Morgan, G8DV, has developed several comparable designs over the past year, and passes along some interesting hints. He stresses that, "it is refreshing to play with simple gear and get results comparable to those from much more complex and expensive equipment."

His first model taught him the absolute necessity for first-class screening and isolation of the common vfo if poor keying characteristics and undue discrepancy between transmit and receive frequencies are to be avoided.

A second model was more successful and brought solid contacts on 1·8 and 3·5MHz using plug-in coils, but several snags were still evident. To avoid breakthrough from strong local and BBC transmissions, only very light coupling between aerial and receiver tuned circuit was possible, resulting in low receiver sensitivity. The inability to vary receiver tuning independently of transmit frequency was felt to be a serious operating handicap, particularly in view of the "double-sideband" characteristic of the synchrodyne receiver. A heavy keying current, due to keying the pa collector, proved too much for the el-bug relay.

He has now overcome most of these problems in a Mark III unit (outlined in Fig 1); this is built in an H. L. Smith standard box (8 by 6 by 2in). The rig now includes an rf amplifier in front of the heterodyne detector but, by using the pa tank circuit as rf input circuit, no additional tuned circuit has been needed. The rf amplifier also serves to reduce oscillator radiation which had been noticeable in the earlier units. A Varicap diode provides "detached" (rit) tuning for the receiver. Keying is by means of base bias of the 2N706 buffer amplifier. These various changes add a little complexity to the transmit-receive switching, and a 5-pole 2-way switch is now used.

The Mk III is for 1·8MHz only, where the 3 to 4W input is felt to be more comparable with that of the other users of the band than on 3·5MHz. After trying various peaked audio filters, G8DV has opted for a simple low-pass filter cutting off about 2,500Hz; he personally prefers to depend on the ear in place of a peaked filter. Generally, compared with his SB101 with 400Hz bandpass filter, he finds that there are few signals which cannot be copied on the synchrodyne.

He uses the form of transistor balanced mixer described in *TT* January 1967 and *ART* Section 4, Fig 53 as the direct conversion detector; this uses cross-coupled transistors without the need for any special transformers. His audio amplifier is similar to the one used by C. F. Dorey, BRS16468 (*Radio Communication*, May 1970, page 298). A product

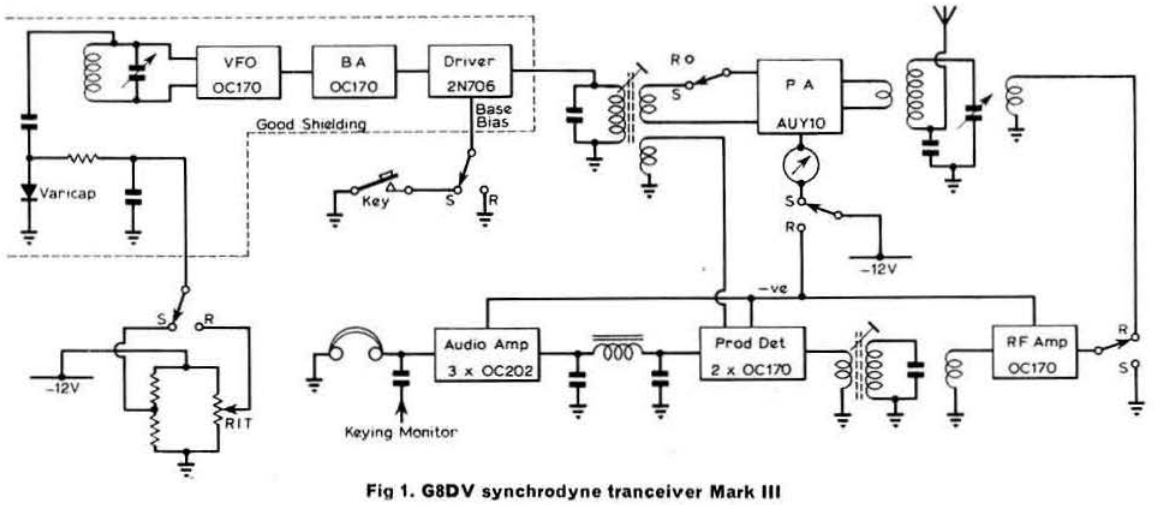


Fig 1. G8DV synchrodyne tranceiver Mark III

detector providing better balancing might reduce breakthrough without an rf amplifier, but by coupling this lightly to the detector he now overcomes this problem except on one strong local signal. He is considering fitting a switched attenuator (some 15 to 20dB) in the receiver input, as this would also be useful at night when band conditions are noisy. It is still possible to pull the vfo a matter of one or two hundred hertz when tuning the pa, but all reports are T9.

Vertically polarized aerials

The recent description (*TT*, July) of the simple vertical-Tee and the associated bobtail array has brought in quite a few comments, all of them indicative of considerable interest in the development of new or improved forms of vertically-polarized aerials.

John Crux, G3JAG, is a little concerned that readers may have gained the impression, from my use of the secondary title "inverted ground plane", that the two "radials" forming the top loading section of the vertical-Tee renders the aerial in any way independent of the ground conductivity beneath it. He considers that top-loading may actually increase losses in poor ground; further that the $\frac{1}{2}\lambda$ vertical dipole is recognized as being more affected by earth constants than a $\frac{1}{4}\lambda$ grounded radiator. Basically, I would not disagree with these views, though—for hemmed-in sites—there seem useful advantages in putting the radiating current up in the air. For more open sites, G3JAG is probably right in suggesting that a $\frac{1}{4}\lambda$ (or less) grounded radiator is more efficient with a few short radials than a $\frac{1}{2}\lambda$ over the same earth. However, I am still convinced that the vertical-Tee and bobtail can be useful in overcoming the very significant ohmic losses that often result from current feeding a vertical without installing a really low-resistance earth connection; this has always been one of the main attractions of the ground plane with drooping radials.

G3JAG takes the opportunity to draw attention to a number of useful short vertical aerials that were included in the series of *CQ* articles on vertical aerials by Paul Lee, W3JM; these began in June 1968 and continued over many months. W3JM, incidentally, was formerly W3JHR, the originator of the well-known Seiler "synthetic rock" transistor vfo.

In particular, G3JAG mentions the NOL folded unipole with shunt-feed, and has also tried successfully the NORD (see also US Patent No 3,386,098), while G3THA is planning a "UG". These unfamiliar sounding types and many other arrangements are all described by W3JM; some make use of top loading and allow multiband operation with quite low support height, since several were originally developed for mf broadcasting from ships, and make use of the guys as part of the top loading.

G3JAG considers that it is quite feasible to erect 40 and 50ft verticals single-handed, if you plan the operation. His record is 69ft, put up some five times without mishap, once in semi-darkness. His technique is based on pivoting the base of the pole in a squared U channel section screwed to a wooden stump, using a $\frac{5}{16}$in steel pin. A 21ft 1$\frac{1}{2}$in steam-pipe mast is put up next to the stump, and guyed with $\frac{1}{2}$in diameter polypropylene caving (or yacht) rope. This has a block and tackle at the top, fitted with plastic clothes-line and gives a 2:1 mechanical advantage, a pulley being tied to the vertical 20ft from the pivot. He just hauls on the rope and "up she goes", the steam-pipe holding the pole (nearly) vertical until he walks round and fixes the guys. The guying of the steam-pipe is good enough to allow use of a ladder to detach the pulley when the guys for the pole are roughly adjusted to length. After taking down the steam-pipe, the vertical can be trued up as accurately as desired. Before finally tightening the guys he knocks out the steel pin and replaces it with a $\frac{1}{4}$in plastic-sheathed pin to provide an insulated base. The whole vertical weighs only about 20 to 30lb and is easily lifted with a car jack or by hand to exchange the pins. The verticals are guyed with braided nylon "bootlace" type line, polyester ("Terylene") tyre cords and polypropylene garden twine.

An all-band vertical

Brian Rose, G3ULR, who—as reported in *TT*, October 1968—has been experimenting for some time with modified forms of ddrr aerials, mentions that recent American work (not yet published) indicates that directional arrays can

be made using parasitic elements consisting of vertically polarized ddrr elements; there is hope of an article on this subject turning up before too long in *73 Magazine*.

Meanwhile during the past year G3ULR has been using an interesting all-band vertical which combines the well-established technique of a tri-band ground-plane (for 14, 21 and 28MHz) with unusual loading techniques to permit the effective use of the same structure on 1·8, 3·5 and 7MHz.

Although the overall height, with the tri-band ground plane mounted on top of a 25ft 2in dural pipe mast, is only about 40ft, it can be resonated, without loading coils, even on 1·8MHz, using only series tuning capacitors. The ground-plane, basically similar to a standard ARRL design, has drooping 0·3λ-trifilar radials connected to the pipe mast supporting the base of the ground plane; these radials provide top loading for the mast radiator on the lower-frequency bands. The dural mast is insulated at the base, and this is always a low impedance point. Originally an outrigger wire was run up the mast to allow shunt-feed tests; although this is no longer used for this purpose it still serves to increase self-capacitance by a small amount, see Fig 2. The ¼λ self-resonance of the entire structure is roughly 4MHz due to the top loading, facilitating matching on 3·5MHz.

The key feature providing the 1·8MHz performance is that the coaxial feeder for the ground-plane is run down inside the dural mast; the coaxial braid is insulated from the

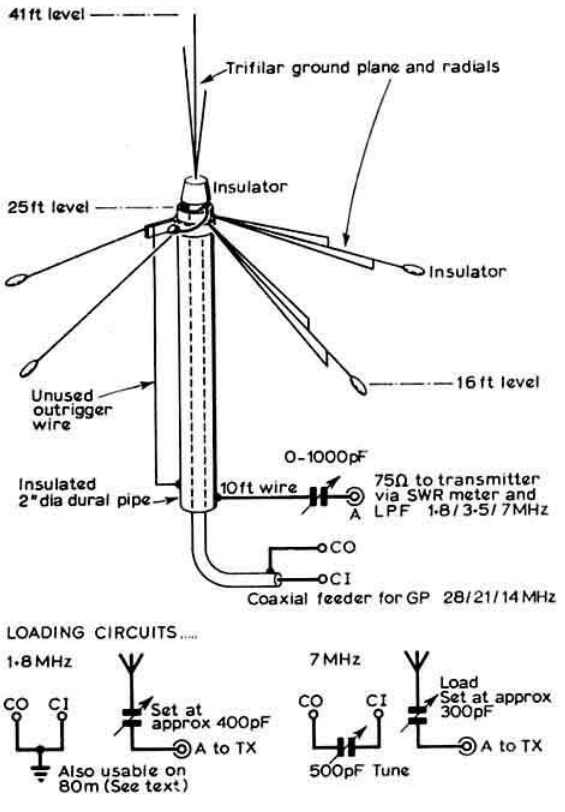


Fig 2. G3ULR all-band vertical

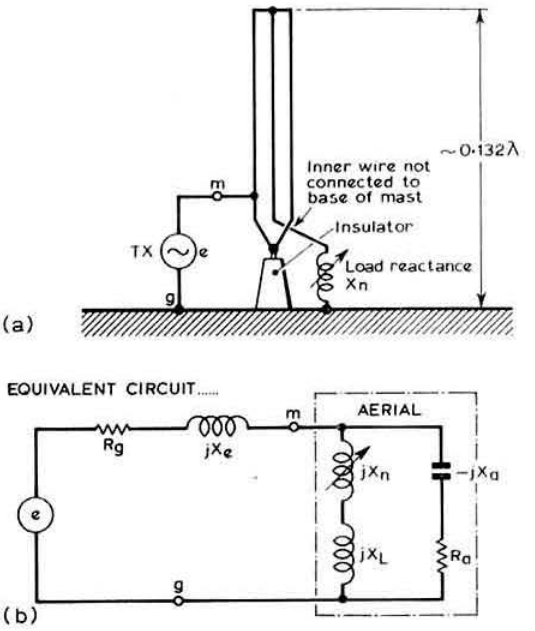


Fig 3. General technique for loading short vertical aerials (from Leonhard, Mattuck and Poté). (b) Equivalent circuit (though G3ULR suggests it is easier to cut and try). In the G3ULR aerial $jX_e = O$, $jX_n = O$ by use of suitable values of jX_a, jX_L which depend on aerial height and capacitance

mast except at the 25ft height where it connects the radials together. G3ULR has only a short run of 10ft from the base of the mast to bring the coaxial into his shack. Within the shack, on 1·8MHz, the coaxial cable inner and outer are connected together and to earth. This means that, on this band, there is virtually a wire running down the inside of the mast from the 25ft level to earth; since it is screened from the aerial currents on the outer skin of the dural pipe it does not carry much rf current, but it does have significant effect on the resonant frequency of the structure as "seen" at the base of the mast, due to the reactance of the coaxial stub formed between the coaxial braid and the inside of the dural pipe. This method of loading was described by Leonhard, Mattuck and Poté (*IRE Transactions on Antennas and Propagation*, July 1955, page 111) as an effective means of loading short vertical aerials. In their case, the arrangement was that of Fig 3, in which the inner wire is connected to earth via a loading inductance. For the G3ULR aerial it was found that a simpler system could be adopted, omitting the small inductor and tuning for resonance by means of a series tuning capacitor in lead A, resulting in an excellent match to 75Ω cable. This method of loading is versatile, and masts of various sizes could be used by adjusting the position of the cable connection inside the mast.

The same arrangement also happens to provide reasonable match on 3·5MHz (though resonance is not in the Leonhard mode) using more series capacitance (of the order of 800pF) than the 400pF for 1·8MHz. On 3·5MHz the aerial has quite low reactance and can also be fed directly or via a series capacitor when the ground-plane feeder coaxial is insulated from earth; it is also possible to use a pi-network atu on this

band. It should be recognized that the 3·5MHz dx performance depends to a considerable extent on the earthing system, and that vertical polarization is not really suitable for medium-distance 3·5MHz operation. However, the system has been found adequate for 3·5MHz at G3ULR.

On the other hand, most satisfactory results (S7 from ZS, Ws etc) are achieved on 7MHz, at which frequency the top-loaded vertical is non-resonant. Resonance is achieved by reactance transfer up the ground-plane feeder, which is insulated and short-circuited at the shack via a variable 500pF capacitor. Since the feeder is roughly $\frac{1}{4}\lambda$ at 7MHz and about $\frac{1}{2}\lambda$ electrical length, this is equivalent to placing a variable capacitor across the base insulator of the ground plane, so that the vertical element acts as a base-loaded whip at the top of a top-loaded 25ft vertical; one position of the capacitor gives minimum swr, and by also adjusting the series tuning capacitor in lead A, a good match to 75Ω can be achieved.

Within this general framework different mast heights and feeder lengths could be used, possibly requiring a relay to short-circuit the coaxial feeder to earth at the base of the mast; if the feeder is near to $\frac{1}{4}\lambda$ electrical on 7MHz, reactance transfer could be done using a variable inductor at the station end. At odd feeder lengths a combination of L and C may be needed. While these suggestions apply particularly to resonating existing ground planes, a specially erected vertical should be designed from the 1955 paper, since it is possible to make the mast match directly into coaxial cable without series tuning capacitors.

The earth at G3ULR is a solid connection to the water main, augmented by a 5ft rod driven in under the mast, and two 8ft rods about 10ft to each side of the mast, wired in parallel with stout copper wire, since radials cannot be used.

Directional verticals

The usual method of obtaining directional effects with vertical radiators is to use two similar $\frac{1}{4}\lambda$ verticals spaced apart, and fed with currents of different magnitudes and phases so as to produce a variety of non-uniform patterns, including cardiods (a classic paper on this is one by G. H. Brown—who is credited with the ground-plane—in *Proc IRE*, January 1937, and a well-known diagram from this paper, giving 40 patterns for two radiators spaced between $\frac{1}{8}\lambda$ and 1λ apart can be found in many standard textbooks, including *Radio & Television Engineers' Reference Book*). It is possible to use vertical radiators shorter than $\frac{1}{4}\lambda$ in this application, although the resulting patterns may be affected by insulation and ground conductivity.

This technique need not be confined to fixed beams, provided that means are incorporated to vary the phase fed to one of the two radiators. Fig 4 shows an "electronic rotary" of this type from an article by G. Tomassetti, I1BER, reprinted in *Old Man* (July 1970). The article includes radiation patterns indicating that the five positions are capable of putting broad beams towards almost all points of the compass, though the pattern differs in each switch position. Typically, gains of about 5dB are possible, and the nulls can be used to reduce interference from unwanted medium-distance stations.

"30 up and 30 out"

To continue this saga of verticals, E. J. Younge, G3IVH, mentions that a detailed description of a 7MHz bobtail array

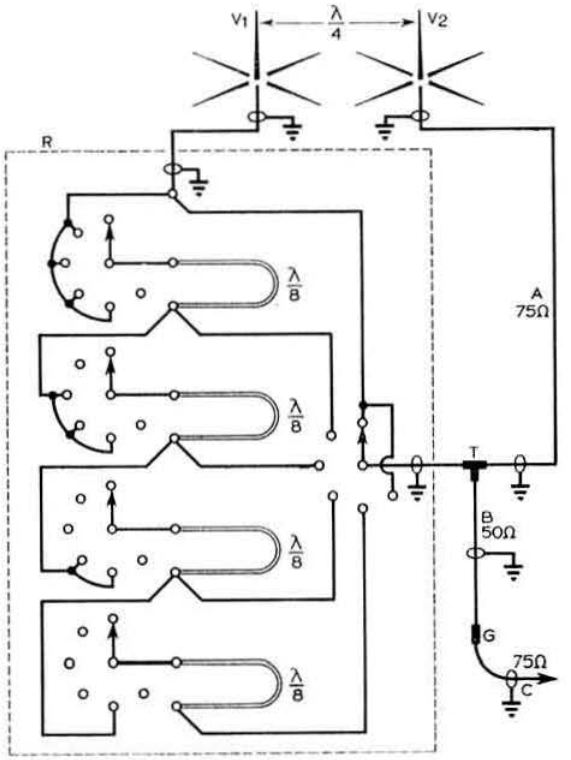


Fig 4. 7MHz directional providing five different radiation patterns. A is RG11 cable; B is ¼ of RG8 cable for impedance transformation; R, aluminium screening; G, cable connector; C, RG11 cable any length; V1 and V2, vertical aerials spaced ¼λ

by Woodrow Smith, W6BCX, appeared in *CQ* in March 1948. This article also recalled from the 'twenties, a 7MHz aerial which was the forerunner of the ground-plane. This was the so-called "30 up and 30 out" and comprised a 30ft (or slightly longer) vertical radiator worked against a 30ft (or slightly shorter) horizontal counterpoise, usually suspended a few feet above earth, fed by means of a series tuned circuit: see Fig 5. W6BCX noted that, in its heyday, "the vertical element often was terminated with a copper toilet ball, which was supposed by the more superstitious to possess some magical dx raising power," (I suppose it helped flush out the rare ones).

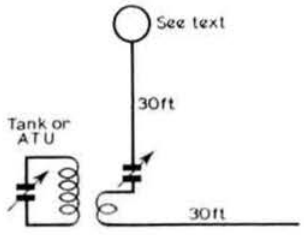


Fig 5. "30 up and 30 out" aerial for 7MHz

This same arrangement (without the copper ball) still turns up in military pack-set instruction books for use where only one support is available. For those who have no room for the full set of 7MHz ground-plane radials, the old omni-directional "30 up and 30 out" might still be well worth a try. Counterpoise techniques seem to have gone out of fashion except in the form of radials since the old days of using them on 1·8MHz or for the "all-purpose" W3EDP (an 84ft end-fed wire tuned against various counterpoises).

L-network for voltage-fed aerials

G3IVH also suggests that another method of voltage-feeding a vertical-Tee or bobtail aerial would be an L-network (*ART*, Section 8): see Fig 6. He has successfully used L-networks for $\frac{1}{4}\lambda$ end-fed aerials on 1·8 and 3·5MHz, using an swr bridge in the coaxial link to the transmitter. He finds that a tank circuit from a Collins TCS surplus unit (300pF high-voltage variable and 52-turn "roller coaster" variable inductor) makes a good L-network for 7 and 3·5MHz, while with additional outboard inductance it will cover 1·8MHz also.

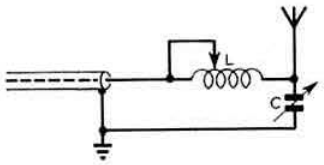


Fig 6. L-network for voltage-fed aerials

Transistor polarity protection

The use of a diode in the battery lead of transistorized equipment to provide protection against connecting the leads with the wrong polarity has been widely used for many years; two other arrangements suggested by R. L. Ives (*CQ*, June 1970) may be new to some: Fig 7. The inclusion of an extra diode and bulb provides a reversal indicator, lighting up when the battery is wrongly connected. A full bridge circuit makes it possible to forget about battery polarity.

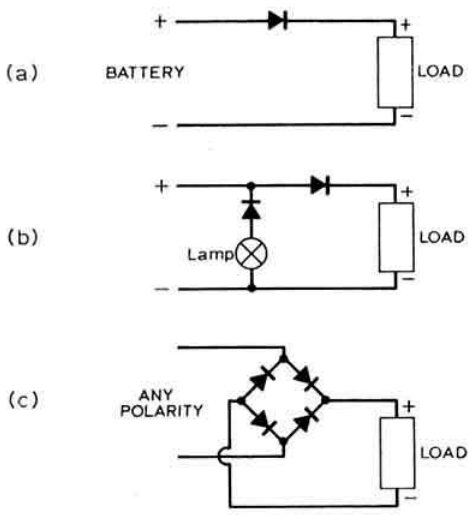


Fig 7. Transistor polarity protection using diodes in power supply line

Butler, vxo and other oscillator topics

An article by Norbert Bissinger, DJ3TU, in *DL-QTC* (Number 1-1970) suggests that the Butler series-resonant crystal oscillator circuit is seldom referred to in amateur literature (he will find several examples in RSGB publications!). He shows the purity of output of this circuit, which with FT243 type crystals can provide output on the fundamental or 3rd or 5th overtones; he gives both valve and transistor circuits and also indicates how the crystal can be pulled to form a vxo. Using a 4,670kHz crystal, he obtains 14,010kHz output and can pull this with good stability at least to 14,007kHz. The standard valve circuit could be also readily adapted for fet operation. For vxo operation, the two inductors should be tightly coupled (bifilar winding?).

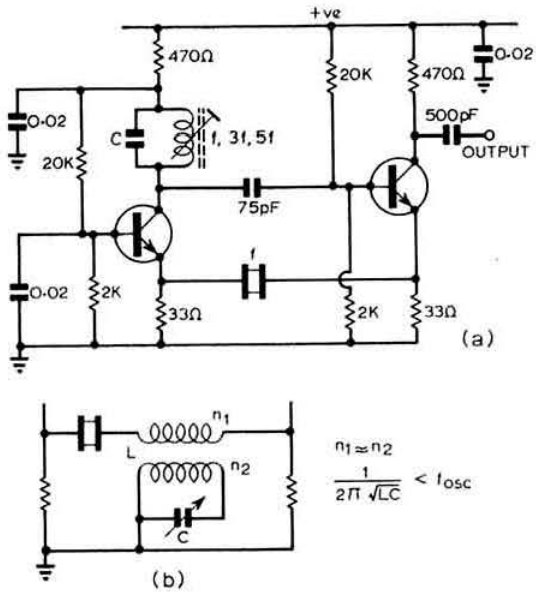


Fig 8. Transistor version of Butler oscillator; typically for 4,720kHz crystal, C would be 910pF for fundamental; 110pF for 14,160kHz and 27pF for 23·6MHz. Transistor types BF173 or similar. (b) Method of providing vxo facility (can be used similarly with valve or fet versions)

Another adaption of a standard oscillator circuit—the useful cathode-coupled oscillator about which a number of comments appear in *ART*—for fet operation is included in the Norwegian *TT* ("Teknisk småplukk") by LA4HK (*Amator Radio*, Number 5, 1970): see Fig 9. This oscillator is usually effective from about 1MHz up to vhf.

G2QY (*SWM*, July 1970) reminds us of the old dodge of "painting" a crystal with Indian ink in order to lower its frequency.

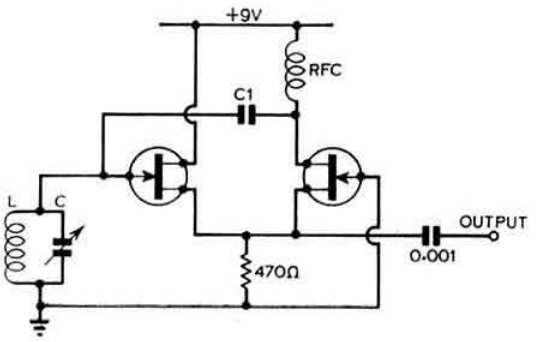


Fig 9. Cathode-coupled fet oscillator using two MPF102s or 2N3819s etc

Here and there

The Mullard Educational Service has designed a compact cctv camera which can be built for £45-£70, of which the 1in vidicon and lens system accounts for about 75 per cent of the cost. Mullards do not supply kits but these can be obtained from Linstead Electronics.

Among Mullard's other recent educational projects is a publication giving details of a "Gunn device transmitter (10GHz)" suitable for the amateur 10,050 to 10,450MHz (3cm) band. With a CXY11A Gunn diode this puts out 5 to 8mW, or up to 12mW with a CXY11B and 20mW with a CXY11C. Despite recent price reductions, however, Gunn diodes are still quite expensive items—an alternative approach is suggested in a letter in *Proc IEEE* (January 1970) on a "poor man's TRAPATT oscillator" which indicates that ordinary low-cost Fairchild FD-300 general purpose diodes can sometimes be used to generate uhf power. Some 83 out of 100 diodes were made to produce significant output in the uhf range. It is suggested "the low cost of the diodes and simplicity of the mount makes it possible for anyone to work in this new and exciting area".

Several other useful projects have been described in the publications put out by the Mullard Educational Service, Mullard House, Torrington Place, London WC1E 7HD. The 10GHz generator publication costs 1s 6d, and since the minimum cash-with-order charge is 2s 6d, another useful-looking publication is "*A simple fet voltmeter*" (1s 0d) describing a BFW61 fet voltmeter in conjunction with a 50μA meter to provide an eight-range (250mV to 500V) voltmeter with minimum input resistance exceeding 10MΩ.

IBM Zurich laboratories, where the Gunn diode was originally developed, have recently reported high-speed gallium-arsenide schottky-barrier field-effect transistors with an f_{max} of 30GHz, and capable of 5dB power gain at 15GHz and 15dB power gain above 2GHz.

In *QST* (May 1970) E. H. Conklin, K6KA, draws attention to a common form of "bubbly hum" that prevents accurate nulling out of carrier on some ssb rigs. He has found that this effect is often due to ac "hum" pick-up in the audio section, rather than due to faulty balanced modulator adjustment; he also notes that such hum can sometimes be caused by cathode-heater leakage in the af amplifier.

Simplified stripline filter for 144MHz

by P. T. BELLAMY*

HAVING read the two articles by Mr G. R. Jessop G6JP, on bandpass filters for 144 and 432MHz, it appeared to me that certain improvements could be made and the bandpass curve did not seem to be quite right either for the layout used.

Dealing with the first point, it was logical that the input and output could be fed directly into the lines, but at much lower impedance points on the lines. This would get away from the problem of using low capacitance value trimmers for coupling—this could be a major source of trouble as a change in either the output impedance of the tx or the aerial would change the bandpass curve due to loading effects.

The bandpass curves given in the articles are typical of ones obtainable with two tuned elements, and not three as the unit was originally constructed. In fact, the same curve is obtainable with two elements and a small coupling capacitor. This coupling capacitor can be left out if the spacing of the lines is made to give critical coupling.

With the space available in the Eddystone die-cast box it would seem that a two-line filter is perhaps better for the amateur constructor. A three-line filter was also constructed but it was found that the coupling between the lines was too great, and the middle line was, in fact, not tuned to the 2m band at all but very much to one side. That is, it is not acting as a real tuning element but purely as a coupling element between the input and output lines. This accounts for the fact that the bandpass curve obtained has only two humps.

Unfortunately the measuring equipment was only available for a short time and so no further work could be done to improve the filter. However, it would seem that perhaps better results could be achieved by reversing the middle line so that its tuning capacitor is at one end of the box, while the two outer lines have their capacitors at the other end.

The measuring system consisted of a Jerrold Type 900 sweep generator, HP 608D crystal calibrated marker generator, HP 335 0-10dB attenuator, GR 874 trombone line, GR 874 50Ω load and a 6in Dumont lf 'scope. The attenuator was put at the output of the sweep generator for two reasons, one being to isolate the source from the load, the other to measure the attenuation of the filter. The vswr matching was made with the aid of a long line; the filter,

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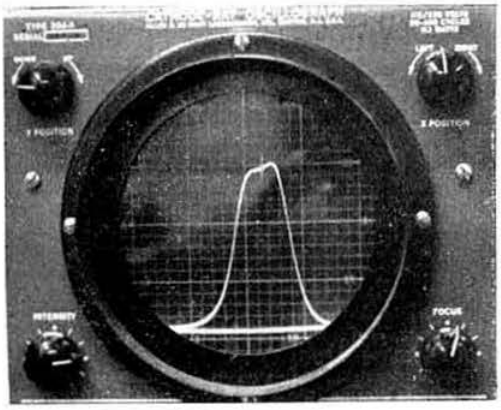


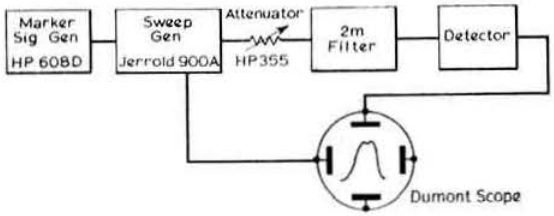


Fig 1. Bandpass curve

terminated with a 50Ω load, was put on the remote end of the line; the detector being next to the attenuator, which was in turn connected to the sweep generator. The trombone line was used to adjust the line length so that a symmetrical trace was obtained.

The photographs show the bandpass curve as well as the vswr trace.

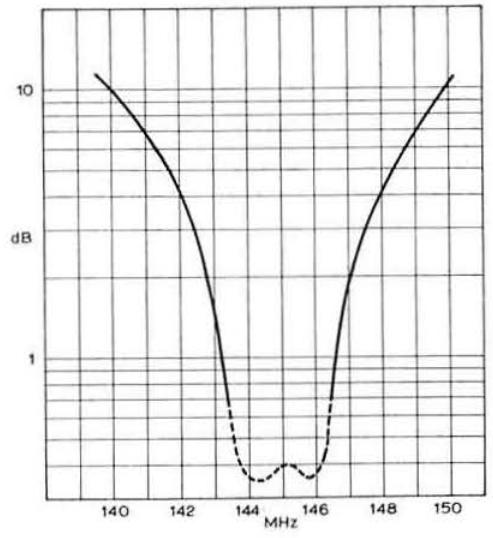
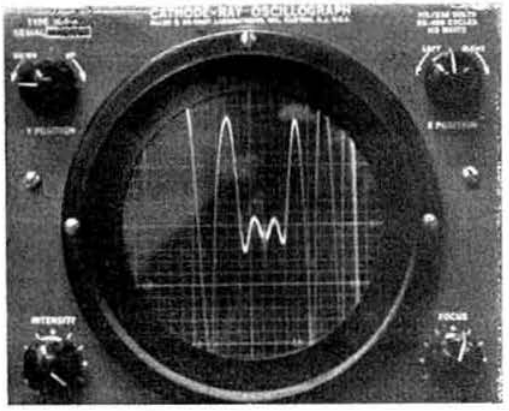


Fig 4. Filter curve



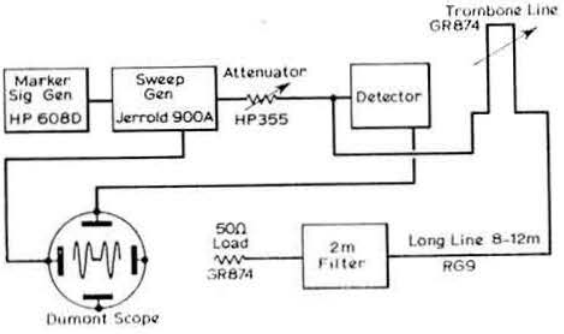


Fig 2. Sweep vswr

I hope that these comments will prove to be useful to others constructing this type of filter and will perhaps provide some food for further thoughts on filter design.

NB. There are no spurious responses between 10 and 1,000MHz.

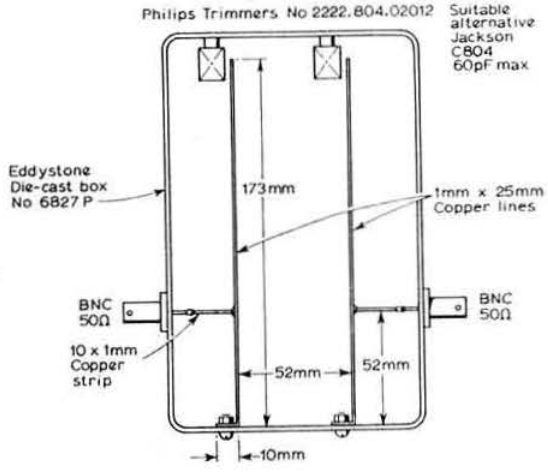


Fig 3. Box arrangement

TVI TIPS

by B. Priestley, G3JGO

Modulation and tvi

Back in 1948, G5RF described a case of tvi which was entirely due to modulation distortion. Since then many amateurs have repeated the experiment with am or ssb and have proved that this is a good way to cause tvi, and ssb does it better!

Some of this distortion is due to bad design of the audio amplifier, in particular a stage which cannot deliver sufficient drive to the output. One such transmission, although not over-modulated, splatters noticeably at 50-mile range. It is believed to cause tvi on top band!

More often the distortion is due to over-modulation or ssb flat-topping producing a modulation envelope which is much more easily visible on the tv screen. This is due to the peaky nature of speech compared with the ideal but useless sine-wave modulation. It is clear from Fig 1 that a transmitter without speech clipping, or similar means of limiting the peaks, cannot simultaneously transmit adequate talk power and yet avoid causing interference.

The simple device shown in Fig 2 will prevent peak over-modulation, although it should not be used as a high-level speech clipper. In any case, a clipper needs a considerable excess of drive available and a filter, so it is more economical to work at a low level.

Key clicks are another form of envelope distortion and can produce a similar result on a tv screen. The standard remedies are effective in general, although some types of mechanical bug key seem particularly prone to sparking at the contacts.

Ssb speech clipping is rather involved (Ref 1) and some form of compression or automatic level control is often the easiest solution. Unfortunately, many alc circuits work by detecting the slight grid current flow which preceeds flat-topping in a Class AB1 amplifier, and this is not fool-proof, so that distortion (and harmonic production) can still result if the af gain is set too high. What is wanted is a circuit which reduces the gain drastically when the grid drive reaches 95 per cent or so of the overload level. This could be provided by applying the output of the transmitter to a biased diode rectifier which only gives an output when the bias voltage

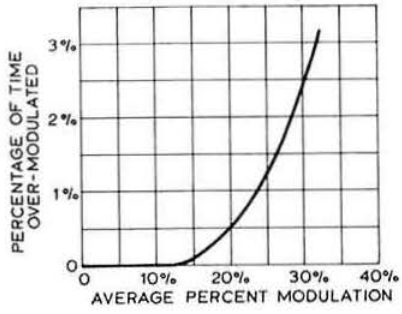


Fig 1. Unclipped speech has a very high peak to mean voltage ratio so that over-modulation can only be avoided by keeping the average level down. This gives a signal which is easily lost in interference

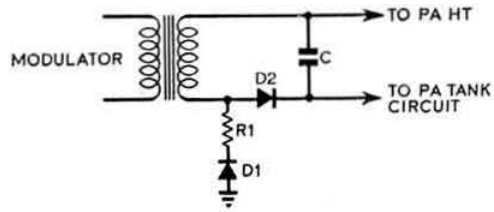


Fig 2. This simple circuit will prevent accidental over-modulation, and also prevent the damage to the modulator which can occur. D1 and D2 should be rated for a current of twice the dc pa current and the piv rating of D1 should be at least thrice the dc supply voltage. Series combinations of diodes may be necessary for high power. C1 should be rated for twice the dc supply voltage, and its reactance should equal the load resistance presented by the pa to the modulator at 6kHz (typically 0·005μF). R1 is equal to the load resistance (nearest preferred value) with a wattage rating of 10 per cent of the modulator output

is exceeded. This output is fed back to the transmitter through the linear alc connection.

Narrow band frequency modulation has of course no modulation envelope so that, except for a click at the start and finish of each over, it will cause no more tvi than an unmodulated carrier. An additional advantage is the elimination of audio rectification troubles. With a good speech clipper and filter, nbfm can give an excellent account of itself, better than ssb in some circumstances, but a half-hearted approach is likely to yield an inferior performance. (Ref 2, 3.)

References

1. *Single Sideband Principles and Circuits*. Pappenfus, Bruene and Schoenike (McGraw Hill), Chapter 20.
2. "A Narrow Band FM Unit for the Elizabethan", Louis Varney, G5RV, *RSGB Bulletin* May 1954, pp499–502.
3. "An Effective Speech Amplifier Clipper Filter Unit for the Elizabethan", Louis Varney, G5RV, *RSGB Bulletin* June 1955, pp560–563.
   (Brief details of 2 and 3 are reprinted in Chapter 9 of *Radio Communication Handbook*).

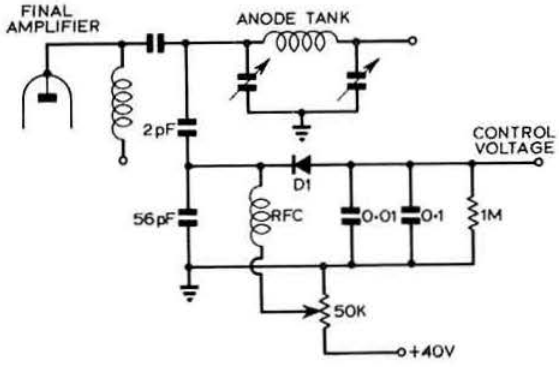


Fig 3. Automatic level control. When the rf voltage peaks exceed the dc level set by the potentiometer D1 conducts and produces a control voltage to reduce the exciter gain. Component values are suitable for valves of the 6146 class, but more details can be found on p246 of the fourth edition of *Single Sideband for the Radio Amateur*, **ARRL**

The auroral opening of 8 March 1970

by R. G. FLAVELL, G3LTP*

WE received 219 reports as a result of the appeal in the April issue of *Radio Communication* requesting details of contacts made during the auroral event of 8 March. This was a very satisfactory response and we hope that all who contributed letters and log sheets will regard this preliminary survey as evidence that their labours have not been in vain. Edited summaries have been circulated among members of the RSGB Scientific Studies Group in recent issues of their monthly bulletin, and Charlie Newton, G2FKZ, has promised to review the event and comment on the implications of the results in a later issue of *Radio Communication*.

A total of 103 stations were involved in the reports received, and their locations ranged across a large part of NW Europe from the Atlantic Ocean to the eastern end of the Baltic Sea. Fig 1 shows the whereabouts of most of them, but a few, working /A, /P, or just plain lost if their reported QRA locators are to be believed, have yet to be placed exactly. Table 1 shows the distribution of stations by country prefix.

For this analysis, which covers the time interval from 1323 to 2142gmt, the reports were separated into half-hourly periods. In the lower part of Fig 2 the rise and fall in numbers of reports per period may be seen to follow the well-established pattern of two distinct phases, separated by an interlude of relative quiet somewhat reminiscent of half-time in a sporting event. In the upper part of the same diagram an attempt has been made to display the varying extent of the activity by listing the country prefixes in roughly north-to-south order and indicating by vertical lines the pairs of

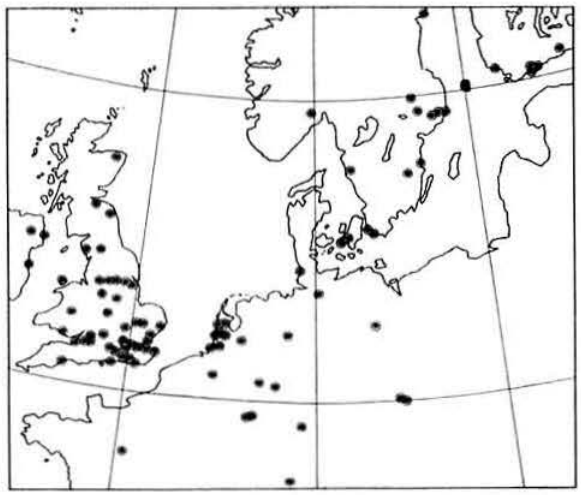


Fig 1. Location of stations featured in the reports analysed in this survey

Table 1

Distribution by country of stations reported

Country prefix	No. of stations	Country prefix	No. of stations	Country prefix	No. of stations
DJ, DK, DL	9	GM	3	OK	2
EI	1	GW	4	ON	2
F	1	HB	1	OZ	3
G	37	LX	2	PA	14
GI	3	OH	7	SK, SM	13

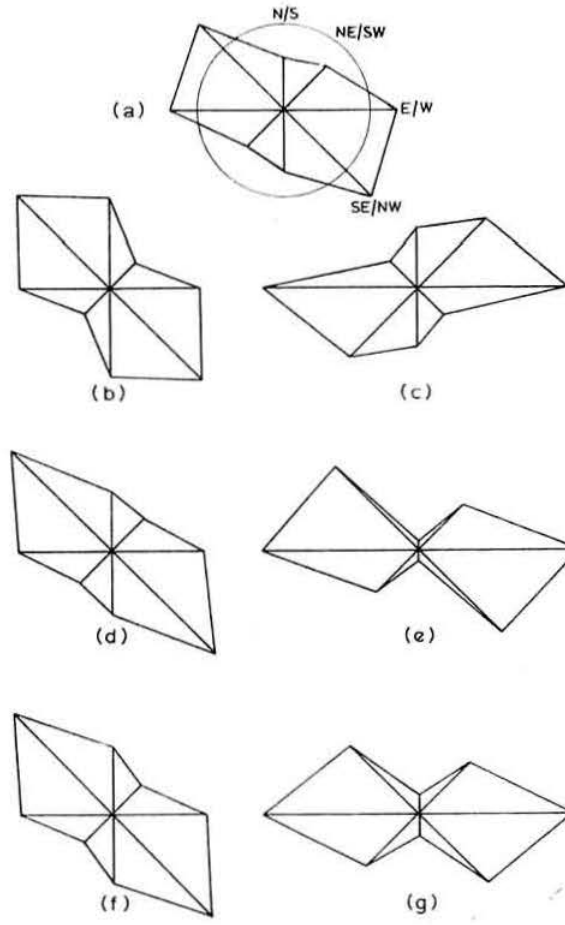


Fig 3. Relative frequency of contacts from Great Britain between stations aligned approximately N/S, NE/SW, E/W, SE/NW during the radio-auroral event of 8 March 1970. (Percentages in Table 2). (a) All cases. (b) 1st phase, short paths. (c) 1st phase, long paths. (d) 2nd phase, short paths. (e) 2nd phase, long paths. (f) Whole event, short paths. (g) Whole event, long paths. The circle indicates a uniform distribution to the same scale

*"Jarlshof", 174 Finchampstead Road, Wokingham, Berks

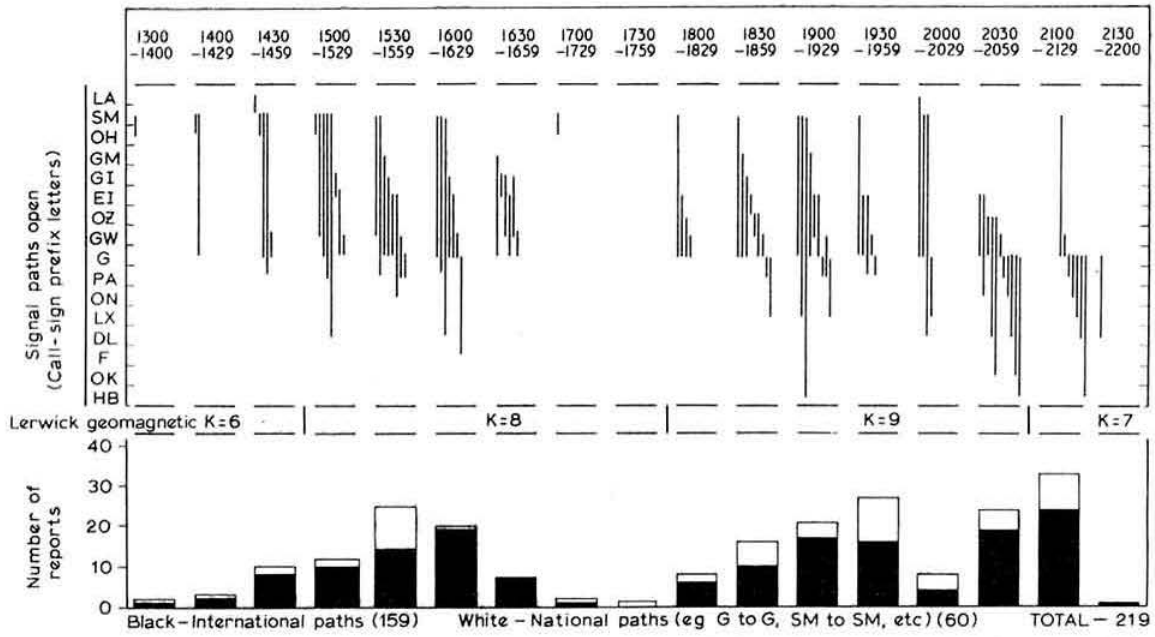


Fig 2. Half-hourly period analysis of 159 international signal paths open on 2m during the radio-auroral event of 8 March 1970

countries which had been reported as being in contact during each period.

The changing progress of events is also revealed by a study of Table 2 which refers to contacts having one end (or both ends) somewhere in Great Britain, including EI. These reports were sorted into four groups according to the direction of the straight line joining each pair of stations; in other words, the line-of-sight alignment between them. (We did not have sufficient information to do the same for beam headings, unfortunately, and the stations which did report bearings seemed to take great care never to work each other!) The groups were further sorted into short-paths (under 500km line-of-sight, roughly the distance from London to Edinburgh) and long paths (over 500km), with the two phases of the activity taken separately at first and then combined.

The vertical columns (corresponding to the four basic directions) have been summed and the results converted to percentages, which are also included in the table. What appears to be a collection of butterflies in Fig 3 is in reality a set of these percentage figures plotted as coarse polar diagrams, showing the relative frequencies of contacts among stations situated in approximately the directions indicated. The uppermost plot (a) refers to all the GB-based reports lumped together irrespective of time or distance, and it shows that stations lying E/W or SE/NW of one another had more frequent QSOs than stations aligned N/S or NE/SW. This, of course, confirms something that G2FKZ has been telling us for years.

The three lower pairs of plots show the distribution of contacts by direction during the first phase, (b) and (c); second phase, (d) and (e); and both taken together, (f) and (g), for short paths and long paths, respectively. They show that on short paths the most-frequent contact was between pairs of stations lying SE/NW of one another, and that this

Table 2

Number of contacts reported to and from Great Britain

Time	Short distance				Long distance (over 500km)				
	N/S	NE/SW	E/W	SE/NW	N/S	NE/SW	E/W	SE/NW	GB to:
First phase									
1400–1429	0	0	0	0	0	0	1	0	SM
1430–1459	0	1	0	0	0	2	0	0	SM
1500–1529	1	0	3	1	0	2	0	0	SM
1530–1559	4	0	4	5	1	0	7	1	SM, PA, ON
1600–1629	2	3	2	7	1	1	0	1	SM, PA, F
1630–1659	3	0	1	2	1	0	0	0	(EI-G)
1700–1729	0	0	0	0	0	0	0	0	—
1730–1759	0	0	0	0	0	0	0	0	—
Totals	10	4	10	15	3	5	8	2	
Per cent	26	10	26	38	17	28	44	11	
Second phase									
1800–1829	1	1	1	1	0	2	1	0	SM, OZ
1830–1859	2	0	3	3	0	3	1	2	SM, OZ, PA, LX
1900–1929	1	1	0	12	1	0	3	1	SM, PA, LX
1930–1959	5	5	7	5	0	1	2	1	SM, PA
2000–2029	0	1	0	1	0	2	0	1	SM, LA, LX
2030–2059	1	0	4	3	0	0	6	4	OZ, PA, ON, DL, OK, HB
2100–2129	3	2	5	6	0	0	7	5	SM, PA, ON, LX, DL, HB
2130–2159	0	0	0	0	0	0	0	1	DL
Totals	13	10	20	31	1	8	20	15	
Per cent	18	13	27	42	2	18	46	34	
Whole event									
Totals	23	14	30	46	4	13	28	17	
Per cent	20	12	27	41	6	21	45	28	

situation applied equally to the period of the first phase and to the second. The overall picture on long paths (g) clearly favoured E/W alignments with an almost equal distribution along the two diagonal directions, but the two other diagrams show the tendency for NE/SW alignments to predominate during the first phase (c), and SE/NW alignments during the second (e). This is borne out by the prefixes in the right-hand column of Table 2, where the long paths are mainly G to SM during the first phase, while G to LX, OK, HB, etc appear in the second.

A very noticeable thing from the reports was the very sudden end to the affair. We had 33 reports in all for the period 2100 to 2129, but only one after that. Several observers told us they stayed up listening later, but the effect was as though the Aurora had had its plug pulled out.

Dr Hughes, of Sheffield University, sent us two photographs of echoes associated with the Aurora, received between 1843 and 1853gmt and between 2044 and 2100gmt on his 25MHz back-scatter radar, which was set looking west with a beam elevation of about 25°. The echoes were separated into a number of distinct patches covering ranges of 300 to 750km, and Dr Hughes suggests that they reveal a patch of ionization passing through side-lobes in the antenna polar diagram.

SM3AKW, our most northerly observer at a latitude of 62·6° N, suggested that his contacts between 1505 and 1540, and again at 1820, were effected by *forward* scatter, because his beam headings at the time were 265°, rather than the 330–030° of earlier contacts. How we wish some of the people he worked could give us bearings in the reverse direction!

Finally, one further observation from SM3AKW which deserves to go on record, although it was made during the progress of a different Aurora. On 17 April at 0125 he received signals *through* the Aurora, and he tells us that there was no auroral tone on them. On that occasion he was certain of the direction of arrival, because the station was W1FZJ/KP4 and the signals came via the moon, which was at the time 8° above the horizon, right in the Aurora!

Background imformation

Newton, C. E., G2FKZ. The Society's IGY Aurora Programme. *RSGB Bulletin*, May and December 1966.
Radio reflection of vhf signals by back-scatter auroral propagation. RSGB *VHF-UHF Manual*, p 2.8 to 2.15.

Election of 1971 Council

Ordinary Elected Council Members

In accordance with Article 52 of the RSGB's Articles of Association, the Council has nominated the following corporate members to fill the vacancies on the Council which will occur on 31 December next:

B. D. A. Armstrong, G3EDD,
E. G. Ingram, GM6IZ,
R. F. Stevens, G2BVN.

Not later than 10 October next any ten corporate members may nominate any other corporate member to serve on the Council by delivering their nomination in writing in a single document to the general manager, together with the written consent of such nominee to accept office if elected, but each nominator shall be debarred from nominating any other person for this election.

Council Members Elected by Zones

Not later than 10 October next any ten corporate members resident in **Zone A** (Regions 1 and 2), **Zone E** (Regions 10 and 11), **Zone F** (Region 15) and **Zone G** (Regions 12, 13 and 14) may nominate any other duly qualified corporate member resident in the zone concerned to serve on the Council by delivering their nominations in writing in a single document to the general manager, together with the written consent of such nominees to accept office if elected, but each such nominator shall be debarred from nominating any other person for this election.

Candidates for nomination as Council Members Elected by Zone must be resident within the Zone for which they are nominated and the nominators must be resident in the same Zone.

The present Council Members for **Zones A, E, F** and **G** are **J. R. Petty,** G4JW; **C. H. Parsons,** GW8NP; **H. E. McNally,** GI3SXG; and **A. F. Hunter,** GM3LTW, respectively.

RSGB Lecture

British Trans-Arctic Expedition 1968/69

Monday 28 September 1970

Institution of Electrical Engineers,
Savoy Place, London WC2

Buffet tea 6pm. Lecture 6.30pm

Lecture by Sqn Ldr F. W. Church, member of the expedition, with D. J. Collins, G2FLB, and R. G. Shears, G8KW, who planned and operated the G7AE section of the Arctic to UK radio link.

The success of the recent polar walk from Alaska to Spitzbergen by Wally Herbert and his three colleagues depended to a large extent upon the reliability of the radio communications link. Freddie Church, operator of the expedition's Arctic radio relay station and on the spot supply organiser, together with Dennis Collins and Roly Shears, will describe and illustrate with slides the problems not only related to radio equipment and communication but also of the polar crossing by Wally Herbert, Ken Hedges, Allen Gill and Fritz Koerner.

Members intending to be present are requested to advise RSGB HQ so that catering arrangements can be made.

FOUR METRES AND DOWN

A monthly account of vhf activity and news compiled by JACK HUM, G5UM*

Proliferation

All Class B licensees are automatically vhf only. This fact produces a metre-wave population in the UK of almost 2,500. How many of the 13,500 Class A licensees have vhf facilities? At a conservative guess we would say at least a third do. Over the next five years this should increase to at least a half as more come to appreciate what vhf/uhf can offer them in the way of high-level noise-free communication. A five-figure population on "Two" might be the result, which would be a very good thing: better still if half of them went to "Seventy" (megs or centimetres, it matters not which).

What persuades a Class A man into the 4m and down world? Let Dale Harvey, G3XBY, of Wolverhampton, as a typical Class A convert, tell his story:

"On 16 June I did a QSY from hf to vhf and I have never looked back since! I missed the really big 12-13 June opening but I did manage to catch the 2m Open Contest (5 countries and 31 counties). So in just under a month I suppose I can't complain.

"This is with a.m. and cw with 12W to a 3/10. Yesterday I started on ssb (180W and a 6/40) and made three contacts with Liverpool stations in 30 minutes, not having worked any in the previous three weeks.

"I think I must be fairly lucky starting my 2m life from the Midlands. The local population is very heavy indeed, and with 200 contacts in the first month of operation I have received a good baptism!"

Well said! Who is next for the font?

"Every night, activity night"

A few thoughts on the subject of those special activity periods which were once so necessary when the Monday Night 2m Activity Night was first mooted by G5KG and G5UM in the mid-1950s but are less so in today's conditions of sustained occupancy.

The Monday Night habit has become an ingrained one to the extent that it is now the accepted meeting time for sideband operators and a "natural" for the ssb contests which are a regular feature on the 2m scene. Apart from this, *every* night is activity night where "Two" is concerned: as we remarked last month, the band is on the go all the time (day as well as night).

But if "Two" no longer needs a special boost, what of less populated "Seventy Cems"? Even here, in the opinion of G8BWO, Christopher Johnson of Tipton in Staffordshire, ". . . every night is activity night now that more stations are beginning to operate most evenings on 432-434. The regulars have been doing so for a long time. A spread out from the 'Monday Nighters only' would be useful."

Yes, indeed it would: and so would a spill-over from 2m to 70cm for shorter-haul contacts. A modulated 3/20 tripler makes a useful quick-starter within most people's financial and technical reach.

In the North Staffs area *every* night is 70cm activity night (listen for G8BWO, G3EHM with some admirable ssb, plus half a dozen others). Is it in yours?

Tracking noise storms

The permanent watch which BRS15744, Ron Ham of Storrington in Sussex, maintains on radio noise output from the sun is of special value when related to subsequently reported anomalous propagation on the amateur bands. Local arrangements by which '15744 alerts nearby operators when anything special is brewing up on his chart recorder permits targets of fleeting opportunity—especially on 4m—to be developed into dx contacts.

The full-scale deflection of the pen recorder at Storrington is 1,500μA above receiver noise level. On 20 July a large burst of solar noise mid-morning on both the 95MHz and 136MHz radio telescopes heralded a noise storm that produced the following chart readings:

21 July	200μA above receiver noise, peaks at 400μA.
22 July	200μA, short bursts peaking 700μA.
23 July	1000μA with a peak as high as 1200μA, one burst lasting as long as 6·5 minutes.
24 July	400μA, short bursts peaking 600μA.
25 July	100μA, one three-minute burst peaking to 300μA.

Turning the amateur band beams into the setting sun produced records of noise bursts as high as 145MHz.

Australia's next "Oscar"

Keeping his ear to the Australian ground, Brian Gibbs, now VK4IC one-time G3OZH (very active on "Two"), has heard that Australis-Oscar 6 is due for launch about this time next year, receiving on 2m and re-transmitting on 70cm, with telemetry designed for direct read-out from teleprinters at ground stations. He adds that the Wireless Institute of Australia (the "RSGB" of VK-land) is planning to raise $A5,000 for the project.

At a more earthly level, VK4IC much enjoyed attending amateur tv demonstrations by the Brisbane group; the receiving side one month, the transmitting side the next. These were not solely to do with television: a secondary purpose (perhaps the primary one) was to encourage 70cm activity among members, with Oscar 6 very much in mind.

Gordon Kelly takes over

Some time this month John Patrick, ZB2BO, will be winging back to England and his original call G3TWG. Listen for

* Houghton-on-the-Hill, Leicester LE7 9JJ.

him from Devon in early November. He leaves behind him in Gibraltar the ZB2VHF keyer, a 10W transmitter for "Four" and a converter adaptable either for 4m or 6m. These will be operated by an enthusiastic member of the ZB2A (RAF Radio Club) team, Gordon Kelly, and should come into their own when the "Gib-to-G" season re-opens next spring.

As for the 1970 season, the ZB2BO score was 62 contacts with the UK on "Four" over the customary period of late-May to mid-July, best for Es over this path. This total was better than 1969 but expectedly down on the golden years of 1968 and 1967. John Patrick reports that there were 10 openings from The Rock that yielded contacts and six short and weak ones that did not, evidenced by the reception of British television a bit lower down in frequency from the 70MHz band.

Almost at the end of the season ZB2BO worked six GI stations in a row, all on A3 on 14 July, but he heard no other areas of the UK. "Perhaps the band had been open earlier to England or Scotland, but we shall never know," he concludes.

Contest news

From Norman Horrocks, G2CUZ, come the results of the North Western Contest organized for RSGB Region 1 operators, with everybody else who cared to have a go welcome (and several dozen did).

Overall winner and 2m fixed station winner was GD2HDZ with 1,062 points. The 2m portable winners were the ever perspicacious G3WIN/P team (793 points) who also secured top place in the 4m portable section with 99 points. The 4m fixed station winner was G3EKP with 113 points. And the 70cm portable winner was G8BRF/P with 11 points.

Clearly, thought Ainsdale Radio Club, who organized the contest, the bias was against 4m and 70cm operation. Next year they plan to restore it by offering bonus points for contacts on these bands.

* * *

Appropriately, the winner of the June Microwave Contest was G3BNL/P, with G3EEZ/P runner-up, a result which will give widespread satisfaction to parabola-pushers everywhere remembering the consistent work which Messrs Sharrock and Wakeman have done to foster enthusiasm for these difficult frequencies—well, difficult at first sight, less so as you come to bend them to your will. Their tech-session at the last VHF Convention will, it is hoped, have persuaded more operators to give them a good run for it at the *next* Microwave Contest on 3–4 October. May the event be favoured by autumnal Indian Summer weather, plenty of ducting and not too much wind to blow parabolas off course (there is no harm in hoping!).

* * *

Look out for a goodly clutch of Northumbrians on 12 September from 1800 to 2200gmt on "Two" (and 160m as well). They will be active during the Tyneside Amateur Radio Society's members' contest.

Frequency setting at "23"

Success or failure in setting up a QSO on the 23cm band rests largely on knowing precisely what the other communicant's frequency is going to be. There are difficulties enough trying to find a weak station by rocking the parabola over a few degrees on the believed source of the signal. If to this operation is added the fiddling double-handed business of tuning the receiver at the same time, the chances of locating him are correspondingly diminished.

In the experience of G8BBE, Trevor Groves of Watford, frequencies have been quoted to him which have been as much as 500kHz in error on 23cm. It does seem that a lot of people have a touching faith that their transmitted frequency is going to be precisely 108 times the crystal frequency (from a 12MHz crystal). In practice, it seldom if ever is.

Says G8BBE: "I would like to suggest a common frequency of 1297·500MHz on 23cm, obtained from a 432·50MHz driver, ie 1MHz below GB3SC. If *all* 23cm operators had this frequency with some form of vxo it would allow netting to be done on 70cm, which in turn would provide the station receiving on 23cm with a marker from his own driver to facilitate locating the frequency of the station he is trying to receive."

It seems to us that this proposal would be highly successful so long as operators equipped themselves with vxo or similar facilities to achieve accurate frequency setting. With many transmitter drive sources—but not all—25pF across the crystal socket does the trick by permitting a wide swing at the terminal frequency.

The G8BBE suggestion could reduce the number of "gotaways" on 23cm. But it needs widespread acceptance if it is to work. Do other 23cm operators detect any snags in it? (Please do not mention having to buy another crystal: they are cheap enough purchased from *Radio Communication* advertisers to your specified frequency).

Letter from America

Here is some amplification of the dx news received from K0CER of which stop-press notice was printed here last month (Bill Smith, K0CER, is contributing vhf editor for ARRL).

First, the new 13cm world record: this was established on 11 July between a very famous American vhf pioneer, W4HHK, with WA4HGN, who was operating portable in the same state of Tennessee. The path distance of 249 miles well exceeded the previous American best on 2304MHz of 175 miles between W1AJR and K2GRI, of whom Bill Smith observes, "I'm betting they will go after the new record and expand the distance before long."

For the 'HHK—'HGN record, crystal-controlled equipment and cw were used, with 'HGN on a mountain top with a portable trailer-mounted parabola. Signals are described as being of good strength and solid copy.

* * *

On 2m the first transpacific moonbounce contact, California to New Zealand, K6MYC—ZL1AZR, occurred on 7 July between 0300 and 0400gmt. This was the rewarding culmination of many patient but unsuccessful e—m—e tests dating back to 1967. The QSO was monitored via moonbounce by VE7BQH of Vancouver.

Super dx in the USA

The following is well worth relating to the auroral and Es anomalous propagation which we in Europe experienced in July, and the coincidence of dates is worth noting.

Bill Smith goes on to report: "Sporadic—E has been exceptional this summer and the 50MHz band has been open at K0CER every day since mid-May allowing contacts throughout the USA and Canada." And he in South Dakota is dx to most.

K0CER adds that several stations have covered 3,000 miles by Es multihop, ". . . which has been in much more evidence this year than in the past." In a 50MHz context it is reported that VE2AIO heard ZK1AA of the Cook Is, north of New Zealand, for 25 minutes from 0247gmt on 8 July, suspected Es to F layer propagation.

As for Aurora, K0CER reports that good manifestations occurred on 4, 9 and 11 July.

Next, ionospheric scatter on "Six": what Bill Smith reports will evoke "if only" thoughts in the minds of UK operators who have neither 50MHz nor the power levels permitted in the USA.

He says: "I might mention 50MHz ionospheric scatter is becoming more and more popular, especially on Saturday and Sunday mornings with the high power and large aerial crowd. Distances up to 1,000 miles are fairly easily covered most of these mornings. Amplifiers using a pair of 3-400Zs or 3-500Zs are the most common. Aerials are usually 6 to 11-element Yagis having 24 to 50ft booms. Lower power does work with larger aerials. The popular Swan 250 series transceivers, pair of 6146s giving 125W output, can do the job when scatter is above average. Most all this work is on ssb; cw runs a poor second in popularity."

Finally on "Two", 28 June and 11 July are quoted as dates that produced excellent propagation and contacts from W5 up to W3 and W8.

French balloon beacon goes up

Over the past three years the club Jeunes Science, of Nancy in France, has sent balloons carrying materials for biological study into the stratosphere. Last year the club permitted F1NK to add a 2m beacon to the payload. Although the beacon power level was only 0·3W, the device was heard at great distances by reason of the height attained.

When Jeunes Science launch their next balloon on Sunday 11 October more elaborate beacon facilities will be carried, providing output on 23cm and 10m as well as 2m. The lower part of the balloon's container will hold micro-organisms, a rat and three mice. One of these mice will have a cancerous tumour to permit study of the action of ionospheric radiations on cancer. The rat is to be fitted with a jacket which will keep close to him a cardiac monitor. Its heartbeats will be transmitted in the met band in the form of impulses at a power of 1W on 27·4MHz. It is suggested that listeners try to receive this frequency and to record it on pen-recorders.

The container will also carry a beacon made by F1NK with an output of 1W precisely on 145·220MHz, amplitude modulated by a musical note, similar to that of an American police siren. There will also be a beacon on 1296·6MHz designed by F1SA with 0·3W output, and modulated by one-second bleeps.

The aerials will be simple dipoles with vertical polarization to give coverage in all directions. Experiment has proved it is not necessary to change the polarization of home station aerials.

BEACON STATIONS

Callsign	Location	Nominal frequency	Emission	Aerial direction
GB3ANG	Angus	145·95MHz	A1	SSE
GB3CTC	Redruth, Cornwall	144·13MHz	A1	ENE
GB3DM	Burnhope, Co Durham	145·975MHz	A1	N/S
GB3GW	Swansea	144·25MHz	A1	ENE
GB3GM	Thurso	70·305MHz	A1	N/S
GB3GM	Thurso	145·995MHz	A1	N/S
GB3GEC	W. London	433·45MHz	F1	N/W
GB3SC	Sutton Coldfield	433·50MHz	F1	N/S
GB3SU	Sheffield (temporary location)	70·695MHz	A1/F1*	Omni
GB3SX	Crowborough Sussex	28·185MHz	A1	E/Omni
GB3SX	Crowborough	70·699MHz	A1	Omni
GB3VHF	Wrotham, Kent	144·500MHz	F1	NW

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

Launch will be at 1400gmt on 11 October. Maximum altitude of 24kM/c should be reached just over an hour later. Then as the capsule parachutes to earth the experiment should be over by 1530gmt. The progress of the balloon will be followed by French Army radar.

Any change in plan will be announced over the air at 1400gmt 11 October by F1FI (QRA DI2IC) on a frequency near the beacon, F6AFC (DI4IE) on 145·282MHz, and F6AKQ (DI4II) on 144·63MHz, all of them well sited. Additionally, F6AKQ and F6AGM will transmit current information on 7MHz.

Reception reports should be sent as soon as possible after the experiment to F1NK, Georges Guinard, 15 Route de Villers, 54, Laxou. The following information should be given: callsign, name, QTH, QRA locator, whether 2m and/or 23cm beacon heard, aerial used and whether tilted or not, type of receiver, and reports on signal strengths taken every five minutes.

Another TF soon?

If all goes well, there might be another Icelandic station putting a vhf signal into the UK before long. Some of the enthusiasm of TF3EA has brushed off on to TF3SF, with the result that the two of them having laid on a series of tests to determine how far 2m would extend over Iceland's rugged terrain, managed to make contact over a 160-mile path slap through the middle (or over the top) of 5,000ft mountains.

At TF3SF/P nothing more elaborate than an HW17 was used at the various sites tried, but with a separate high performance cc converter and receiver. Back at TF3EA an HW17, modulated, preceded the 4CX250B linear.

By these proselytising means new people in isolated places are brought on to vhf . . . which reminds us that it was a chance meeting of TF3EA with G3JVL on 20m some time ago that enabled the latter to expound the delights of vhf to the Icelander, with the eventual successes on "Two" and "Four" which we all now know.

VHF round table on "Twenty"

Several of the top vhf dx men in Europe meet on "Twenty" daily at 1830gmt on 14,345kHz to discuss the latest metre-wave propagation situation and the imminence of openings

that might encourage an immediate dive down to "Four" or "Two".

Some days this 20m schedule is attended by TF3EA, G3JVL, OY2BS, a trio of OZ-men and F9FT, with LZ1XA doing proxy for meteor-scatter man LZ1BW, and G3AMM proxy for that other m-s man G3CCH. Other metre-wave notabilities to be heard include EI6AS, GM3UAG, ZB2BO and LX1SI.

We are asked to state that any vhf dx enthusiast is welcome to join this net.

The log for IARU

As if we need to tell you—it has been said enough times here—an IARU Contest ran concurrently with our VHF NFD. Participants in VHF NFD who wish to enter the IARU event need only follow the advice given here by G3JKY last month. He will then ensure that the entries go on to SRAL, the Finnish national society, who are handling the IARU event for 1970. (Incidentally, the RSGB's turn comes in 1972). Fixed stations may also enter on all three bands involved, 144, 432 and 1,296MHz.

The same arrangements apply for the IARU uhf/shf event on 3-4 October (two sections, fixed and portable, for 432MHz and all bands above).

Listeners may enter both contests using the standard form of RSGB contest log and declaration cover sheet. Two copies of log and cover sheet should go to G3JKY; one for RSGB the other for SRAL.

Significant figures

Unsubstantiated allegations plus generalizations equals nought. We are, believe it or not, talking about QSLs, the rate of returns, whether Class B men fail to acknowledge more often than Class A—all the subject of intermittent comment in this column for the last year or two or three, and much of it self-cancelling at that.

To try to devil out some hard statistics on the subject, G8APO of South London—widely known as an enthusiastic /P visitant to all sorts of rare spots—sat down and went through his filing card system. He found that during two years of operation on "Two", and leaving out Continental contacts, 58 per cent of the UK stations worked, whether portable, mobile or from the home QTH, were G8-plus-3 calls. Of these, 61 per cent sent him QSLs (not counting duplicates or extras for rare counties). Under exactly similar conditions only 43 per cent of all other G calls have QSLd. Graham Meachen adds, "This is possibly higher than the average, from what I can hear on the air and from comments of known amateurs. I make no comment about the proportion of Class A to Class B QSLs, but surely more than this percentage could rise to a card if they receive one?"

He goes on to point out that he QSLs 100 per cent via the bureau, and sends extras to anyone who requests another or has not received the first. If he gets any direct with a request for return, he sends one direct, regardless of whether or not there is one on its way via the bureau. His parting shot: "Obviously, if everyone did this there could be no complaints. I don't expect everyone to do so, but I must say that there's no excuse for those few stations who haven't the grace to reply to a direct QSL (no names, no pack drill), as I have suffered before now." He does not say so, but we assume an sae is always sent with a request to QSL direct.

They are DX indicators

We believe it was G8ANQ who remarked some time ago that he hoped the then projected Durham beacon would turn out to be "the GB3VHF of the north". In the past couple of months GB3DM on 145·975MHz seems to have become just that to people 200 miles to the south, an indicator of band conditions to them in just the same way that GB3VHF has been for so many years to 2m listeners along the spine of England almost up to the border.

As early in its life as the first week of August GB3DM offered to Ron Ham in Sussex, and no doubt to many other BRS listening men who do systematic propagation observations, a classic example of tropo behaviour. When during that week the steadily rising barometric pressure tipped over from 30·4 the 2m band opened up as it so often does when the millibars begin to droop, and up came "Delta Mike" from normal 539 to almost S7.

* * *

Further north the GB3ANG beacon has been enjoying an extended range since its removal to the ITA Angus transmitter site—and once again a "thank you" to the technical division of the Authority for making this facility possible, as indeed at Burnhope for GB3DM.

At Angus as with Burnhope, Bill Burton, G8ANQ, has done a lot of behind-the-scenes slogging to bring this project to success. And so has that pioneer of Scottish vhf activity GM4HR: he is beacon-keeper at GB3ANG, and must assuredly by now feel that the responsibility of this office (liable to call-out at any time) well repays the enhanced use members will enjoy from "ANG" now that its coverage is so effective.

Tech corner

From G3JVL (Mike Walters, Hayling Island, Hants)

Having the 4m beam at an adequate height can make the difference between hearing weak signals during the openings for which the band is noted, and not knowing anything about them at all. The angle of radiation is the operative factor here.

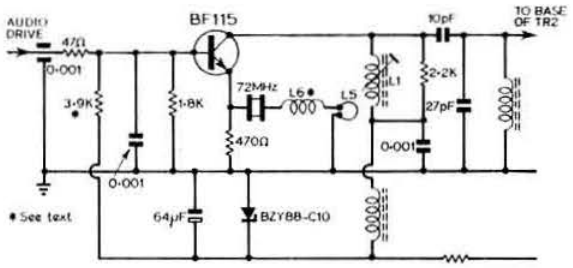
Roughly doubling aerial height halves the angle of radiation. Assume 30° for half a wavelength above ground for non-stacked arrays: then at a height of 4m above ground the aerial's angle of radiation will be about 15°, at 8m 7°, and at 16m as low as 3·5°.

This means that to work with maximum signal into Iceland from the south of England on 4m the commonly-used four-element aerial would need to be up at 50ft. But as we know, this generally is not always possible, and so aerial gain is effectively reduced. In spite of this, choosing the right time still gives satisfying dx results on "Four".

From GM3TLA (David Pearson, Aberdeen)

This note describes a method of frequency modulating a crystal oscillator by changing the transistor's operating point.

Several circuits have been published for frequency modulating overtone crystal oscillators, using a variable capacity diode in series with the crystal. In my experience with these circuits, the frequency-shift voltage-change relationship was very non-linear and the frequency shift inadequate.



The GM3TLA suggestion for modulating a crystal oscillator
L1, 6 turns of 26swg wound on 7mm former, slug tuned
L5, 1 turn link on former for L1
L6, 4 to 10 turns of 22swg 6mm internal diameter (see text). This coil can be mounted in place of C2 on the G8ARV exciter board

The circuit shown is a modification of the oscillator in the G8ARV 2m exciter, and produces an acceptable linear frequency shift with voltage change, the total shift available being more than required for amateur use. The value of L6 depends on the crystal. It is chosen so that the output on 2m can be shifted below the nominal frequency by about 25kHz, by tuning L1 for maximum shift. L1 is then set to give a shift of about 15kHz below the nominal frequency.

It is desirable to plot the frequency against the base voltage over the range 2 to 4V, to determine the most linear region (and ensure that the oscillator is always stable). This region was centred at 3·3V with the transistors tested, and the linear region permitted a frequency shift of plus or minus 5kHz from the centre frequency. The sensitivity was typically 6kHz shift for a change in base voltage of 0·4V, ie for normal amateur modulation a maximum audio drive of 0·15V rms was required.

The base bias resistors should be chosen so that the transistor operates at the centre of the linear frequency change region. The values shown are typical if the audio drive is capacitor coupled to the base.

The performance table

The old style Four Metres and Down Certificates table would now cover almost a whole page of *Four Metres and Down*. This is space which can ill be spared at a time when the amount of news being generated by the metre-wave community increases monthly and more column inches of the quota for *FMD* are required to report it. So the table has to wait. However, it should next appear completely updated and in more compact form in December.

Here and there

"Did you hear about the G8 in St Helens who had a serious operation earlier this year, and shortly after (I believe he said the day following) he was operating a little transmitter on the bed with the receiver on the table, and the nurse had taped the halo to the top of the drip stand by his bed!"—G8BRT.

* * *

When reporting activities to *Four Metres and Down* never use Christian names, only callsigns. There are dozens of Johns, Jims and Mikes on vhf, but only one ZB2BO, GM3UAG and G3JVL. Precision avoids confusion.

* * *

"An old boy out for a country walk, looking over our garden fence, pointed towards the solar Yagi array and said to Mrs BRS15744 who was working on a flower bed: 'Is that a garden spray?' No comment!"—Ron Ham, BRS15744.

* * *

"Noted with interest G3TPW's experiences with the Motorola MM1552 on 2m. However, it should be pointed out that they cost £34 17s 8d each. When they are being caned at 75W one false move can result in rapid destruction—a very expensive pastime!"—G3COJ.

* * *

For 2m cw ops G3KH offers FT243 overtones on 8,006·6kHz (they come out on 144·12) in exchange for crystals in Zone C. QTHR.

* * *

"Am now QRV on 432·15MHz with 600W of ssb most evenings looking for contacts especially with the Continent"—G8BGQ of Rickmansworth, Herts.

* * *

How did the big opening of 6 July affect television? John Worsnop, A7081, Leeds, can provide the answer. On Band I perfect lock was obtained from RAI, Italy, Sweden, Czechoslovakia, West Germany and Norway. By 1930gmt, DFF Berlin was blotting out Holme Moss, which is almost visible from Leeds! Receiver: GEC BT1748 modified for 625-lines, negative going: aerial rotary dipole.

* * *

Who will be the first G8C—— to earn the Senior 2m Award? G8CMU is within striking distance, but needs schedules with the four northern English counties and any GM ones to help him over the hump. Co-operators are asked to write to Mike Adcock direct (QTHR).

* * *

Note for non-vhfers: if you think your site too poor to warrant coming on to the metre-waves, be inspired by young Nicholas Richardson, A6812. His 8-element fires straight into the Chilterns 1½ miles from his Wendover QTH, but he still pulls in the Continentals over the top of them, typically nine ON, four PA and four F, most at S9 during the mini-opening on 2m of 1-2 August.

Good work, "GMY"

Frank Green, G3GMY, has reluctantly had to give up the office of vhf certificates manager due to pressure of many duties outside amateur radio. The Society records its appreciation of the good work he has done over very many years in connection with the issue of Four Metres and Down Operating Awards. More than 300 have been vetted and cleared by 'GMY for ratification by the VHF Committee.

As from the beginning of September G5UM took over the duty of vhf certificates manager and claims should be sent to him from now on.

THE MONTH ON THE AIR

A monthly feature by JOHN ALLAWAY, G3FKM*

THE request for reports on stations who do not QSL in spite of being supplied with SAEs and IRCs has produced a number of replies. Quite a few cards which are not arriving seem to be those dealt with by QSL managers and there may well be delay in receipt of logs. However, there would seem to be no excuse whatsoever for the widespread absence of cards from AP5HQ who appears to default regularly in spite of being supplied with more than adequate postage. UG6AD has so far scored the second largest number of complaints, and your scribe's personal experience is that cards from Box 88 are not as plentiful as they used to be. More reports of stations who have not QSLd would be appreciated.

An apology from G3KDB (held over from last month and not received as a result of the introductory remarks in July *MOTA*) who apologizes for the delay in supplying VS9MB confirmations. Despite three letters to the operator concerned and one to the secretary of the club at RAF Gan no logs have been received since March and some 400 cards are held awaiting their arrival. It is suggested that anyone desiring rapid action should write direct to BFPO 180, c/o GPO London.

G2FUX is visiting South Africa during the period 2 to 25 September, Australia from 5 October to 8 December, New Zealand from 14 December to 21 January 1971, and the USA from 14 February until sometime in April or May. Permission has been sought and obtained for operating privileges but callsigns are not yet to hand. Ockenden Award matters will be looked after by Frank's daughter, BRS20988, during his absence, and Ex-G Radio Club affairs will be dealt with by G8FG, Howard Cunningham, 235 Station Road, West Moors, Dorset.

Subscriptions to Euradio are being increased to 15s from 1 September (or £1 per annum by first class mail). A special reduced fee of 10s is applicable to those under 18. Membership includes receipt of six bi-monthly editions of the Euradio bulletin.

Congratulations to G3HCT who is believed to be the first UK applicant for the much sought after Five Band DXCC Award.

Top Band news

Bulletin No 3 from W1BB appeared during July and gave more details concerning the South American dx mentioned in August *MOTA*. Brazilian stations are now permitted to use 1,800 to 1,850kHz with a maximum input of 1kW, and PY1MGF uses 500W input to a half-wave aerial 45ft above ground and running uphill. He has been heard by ZM1AYG/1 and has worked G, GM and EI. It seems likely that the best time for Europe/South America contacts may be during May, June and July between 2200 and 0100. According to Stew, G3PQA, who was previously VP9GJ, is now in Turkey and trying to obtain operating permission.

Isaji Shima, JA3AA, is interested in starting some dx tests between Japan and Europe and would be pleased to hear from others who would like to help. His address is 1-4-8 Furuichi, Habikino, Osaka, Japan.

What is believed to be the first Louisiana-UK contact took place between K5TFG and G2PL on 21 March. The K5 also worked EI9J and HB9CM.

Following their very successful visit to Perthshire in June, G3ONS, G3KRH and GM3NVU have asked for readers to

The 21-22 February HB0CM Lichtenstein 160m operation by HB9CM was a great success. Equipment used included a homebrew transmitter and Pearson KE93 receiver. Here Philo is shown at the operating position. Walter, HB0ALF, operated a Swan transceiver on the other bands

Photo by W1BB

* 10 Knightlow Road, Birmingham B17 8QB.

let them know which are the five most "wanted" Scottish counties so that they can plan further movements. Would those interested please write to GM3NVU, George McLauchlan, 16 Wellpark Terrace, Bonnybridge, Stirlingshire?

The Tyneside ARS has organized a member's contest to take place between 1800 and 2200 on 12 September. This should result in a high level of activity from Northumberland during this time.

GB2USA

GB2USA, the Mayflower '70 Exhibition station which operated from the clubroom of the Plymouth ARC, closed down on 15 August after a successful four weeks on the air. Many contacts were made and readers are reminded that applications for the Commemorative Certificate should be directed to G3SPI and *not* to the address of G3KFN as originally indicated. Those who submitted claims to the latter are asked to re-submit to G3SPI who hopes to clear claims within a few weeks.

QSL via DOTM . . .

The latest issue of the *DOTM Bulletin* points out how applicants for QSL cards are able to help reduce the not inconsiderable work load at Box 7388. Stew asks that all the information necessary for confirming a contact should be shown on one side of the card—ie if the applicant's QSL is the type with callsign on one side and the data on the other he is requested to write in his callsign on the same side (and near) the date, time, band etc information. Please put the callsign(s) of the stations for which cards are enclosed on the reverse of the outside of the envelope in which they are submitted. All times should be give in gmt and in the case of contest QSOs the received serial number should be quoted to assist location in the log. Quickest results will be obtained by sending one sae plus irc for each card requested. All incoming cards received without postage or envelopes as well as those received via bureaux are QSLd via the bureaux. As a matter of interest readers will be pleased to know that all cards are sent on to the station for whom W2GHK has acted as QSL manager.

DXCC

July *QST* lists 327 callsigns in the Honor Roll. These include G3FKM (322), G8KS (321), G4MJ (319), GI3IVJ (318), G2BOZ, G2BVN, G3HCT and G3HDA (316), G5VT (315), G3DO and GI3JIM (314) and G6TA (313). The radiotelephone listing contains 88 calls with G3FKM and G8KS (318), GI3IVJ (315), G3DO, G5VT and G6TA (313). Figures in brackets are the number of "countries" confirmed, the current maximum being 322.

QST also gives the following very welcome news: "During the ARRL Board Meeting, held in May, the matter of the dxpedition requirements was informally discussed. As a result, we are glad to announce that as of 1 May 1970 the requirement that all dxpedition type operations be approved before DXCC credits can be given has been lifted and only those about which some question arises will be asked to do so."

The operators of GB3TT near Alum Bay, IW, last November: (l to r) G3RXC, G3RJK, G3XYB and swl Mike Cuffe. In the foreground is G3AFK. Readers may remember that this station was set up to celebrate the 50th anniversary of the first radio transmission by Marconi from the same site in 1919

of information for the production at sea of a newspaper

Contests

The VK/ZL/Oceania Contest 1970

1000 3 October to 1000 4 October (phone section).
1000 10 October to 1000 11 October (cw section).

Two points for each QSO on a specific band with VK/ZL stations, one point for QSOs with other stations in Oceania. The final score is determined by multiplying total QSO points by the number of VK/ZL call areas worked on all bands. The same call area worked on different bands counts as a separate multiplier. Serial numbers should be exchanged and consist of RS/T plus QSO number (starting from 001). Logs should show date, time, call of station worked, band, number sent, number received, and each new call area should be underlined. Different logs should be submitted for each band, and should be accompaneid by a summary sheet giving callsign, name and address (in block letters) and details of equipment used. It should show QSO points and multiplier totals for each band and a declaration that all rules and regulations were observed. Very attractive certificates will be awarded to top multi-band scorers and to others according to activity level produced. Listeners may enter by reporting VK/ZL stations, and should log their time, call, call of the station being worked, RS/T, and serial number being sent by the VK/ZL station. Logs should be posted to reach Federal Contest Committee—WIA, Box N1002 GPO, Perth, WA, 6001, Australia, before 22 January 1971.

The Scandinavian Activity Contest

1500 19 September to 1800 20 September (cw).
1500 26 September to 1800 27 September (phone).

Covers 3·5 to 28MHz. Non-Scandinavians will work Scandinavians and the same station may be worked once on each band. The prefixes are LA (Norway), JW (Svalbard), JX (Jan Mayen), OH (Finland), OH0 (Aaland Is.), OX (Greenland), OY (Faeroes Is.), OZ (Denmark), and SM/SK/SL (Sweden), and these count as the nine multipliers. A total of 45 multipliers is therefore possible. Participants

should exchange RS/T plus serial QSO number (starting from 001). All entries must be multi-band, and may be single- or multi-operator. One point is awarded per QSO, and the final total is the sum of complete QSOs multiplied by the total of the multipliers. Logs must show date, time, station worked, sent number, received number, band, and note if a new multiplier. The summary sheet should show totals for each band and how arrived at, and the final score. A signed declaration that the entrant fully agrees with the rules and has been working to them and agrees with the final decision of the contest committee should also be submitted and posted no later than 15 October to: EDRs Contest Committee, Post 0. Box 335, 9100 Aalborg, Denmark.

The Fourth International Convention Contest.

This is a competition to see who can work the most stations in Barcelona city and province (EA3) and the Balearic Is (EA6) between 15 July and 15 September. Unfortunately details were received too late for inclusion in an earlier *MOTA*. However, a diploma will be given to those who reach 100 points which are worked out as follows: stations in Zone 14, 15, 16, 20 and 33 count two points per phone and four points per cw QSO. Contacts on 3·5MHz count double and contacts with the same station may be claimed on different bands provided they have taken place on different dates and are at least six hours apart, the same conditions apply to working each station on phone and cw. Send list of QSOs to URE, Box 1461, Barcelona, Spain, before 29 September.

The Four Land QSO Party

Organized by CHC Chapter 79. From 1800 12 September to 0200 14 September.

One point per QSO. Total score number of QSOs by number of USA 4th district states worked by number of counties worked. States and counties count once only. Activity around 3,575, 7,060, 14,075, 14,343, 21,090, 21,360, 21,100, 28,090 and 28,600kHz. Mail logs to Bob Knapp, Rt. 7, Box 187, Greenville, NC 27834, USA, before 31 October.

Awards

Worked Norwegian Cities

Issued by Larvik Society of NRRL, Award Manager, PO Box 59, N-3251, Larvik, Norway.

Class 1	(Europe)	10	cities	(DX) 5	cities
Class 2	,,	20	,,	,, 10	,,
Class 3	,,	30	,,	,, 15	,,

Cities are: Arendal, Bergen, Bodo, Drammen, Egersund, Fredrikstad, Gjovik, Hammerfest, Halden, Hamar, Harstad, Haugesund, Horten, Kongsberg, Kristiansand S., Kristiansand N., Kragero, Larvik, Lillehammer, Mandal, Molde Masjoen, Moss, Mosi, Namsos, Narvik, Notodden, Oslo, Porsgrunn, Rana, Sarpsbourg, Sandnes, Sandefijord, Stavanger, Skien, Steinker, Trondheim, Tonsberg, Tromso, Vardo and Aalesund. There are no date/band/mode restrictions and a list certified by two licensed amateurs should be sent to the address above. Contacts with LF, LH and LJ stations do not count. The award is available to listeners.

The 9H1 Award

The Awards Manager, Malta Amateur Radio Society, Malta.

Requires specified number of points for contacts with Maltese stations since 21 September 1964 (Independence Day). These are as follows: 50 points for one band working, 40 points for two band working, 30 points for three band and 20 for four band working (for European applicants in zones 14, 15 and 16). Each contact counts five points on 1·8MHz, three on 3·5MHz, one on 14MHz, three on 21MHz, and five on 28MHz. Contacts on any five bands qualify. 9H1 listener cards up to two per band may be substituted for QSOs provided that they have been QSLd. The award is avilable to listeners on a heard basis. QSLs or GCR list plus 6s or 10 IRCs should be sent to the address above. A station may be worked on more than one band for points.

Expeditions

During the period 13 to 30 September G3EJF will be operating as GM3EJF/P from Kirkcudbrightshire and Wigtownshire. He will be active on 3·5MHz cw between 1700 and 2100 some evenings although the trip is primarily a holiday. WAB chasers should look for G3EJF/P from rare areas in northern England on Saturdays between 1700 and 1900 on 3,560kHz cw.

By the time this issue of *MOTA* is being read W4BPD is scheduled to be back in the USA following his Indian Ocean trip. All QSL cards should be directed to W2MZV.

KM6DU/KH6 (Kure Is) was on the air in mid-July. KM6CE reports that there will be further activity from the island soon and it is believed that W7UXP/KH6 hopes to be on during October—14,205kHz is mentioned as a likely frequency on which to find him.

West Coast DX Bulletin reports that 9K2AM is attempting to visit Iraq (YI), but that no plans have been announced yet.

According to *DX News Sheet* OH2BH/ZA made 868 QSOs during 8½ hours on the air. Their equipment was impounded but was returned to them when they left Albania a week later. DL7FT is believed to have already received his equipment from the USA and hopes to operate /ZA in September or October.

Later news suggests that DL7FT/ZA may be on the air from 22 to 25 September with possible extensions for a few days before and after these dates. Frequencies are likely to be 14,195, 14,185, 21,245 and 21,235kHz, the transmitter being crystal controlled. Martin, OH2BH, is reported to have had discussions with the Albanian authorities and indications were that they would not object to him making a return trip within the next few months.

VE7IG is in the Far East for a two-year tour and has already been on the air from Brunei as VS5RG. According to the *DX'ers Magazine* he will visit India and try to visit the Laccadive Is. He intends to concentrate on the lf bands.

A visit to Bajo Nuevo (HK0) may be undertaken by HK3RO and W4DQS if sufficient interest is shown.

News from overseas

K4MQG, who acts as QSL manager for MP4BHH, MP4MBB, MP4QBK, KB6CZ, KG6ASC, VK9MM, 9L1GQ and 9L2SL has now moved to a new address (see *QTH Corner*).

Bill, WB4APC (also 9M8APC), is now back in Germany and wishes it to be known that he has his DL5KS call back. He will be looking for old friends on all bands 160 to 10m from September onwards.

JA6ACZ (left) and JA6AFZ are keen 40m dx operators who have given first contacts with Japan on the band to many Europeans

JW7UH writes to say that he will be in Spitsbergen until June 1971 and that his QTH is a former coal-mining community at Ny-Aalesund which is now occupied by a 30-man team working at the Kongsfjord satellite telemetry station. With the exception of the UA1KED base at Franz Josef Land they are the most northerly community in Europe. During the winter months contact with the outside world is by a small single-engined aircraft which connects with Longyearbyen, some 80 miles to the south. From here there is a regular service to Norway. So far Ed has made over 6,000 QSOs with his Drake 4 line and 18AVQ vertical aerial. He is working towards 5BDXCC but having difficulty with 28MHz because of the very poor propagation on that band at 79°N; for this reason he concentrates on that band whenever it is open.

VR2FT reports that there is a new station active from Nauru Is. This is Derek, G3JYJ, who runs an FT200 with a dipole aerial pointing towards Japan. His callsign is C21GB and QSLs should be sent to the address in *QTH Corner*. Les says that the Fijian licence fee is going up to £2 on 1 August, and that there will be a special station on the air during the Scout Jamboree on the Air between 6 and 10 September using the callsign VR2SA. A new prefix is expected to take over from VR2 when independence is attained in October.

HR2WTA, via GM3VEY, says that he has only just received a batch of QSLs from the bureau which date back to January 1968! He is most anxious to assure everyone that they will receive cards from him, but that they may take time unless they are sent to him direct.

KH6GLU, who acts as QSL manager for FW8DY, KR6AP, KX6BK, VR3DY, ZK1AJ, ZK1MN (Manihiki) and 5W1AF, now has a new address (see *QTH Corner*).

Keith Howard, VK2AKX, left Australia on 8 August on an extended trip to Asia, Europe and Africa. He is crossing the USSR by train and departs from Vladivostock on 7 September, his period in London will extend from 15 to 23 October approximately. During the trip he will try to keep in touch with VK2XT on 14,150 and 21,300kHz, and he will try to visit as many amateur stations as possible. Keith has been re-issued with his old G call and his UK QTH will be c/o G. L. Coath, School House, East Claydon, Bletchley Bucks.

George, GW3DIX, informs your scribe that the cw station using the callsign ZB2BY is a pirate. The genuine ZB2BY is exclusively ssb and has no intention of operating on cw.

DX news

5VZWT is expected to operate from Dahomey for a two-month spell commencing around 19 August. His callsign will be TY7ATF.

According to *Long Skip* VU2CK has reported that possibilities for operation from the Laccadive Is seem to be improving and that transport and weather may be favourable next February.

OX5AP, Thule, Greenland, will be carrying out a series of tests on 50·15MHz for the rest of the year. Five-minute transmissions will be made at each hour between 2200 and 0200 daily. Any reception reports would be welcomed by ARRL.

JD1AAH closed down on 15 July. A new station has now come on the air in the person of JA6CS who is using the callsign JD1ABO. A new Japanese possession net has been formed and meets every Saturday on 14,170kHz at 2000 JD1ABO often looks for European contacts on 14,110kHz at 1800. JD1ABH, who is located on Ogasawara Is (formerly Bonin Is), runs 50W to a ground plane and will be on the air until next spring. He favours 14,060-14,070kHz cw and 14,160-14,170kHz ssb.

Stations in Peru used the special prefix OB from 24 to 30 July to celebrate Peru's 149th Anniversary of Independence. Another unusual prefix belonged to OI9SUF which was a Scout camp station located in northern Finland. Stations using 5K and 5J prefixes were Colombian stations taking part in the HK contest.

Countries Table

	1·8 MHz	3·5 MHz	7 MHz	14 MHz	21 MHz	28 MHz	Total
G3VPS	9	12	10	60	18	10	119
G8VG	3	21	30	35	71	51	211
G3JVJ	4	66	18	37	23	26	174
A6265	3	80	76	188	158	128	633
A6248	4	59	68	160	120	106	517
BRS25429	3	101	79	136	130	110	559
A7006	17	32	28	181	181	137	576
A6904	10	36	47	149	145	95	483
ORS31427	—	14	13	181	115	120	438
A6992	—	—	—	161	—	35	196
BRS27880	4	54	42	116	89	59	364
A6023	5	38	39	78	37	19	216
A5489	—	76	21	95	83	123	398
A6278	3	44	36	76	24	29	212
BRS30694	6	24	29	70	61	44	234
A6148	5	84	19	49	46	68	271
A7054	1	84	4	62	73	3	227
A6553	1	16	14	41	72	53	197
A6242	2	19	7	38	26	29	121
A6098	4	21	12	26	37	25	125

(This month's table is in order of 7 plus 14MHz totals)

CR9AK, Macao, was recently active and being operated by VE7IG. QSLs should be sent via CT1BH as usual.

3B7DA is reported to be on the air from St Brandon Is and is thought to be using a crystal controlled transceiver on 14,330kHz. He also is to be found on 7, 14 and 21MHz cw using a modified HW16 transceiver with 7,004 and 7,011kHz crystals given to MARS by the S. Calif DX Club. QSLs should go via 3B8AD.

As mentioned before, ZM1AAT/K will be closing down soon. He will be active daily until he leaves on 3,504kHz at 0615, 7,004kHz at 0715, and on other bands according to conditions.

A new prefix is now in use in Botswana (formerly Bechuanaland). 9B3AC has been active and gives his location as Serowe.

The group of stations whose callsigns began with the prefix 4N2 were located in the Dalmatian Is off the coast of Yugoslavia. QSLs for all of them should be sent to YT2NEG, Tomislav Dugec, Lavcevica 15/3, Split, Yugoslavia. A special certificate is available for those who worked at least four different islands and seven IRCs plus QSL cards should be sent to YU1SJ, Miroslav Bogosavljev, Splitska 6/IV, Beograd.

This fine array of equipment belongs to Paul, WB2OZW, of Park Ridge, NJ. Paul is a keen FOC and TOPS member who believes that communicating is more important than working new countries

QTH Corner

C21GB	MQ1 GVT, Nauru Is, Central Pacific.
C31CR	WB2NXL, 22 Ambassador Drive, Victor, NY, 14564, USA.
C31CY	DL2LK, Hauptstr 30, D-3401 Holtensen, Germany.
C31DB	F3YV, 45 Rue G. Bizet, 59 St-Andre-Lez-Lille, France.
GD3YWP, GM3YWP, GW3YWP	G3YWP, P. White, "Sycamore", Lower Lane, Freckleton, Preston, Lancs.
HB0AJH/P	HB9AJH, Rue L Envers 12, 2605 Sonceboz, Be, Switzerland.
HB0XJB	K4CFS, J. Lewis, 2118 Pullman Cir, Pensacola, Fla, USA.
HB0XJD	DJ2SX, W. Zimmermann, Poststr 9, 6843 Biblis, Germany.
HB0XJF	DL1GK, Hans Rothenhagen, Parkstr 4, 2304 Laboe, Germany.
HC8RS	via YV1YD, Peter Buerger, Aptdo 787, Maracaibo, Venezuela.
HP8C	via HP1AA, Box 2033, Panama 1, Panama.
HR2WTA	Bill Anding, Tela Railroad Co, La Lima, Honduras.
JD1ABO	via JA1BA, PO Box 1, Funabashi-Higashi, Chiba, Japan.
K4MQG	(new address) 801 Chelwood Place, Charlotte, NC, 28210, USA.
KH6GLU	(new address) 95213 Waimeli Place, Waipio, Hawaii, 96786, USA.
KM6DU/KH6	via KM6CE, US Naval Security Gp Activity, Bldg 7136, Midway Is.
KP6AL	via K3RLY, 35 Allview Drive, Ellicott City, Md, USA.
PZ5RK	PO Box 1838, Paramaribo, Surinam.
TA3AY/1	via W1NYA, 202 Metropolitan Avenue, Roslindale, Mass, 02131, USA.
TR8LB	BP 5050, Libreville, Gabon.
VP1CP	PO Box 548, Belize, British Honduras.
VP2LC, VP2SM, VP2LY, VP2SN	VE3GCO, G. V. Hammond, RR4, Main Street, Atwood, Ont, Canada.
VQ9/A/A, VQ9/A/C	VE3EWY, R. C. Kenny, 2 Delbert Drive, Scarborough, Ont, Canada.
VR3I	via K3RLY (see KP6AL).
VS5RG	via VE7BWG, 488 E 4th St, North Vancouver, BC Canada.
VS9MQ	via 9V1OY, Malcolm Hamilton, 18 Lynwood Grove, Braddell Hts, Singapore 13.
XT2AA	BP 75, Ougadougu, Upper Volta.
3A0FH	WA2UJM, 436 N. Geneva St, Ithaca, NY, 14860, USA.
3V8AH	BP 780, Tunis, Tunisia.
3V8ZK	via F5ZK, 51 Av de L Agt Sarre, 92 Colombes, France.
HB9YC/4W1	Box 126, 6903 Lugano, Switzerland.
5X5MP	via LA8ML, Fagerliveien 33, Frodrikstad, Norway.
ex-9G1GD	K. D. Abbott, 25 South St, Portslade Old Village, Sussex.
9V1QA	via W6HRE, 30117 Via Borica, Palos Verd Pen, Calif, 90274, USA.

RSGB QSL Bureau: G2MI, Bromley, Kent, BR27 NH.

VE7GI says that the operation by ZS6ANT expected to take place from Bouvet Is this winter has been postponed for one year due to the fact that the special boat being built for the weather station is not likely to be ready.

VQ9CD is now on ssb, crystal controlled on 14,230kHz. He uses 14,024 and 14,030kHz crystals for cw usually after 1300.

Band reports

Once again the level of activity has been quite high, and interesting dx has been reported on the lf bands. Features of the month have been the elusiveness of Gus Browning and the abominable behaviour of the European "pile-up" attempting to work KP6AL. The latter demonstrated the disaster of trying to work transceive when operating from a rare location, and congratulations and thanks are due to KH6SP and others who so patiently did all they could to help in the face of quite impossible odds.

Ten metres has been almost useless but 15m seems to have produced the largest number of reports. Many thanks are due to all correspondents and especially to the following: G2BOZ, G2HKU, G3AAE, GW3AHN, G3HB, G3UKH, G3UYM, GM3VEY, G3WBT, G3WPO, G3YWX, GM4QK, G5JL, G8VG, BRS2098, BRS17567, BRS30231, A5489, A6248, A6553, A6658, A6947 and A6958.

Propagation Predictions

While the F2 MUFs are relatively low during June and August, they begin to increase again during September. For this reason dx conditions on the hf bands (28 and 21MHz) will improve steadily during the month to reach a maximum at the end of October and in early November.

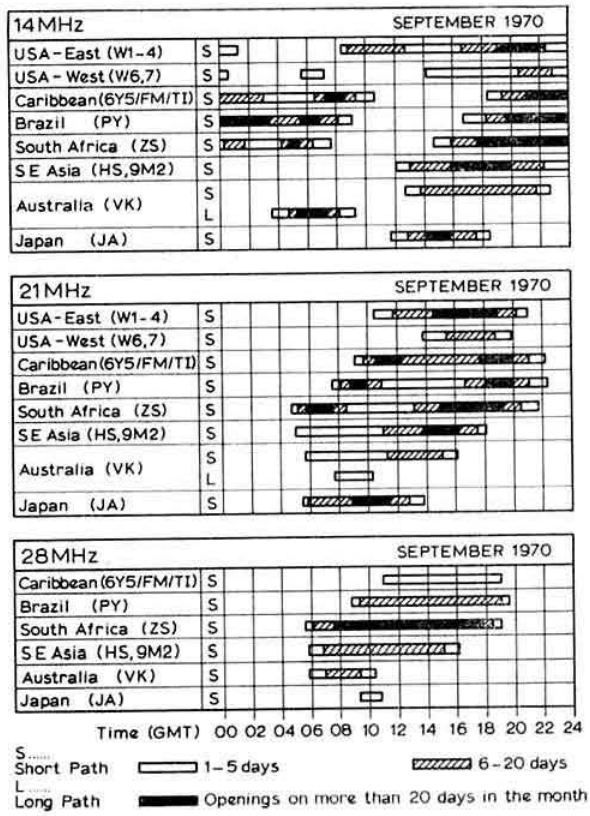
After a long break the east coast of North America and Japan should once more be heard on **28MHz** on favourable days (ie days with above average F2 MUFs). The West coast of North America, however, will only be heard under exceptional conditions, for which the latter half of the month should be more favourable. In general, conditions on the hf bands with North America and East Asia will be easier from Southern Europe than from stations further north. This difference will become more marked during the coming winter months. In contrast to the summer months Central and South America as well as South-East Asia and Australia should be heard with certainty. Contacts with these will improve markedly towards the end of the month.

The improvement of conditions on **21MHz** will not be noticed as much as on 28MHz, and will be limited mainly to contacts with North America, Japan and Australia. With the coming of spring in the southern hemisphere, the period for traffic with Australia and South Africa will increase. In September the season of short-skip contacts via the sporadic-E layer usually comes to an end.

Traffic with North America will experience a slightly worsening condition in the latter half of the night on **14MHz**. As darkness falls earlier, there will be more opportunity for dx before midnight. Local contacts will be possible over greater distances on **7MHz** during daytime. With the approach of winter the dx opportunities on this band improve, when the greater part of the transmission path lies in darkness and local QRM permits.

On **3·5MHz** too, the daytime transmission distances will increase slowly. Interruption of local traffic by the dead zone will only occur in the latter half of the night in disturbed conditions.

The provisional mean sunspot number for July 1970 from the Swiss Federal Observatory was 112·5, with solar activity concentrated at the beginning and end of the month. The predicted smoothed sunspot numbers for November and December 1970 and January 1971 are 89, 87 and 85, respectively.



All calls listed were on ssb except those in italics which were on cw.

1·8MHz. 1100 PA0PN.

3·5MHz 0400 *PY1NDS*, *W7MB*. **0500** *ZM1AAT/K*. **2100** CR9AK, FR7ZX, *HB0XJF*, 5Z4KL. **2200** *AX9XI*, CR6s IV, MH, HS5ABD, OY7JD, ZD9BO, ZS1MH, 9V1PP. **2300** ZB2BY, *ZS1MH*. **2400** TJ1AW, YV4AU.

7MHz. 0000 EP2TW, *UL7GW*, *VP2SM*. **0500** *CE2s FZ, RF, CE0AE CMs, HI8MMA*, PYs, *XE1JF*, *XE2S*, *ZE1BL*, *ZM3GQ*. **0700** *HP8C*, *VP2LY*. **2000** *CR7IZ*, VK6JJ, *ZD5X*, ZS1JA. **2100** CN8DW, *CT3AW*, HS5ABD, TR8DG, XW8DS, ZD9BO, ZS1MH, ZS5XA, 5Z4s KL, MO, 7Q7BC, 9J2PV, 9V1PP. **2200** CR6MH, CT2AK, EL2Y, LU7AAC, PY0AD, VP2AA, ZB2A, 3A0FH. **2300** *AX6HD*.

14MHz. 0000 *6Y5SR* (now in UK on leave). **0500** *KS6DH*. **0600** FO8s BS, DE, DS, VR6TC. **0700** AX0LD, CR5SP, KH6s KP6AL, VP1AJ, 5A1JB (on a.m.). **0800** HP8C. **1500** FC2BA (BP 20, Bastia, Corsica). **1600** VS5RG. **1700** AC9A/BR. **1800** F0CH/P/FC (QSL via HB9TL), K2ALO/OH0, XT2AA, VQ9E, YB0AB, 5R8AS. **1900** AP2KS, CR9AK, ZD7SD. **2000** *JW5NM*, KG6AQY, *TA2AE* (QSL via DL7FT), TR8LB. **2100** ZB2A, 9B3AC. **2200** PY0AD.

21MHz. 0000 VP2s V1, VJ. **0600** HB9YC/4W1. **0700** KS6DH. **0800** KH6s *3B8CC*. **0900** *FR7ZX*, KW6EG, TJ1AW, *VR2EK*, *ZM1AAT/K*, 5H3MB. **1000** HM4FA, *JA3XPO*, *KM6DU/KH6* (Kure Is), KX6HG, TA3HC. **1100** AX9AC, MP4QBK, TT5JR, VR1L. **1200** FB8XX, *LF8PJ*. *U4L* (QSL via UA4LM), VR2EK, ZC4IK. **1300** FR7ZW, KC6JC (E. Carolines), VS6EA. **1400** *TU2BW*, VP2LY, ZD8AB, 8R1J (at this time every Sunday on 21,325kHz), 9V1s. **1500** YB0BY. **1600** CR5SP, LU1ZE (Antarctica), MP4TDA, *OX5AP*, TR8JM (QSL via DK2NU). **1700** *TA3OZ*, *VS9MZ*, XW8DM (QSL via WA5KNN), 5V4JS. **1800** AX9XI, *KH6GF*, VP8KD (QSL via W2FBA), *VQ9/A/A*, 5A3JY,. **1900** JY1, PZ5RK, VQ9E, 5X5MP, 9G1GT. **2000** *FL8RC*, JX3FN, VP2VAA, ZD8JK, *5T5BG*. **2100** CP6EL, *3V8AH*. 2200 CE0AE, *FM7WF*.

28MHz. 1000 CR7HC. **1100** *UA1KAE*. **1200** ET3DS. **1300** PYs, 7Q7BC, 9K2CF. **1400** TJ1AW, 5N2AAF. **1500** 5V4JS. **1700** VP8KD. **2100** CX1DDA, KV4AD, KZ5JW.

Many thanks to all correspondents, and especially to the following for information obtained from their publications: the **DX'er** (*K6YGS*), **NARS Newsletter** (*5N2AAF*), **Long Skip** (*VE3DID*), **On the Air** (*ON4AD*), the **West Coast DX Bulletin** (*WA6AUD*), the **EX-G Radio Club Bulletin** (*W3HQO*), **DX'press** (*PA0TO*), **DX News Sheet** (*Geoff Watts*), **International Communications** (*Euradio*), **QUAX** (*G3DME*), the **DX'ers Magazine** (*W4BPD*), and the **Florida DX Report** (*W4FRO*). Please send all items for **November** issue **to reach G3FKM** no later than **12 October**, and for **December** issue no later than **9 November.**

BATC Convention Report

CONSTANTLY, when following the progress of the British Amateur Television Club, one is reminded of the spirit that existed in the early days of amateur sound communication 50 years before. There is the same togetherness, the same feeling of breaking new ground, the same stretching of technical resources to achieve maximum effectiveness at minimum cost. And the numbers are about the same too—900.

In the early headphone era togetherness found expression in some wonderful convention meetings. In today's picture-tube era the same is true: the CAT 70 (Convention of Amateur Television 1970) organized by the BATC at Churchill College, Cambridge—a true centre of scientific research—on 25-26 July showed how effectively the club had come-of-age since its formation 21 years ago as the result of a chance meeting in a railway waiting room between two amateurs interested in television transmission, an event duly recalled by President G5IJ in his speech after the convention banquet on the Saturday night.

Something else which BATC impresses upon one's awareness is a maturity of outlook that makes some sound licence activities look positively *gauche* by comparison. This comes about because amateur tv attracts the serious-minded individual capable of mastering the circuit intricacies inseparable from the medium. You simply *do not* play at amateur television.

This seriousness of purpose, evident at the Cambridge convention, was laced with much humour that brought to the event an ideal balance of instruction and entertainment.

What was in store for visitors was partly revealed in the 12-page commemorative brochure recording the history of BATC over 21 years and of its official journal *CQTV*, initial print order 25 copies office duplicated, now 1,000 copies a time in a professional-looking well-printed format.

"Professional-looking". This phrase sums up the standard of the convention's Saturday afternoon technical demonstrations. Because of the writer's indisposition at the time, Peter Simpson, G3GGK, covered these, and this is what he had to say about them:

"From a very well equipped control centre, G6KKD/T, Ian Waters, with a team of assistants, provided excellent pictures from several outstations.

"G6ADM/T/G8BBB at Haddenham took the audience at Churchill College on a conducted tour of his station despite the setbacks caused by failure of the public supply mains for short periods.

"The second station viewed was Jeremy Royle's, G6NOX/T, over at Saffron Walden in Essex. With assistance from G8s BTK, DLW and AJR, Jeremy's performance was extremely polished and nothing short of professional both in quality and technique.

"Next on the programme, G6REH/T at Sutton St James, about 36 miles to the north, provided some of the more humorous moments of the afternoon. G6REH/T, standing atop his 105ft tower, described its building and erection process. He gave the audience panoramic views from the platform and proceeded to climb the last 15ft of 2in mast to indicate the finer points of the aerial system.

"An outside broadcast from Banham's Boatyard in Cambridge was presented by a team led by G6AEV/T (G3VZV). Despite early problems they were on the air on time and gave excellent pictures of G3VZV sitting on the deckhouse of a motor launch trying to stay in the picture despite a howling gale which threatened to drop him in the Cam on several occasions.

"The climax of the show came when G6NOX/T relayed G6WJ/T from southern Essex, over the hills into Cambridge. Acknowledgement was made to MPT for granting permission for this unusual experiment. G6KKD/P presented a VTR conducted tour of his station.

"The afternoon session concluded, three groups then visited G6ADM/T, G6NOX/T and G6KKD/T."

* * *

At the convention banquet that evening (88 sat down), visitors from six overseas countries included many ladies, two in attractive national costume. But this was by no means the concluding item in the convention. On the Sunday morning there was a lecture session featuring G6AEC/T (C. Grant Dixon) on Slow Scan Television, and Arthur Critchley on Integrated Circuits.

Off the technical front and on the political, there was close attention to what Mr M. P. Davies from MPT had to say about amateur licensing. He emphasized the pressures that were bearing upon the 420-450MHz spectrum where amateur television is conducted, and remarking that there were only 181 amateur video licences in issue. He recommended making full use of the frequencies we had to justify their continued availability (see "Reap and keep" last month).

Other highlights from Mr Davies's discourse were: No slow-scan licences had been granted yet, but would be considered if applied for; MPT delves regularly into its band-occupancy records to keep themselves up-dated on current levels of activity; the Ministry is not entirely happy about crossband working.

We must say the latter rather surprised us in view of the fact that this is of very great convenience to operators receiving video on 70cm and wishing to talk-back to the /T station on "Two". It seems that the main problem here is one of identification, and operators on "Two" who fail to say who they are have only themselves to blame if the licensing authority takes a dim view of this mode of operation.

Nevertheless, one gained the impression that MPT takes a very liberal view of amateur requirements and will be pleased to do all it can to meet them. If crossband working is considered desirable a note to the Ministry asking for permission to do it would, as we read the situation, be sympathetically received. "The Government looks upon the amateur service as a responsible one deserving of encouragement," said Mr Davies.

* * *

Throughout the Saturday and the Sunday there was a display of amateur and professional equipment, any one item of which would make a full-dress article for *CQTV* or *Radio Communication*.

GW6JGA/T showed a transistorized camera displaying RMA test card on a monitor screen, resolution excellent, and a tiny pulse generator and counter using ICs.

VE8WJ/T an ic waveform generator for dual standard; and

G6KQJ/T and G6LEE/T both showed displays of video tape recordings taken off the air at various distances.

DJ7RI, DJ8DW, DJ3UL, DJ6JA. This group of German amateurs showed an extremely professional-looking trick effects panel with provision for inserting one picture into the corner of another as well as standard sound and vision mixing circuitry.

G6ACT/T showed a PAL decoder and off the air transmitter, effects generator and diode switching system;

Belgian ATA a photographic display of amateur tv equipment in use in ON-land;

Arthur Critchley colour tv pattern generators using integrated circuits; and

PYE TVT Ltd a colour tv camera with zoom lens and ancillary programme monitors.

* * *

We have covered the BATC Convention in some detail because it was both celebrational in the 21st anniversary sense, and cerebrational in respect of the amount of food for thought which it provided for digestion by all interested in point to point communication by video. There are many more of these folk than is sometimes believed, often clustered round *one* local G-Six-plus-T man. If they could get hold of inexpensive equipment and the essential information to put it into on-air service, it is our guess that those 181 amateur tv licences and 900 BATC members would double in numbers in a surprisingly short space of time.

G5UM

YOUR OPINION

The Editor
Radio Communication

Sir—I would like to sympathize with **BRS30328** and agree with **G3COI**, but also to suggest a way out of the dilemma of trying to get rid of the slow morse frequency squatters.

As far as I can gather from listening around, most phone operation on Top Band is confined to approximately 60kHz of the available 200kHz, and then in three main areas, ie 1,870-1,895kHz for ssb, 1,910-1,930kHz and 1,975-1,990kHz for a.m.

From the published list I find that most slow morse transmissions are made at the most popular times for operating in these segments. Is it any wonder then that complaints of interference are made? Of the 76 transmissions made weekly on 160m only two are on frequencies below 1,830kHz and none below 1,820kHz. Would it be possible for G3KGU to "organize" some of the slow-morse crowd to QSY down to the segment between 1,800 and 1,820kHz, spacing those who have to come on at the same time about 3kHz apart? Every swl would know exactly where to look on the band for his favourite slow morse transmission without having to worry about interference from phone stations.

I am on the side of the swl in his complaints against those who interfere with the slow morse ... BUT when those who transmit slow morse are left to pick their own frequency, then I have every sympathy with the ordinary bloke who wants to use the band after tea and finds cw in what has become the accepted phone segments.

The dx man has no cause for alarm if the first 20kHz of the band is adopted for slow morse as at the time the majority of these transmissions take place the dx will not have surfaced.

Yours faithfully,
H. Bluer, GW3UUZ

The slow morse practice transmissions organizer comments as follows:

The Editor
Radio Communication

Sir—I have read the letters of both Mr Bluer and Mr Worthington (July issue) with considerable interest, but there is only one way to help Mr Harding and many others similarly placed. We must have many more slow morse practice transmissions giving a much wider coverage of the British Isles. There are vast areas where the present listed transmissions must fail to provide a service. I look upon each Top Band transmission as providing a local service area of say 10 to 15 miles around. At a greater distance QRM is inevitable, and Mr Harding must live at least 25 miles from his nearest listed operator.

With the appearance of beacons and other "funny noises" on Top Band, I think it would be unwise to specify certain sections of the Band for this service. I consider it is far better to leave each operator with his knowledge of local conditions to select his own frequency. Mr Bluer has overlooked the fact that, after sending a passage of slow morse, the operator has to read back the text or number groups, so whichever section of the band is selected, "offence" is given for part of the time. Mr Bluer should stop to consider why certain segments of the band have become popular. Surely because in these there is less chance of interference from non-amateur sources. If any "right" is to be established for the use of these frequencies, surely it should go to the chap who is providing a service to his fellow enthusiast, not to "after tea natterers" who could carry on their cross-town QSO almost anywhere in the band. I think we can only hope for co-operation from our own local amateurs. This I personally always get, and I am sure other listed operators receive equal consideration. But let us be fair, if a more distant station causes the QRM he may have checked the frequency and not heard the slow morse station at all. Not all of us put out signals that blanket the country.

Local clubs and societies could play a very big part in extending this service by over-the-air practice for their listener members and other locals, and by nominating certain members to send slow morse on a regular rota basis. If four members of a club got together, it would mean giving up just about an hour of one's time each month to help the listeners. This is not a tremendous sacrifice. I would be happy to send details to any secretary who cares to write to me.

The listeners must also play their part. About 90-95 per cent of all operators who withdraw from the service do so because after repeated requests made over a long period no reports have been received.

Perhaps some of the operators already sending slow morse practice for the listeners, and who have followed this correspondence, would like to let me have their observations on the various suggestions that have been made.

Yours faithfully,
M. McBrayne, G3KGU

Contests calendar

5–6 September*—VHF NFD and IARU Region 1 VHF Contest; Rules in March/May issues
5–6 September—IARU Region 1 VHF/UHF Listener Contest; Rules in June issue
12–13 September—WAE DX Contest (phone)
13 September—80m Field Day; Rules in August issue
20 September—DF National Final, Slade
3–4 October*—IARU Region 1 UHF/SHF Contest; Rules in May issue
3–4 October—IARU Region 1 UHF/SHF Listener Contest; Rules in June issue
10–11 October—28MHz Phone; Rules in May issue
24–25 October—7MHz CW; Rules in June issue
24–25 October—CQ WW DX Contest
7–8 November—7MHz Phone
7–8 November—144MHz CW
14–15 November—Second 1·8MHz
20–21 November—Malta Independence Day Contest (cw/phone)
27–28 November—CQ WW DX Contest
6 December—144 MHz Fixed Station
*To coincide with IARU Contests

SOCIETY AFFAIRS

A brief report of the Council meeting held at Society HQ on 4 July 1970, commencing at 10 am.

Present: *Dr J. A. Saxton (President, in the Chair), Dr E. J. Allaway, Messrs A. Hunter, R. J. Hughes, E. G. Ingram, G. R. Jessop, L. E. Newnham, J. R. Petty, R. F. Stevens, G. M. C. Stone, J. W. Swinnerton, F. C. Ward, E. W. Yeomanson (members of the Council), R. G. B. Vaughan (general manager).*

Mr J. O. Brown attended by invitation to advise Council on financial matters.

Apologies for absence were received from Messrs Armstrong, McNally, Morris, Parsons, Scarr, (Council members) and A. W. Hutchinson (editor).

Mr Norman Caws

The President confirmed that he had visited Mr Caws recently to present him with his Honorary Member's Badge. Mr Caws had sent greetings to Council, and the President said that he was pleased to note a great improvement in Mr Caws' health. A formal letter had been received from Mr Caws, thanking Council for its action in electing him an honorary member.

Register of forthcoming events

Mr Yeomanson tabled a loose-leaf form of register which he had prepared. Some dates were already in this register, and a note drawing attention to the existence of the register would appear in the September issue of *Radio Communication*. Council approved Mr Yeomanson's action in this matter.

Membership and affiliation

It was resolved:

(i) to elect 122 corporate members and 34 associates;
(ii) to grant corporate membership to 14 associates;
(iii) to waive the subscription of one member due to blindness or other disability;
(iv) to grant affiliation to the North Devon Radio Club.

Society trophies

Council noted that nominations for the Calcutta Key, ROTAB and Founders Trophies would be required at the August meeting. The general manager was asked to circularise Regional Representatives in this connection. Council members agreed to make nominations in writing to the general manager prior to the August meeting of Council.

Articles of Association

Council considered a draft of minor amendments to the Articles of Association prepared by the Finance & Staff Committee. This was considered in association with the present Articles, and Council approved the preliminary draft.

1969 Regional Representatives' Conference report

It was agreed to receive comments on the report at the next Council meeting, including any received from Regional Representatives.

Minutes of committee meetings

Council approved the minutes of the Education Committee (14.3.70 and 13.6.70), Exhibition Committee (22.5.70), VHF Contests Committee (24.5.70), VHF Committee (1.6.70) Membership & Representative Committee (8.6.70), GPO Liaison & TVI Committee (12.6.70), Scientific Studies Committee (15.6.70) and Finance & Staff Committee (21.6.70).

Speaking on the minutes of the VHF Committee, Mr Stone reported on the successful completion of the new Burnhope beacon (GB3DM) and the transfer of the Craigowl beacon to the Angus ITA site (GB3ANG), and wished to have recorded the Society's appreciation to the members who had provided so much assistance with these projects.

YOUR OPINION

The Editor
Radio Communication

Sir—I am concerned about the threat to the 70cm band by commercial interests who wish to extend the 450-470MHz commercial band down to 420MHz. Even if a compromise is achieved, the television section of the band may be lost, which would put nearly all present amateur tv stations off the air.

One of the largest radio and television manufacturers, whose stated policy is to take over the 70cm band, advertise regularly for staff in *CQTV*, so at the same time they wish to benefit from the experience of technicians who have gained their experience on the 70cm band.

If the 450-470MHz band is really overcrowded, it could be extended upwards to 500MHz without causing much hardship. There are at present 44 television channels between 470 and 854MHz. If the above alteration were made, there would still be 40 channels available which is surely sufficient to provide three or four programmes.

In a few years, when the 405-line system is phased out, further bands will become available for other purposes. Is it too much to hope that any amateur frequencies lost will be restored?

Yours faithfully,
J. C. German, GM3VBB, GM6ADU/T

The Editor
Radio Communication

Sir—Pat Hawker in *Wireless World* and Jack Hum in the August *FMD* have done a great service to the vhf radio amateur by pointing out before it is too late that other people are interested in having the 4m amateur band. The words "Use or lose" which were heard after the dinner at the 1969 VHF Convention were *wise* words, and words that have been heeded.

If the radio amateur is dismissed from the 4m band, so will a raynet circuit which gives a service to our country; off will come the RSGB beacons, which can be used by all and serve our fellow radio men overseas; and bang will go the title of *Radio Communication*'s vhf page.

The powers that be would be wise to read *Four Metres and Down* for several years back so that they would see that 4m is *used* not only by the licensed amateur whose wish and right it is to communicate, but also by the scientific observer who has no use for a transmitter, only requiring the right to make observations on a scientifically valuable part of the frequency spectrum.

They would also learn of the natural manifestations that will stir up a signal on this band, and perhaps they will spare a thought for the radio amateurs who made the information possible.

They may have the power to change the tenancy of the 4m band, but they do not have the power to stop a solar burst, an Aurora, a meteor reflection or a thumping great sporadic-E sharing the band with any new tenants. Maybe when any such new tenants have used the band for a couple of summers they will be pleased to return it to the people who are investigating its many unpredictable ways.

Yours faithfully,
Ron Ham, FRAS, BRS15744

Jack Hum comments as follows:

Any members who detect a resigned mood in Ron Ham's letter are reminded that at the time of writing there is no change in the occupancy of the 4m amateur band and that any threat to it—or other amateur allocation—is given priority attention by the Council of RSGB. This is one of the primary purposes for which a national society, properly funded by an adequate subscription rate, exists.—G5UM

The Editor
Radio Communication

Sir—As a firm non-believer in the accepted theory of propagation by reflection and multi-skips and a firm believer in the conduction theory, I am interested in correlating signal strengths, transmitted and received, against barometric pressure and direction of change.

If licensed amateurs and SWLs were to give barometric pressures, rising or falling, and temperature instead of the usual "sunny" or "raining here", it might then be possible to forecast to the hour when conditions on the hf bands would be at their best within any given month's propagation prediction chart.

Yours faithfully,
A. G. Thorburn, G3WBT

The Editor
Radio Communication
Sir—Please may I be allowed space in an early issue of *Radio Communication* to make an appeal concerning that section of the RSGB QSL Bureau for which I am responsible.

At the present time some embarrassment is being caused by the number of amateurs who have failed to send me fresh supplies of envelopes.

The number of cards that has accumulated for any one callsign does not yet warrant sending off one of our reminder postcards, but the fact remains that 1,000 cards take up a certain amount of space regardless of the number of addressees involved.

If, therefore, any active amateur who has not been receiving regular batches of cards could send me one or more SAEs he may well discover that long-awaited "rare one"—he would certainly help to un-clog the files!

On the other hand, of course, those not interested in QSLs should let me know, and it would help the amateur fraternity as a whole if they also made it clear when in QSO.

Finally, may I present my compliments to G2MI and to those amateurs who, by following the few simple rules, help to make my job a most satisfying one.

Yours faithfully,
E. G. Allen, G3DRN

The Editor
Radio Communication
Sir—I am an amateur Mum. In other words I am the Mum of a would-be amateur and so from time to time get to reading parts of your magazine. I read of the trials and tribulations of SWLs and G3- - -, but these are mere trifles compared to the problems of a G3 MUM and G3 DAD. Along with my 15-year-old son I have had to learn the colour code of "piggies" (corrected, I now call them resistors), the morse code, and have many times had to drop the essentials of housework to listen to long explanations, answering untruthfully with yesses, nos, I sees and ohs. I have "lost" a clean tidy bedroom and gained a dusty untidy shack where vacuum cleaners are forbidden. I have also gained a happy young son who knows exactly what career he is making for, who is now making friends with some of the best chaps bent on helping him along, and a share of amusement for me occasionally listening to some of the locals chatting.

I have now got my fingers crossed that the result of the RAE will be favourable and then we will be away and he will really be an "Old Man"!

So a big thank you to the editor and contributors to your magazine for the help you give, and to the fine fellows who make this absorbing hobby possible.

Yours most truly,
M. B. Smith (Mrs)

OBITUARIES

C. W. Booth, G3GSP
Cliffe Booth G3GSP, of Rainham, Kent, died on 8 June 1970. He was in his 81st year.

F. E. Gorse, G2DON
F. (Fred) E. Gorse, G2DON, of Kingswinford died on 25 July, aged 62. He was a long-standing and popular member of the Stourbridge and District ARS.

W. F. Neal, G3FUL
"Billy" Neal, G3FUL, died at the age of 79 on 16 July 1970. He was the first secretary of the Luton & District Wireless Society on its formation in 1921 and was a tower of strength in amateur radio circles for many years.

R. H. Smale, GW3UO
"Dick" Smale, GW3UO, of Swansea, died on 19 June 1970 at the age of 59. His main interest was in beam aerials for 10 and 15m.

D. Willett, G3IRD
Don Willett, G3IRD, died suddenly on 28 July at the early age of 46.

RADIO AMATEUR EMERGENCY NETWORK

by S. W. Law, G3PAZ*

Been to any good shows lately? Not the theatrical type, but the open air carnivals and so forth which are so prevalent in the summer months. As an example of what to expect we have found all three of our user services plus demonstrations by local fire services, Scout troops, Sea Scouts, Guides and WRVS all on the same showground. In addition there was a combined effort by no less than three local radio clubs who worked together to bring the hobby before the public eye. As the only RAEN member apparently in sight we circulated a little in order to find out how our image fared. Not so good we found. One of the local fire chiefs was astonished to hear that we existed at all, let alone that a group had been available for over 10 years in his area. He expressed his intention of contacting the police at the first opportunity to find out more.

Now, while it is true that we are restricted at the moment to the three user services quoted in the regulations, it does seem that any request to these three from any of the other "disaster organizations" for communications assistance might well be legitimate traffic if it were presented in the correct framework. Surely we are not so very diffident that the presence of a well-organized emergency communications group can remain unknown to any civic body who may be faced with a top priority disaster at any time.

Let it be known that RAEN exists. Do not be content with a small mention in a small sub-paragraph in an obscure report. Drop a polite letter to each and every group of people in your area who might have to assist during an emergency, explaining clearly the capabilities and legal availability of your group in particular and RAEN in general. If you are fully convinced of your abilities as a group, invite some observers to attend your next exercise. Both you and they may be very well pleased with the results.

How far?
We have commented before on the keen vhf types who persist in complaining of the weak carriers with unreadable modulation which emanate from certain areas and (so the complainants aver) arise from outmoded ex-professional transceivers used by operators who are too idle or incapable of fitting bfo or keying to the gear.

For those gentlemen who should chance to read this column, may we RAEN types apologize for not helping to raise their county scores by our apparent disregard of the dx phobia to which we are seemingly immune. Cross our hearts, we just do not wish to painstakingly push our signals out to far places for RAEN purposes! We just wish to cover our allotted area efficiently without causing unnecessary QRM to anyone not concerned with our particular activity. Those of us who are dx-minded (and why not?) will use the gear for the job for this branch of the hobby when we indulge in that pleasure; and just as a final reminder, may we point out that many RAEN receivers are crystal-controlled for a reason. We are not "listening round" but confine our attention to our particular channel within our group.

Let us now examine the RAEN angle of cw operation. Let us confess that there have been times when we have ourselves had to resort to the expedient of sending some rather shaky cw on the pressel switch when the local QRM has defeated all other attempts. Maybe we should give a little thought to the cw angle after all, if only for use in the last extremity. Do not forget that our major user service gave up the use of cw years ago. Talk it over and let us have a few opinions.

Honorary registrations secretary: **Mrs Jane Balestrini, "Merrivale", Willow Walk, Culverstone, Gravesend, Kent.**

Honorary secretary, RAEN Committee: **Mr. E. R. L. Bassett 57 Upper St Helens Road, Hedge End, Southampton, SO3 4LG.**

*130 Alexandra Road, Croydon, Surrey, CRO 6EW

NFD 1970

RESULTS

WONDERFUL weather and a most enjoyable contest is the comment repeated by almost all entrants, and with band conditions also in good shape the 1970 NFD Contest appears to have pleased almost everyone.

This year, although extremely careful checking was necessary, the Port Talbot Group came out as quite clear overall winner as well as being the band leader on 14 and 21MHz and so takes the NFD Trophy for 1970.

Runner-up and winner of the Gravesend Trophy was the Oxford & D ARS, only 162 points behind the winner.

The Bristol Trophy was won by the Cannock Chase ARS with a record score of 1,633 points—truly a magnificent effort.

Runner-up in the single station section was the Dunbartonshire Group with a score of 1,573 points which also wins it the Scottish NFD Trophy.

The excellent scores made by the leading entrants show that apart from having good equipment and operators, careful selection of bands and times, was all important.

1·8MHz

Top Band produced 61 logs this year, against 62 in 1969 and 67 in 1968. Conditions appear to have been quite reasonable with good reports being exchanged, and a number of stations working HB9 and OK/OL.

Repeating its 1969 success, but with an increased score, was the Coventry ARS (G2ASF/P). Its 1·8MHz-only entry led the field with a corrected score of 228 points from 138 QSOs. Shefford & D RS (G3FJE/P) took second place with 213 points from 106 contacts made in a single operating spell from 1730 to 0315gmt. In third place was the Mansfield ARS (G3GQC/P) which made 115 contacts worth 207 points.

On the equipment side, Coventry used a Codar AT5, an EC10, and a dipole, while Shefford employed a Geloso vfo/TT11 pa, a G2DAF type receiver, and an inverted-Vee dipole.

An analysis of the cover sheets produced the following: transmitters—homebrew 33, commercial 14; receivers—homebrew 8, commercial 39; transceivers—homebrew 1, commercial 13; power supplies—ac generator 39, dc generator float-charging batteries 5, batteries only 17.

NFD Trophy

Port Talbot — 2,336 points

Gravesend Trophy

Oxford & D ARS — 2,174 points

Bristol Trophy

Cannock Chase ARS — 1,633 points

Frank Hoosen (G3YF) Memorial Trophy

Port Talbot — 985 points

Scottish NFD Trophy

Dunbartonshire Group — 1,573 points

Leading scores on individual bands

1·8MHz	Coventry ARS	228 points
3·5MHz	Edgware	635 points
7·0MHz	Cambridge & D ARC	619 points
14·0MHz	Port Talbot	985 points
21·0MHz	Port Talbot	647 points
28·0MHz	Croydon/SRCC	77 points

Overseas station giving most points to NFD entrants
EI9ONE/P

A number of groups commented that an incentive is now needed to restimulate interest in 160m during NFD. The committee will consider this problem in detail when next year's rules are formulated.

The accuracy of some logs left much to be desired. Most logs contained errors and therefore points were duly deducted, but a few of the logs had so many mistakes that their final scores were up to 20 per cent down on their claimed scores.

3.5MHz

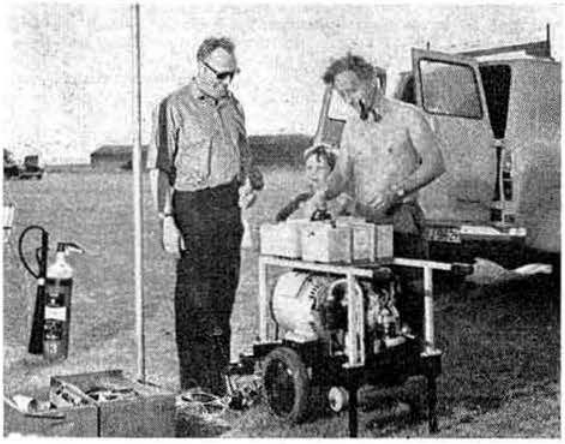
With conditions quite good, scores were mostly as good as, or better than, last year's.

Once again a single-station entry won the band award. This time it was Edgware, G3VW/P, which made 635 points from 260 contacts. The equipment used was a CODAR AT5 transmitter, a Drake R4B receiver with two half-wave aerials N/S and E/W.

No dx was worked, all contacts being within Europe.

The next highest score came from Guildford, G3KMO/P, with 530 points from 214 contacts, and once again no stations outside Europe were contacted. G3KMO/P used a modified KW Vespa with a home-built receiver, the aerial being a half-wave dipole.

Edgware spent the entire contest on 3.5MHz, obviously with the intention of gaining the band award. Guildford, on the other hand, finished up with 105 points less and spent only 11 hours on the band.



Bedford & D ARC at Cranfield Aerodrome. John Bennett, G3FWA, hon sec, and Ken Wood, G3SME, supervising the generator and G3SME junior op

Dennis Robinson, G3UQR, Bedford & D ARC chairman, on the key, with Lee Grant, G3XNG, looking on

SINGLE STATION ENTRIES

Posn	Group	Callsign	1·8 MHz	3·5 MHz	7·0 MHz	14·0 MHz	21·0 MHz	28·0 MHz	Total
1	Cannock Chase ARS	G3VCC	—	259	579	795	—	—	1,633
2	Dunbartonshire Group	GM3ITN	126	—	594	853	—	—	1,573
3	Stockport RS	G3NBN	—	364	374	446	—	—	1,184
4	*Verulam ARC	G3VER	159	403	531	—	—	—	1,093
5	*West Kent ARS	G3WKS	—	338	354	382	—	—	1,074
6	Maidstone YMCA ARS	G3TRF	—	390	488	191	—	—	1,069
7	North Bucks ARS	G4CK	—	363	396	290	—	—	1,049
8	Bristol ARC	G4UZ	—	191	582	240	—	—	1,013
9	*Gloucester	G3MA	180	377	453	—	—	—	1,010
10	Leicester RS	G3LRS	—	323	470	205	—	—	993
11	*Cheltenham	G3CGD	193	331	473	—	—	—	997
12	Chelmsford ARS	G4VF	—	388	448	154	—	—	990
13	North Riding ARG	G2KK	—	409	352	166	—	—	927
14	*Spen Valley ARS	G6LD	—	473	261	217	—	—	915
15	*Bangor & D ARS	GI3XRQ	—	160	313	440	—	—	913
16	*Reigate ATS "1"	G3FM	—	282	462	104	—	—	848
17	*Hull Group	G3LIQ	—	288	252	303	—	—	843
18	Bedford & D ARC	G3WTP	—	380	412	47	—	—	839
19	Echelford ARS	G3UES	—	265	445	122	—	—	832
20	*Crystal Palace & D RC	G3IIR	—	247	370	173	—	—	790
21	East Barnet ARCC	G6KQ	—	375	327	86	—	—	788
22	Cornish RAC	G3OHB	—	178	214	394	—	—	786
23	Blackpool & Fylde	G8GG	—	393	—	282	101	—	776
24	*Salisbury	G3FKF	—	419	301	52	—	—	772
25	Cray Valley RS	G3RCV	—	402	339	24	—	—	765
26	Southgate RC	G5FA	—	268	367	117	—	—	752
26	*Shefford & D RS	G3FJE	213	281	258	—	—	—	752
28	Pudsey & D RC	G3XEP	159	241	348	—	—	—	748
29	Scarborough ARS	G4BP	—	282	329	117	—	—	728
30	Bristol RSGB Group	G6YB	—	258	356	85	—	—	699
31	*NW Durham ARS	G3UTS	—	142	168	341	—	—	651
32	Lincoln SWC	G4BU	—	336	261	43	—	—	640
33	Edgware	G3VW	—	635	—	—	—	—	635
34	Racal ARS	G3RAC	108	319	—	194	—	—	621
35	*Cambridge & D ARC	G3IIT	—	—	619	—	—	—	619
36	*Glenrothes & D ARC	GM3YOR	184	—	201	231	—	—	616
37	Chippenham & D ARC	G3VRE	98	282	232	—	—	—	612
38	*Garendon School RC	G3MKX	85	223	300	—	—	—	608
39	Bradford RS	G3NN	129	220	244	—	—	—	593
40	*Conway Valley ARC	GW3RUA	137	165	289	—	—	—	591
41	Swindon & D ARC	G3FEC	—	248	300	41	—	—	589
42	*Loughton & D RS	G8AB	—	585	—	—	—	—	585
43	*Mid Sussex ARS	G3RXJ	74	362	—	131	—	—	567
44	Southend & D RS	G5QK	117	217	232	—	—	—	566
45	*Ilford	G3HIW	129	275	159	—	—	—	563
46	Univ. of Kent ARS	G3UKC	163	354	—	32	—	—	549
47	Nailsworth & D ARS	G3VVV	—	299	147	93	—	—	539
48	Maidenhead & D ARC	G3WKX	60	456	—	—	—	—	516
49	South Shields & D ARC	G3DDI	—	261	111	133	—	—	505
50	Woodmansterne	G3KTA	140	341	—	—	—	—	481
51	*Hull & D ARS	G3AMW	66	327	—	69	—	—	462
52	*Eccles & D RC	G3GXI	—	—	328	132	—	—	460
53	*Stratford-upon-Avon & D RC	G3RPJ	119	261	—	70	—	—	450
54	*Havering & D ARC	G3TTB	115	316	—	—	—	—	431
55	Greenford ARS	G3XWR	—	180	199	47	—	—	426
56	*Dunstable Downs RC	G3YAW	69	354	—	—	—	—	423
57	Great Yarmouth RC	G3YRC	36	335	51	—	—	—	422
58	Basingstoke ARC	G3TCR	—	340	—	18	53	—	411
59	*Adur CG	G3LQI	—	—	227	125	57	—	409
60	*Liverpool & D ARS	G3AHD	—	144	103	157	—	—	404
61	*Reigate ATS "2"	G3REI	162	235	—	—	—	—	397
62	*South Dorset RS	G3SDS	73	208	112	—	—	—	393
63	Bury & Rossendale	G3BRS	—	250	—	90	39	—	379
64	Sunderland ARS	G3RDI	—	237	110	8	—	—	355
65	Fareham & D ARC	G3VEF	—	223	99	24	—	—	346
66	*Exeter ARS	G5IP	—	333	—	—	—	—	333
67	Mid Herts ARS	G3AAZ	—	—	—	297	—	—	297
68	Colchester ARG	G3OCQ	—	194	58	—	—	—	252
69	Taunton & D ARC	G3XZW	66	177	1	—	—	—	244
70	Coventry ARS	G2ASF	228	—	—	—	—	—	228
71	Fulford & D ARS	G3XLH	0	211	—	—	—	—	211
72	*Mansfield ARS	G3GQC	207	—	—	—	—	—	207
73	Chorley RSGB Group	G3DBY	204	—	—	—	—	—	204
73	Bromsgrove & D ARC	G3VGG	—	164	36	4	—	—	204
75	*Norwood & South London	G2LW	21	128	—	40	—	—	189
76	Ardeer Recreation Club ARS	GM3USL	40	94	—	—	—	—	134

Inspection carried out

TWO STATION ENTRIES

Posn	Band group	Group	"A" Station Callsign	"B" Station Callsign	1·8 MHz	3·5 MHz	7·0 MHz	14·0 MHz	21·0 MHz	28·0 MHz	Total
1	(a)	Port Talbot	GW4NZ	GW5VX	145	239	320	985	647	—	2336
2	(a)	*Oxford & D ARS	G2DU	G8IB	174	520	458	539	477	6	2174
3	(a)	*Croydon RSGB/SRCC	G2PL	G6LX	177	434	470	644	313	77	2115
4	(a)	*Guildford & D RS	G3IAF	G3KMO	198	530	494	596	171	9	1998
5	(a)	RS of Harrow	G3EFX	G3HBR	137	483	468	429	157	41	1715
6	(a)	*Crawley ARC	G3TIR	G3TR	167	484	572	314	150	12	1699
7	(a)	Wirral ARS	G3NWR	G2AMV	170	303	265	490	263	—	1491
8	(b)	*Ariel Radio Group (BBC)	G3AYC	G3GDT	96	349	464	335	238	—	1482
9	(h)	Thames Valley ARS	G2NH	G8SM	187	369	354	262	253	6	1431
10	(a)	Leyland Hundred ARG	G3XII	G3GGS	130	293	503	355	121	6	1408
11	(a)	Torbay ARS	G3LHJ	G3NJA	192	310	298	328	248	15	1391
12	(f)	*Glasgow City Group	GM3SSB	GM3AXX	142	195	268	564	65	6	1240
13	(a)	*Moray Firth ARS	GM3TKV	GM3UKG	150	132	254	384	268	4	1192
14	(a)	Derby & D ARS	G3ERD	G2DJ	158	440	460	113	6	—	1177
15	(a)	Sutton & Cheam RS	G2XP	G8DF	140	346	357	152	141	16	1152
16	(a)	Dundee	GM4HR	GM3KYI	24	240	369	222	285	—	1140
17	(a)	Chiltern ARC	G3BZM	G3BXS	131	426	254	127	46	30	1014
18	(a)	Southampton RSGB	G3SOU	G6RC	149	408	318	76	53	—	1004
19	(a)	Weston-s-Mare/RAFARS	G5DV	G8FC	90	211	459	236	—	1	997
20	(a)	*Purley & D RC	G3WRR	G3SJX	141	214	375	111	108	22	971
21	(c)	Clifton ARS	G3GHN	G3JKY	—	291	359	210	104	—	964
22	(a)	Newark ARCS/Magnus GS	G3PAW	G3ELJ	100	370	411	34	32	—	947
23	(f)	Pontypool	GW3RNH	GW3UUS	172	362	210	179	—	—	923
24	(a)	North Kent RS	G4CW	G3VST	130	358	212	66	54	—	820
25	(d)	Portsmouth & D RS	G3DIT	G3TVI	171	176	443	—	7	2	799
26	(c)	Greenock & D ARC	GM3HZN	GM3LYI	65	101	193	238	98	—	695
27	(a)	*Ayrshire ARG	GM5KF	GM3NYG	98	58	253	183	5	—	597
28	(b)	Sheffield	G8NN	G3PHO	180	—	16	—	—	—	196

*Inspection carried out.

Entries disallowed

The following entries have been disallowed for the reasons stated:

Reason	Group	Callsign(s)	1·8 MHz	3·5 MHz	7·0 MHz	14·0 MHz	21·0 MHz	28·0 MHz	Total
(i)	*Norfolk ARC	G3YIR/G3IOR	103	403	339	306	388	6	1,545
(i)	*Aberdeen ARS	GM3BSQ/GM3WIJ	79	182	223	503	148	—	1,135
(i)	Chingford RSGB Group	G8JM	—	321	357	101	—	—	779
(ii)	Hallamshire	G6LF	—	—	295	97	326	—	718
(i)	Rugby	G3BXF	—	316	280	75	—	—	671
(i)	*Nunsfield House RG	G3EEO	167	360	—	128	—	—	655
(i)	Ainsdale RC	G2CUZ	99	129	163	—	—	—	391
(ii)	Worthing ARC	G3WOR	—	189	26	—	—	—	215

(i) Late entry, General Rule 8f.
(ii) Not on site stated.
Inspection carried out
The scores given above are **claimed** figures only.

Band groups
(a), 1·8, 7, 21; (b), 1·8, 14, 21; (c), 1·8, 3·5, 28; (d) 1·8, 7, 28
(e), 1·8 3·5, 7; (f), 1·8, 14, 28; (g), 1·8, 21, 28; (h), 1·8, 3·5, 21.

General view of the field used by the North Kent RS
Photo G3WZJ

G2ASF/P. Left to right: Dave, G3SCJ; Ken, G3XQE; Chas, sec; Bill, G3UOL; Neil, G3RIR; and G8APB stretched out

Overseas check logs

Posn	Callsign	Power	Points to G stations
1	EI9ONE	—	388
2	EI4LRC	120W	314
3	G3NKR/W2	1kW	228
4	AX6NK/P	150W	160
5	AX2BJL/P	—	96
6	OK3KAG	100W	68
7	SM0BDS	150W	48
8	XE1RV	170W	21
9	OK1AEH	40W	8

7MHz

Eighty-three logs were received for 40m, compared with 88 last year and 86 in 1968.

Cambridge & D ARC (G3IIT/P), having taken the 80m award in 1969, switched its attention to 40m this year and emerged as band leader with a final score of 619 points from 223 contacts. Cambridge's seven operators used a modified SB101 transceiver with a 2E26 pa, and an inverted-Vee dipole with the apex at 35ft. Most of their score came from contacts with G and European portables—the only dx worked being three W/K stations.

In second place came the Dunbartonshire Group (GM3ITN/P) with a checked score of 594 points from 197 QSOs made during the following periods: 1800-2300, 0315-0430 and 1430-1600gmt. Operators GM3ITN and GMUMW had a modified SB100 transceiver and an inverted-Vee aerial.

The Bristol ARC (G4UZ/P) is in third place with 203 contacts totalling 582 points. It used an HW100 (modified) and the aerial was another inverted-Vee.

Fourth place was taken by the Cannock Chase ARS with a score of 579 points. A Vespa with a 2E26 pa and a Drake 2B made up the station, whilst the aerials were two dipoles at right angles.

As usual, the going was pretty hectic. Plenty of activity from the British Isles and Europe enabled the leading stations to maintain a QSO rate of around 25 for many hours. Apart from a few North Americans and 9H1BL, little else was worked in the way of dx.

14MHz

Top scores, while down a little on last year, were still way above the 1968 level, and conditions on the transatlantic path were pretty good.

Apart from USA and Canada and the two VP9 portables there was little dx of note except a dozen or so AX stations early on Sunday morning.

The transatlantic path opened a little before 2000 and was good all through the night until around 0600 when the Europeans took over.

The band leader was Port Talbot (GW5VX/P) with a score of 982 points from 322 contacts which wins it the Frank Hoosen (G3YF) Memorial Trophy. The station was operated by GW3MOP and GW3BQY, who under the name of Maestag Contest Group won this section of NFD last year.

Runner-up on this band was the Dunbartonshire Group, GM3ITN/P, operated by GM3ITN and GM3UMW; its score was 853 points from 247 contacts.

GW5VX/P used a quad and a dipole antenna with a modified Vanguard transmitter and an Eddystone 888A receiver. GM3ITN/P used a vertical dipole and a modified SB100 transceiver.

Quads were the favourite aerials, although some rhombics and Vee beams were also used. At least half the stations used homebrew transmitters.

21MHz

As usual on 21MHz, considerable divergence in results can be observed, and once again the arguments will be rife all over the country—"We weren't on the band at the right time."—"The quad couldn't have been working."—and so on.

Port Talbot (GW4NZ/P), operated by GW3RVG and GW3WRE, made a mammoth 647-points score with 205 contacts. The runner-up on this band was the Oxford Group operating G2OU/P to gain 477 points from 142 contacts. The Hallamshire (Sheffield) Group took third place with 323 points. For Port Talbot, most of the points on 15m came from W/VE QSOs made during consistent operation between 1700-2200 and 1118-1700. Oxford followed a similar pattern, although it also found contacts as early as 0500 on the Sunday morning.

The "12-point" activity was from VP9BY/P, VP9FU/P, ZC4SS/P and 9J4AA/P.

Clear superiority of the quad was again in evidence with 13 of the first 16 groups using this type of aerial. An interesting point was the high scores made by Scots groups Dundee and Moray Firth with a dipole and long wire, respectively. Over 50 per cent of groups used home-constructed equipment, the remainder the "modified KW2000".

28MHz

Very few entrants operated on the band, and those that did found the going very hard indeed. Conditions were generally poor, although there were one or two openings to Africa, South America and the Middle East.

Once again the Croydon/SRCC Group is the band leader with RS of Harrow as the runner-up. Using a cubical quad backed up by a low dipole and Vee-beam, Croydon's 77 points were obtained from 23 contacts. Harrow also used a quad and its 12 contacts gave it 41 points.

A few of the logs submitted include contacts with UK portables via extended ground-wave or scatter-back propagation, which suggests that scores could have been higher had entrants spent more time on the band.

Comments

Nice to get quite a lot of check logs from overseas. G3NKR/W2 reports that the quality of G signals was noticeably lower than other EU signals received.

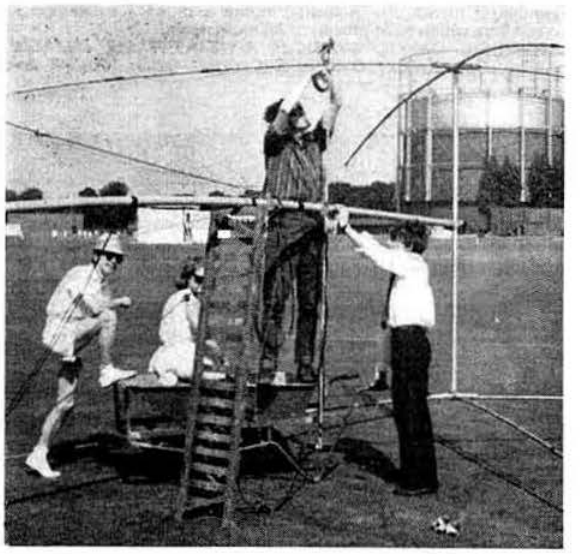
AX6NK/P operated by the 29 DX Club of Perth, Western Australia, had torrential rain. Bad cooking by VK6IZ, VK6EU produced a duff receiver, VK6NK labelled the feeders incorrectly, VK6KR forgot the coaxial, VK6PG forgot his tool kit, and to cap it all NFD started at 0100 Sunday and finished 0100 on Monday in Western Australia! In spite of this they had a ruddy good time and will be back next year.

Harrow considers the rules fair to all but would like to see more encouragement for Commonwealth /P expeditions.

Port Talbot and Croydon want the use of more power—they manage 1st and 3rd with only 10W!

Weston-super-Mare report early morning dew on its feeders, which played havoc with the swr. Its 21MHz crystal packed in and the quad collapsed but in spite of this had a wonderful time.

Clifton's efforts were not entirely successful, as some of its chaps are like triodes—you have to drive them hard to get any output!



G3PSH and G3POI assembling Ariel Radio Group's quad, observed by tennis enthusiasts G8AUG and yl

Photo G3COJ

Stockport asks how Cannock and Dunbartonshire get such high scores and says "No change in the rules, please."

Verulam, in addition to putting on a first-rate single station entry, also had "fun" stations operating on ssb and on 144MHz as well. This group is famous for getting its masts up in double quick time by careful design—one man can raise the big quad to 32ft in the winking of an eye.

Maidstone wonders when 14MHz was open? It used a quad for the first time and it had an swr 1·1 to 1. The answer is—it was always open and the fact that an indicated low swr does not necessarily mean that the aerial was radiating properly. Suggest a good try out and check before next year!

Bristol had a wonderful time although G3SWH's keying finger had a disagreement with a 28lb sledge-hammer.

Spen Valley says there was far too much sending double and too much high speed sending under QRM conditions. It also suggests having two stations, one on cw as at present and one on ssb with 40W peak input. Amend operating times to 1200 Saturday to 1600 Sunday with only 24h operating time allowed.

Hull had to compete with an S9+++ fog horn, as they were next to a lighthouse.

Echelford had a beer ration of 12 dozen cans, which works out at one can per two QSOs, and this certainly made things most enjoyable.

Southgate has used up all its excuses and now concludes that its weakness lies in its operators!

Shefford had all kinds of generator trouble, but G3UMI took over the key and did a marathon 14h stint—a real chairman's effort.

The HF Contests Committee thanks all the entrants for a most sporting contest and for the many kind letters of thanks for the great deal of work put in checking such an enormous number of logs. It would also like to thank all the station inspectors for the work they put in travelling to so many stations.

Rules

While there is still a considerable amount of controversy over the power limit, the vast majority of entrants say "Leave the rules as they are."

Naturally, all suggestions will be carefully considered before next year.

To the few whose entries were disallowed due to late posting we say, please do post in time next year as we really hate having to disallow an entry after all the effort put in.

Check logs

In addition to the overseas check logs which have been tabled, the committee thanks the following home stations for sending in check logs which have proved to be most useful.

GW3SSK, G3GJL, GW2DC/P, GW3JAF/P and G3JAF/M, G3RSP/MM, G3YOZ, G3LLM, G2DHV/M, G2MI, G4GX/P and G2AJB/P.

The Bury St Edmunds Group did not take part in NFD this year and was, therefore, surprised to see this sign in Bury St Edmunds on the day

CONTEST NEWS

High Wycombe DF Qualifying Event Results

Twenty teams, some from as far as South Manchester and Chelmsford, assembled in favourable weather for the start at 1320.

Good signals were received from both stations, and from the strength of Station "B", G3TRY/P, several competitors guessed it must be close at hand. It was in fact only half a mile away behind the well-named "Hard to Find" Farm, but the task of the competitors was made more difficult by the long walk and strange bearings caused by the use of a wire fence over a mile long as the transmitter aerial.

The "A" Station, G3YYK/P, was approximately six-and-a-half miles from the start on the tow-path on the north bank of the Thames between Hambleden and Medmenham; the chosen spot was only a short distance from that used in the same contest last year. A number of competitors, including E. L. Mollart, found themselves on the wrong bank of the river; Eric was fortunate to hitch-hike a lift across the river in a rubber dinghy.

Thirteen teams successfully found both transmitters and, subject to confirmation, B. Mahoney, P. Rich and L. Harding qualify for the Final. Sixty-three people sat down to tea at Bergers Cafe in Marlow, Mrs Mollart and her helpers providing generous and excellent fare. Mrs G. T. Peck presented the HighWycombe Challenge Trophy to Mr Hawkins, and prizes to the first three successful competitors.

Posn	Competitor	Club	Time of arrival "A" Stn	Time of arrival "B" Stn
1	M. Hawkins	Colchester	1503	1420
2	R. Pearce-Boby	Oxford	1439	1532
3	A. Simmons	Oxford	1534	1451
4	E. Mollart	Oxford	1537	1419
5	B. Mahoney	Rugby	1505	1552
6	P. Rich	High Wycombe	1504	1553½
7	I. Butson	Chelmsford	1505	1601
8	L. Harding	Lincoln	1515	1602
9	B. Bristow	High Wycombe	1524	1603
10	R. Vickers	Stratford	1522	1603½
11	P. Tyler	Oxford	1618	1446
	D. Nasey	Chepstow	1618	1450
13	M. Gee	Oxford	1528	1624
14	T. Gage	Oxford	—	1500
15	G. Peck	High Wycombe	—	1501
16	K. Lennard	Oxford	—	1529
17	I. Cobbold	Stratford	—	1552
18	D. Newman	Rugby	—	1556
19	B. Holland	South Manchester	1628	—

Stratford upon Avon DF Qualifying Event Results

Twenty teams entered for the fifth qualifying event of 1970, starting near Bourton-on-the-Water. Signals from the "B" transmitter were stronger at the start, and most of the competitors chose to search for this station first. They had little difficulty in locating G3ZHL and his assistant, A5441, in a small wood on the hillside to the east of Cheltenham, about six miles from the start.

Arriving in the area of the "A" transmitter full of confidence after their easy hunt for the "B", competitors were soon disillusioned. To the rear of a worked-out quarry on an area of steeply sloping scrubland was a conspicuous aerial one and a quarter wavelengths long. This wound its way up and down the slope, through a thick hedge and over gorse bushes, producing a very peculiar field pattern. The transmitter was in fact tapped into the aerial near its centre, with the operator, G3RPJ, hidden deep in a gorse bush. He soon found that with the transmitter on, hunters took bearings and moved away, rather than towards him. He was amused to hear despairing remarks such as, "I can't go up and down this hill much longer," and the whole performance was so entertaining that by 1610 he had run his battery completely flat. Noisily, he set about packing up and was found by four more teams before the end of the contest.

A party of 55 sat down to high tea at Broadway, when the results were announced and Mrs Peck presented prizes. Subject to official confirmation, Messrs Vickers, Tyler and B. Bristow qualify to enter the National Final. The organizer thanked his assistants at the transmitter sites, and G3YIK who acted as official starter.

Posn	Competitor	Club	Time of arrival "A" Stn	"B" Stn
1	J. R. Vickers	Oxford	1418	1510*
2	M. Hawkins	Chelmsford	1526	1412
3	R. Pearce-Boby	Oxford	1532	1433
4	P. Tyler	Oxford	1533	1421*
5	M. J. Gee	Oxford	1540	1440
6	B. Bristow	Chiltern	1540½	1434*
7	E. L. Mollart	Oxford	1541	1411
8	W. North	Chiltern	1547	1448½
9	C. A. Newman	Salisbury	1551	1448
10	K. Lennard	Oxford	1558	1458
11	D. E. Newman	Rugby	1603	1439
12	I. Butson	Chelmsford	1611	1447½
13	M. D. Fowler		1615	1426
14	P. Woollett		1615½	1449
15	G. Taylor	Rugby	1629	1456
16	D. Nasey		—	1508
17	O. L. Harding	Lincoln	1517	—
18	T. Gage	Oxford	1529	—
19	G. Peck	Chiltern	1555	—

One competitor was unable to locate either transmitter.
*Qualifies to enter National D/F Final.

Bristol Contest, 4 October

1. The contest will be known as the Bristol Contest and will take place on Sunday 4 October 1970.
2. The contest will run in two periods, from 0900 to 1100 and from 1700 to 1900.
3. An eligible entrant is any person who holds a current Amateur (Sound) Licence A, and an entrant must operate within the terms of his licence.
4. All contacts must be on cw (A1) in the 1·8–2·0MHz amateur band. Crossband contacts may not be counted for points.
5. Contacts with unlicensed stations will not count for points.
6. Single-operator entries ONLY will be accepted.
7. One contact only in each period with any one station will count for points. Duplicate contacts must be marked and will not score in either period.
8. A contact consists of an exchange and acknowledgement of contest information. For contest entrants, this consists of RST and a three-figure serial group starting 001 for the first contact and increasing by one for each successive contact throughout both periods of the contest. RST and QTH (town) must be received from non-contest stations.
9. Entrants are to call "CQ = BTL TEST ="
10. All contacts will score five points.
11. Logs are to be on lined foolscap or A4-size paper and should be set out in columns with the following headings.

Time gmt | Station worked | RST/Serial out | RST/Serial in | QTH | Points claimed

12. Entrants' logs should be forwarded to G3XEI (QTHR) and post-marked not later than 19 October 1970. Late entries may result in disqualification.
13. A signed statement to the effect that the entrant has complied with these rules must accompany the log sheets.
14. Results will be published in the Bristol Amateur Radio Club Newsletter *Director*, November issue, which will be circulated to all entrants.
Further copies of these rules may be obtained from G3SWH, 21 Dickensons Grove, Congresbury, Bristol BS19 5HQ, enclosing an sae.

Grafton's Annual "G2AAN" Top Band Contest Results

Members Section

	AM	CW	SSB	Total claimed
G3RX	—	19	49	68
G3MFO	—	—	89	89
G3AFC	—	—	34	34
G3KRH	29	—	—	29
G2CJN	—	—	24	24
Received late				
G3ONS	—	—	51	51

Contest winner—G3RX. AM winner—G3KRH.
CW winner—G3RX. SSB winner—G3MFO.

Members SWL Section—Results to be announced later

Open Section

	AM	CW	SSB	Total claimed
GM3WDF/P	—	76	102	178
G3VRW	—	51	87	138
G3WTA	—	46	80	126
G3YMH	—	38	67	105
G3XJM	—	36	69	105
G3VLX	—	28	48	76
G3ZDY	33	30	—	63
G3WZM	3	—	79	82
G3UID	—	—	60	60
G3YJP	34	—	—	34
G3NAA	20	—	—	20
G3YWT	18	—	—	18
Received late				
G3BWQ	—	14	40	54

Contest winner—GM3WDF/P. Second place—G3VRW.
AM winner—G3ZDY. CW winner—GM3WDF/P.
SSB winner—GM3WDF/P.
Check logs received from GW3SRG, G3VHL, OL6AMB and OK1HBT

70 MHz Portable Contest 21 June 1970

Conditions during the contest varied throughout the British Isles. At times quite good, best at the start, but dropping off considerably as time went on. Some lift occurred in various parts, at different times of the day, bringing unexpected long-range contacts. Best QSO was between GI3VPK/P and G3JHM/A at 1415gmt, the range being in the order of 575km, a tough contact on cw. Converter inputs varied from EF95 to the latest technological developments with FETs. Powers ranged from 50W into QQVO6-40, 25W to a pair of 2N3632s, and a few watts in BCC low-power equipment.

A good turnout of GI and EI was noticed. Spare a thought for the members of the YSBYTY YSTWYTH contest group, who hauled their gear on their backs up 1,500ft and two miles from the road access in an hour and a half. Their batteries gave out right at the end of the contest. The callsign used was GW3VFD/P.

Posn	Callsign	Score	Contacts	County	Best dx claimed
1	GW3UCB	676	96	CV	G3VIR/P
2	G3XAC	557	70	CD	G3KSU/P
3	GW3NWR	496	91	FT	GM3TLA/P
4	GW3OXD	469	67	RN	GC3OBM
5	GW3VFD	418	53	BR	GI3VPK/P
6	GI3VPK	409	48	AM	G3JHM/A
7	G3FDW	401	47	WD	G3JHM/A
8	GW3ITZ	393	60	DB	G3VIR/P
9	G3VJR	379	59	YS	GM3TLA/P
10	G3VIR	360	56	KT	G3FDW/P
11	G3EFX	341	53	DT	G3FDW/P
12	G3RLE	326	68	LE	G3YZN/P
13	G3TDH	302	70	BD	G3FDW/P
14	G3TDM	290	72	BS	G3TTG/P
15	G3YZN	284	61	SX	G3RLE/P
16	G3JEQ	278	66	SY	G3UUT/P
17	G3WIN	242	42	CD	—
18	G3WYX	239	29	DN	GI3VPK/P
19	G3SJV	238	63	SX	G3XAC/P
20	G3UES	228	56	HF	GI3VPK/P
21	G3UUT	224	39	YS	G3EFX/P
22	G3KSU	220	46	HE	G3XAC/P
23	G3ERD	217	40	DY	G3YZN/P
24	G3YFM	214	43	BE	G3FDW/P
25	G3UUP	189	57	BS	G3XAC/P
26	G3WRS	182	30	YS	G4KF/P
27	G3SJX	174	45	SX	G3VJR/P
28	G5UM	164	31	LR	G3FDW/P
29	G3TQF	129	27	NR	G3XAC/P
30	G3KJW	99	27	CH	—
31	G2WS	75	15	ST	—
32	GM3TLA	52	4	KE	GW3NWR/P
33	G3TSC	36	24	SY	G3KSU/P
34	G3WDS	6	2	ND	G3WRS/P

G4KF disqualified—Rule 13(1) (Time not in gmt)
Check log from G3JFO/A appreciated

Listeners

1	BRS 28005	195	40	SX	G3XAC/P
2	BRS 15822	142	34	LD	GI3VPK/P
3	BRS 30386	29	19	SY	—

CLUB NEWS

Items for inclusion in this section should be sent to regional representatives on the first of each month for inclusion in the following month's issue. They should not be sent direct to the editor.

The date of publication of the following month's issue, first Tuesday in the month, should be borne in mind so that events are not, in fact, history when the details are published. While regional representatives are pleased to receive clubs' events calendars for several months ahead, they still require monthly events lists so that entries can be confirmed or amended.

REGION 1 — RR B. O'Brien, G2AMV

Special regional events:
Region 1 Field Day 13 September. Local representatives have been circularized; further copies of the rules may be obtained from the regional representative.
Official Regional Meeting, Southport, 27 September. Watch out for further details.
Regional Lecture 23 October. "Why vhf" by T. P. Douglas, G3BA, at Welman House, Moss Lane, Altrincham. Tickets free from G3SMM or G2AMV. Please enclose stamped addressed envelope. 1971 Belle Vue Convention scheduled for 9 May.
Merseyside Luncheon Club—First Monday in every month. 12.30 for 12.45 HMS *Landfall*. Please advise G3VQT or G2AMV beforehand if you wish to attend.
Ainsdale (ARC)—2, 16 and 30 September, 7 October, 8pm, "Morris Dancers" Scarisbrick.
Allerton (Liverpool) Scout ARS North West Region—Thursdays, 8pm, Allerton Group Headquarters, Aigburth Vale, Liverpool 17. All scouts interested in amateur radio are welcome.
Blackburn (East Lancs ARC)—3 September ("Going mobile", John S. Derbyshire, G3SSD), 1 October (Film show—Shell Mex & BP. "Song of the clouds", "Antarctic crossing"), 7.30pm, Edinburgh House, Shearbank Road, Blackburn. Further details from *G4JS*.
Blackpool (B & FARS)—Mondays, 8pm, Pontins Holiday Camp, Squires Gate. Morse tuition at 7.30pm.
Bury (B & RRS)—Second Tuesday each month with an informal meeting on the fourth Tuesday, 8pm, The George Hotel (Private room), Market Street, Bury. Secretary: G3VVQ, 411 Holcombe Road, Greenmount, Bury.
Carlisle (C & DARS)—Mondays, 7.30pm, Currock House, Lediard Avenue, Currock. Further details from A. Treanor, *G3FZG*, 171 Scotland Road, Stanwix.
Cheshire (Mid Cheshire ARC)—9 September (Annual General Meeting). Meetings every Wednesday, 7pm, Technical Activities Centre, Winsford Verdin Grammar School, Grange Lane, Winsford.
Chester (C & DARS)—1 September (Net night 2m), 5/6 September (Expedition—all welcome. Vhf nfd), 8 September (Vhf and uhf propagation by G8AWS), 15 September (Junk sale), 22 September (Lecture by "Dave the transistor"), 29 September (Equipment demonstration by Stephens-James Ltd).
Douglas (D & DARS)—Second and fourth Wednesdays each month, 7pm, 19 Rosemount, Douglas. Further information from W. T. McEvoy at the same address. Telephone Douglas 6146.
Eccles (E & DRC)—Tuesdays, 8pm, Bridgewater School, Worsley, Lancs. Thursday—Club top band net, 2030gmt.
Leyland Hundred Amateur Radio Group—Net nights Thursdays at 2000gmt, 1915kHz. Saturdays at 1900 gmt, 145·8MHz.
Liverpool (L & DARS)—Tuesdays, 8pm, Conservative Association Rooms, Church Road, Wavertree. Secretary: G3WCS, K.Wood, 90 Childwall Valley Road, Liverpool 16.
Liverpool (NLRC)—11, 25 September, 9 October, 8pm, Labour Party Headquarters, 13 Crosby Road South, Liverpool 22. Secretary: M. Graham, G3XMG, 14 Albert Road, Liverpool 22.
Manchester (M & DARS)—Wednesdays, 7.30pm, 203 Droylesden Road, Newton Heath, Manchester 10.
Manchester (SMRC)—4 September (Dx night on the air), 11 September (Surplus equipment sale), 18 September (Talk on club project—2m fet converter), 25 September (Club meeting will be at the special event station, GB3SSA, at Worthington Park, Sale, Cheshire), 2 October ("Equipment fault finding techniques" by D. Holland, G3WFT). As well as meetings every Friday at 8pm at the Conservative Divisional Office, 449 Palatine Road, Northenden, the vhf section meets 8pm on Mondays at the club shack, Greeba, Shady Lane, Manchester 23.
Preston (PARS)—3, 17 September, 1 October, 7.30pm, "Windsor Castle" (Private room) St Paul's Square. Secretary: George Windsor, 26 St Gregory's Road, Preston.
Salford (Dial House Radio Society)—A society formed by GPO Engineers. Wednesdays, 6pm, 8th Floor River End of Dial House, Salford. Further details from the secretary at Dial House, Chapel Street, Salford 3.
Southport (SRS)—Wednesdays, 8pm, Sundays, 2.30pm, The Esplanade. Secretary: A. White, 91 Portland Street, Southport.
Southport (73 SSB Society)—Thursdays, 8pm, at 73 Avondale Road, Southport. All meetings start with a talk on part of the RAE syllabus.
Stockport (SRS)—2nd and 4th Wednesdays, 8pm, The Blossoms Hotel, Wellington Road South. It is likely a formal dinner and reunion will be held later in the year to celebrate the 50th anniversary of the society—possibly October. Further details from the secretary: G8BCG, QTHR.
Thornton Cleveleys (TCARS)—2, 16, 30 September, 14 October, 8pm, St John's Ambulance Brigade Hall, Fleetwood Road North, Thornton, Blackpool.
Warrington, Culcheth (CARC)—Fridays, 7.30pm, Chat Moss Hotel, Glazebury. All visitors welcome. Secretary: K. Bulgess, 32 Hendon St, Leigh.
Westmorland—Fridays, 7.30pm, 24 Park Road, Milnthorpe. All visitors welcome. Secretary: Jim Forrester, 44 New Street, Carnforth.
Windscale (Cumberland) (WAR & ES)—Fridays, 7pm, c/o Falcon Club, Falcon Field, Egremont, Cumberland. Further details from N. Ramsden, *G3RHE*, QTHR.
Wirral (WARS)—First and third Wednesdays each month, 7.30pm, Former Civil Defence Headquarters, Upton Road Bidston, Birkenhead. Secretary: Alf Fisher, G3WSD, 34 Glenmore Road, Oxton, Birkenhead.
Wirral (Wirral DX Association)—Last Thursday each month. 24 September (Visit by regional representative). Further details, including venue, from *G3OKA*.

REGION 2 — RR K. Sketheway, BRS20185

Barnsley (B & DARC)—11 September (AGM), 7.30pm, King George Hotel, Peel Street, Barnsley *G3LRP*.
Durham (DCARS)—10 September (Meeting to be arranged), 24 September ("Elementary tv servicing", by Arthur Dowdell), 7pm, Room 146, Durham University's Elvet Riverside Arts Block, New Elvet, Durham City. *G3PDM*.
North East (NEARG)—For the second meeting of the group, J. M. Bryant of the Plessey Co. Microelectronics Group travelled up from Swindon to lecture on "Integrated circuits for radio communications". An audience of 75 heard his brilliant talk on the use of the SL series of ICs in amateur radio equipment. Demonstration

included a complete IC communications receiver, a stereo hi-fi demonstration, and an MOS-logic electronic keyer. *G3PDM.*

Halifax (NHARS)—2 September (Mini auction followed by pie supper), 16 September (Morse practice & ragchew), 23 September (Discussion on tvi sponsored by G3TCS), 7 October (W1BB Mk1 lecture on dxing on top band), 7.45pm, Peat Pitts Inn, Ogden, near Halifax. *G3MDW.*

Hull (H & DARS)— 4 September ("A short wave listener should never be bored" by SWL I Carress), 11 September ("The mobile rig", by G3SSA), 18 September ("Modern trends in receivers", by G3OHT), 25 September (Construction night), 2 October (Open night), 7.45pm, 592 Hessle Road, Hull. *M. Longson.*

North Riding (NRARG)—Group meets in the back room of the Ship Inn, Falsgrave, Scarborough, alternate Tuesdays and Thursdays fortnightly. Details from secretary, Jeff Jones, G3VLM, Bingley Private Hotel, Albermarle Crescent, Scarborough. *G3VLM.*

Scarborough (SARS)—Thursdays 7.30pm, c/o RAF Association, Fulbeck House, 3 Westover Road, Scarborough.

Sheffield (SARC)—22 September (RSGB lecture by G4JW) 27 October (5 minute lectures by SWLs) 24 November (Construction competition). Meetings on the fourth Tuesday every month, 8pm, The Crosse Scythes Hotel, Totley, Sheffield. *G8NN.*

South Shields (SS & DARC)—8 pm, Fridays, Trinity House Social Centre, Laygate, South Shields.

Sunderland (SARS)—Meetings at 7pm on the first and third Tuesday of each month at Sunderland Polytechnic. *G3XID.*

York (YARS)—Thursdays, 7.30pm, in the British Legion, 61 Micklegate, York. 30 October (Annual dinner at the Granby Lodge Hotel, Scarcroft Road. For details see Secretary, J. Rainbow, 14 Temple Road, Bishopthorpe, York).

REGION 3 — RR R. W. Fisher, G3PWJ

Birmingham (MARS)—15 September, 7.45pm, Midland Institute, Margaret Street, Birmingham 3.

(Slade)—11 September ("The DAF car", by Mr D. Grant), 25 September ("Aluminium", film introduced by Mr Smart), Church House, High Street, Erdington, Birmingham 23.

Coventry (CARS)—4 September ("Integrated circuits", by Mr Kinsella), 11 September (Night on the air), 18 September (G3UOL/P in C3 land), 25 September (AGM), 8pm, City of Coventry Scout Headquarters, 121 St Nicholas St, Radford.

Dudley (DARC)—8 September ("G2DAF ssb equipment", by G3CAQ), 22 September, 8pm, Central Library, St James's Road, Dudley. Club station every Friday at Old Windmill, Vale St, Upper Gornal, Dudley, Worcs. *G3PWJ.*

Lichfield (LARS)—First Monday and third Tuesday of each month, The Swan Hotel, Lichfield. *G8CNB.*

Mid-Warwickshire (AE & RC)—The Society meets every Monday at 8pm, at 28 Ham Terrace, Leamington Spa. *G3UDN.*

Redditch (EWARC)—10 September ("Junk sale"), 24 September ("Natter night"), 8pm, The Old People's Centre, Park Road, Redditch.

Rugby (R & DAR & EC)—Every Tuesday evening, 8pm, 10 Drury Lane, Rugby. *G3YQC.*

Shrewsbury (SARS)—3 September and every Thursday thereafter, 7.30pm, at the new QTH, Harlescott Youth Centre, 218 Sundorne Road. Shrewsbury. *G3UDA.*

Stoke-on-Trent (NSARS) Every Monday evening, 7.30pm, Harold Clowes Community Association Centre, Bentilee, Stoke-on-Trent.

(SoTARS)—Every Thursday, 7.30pm, 2a Race Course Road, Oakhill, Stoke.

Solihull (SARS)—15 September, ("VFO controlled 2m Transmitter", by G8BYM), 7.30pm, The Manor House, High Street, Solihull, Friday 25 September (Social evening at the Huntsman Inn, Kempsey, Worcs). Details from G3VPE, QTHR. *G3YOY.*

Stourbridge (STARS)—15 September (Informal at the "Shrubbery Cottage", Heath Lane, Stourbridge). *G8CVK.*

The annual outing of the club on 4 July was very successful. A station using the call GW6OI/P was established at Llanfair-Caereinion terminal station and many QSOs were made on 40 and 80m. During the afternoon members and their families enjoyed a trip in a reserved coach on the train which runs to Castle Caereinion.

Stratford (SoA & DARC)—4, 18 September ("RSGB Matters", by Mr R. W. Fisher), 7.30pm, Halls Croft, Old Town, Stratford.

Telford (WARS)—Every Wednesday, 8pm, Ketley Bank Youth Club, Main Road, Ketley Bank, Telford, Salop. *G3YEW.*

Worcester (W & DARC)—Every Wednesday and Saturday evening, 7.30pm, Perdiswell Park, Droitwich Road. *G3VJN.*

REGION 4 — RR T. Darn, G3FGY

Derby (DADARS)—9 September ("Aerials I have tried", by Noel Richens, G3VKR), 16 September (Sixth df practice run. The clubroom will be open for non-participants). 23 September ("ICs", by D. Foulds), 30 September ("Quiz night". Visit by members of Nunsfield House Club). 7 October (Surplus sale).

Derby (NHCAARG)—11 September (Night on the air), 18 September (Technical film show, G3ALA), 25 September (Talk for beginners. Construction of components), 30 September (Return quiz with DADARS).

Grimsby (GARS)—17 September (Junk sale), 1 October (Annual general meeting).

Heanor (SEDARS)—22 September (Forum—questions and answers), 29 September (Transistor circuits).

REGION 5 — RR S. J. Granfield, G5BQ

Peterborough (P & DARS)—First Friday in the month, 7.30pm, Peterborough Technical College. Other Fridays at the club HQ in the Old Windmill behind the Peacock Inn, London Road. *G3KPO.*

REGION 6 — RR L. W. Lewis, G8ML

Cheltenham (RSGB Group)—First Thursday, 8pm, Great Western Hotel, Clarence Street, Cheltenham.

Gloucester (GRS)—Second and fourth Thursdays each month. 10 September (AGM).

South Bucks VHF Club—6 October (RSGB talk on 2m), 8pm, Bassetsbury Manor, High Wycombe.

REGION 7 — RR P. A. Thorogood, G4KD

It has been suggested that these notes should be omitted if there are no talks or events at clubs or groups. I agree it is difficult to arrange a programme every week or month but I believe you all like your dates and times shown, so drop me a line giving your club's notices in good time for inclusion.

Acton, Brentford & Chiswick (ABCRC)—15 September (G3CCD/F0UT mobile operation in France), 7.30pm, Chiswick Trades & Social Club, 66 High Road, Chiswick.

Addiscombe (AARC)—Second and fourth Tuesdays, 7.30pm, Toc H Hall, 158 Lower Addiscombe Road.

Ashford, Echelford (ARS)—Second Monday and last Thursday in each month. 14 September (Natter night), 7.30pm, St Martins Court, Kingston Crescent, Ashford, Middx.

Barking (B & DREC)—Tuesdays and Thursdays, 7.30pm, Gascoigne Recreation Centre, Gascoigne School, Morley Road, Barking.

Bexleyheath (NKRS)—Second and fourth Thursdays. 10 September (Junk sale), 24 September ("Solid state vhf/uhf transmitters," by G3OOU), 7.30pm, Congregational Church Hall, Chapel Road, Bexleyheath.

At the last meeting, the "Brains Trust" answered questions ranging from beam antenna design to fault finding in tape recorders.

Cheshunt (CDRC)—First Friday of month, 7.30pm, Methodist Church Hall, opp Theobalds Station, Cheshunt.

Chingford (RSGB Group)—Fridays. Telephone 01-524 0308.
Chingford (SRC)—Fridays, 7.30pm, Friday Hill House, Simmons Lane Chingford E4.
Civil Service (CSRS)—First and third Tuesdays, 6.30pm, Civil Service Recreation Centre, Monck Street, Westminster.
Croydon (SRCC)—Third Tuesdays, 7.30pm, Swan & Sugarloaf, South Croydon.
Crystal Palace (CP & DRC)—19 September ("Receiver alignment", by Bob Burns, G3OOU), 8pm, Emmanuel Church Hall, Barry Road, SE22.

Last Club meeting discussed vhf nfd at Woldingham with 4 and 2m stations by G3IIR/P and G3FZL/P. May also be on 70cm with G3VCP/P.

Dorking (DR & DRS)—Second and fourth Tuesdays. Second Tuesday at the "Wheatshaft", fourth Tuesday at "Star & Garter", Dorking.
Ealing (E & DARS)—Tuesdays, 7.30pm, Northfields Community Centre, Northcroft Road, W13.
East London—20 September (Group structure in the RSGB and affiliated societies), 2.30 for 3pm, Wanstead House, Wanstead (100 yards from Wanstead station, Central Line).
Edgware & Hendon (E & DRS)—Second and fourth Mondays, 8pm, St Georges Hall, 51 Flower Lane, Mill Hill, NW7.
Farnham, Bucks (Burnham Beeches RC)—Fortnightly on Mondays, Farnham Common, Village Hall, Victoria Road.
Grafton (GRS)—The society has transferred to a new headquarters on the top floor of a school almost opposite the famous Whittington Stone on Highgate Hill. The society now has the advantage of a permanent shack.

The RAE classes and the Grafton Club re-open in September. The RAE class will be held on Mondays, the club meetings on Fridays. The new address is Archway School Annexe, Highgate Hill, London, N19. Visitors are most welcome and further details are available from the secretary: Tom Coleman, 14 Norman Court, Stapleton Hall Road, London N4 4QD.

Gravesend (GRS)—Thursdays, 7.30pm, Northfleet Recreation Centre, Springhead Road, Northfleet, Kent. Details from A. Moules, 166 Darnley Road, Gravesend.
Guildford (G & DRS)—Second and fourth Fridays, Guildford Engineering Society, Stoke Park.
Hampton Court (TVARTS)—First Wednesday, 7.30pm, The Three Pigeons, Portsmouth Road, Surbiton.
Harlow (DRS)—Tuesdays (General and cw practice), Fridays (junior meetings), 7.30pm, Mark Hall Barn, First Avenue.
Harrow (RSH)—Every Friday, 8pm, Harrow County School, Gayton Road, Harrow.
Havering (H & DARC)—Fortnightly, 8pm, British Legion House, Western Road, Romford.
Hemel Hempstead (HH & DARS)—First and third Fridays, 7.30pm, "Addmult", Sports Club, Hemel Hempstead.
Holloway (GRS)—Mondays (RAE) 7pm, Wednesdays (Morse) 7.30pm, Fridays (Club), 7.30pm. RAE classes start on 21 September from 6.30 to 9.30pm at Whittington School, Highgate Hill, N19. Enrolment from 14 September. The instructor will be G3MMC.
Ilford—Every Thursday, 8pm, 50 Mortlake Road, (off Ilford Lane), Ilford.
Kingston (K & DARS)—Second Wednesday in each month. 9 September (Surplus equipment and component sale), 14 October 8pm, Penguin Lounge, 37 Brighton Road, Surbiton.
Leyton & Walthamstow—Tuesdays, 7.30pm, Leyton Senior Institute, Essex Road, E10.
London (UHF Group)—First Thursday (Uhf as you would like it to be!), 7.30pm, Whitehall Hotel, Bloomsbury Square, Holborn, WC1.
Loughton—Fortnightly on Fridays. 5 and 19 September, Loughton Hall, Rectory Lane, (Near Debden Station).
Maidenhead (N & DARC)—Third Tuesday of month, 7.30pm, Victoria Hall, Cox Green, Maidenhead.
New Cross (Clifton ARS)—Wednesday and Friday, 8pm, 225 New Cross Road, SE14.
Paddington (P & DARS)—Thursdays, 7.30pm, Beauchamp Lodge, 2 Warwick Crescent, W2.
Purley (P & DRS)—First and third Fridays, 8pm Railwaymans Hall, Side Entrance, 58 Whytecliffe Road, Purley.
Reigate (RATS)—First Wednesday. 7 October (G2PL on dxing), 7.45pm, George and Dragon, Cromwell Road, Redhill.
Romford (R & DRS)—Tuesdays, 8.15pm, RAFTA House, 18 Carlton Road.
Scouts (ARS)—Third Thursday of month. 17 September (Police radio), 3, 4 October (Electronics weekend at Phasels Wood, Herts), 7.30pm, Baden Powell House, Queensgate, South Kensington, SW7.
Sidcup (CVRS)—3 September ("Amateur radio for the beginner", by Tim Hughes, G3GVV), 17 September (Natter night), Congregational Church Hall, Court Road, Eltham, SE9.
Southgate (SRC)—Second Thursday of month. 10 September (Junk sale), 7.30pm, Civil Defence Hut, Bowes Road, N11.
St Albans (Verulam ARC)—16 September (J. Mathews, G6LL talks on "Twenty eight megs in the twenties" and other interesting subjects), Town Hall, St Peters Street, St Albans.
Sutton & Cheam (SCRS)—Third Tuesday. 16 September ("Equipment for beginners", by Tim Hughes, G3GVV), 8pm, The Harrow Inn, High Street, Cheam.
Welwyn (Mid-Herts ARS)—Second Thursday of month, 8pm, Welwyn Civic Centre, Welwyn.
Wimbledon (W & DRS)—Second and last Fridays, 8pm, St John Hall, 124 Kingston Road, South Wimbledon, SW19.
Wembley (GECARS)—Thursdays, 7pm, Sports Club, St Augustin Avenue, North Wembley. (This club is open to non-GEC employees by invitation. Telephone: ARN 1262 for details.)

REGION 8 — D. N. T. Williams, G3MDO

Crawley (CARC)—Formal meetings held on fourth Wednesday of each month, informal meetings held on second Wednesday of each month. 23 September (Quiz between teams from CARC and Reigate Amateur Transmitting Society), 8pm, Trinity Congregational Church, Ifield, Crawley.

REGION 9 — RR J. Thorn, G3PQE

Plymouth Radio Club—5/6 September (VHF NFD on Dartmoor) 15 September (Illustrated inquest on VHF NFD), 7.30pm, Club HQ G3PRC, Virginia House, Bretonside. *G3SPI.*

REGION 10 — RR D. Thomas, GW3RWX

Blackwood (ARC)—Fridays, 7pm, Blanche Cottage, off High St, Blackwood, Mon. *G6BK.*
Barry College of Further Education (ARS)—Details of September meetings from GW3VPB.
Cardiff (RSGB Group)—Monday 14 September (Discussion of VHF Field Day), 7.30pm, TA Centre, Park St, Cardiff. *GW3GHC.*
East Glamorgan Raynet Group—Meetings being reorganized. Details available from GW3ZFG. Cardiff 62411.
Hoover (ARC)—Mondays, 7.30pm, Hoover Social Club, Hoover Works, Pentrebach, Nr Merthyr, Glam. Sec: Mr F. E. Tribe.
Port Talbot (ARC)—Meetings second Tuesday of month, 7.30pm, Trefelin Club & Institute, Port Talbot. *GW5VX.*
Pontypool (ARC)—Details of summer activities from GW3JBH.
Pembroke (ARC)—Last Friday of each month, 7.30pm, Defensible Barracks, Pembroke Dock. *GW3LXI.*
Rhondda (ARC)—Meets at Rhondda Transport Employees Club & Institute, Porth, Rhondda, Glam. *GW3PHH.*

The society will be running a special event station, call-sign GB3WAC, at the World Archery Championship meeting on 10, 11, 12 September. All bands, including two metres will be used, and the location will be the Glyncornel Archery Centre, Llwynypia, Glam.

Sully & District Short-wave Club—Tuesdays, 7pm. The Annexe, Sully Bowls & Social Club, 59 South Rd, Sully, Glam. Sec: Mr Glyn Maggs, 3 Thorley Close, Cyncoed, Cardiff.
Swansea Telephone Area (ARS)—Tuesdays, 7.30pm, Telephone Engineering Centre, Gors Road, Swansea. Society call-sign: GW3ZTK. Sec: Mr M. D. E. Connor, 7 Glanmon Park Road, Sketty, Swansea, Glam.
University College, Cardiff (ARS)—Official meetings suspended for summer vacation, but shack open for local members. Interested students entering college next session are invited to contact the secretary, c/o Student's Union, Dumfries Place, Cardiff.
University College, Swansea (ARS)—Activities suspended for the vacation. Interested new students entering college next session should contact the secretary, c/o Student's Union, University College, Singleton Park, Swansea.

REGION 12 **RR A. W. Smith, GM3AEL**

Aberdeen (AARS)—Fridays, 7.45pm, 6 Blenheim Lane, Aberdeen. *GM3HGA*, telephone Aberdeen 33838.
Dundee (RSGB Group)—Thursdays, 8pm, 3 Magdalen Place (off Roseangle), Dundee. *GM3KYI*.
Inverness (IRS)—Thursdays, 7.30pm, 4 Falcon Square (near railway station), Inverness.
Lerwick (LRC)—Tuesdays and Thursdays, 8pm, Annsbrae House, Lerwick. *GM3XPQ*, telephone Bixter 249.
Lhanbryde (MFARS)—Wednesdays, 7.30pm, St Andrews School, Lhanbryde, by Elgin, Morayshire. *GM3UKG*, telephone Clochan 225.

REGION 13 **RR V. W. Stewart, GM3OWU**

Lothians Radio Society (LRS)—10 September (Presidential address), 24 September (Junk sale—please come—with junk), 7.30pm, Theatre Workshop, 66 Hanover Street, Edinburgh.

REGION 14 **RR N. G. Cox, GM3MUY**

Ayrshire (Ardeer Recreation ARC)—1, 3 8, 10, 15, 17, 22, 24, 29 September, 7.30pm, Ardeer Recreation Club, Amateur Radio Section, Stevenstone, Ayrshire. Details from J. F. McCreight, GM3DJS, 10 Auchenharvie Road, Saltcoats Ayrshire.
Ayrshire (AARG)—27 September, 7.30pm, YMCA, Howard St, Kilmarnock.
Falkirk (RSGB Group)—18 September, 7.30pm, Temperance Cafe, Lint Riggs, Falkirk.
Greenock (G & DARC)—4, 11, 18, 25 September, 7.30pm, James Watt Library, Union St, Greenock.
Mid-Lanark (RSGB Group)—18 September, 7.30pm, YMCA Brandon St, Motherwell.

REGION 15 **RR J. Thompson, GI3ILV**

City of Belfast YMCA Radio Club—Mondays (Morse practice and operating procedure), Wednesdays and Saturdays (Club nights), 8pm, City YMCA (3rd Floor), 12 Wellington Place, Belfast, BT1 6GE. Information from YMCA general office.
Annual General Meeting at 7.30pm on Wednesday 23 September.

REGION 16 **RR W. J. Green, G3FBA**

Basildon (VARS)—Thursdays, 7.30pm, The Scout Hall, Fairview Road, Vange, Basildon. *G3VOP*.
Chelmsford (CARS)—First Tuesday in each month, 7.30pm, Marconi College, Arbour Lane, Chelmsford. *G3VCF*.
Colchester (CARS)—Wednesdays, 7pm, NE Technical College, Colchester. *G3VAG*.
Gt Yarmouth (GYRES)—Fortnightly, 7.30pm, 98 South Market Road, Gt Yarmouth. *G3HPR*.
Ipswich (LRS)—Details from G3YWM, QTHR.
Norwich (NARC)—Mondays, 7.30pm. 6 September (Business meeting), 13 September (Informal discussion), 20, 27 September (to be announced). Secretary: Gary Purcell. Tel Drayton 459. Meetings are held at the Brickmakers Arms, Sprowston Road, Norwich.

REGION 17 **RR C. Sharpe, G2HIF**

Basingstoke (BARC)—Meetings on the first and third Saturday in each month, 7.30pm, Chineham House, Popley Way, Basingstoke. *G3CBU*.
Maidenhead (MDARC)—7 September (G3IAR describes the EMSAC range), 15 September (Informal), 7.30pm, Victory Hall, Cox Green, Maidenhead. *G3VMR*.
N Berks (AERE, Harwell, ARC)—Meetings on the third Tuesday in each month, 7.30pm, Social Club, AERE, Harwell, Berks. *G3NNG*.
Portsmouth (PDRS)—Meetings every Wednesday at 7.30pm. Room 5, Twyford Avenue Community Centre, Portsmouth. Visitors welcome. *G3CNO*.
Reading (RARC)—1 September ("Let's club together"—an informal meeting to initiate our autumn membership drive), 7.30pm, Victory PH, Meadway Precinct, Tilehurst, Reading. *G3NBU*.
Swindon (SDARC)—9 September (First meeting of the winter session), 23 September (Informal meeting), 7.30pm, Penhill Evening Centre, Alton Close, Penhill, Swindon. *G3JAP*.

SPECIAL EVENT STATIONS

Wycombe Show, 5 September

GB3WRA will be operated by a group of local amateurs from the annual Wycombe Show on the Rye, High Wycombe, Bucks. Operation will be on all bands 160-10m, a.m., cw and ssb. Further information from A. C. Butcher, G3FSN, 70 Hughenden Avenue, High Wycombe, Bucks. Tel: 24835. Special QSL cards.

Royal Leamington Spa, 18-19 September

The Mid-Warwickshire Amateur Electronics & Radio Society will operate GB3RLS at a Crafts & Hobbies Exhibition in the Town Hall, Royal Lemington Spa, on the above dates, using a.m. and ssb on 80 and 20m. A special QSL card will be sent.

Manchester University Freshers' Week 28 September-2 October

The University of Manchester Institute of Science & Technology will operate GB3MAN on all bands 160m to 10m, and on 2m from 26 September to 17 October. Further information from: Secretary, Amateur Radio & Electronics Society, UMIST Union, PO Box 88, Sackville Street, Manchester M60 1QD. Tel: 061-236 1281.

Phasels Wood Scout Camp, 3-4 October

An activity camp for Scout electronics enthusiasts will be held at Phasels Wood Scout Camp, Kings Langley, Herts, during the above weekend. There will be lectures and demonstrations, a df hunt, and a wide range of practical activities. An exhibition station will be on the air on all bands.

Jamboree-on-the-Air, 17-18 October

GB3SSS will be operated by Solihull ARS on behalf of Solihull School Scout Group at Solihull School, Solihull, Warwickshire, during Jamboree-on-the-Air. Operation will be on 160, 80, 20, 15 and 10m ssb.

Mobile rallies calendar

19 September—RSGB Scottish Mobile Rally.
20 September—Peterborough Mobile Rally.
27 September—Harlow and District ARS Mobile Rally.

Looking ahead

4 September—RSGB Dinner Club, Kingsley Hotel, London WC1.
16-18 September—IARC Convention, Geneva.
26 September—Region 10 ORM, Cardiff.
27 September—Region 1 ORM, Southport.
28 September—Lecture at the IEE. "The Trans-Arctic Expedition".
11 October—RSGB Scottish VHF Convention, Dundee.
27 October-1 November—4th International Convention of Radio Amateurs, Barcelona.
4 December—RSGB AGM.

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. MacBrayne, G3KGU, 25 Purlieu Way, Theydon Bois, Essex.

Sundays

Clock time	Callsign	MHz	Town
0930	G3TNF	1·920	Gateshead
0930 †	G3KZZ	1·920	South Shields, Co Durham
1000 †	G3WNR	1·920	
0930	G3HZL	1·940	Isleworth, Middlesex
0945	G3YRO	1·860	Fareham, Hants
0915	G3USK	1·975	Mablethorpe, Lincs
1000	G2FXA	437·000 to north	Stockton-on-Tees
1015	G3CGD	1·875	Cheltenham
1030	G2FXA	437·000 to south	Stockton-on-Tees
1030	G3NPB	1·875	St Ives, Cornwall
1100	G2FXA	1·900	Stockton-on-Tees
1100	GW3UMB	1·880	Colwyn Bay
1130	G3KKU	1·940	Liverpool
1130	GW3VPL	1·918	Porthcawl, Glam
1130	G3VVP	1·880	Plymouth, Devon
1200	G3HVI	1·890	Stoke-on-Trent
1200	G3GNS	1·910	Weston-super-Mare
1330	G3FWW	1·880	Burnham-on-Sea, Soms
1330	G3XDV	1·910	Canterbury, Kent
1400	G3XGJ	1·830	Huddersfield, Yorks
1730	G3TN	1·920	Gateshead
1930	G3YFO	144·19 to south	Burnham, Bucks

† Alternately

Mondays

1730	G3TNF	1·920	Gateshead
1800	G3SWR	1·980	Birmingham
1830	G3NCZ	1·920	Blackburn, Lancs
1830	G3RXH	1·910	Skipton, Yorks
1900	G3WGU	1·880	Bispham, Lancs
1900	GC2FMV	3·600	Jersey, CI
1900	G3YJA	1·920	Coventry, Warks
1900 †	G3WFY	1·850	Thornton Cleveleys
	G3YEI		Fleetwood, Lancs
2000	G3KAN	1·990	Northampton
2000	G3IBJ	1·910	Southampton, Hants
2000 †	G3WDW	1·915	Leeds, Yorks
	G3VTY		
2000	GI3JEX	1·855	Belfast
2015	G3YMH	1·845	Wraysbury, Middlesex
2030	G3YEB	1·915	Harlow, Essex
2030	G3JHM	70·050	Worthing, Sussex

† Alternately

Tuesdays

1730	G3TNF	1·920	Gateshead
1800	G3XDV	1·910	Canterbury, Kent
1900 †	G3UFO	1·980	Wirral, Cheshire
	G3XAM		
1930	G3SWP	1·850	Doncaster, Yorks
1930	G3WGU	433·500 to south-east	Bispham, Lancs
2030	G3UPA	1·850	Meriden, Warks
2000 †	G3FAU	1·980	Stevenage, Herts
	G3KSS		
	G3OVT		
2000	G3FWW	1·880	Burnham-on-Sea, Soms
2000	G3WGD	1·860	Leicester
2000	GM3PIP	3·590	Mintlaw, Aberdeen
2030	G3HZL	1·845	Isleworth, Middlesex
2030	G3PRN	1·915	Harlow, Essex
2100	G4RS	1·865	Blandford, Dorset
2100	G3XUS	1·970	Newhaven, Sussex
2200	G3HZM	1·925	Manchester

† Alternately

Wednesdays

1730	G3TNF	1·920	Gateshead
1830	G2FXA	1·900	Stockton-on-Tees
1900	G3YPZ	28·700	Harlow, Essex
1930	G3VVP	1 880	Plymouth, Devon
1930	G3WGU	433·500 to south-east	Bispham, Lancs
1930	G3YFO	144·19 to north	Burnham, Bucks
1930	G3UJD	1·825	Farnborough, Hants
2000 †	G3AJX	1·925	Winchester, Hants
	G3TWP		
	G3YSK		
2000	G8QU	1·970	London, N22
2000	G3JHM	70·050	Worthing, Sussex
2000	G3XGY	144.054	Weston-super-Mare
2015	G3UNV	1·845	Ashford, Middlesex
2030	G3KGU	1·915	Theydon Bois, Essex
2100	G3HVI	1·890	Stoke-on-Trent

† Alternately

Thursdays

1730	G3TNF	1·920	Gateshead
1800	G3SWR	1·980	Birmingham
1830	GW3VBP	3·590	Barry, Glam
1830	GW3UMB	1·880	Colwyn Bay
1830	G3NC	1·968	Swindon, Wilts
1900 †	G3WFY	1·850	Thornton Cleveleys,
	G3YEI		Fleetwood, Lancs
1900	G3WGU	1·880	Bispham, Lancs
1930	G3GNS	1·910	Weston-super-Mare
2000	G3WDS	1·975	Carlisle
2000	GI3JEX	3·590	Belfast
2030 †	G3SJE	1·875	Harrow, Middlesex
	G3GC		
2030 †	G3ROE	1·915	Harlow, Essex
	G3RSF		
	G3YMJ		
	G3YFC		
2100	G4RS	1·865	Blandford, Dorset
2100	GW3XNI	1·930	Crosskeys, Mon

† Alternately

Fridays

1730	G3TNF	1·920	Gateshead
1800	G3XDV	1·910	Canterbury, Kent
1830	G3NCZ	1·920	Blackburn, Lancs
1900	G3WRO	1·915	Romford, Essex
1900	G3NPB	1·875	St Ives, Cornwall
1930	G3PQF	1·825	Farnborough, Hants
2000	G3EEL	1·980	Peterborough
2000	G3WGD	1·860	Leicester
2000 †	G3KEP	1·910	Bingley, Yorks
	G3UCZ		Pudsey, Yorks
	G3WTF		Bradford, Yorks
2015	G3SAZ	1·845	Ashford, Middlesex
2030	G3JHM	70·050	Worthing, Sussex
2030	G3ZEV	1.930	Harlow, Essex

† Alternately

Saturdays

0930	G3UNV	1·935	Ashford, Middlesex
1000	G3PLE	1·820	Stourbridge, Worcs
1300	G2FXA	1·900	Stockton-on-Tees
1400	GC2FMV	3·600	Jersey, CI
1730	G3TNF	1·980	Gateshead
1800	G3ZCC	1·915	Chingford, Essex
1930	G3EFS	1·913	Bromley, Kent
2000	G3KPO	1·980	Peterborough

† Alternately

Members might like to be reminded that the Royal Naval Amateur Radio Society, using their call-sign G3BZU, transmits cw as a proficiency test at 1900gmt on the first Tuesday of each month. Frequencies used are 1·875MHz for practice only, and 3·520 MHz for speed proficiency tests. Certificates are issued against correct copy submitted to: The Royal Naval Amateur Radio Society, HMS Mercury, Leydene, Hants. A small charge is made to cover costs.

MEMBERS' ADS

These advertisements are accepted free of charge as a service to members of RSGB. They must be submitted on the Members' Ads order form printed on the penultimate page of each issue of *Radio Communication*, or on a post-card similarly laid out. Each must be accompanied by a **recent** *Radio Communication* wrapper addressed to the advertiser, as proof of membership.

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 equipment offered for sale.

Members are advised to enclose a stamped addressed envelope when replying to advertisements.

The closing date for each issue is the 7th of the preceding month, but no guarantee of inclusion in a specific issue can be given. No correspondence concerning this free service can be entered into

See the current order form for further details.

FOR SALE

Complete station of deceased GW3UO: FL200B, FR100B, TH3jr 3 ele beam, Hansen swr bridge, commercial built heavy duty 25ft welded steel tower with central 20ft dural, Shure 444 mic, quantity of oddments, £200 ono. Would split. Prefer buyer coll. GW3IMQ, QTHR.

Property of late G3BLU: comp station: Little used Trio TS500, PS500, VFO5, all in orig cartons. Also Admiralty lpf, Hansen SWR-3, G8KW trapped dipole, ptt mic, £165. G3HIS, QTHR. Tel Cheadle 2378.

Equipment of late G3OCX: G2DAF tx built by G2DAF. Also G2DAF rx aligned by G2DAF (Bull Feb/Aug 1967), £75 ea inc post. LM14 freq meter, £20. MIP testmeter series 100, 10,000Ω pv, £15 ono. G8GG, QTHR. Tel OFY15 25717.

Electroniques hamband rx, transistor, ssb i.f., af amp, stab psu, prof case, wkg, £30. B40 gd cond, £20. R/C bridge, £6. 12V neg earth alternator and control box, £12. G8DOS, 57 Bacon Lane, Edgware, Middx. Tel 01-952 6570.

Solartron CD523 10MHz scope, with manual, fb cond, £25. Also Ediswan psu type R1103A, 200-400V cont, stabilized at 200mA, 2 × 6·3V, in rack mounting case, gen bargain, £25. Pref buyer coll and inspect. G3YDC, QTHR.

Quantity of gd valves cheap, sae for details. BM3 mic and comp stand, £1. Wanted: 100W carbon resistor about 50Ω. Also 6CH5 valve, 1A rf meter. G2ANB, QTHR. Tel Hockley (Essex) 3278.

Heathkit HW12 (factory built) with Heathkit ceramic mic and home-built psu, £40 buyer coll. Pair brand new RCA 6LQ6, £3 10s. Four 807s, £1. Three QVO4-7s, £1. All valves post paid. G3GVV, 10 Farm Lane, Tonbridge, Kent. Tel 073-22 3360.

AR88LF, extremely gd cond, £40 or would consider swop for Trio 9R59DE. US Navy scope, £9. Frisby, 11 Kingston Ave, Stony Stratford, Wolverton, Bucks. Tel Stony Stratford 2382.

32ft Heathkit tower, galvanized, no rust, £30. G3AJ, QTHR. Tel Sway, Hants. 464,

DX40U tx with vfo and mic, £22. G3WBO, 88 Crawley Road, Horsham Sussex.

Marconi TF144G sig gen, 85kHz–25MHz, vgc. £25. CT53 vhf sig gen, vgc, £25. CR300/2, psu. £10. R1475. £10. All ono. Exchange lot for ssb tc or trnscvr (for school station). G3YXO, 87 Sandridge Road, St Albans, Herts. Tel St Albans 57930.

DA1 electronic keyer, £10. G3VRY, 13 Crombie Close, Lovedean, Portsmouth, PO8 8LG.

Sinclair stereo 25 with 2 Z12 amps and mains psu in small case, ex cond, £6 plus carr. Glover, 30 St Chads Ave, Leeds 6.

LG50, £20. HRO plus coils (no psu), £16. Avo bridge, £8. Marconi trnscvr HP16B (4m), £8. UM2, £2. Marconi voltmeter, £4. KW160 tx, £15. G3LWB, QTHR. Tel Sheffield 363155.

Pye Ranger, boot mount, £8. Eagle FMT640 tuner, £10. Sansui MP2 decoder, £4. Pentax S1A 55m, 135mm lens, Pentax meter, cases, £80. G3XJS, 6 St Stephens Road, Hounslow, Middx. Tel 01-572 2311.

Murphy 2m base station, complete mains operated, 25W output. Simple mods to rx and tx can be supplied, £39 10s. Advertised elsewhere for £70. G3CXI, QTHR. Tel Bishops Cleeve 3834.

Trio JR310 rx, hardly used, £68. Codar T28, £8. Harley 17 Desborough House, Amersham Hill, High Wycombe, Bucks. Tel High Wycombe 25069.

ART13 tx, 2-18MHz, 813 pa, am/cw/mcw, with manual but no psu, £12 ono. Cook, 17 Pangbourne Ave, London W10. Tel 01-387 3827

BC221M, charts, built-in mains psu, calibrated June 1970, ex cond, £20 ono. G3VIR, QTHR.

Collins TCS12 tx/rx and heavy duty versatile ac psu. 10 years *Bulletins* and *SWMs*. Numerous units and components all for £25. Good causes try offer. Pref buyer coll. G3MQU, QTHR. Tel Diss 2875.

TW 2m convtr, 4–6MHz i.f., with psu, £8. Camm, 25 Sunnyhurst Lane Darwen, Lancs. Tel Darwen 71690 after 6.30pm.

KW2000 with ac and dc psus and bug key, £140. Eddystone bug key, £4. Auto trnsfmr 115V 200W out in case with connectors, £2 10s. Wanted: Good 2m ssb transverter. G3WUW, QTHR. Tel Swavesey (Cambs) 339.

Codar CR45 with full set of coils, spkr and phones, £7 10s. Mitchell, 5 Hill Park Road, Gosport, Hampshire.

Record player (transistor), 4 speed auto change Garrard deck model 50, vy little used, extra new stylus for buyer, £15 ono. Curran, 2 Bridges Ave, Paulsgrove, Portsmouth, Hants, PO6 4PA.

Books, all gd cond: *Radio Handbook* (Orr), 50s. *Radio Communication*, (Reyner), 40s. *Transistor Transmitters* (Stoner), 15s. All three for £5 with 1965 ARRL *Handbook* free. G3UYK, QTHR.

Have a number of EF91 and EF92 valves for quick sale, not in makers boxes but in gd cond, 1/6d ea plus 10d pp. Wanted: Cheap wkg tape recorder not over £3. Kenyon 116 Wisden Road, Trotts Hill Stevenage, Herts.

50 multi coloured stranded wires in harness, 9ft lengths, ideal for wiring all ham equipment, 10s ea. Newman, 264 Collier Row Lane, Romford, Essex. Tel 70 63970.

Taylor Windsor 66A sig gen, rf/mod, 100kHz–80MHz, with manual, £8. Truvox Mk3 tape deck, 3 motor, single track, unused since new purchase from makers, with manual and cabinet, offers. Standard 19in steel rack, 5ft 6in, £3. G3OEI, QTHR.

Pair No 88 rx/tx with valves and xtals, less phones. Ekco type 2 12V Amp psu to suit. Official alignment data available. Sets should work. Any offers? G8APS, QTHR. Tel 021-308 3044.

EC10 Mk2, new May, £60 ono. Paxina 29 camera with case, rangefinder flashgun etc, £15. G4HU, 34 Birch Ave, Romiley, Cheshire, SK6 4DG.

Xtals: 6·081, 7·75278, 8·3444 (2), 8·9219 (4), 9·48333, 10·839286, 11·3625, 11·4125 (5), 12·1125 (2), 12·1625 (9), 12·72214, 12·93333, 13·6125 (2), 14·3625, 18·16875 (2), 18·24375 (2), 28·2375MHz, 10s ea. Cossor scope 1049, £10. G2DAF rx, £25 (14 new xtals). G3VUT, QTHR. Tel 01-550 9300.

Pye 12V low band high power tx/rx, transistor psu, modulator, QQVO6-40A pa, £10. HE30, ex cond, £23 10s. Buyer coll. G3ZIG, 2 Attleborough Road, Little Ellingham, Attleborough, Norfolk.

Bargains in trnsfmrs, valves and components, cheap to clear.

Cossor 339 db scope, needs repair, £3. Spare 09J tube, £1. 19 Set, £2. Carr extra. Sae for details. G3LDG, QTHR.

42in equipment desk, £10. 46in operators desk, £12 10s. Both single pedestal, grey steel, black tops, bright metal trim, fb cond. Buyer coll. 12177·5kHz xtal for KW2000A/B, 30s. G3UFU, QTHR. Tel 994 6931.

Panoramic adaptor BC1031B, 450–470kHz input freq, hndbk, circ and spare crt, not in wkg order, £7 10s. Buyer coll or pay carr. G3TCJ, The Pippins, Lake Lane, Liskeard, Cwll. Tel Liskeard 2073.

RSGB *Bulletin*: March 1939 to June 1952, 152 copies 8 missing. July 1952 to December 1967, 185 copies 1 missing. Offers. G3DU, QTHR. Tel 01-997 7514.

813s, 30s ea. G3RVM, 27 Kingsthorpe Grove, Stratton St Margaret, Swindon, Wilts.

HW17 2m trnscvr (17A spec), HW-A-17 psu, 4 xtals, £55 ono. Two Hudson FM208 trnscvrs, dash mounting, wkg on 2m, with accessories and hndbk, £40. Brand new unused 4X150As, £4. 4CX250Bs, £6. FM4U fm tuner, £5. G8BAM, QTHR. Tel 01-556 9366.

HW100 with homebrew psu, matching spkr, swr bridge and bug key, £125. Heathkit vvm, new, £15. CR100, £11. Transistorised gdo TE15, £8 10s. Mint cond. G3XCE, QTHR.

RCA AR88D in fb cond, with hndbk, £30. G3YNY, 242 Westward Road, Stroud, Glos. Tel Stroud 2826.

Trio 9R59D with spkr, brand new in packing crate, £35. G3HQH QTHR.

KW2000A plus KW Q mult, £175, KW600 lin amp, £80. G3WGF QTHR.

Several Ranger 2202s comp with all plugs, control box and mic, QQVO3/20 pa, 12V, boot mounting, easily modified to 2m or 4m, £9 ea plus p and p. Modified if desired. G8BKV, QTHR. Tel Ipswich 41674.

Coil formers, 1¼in by ⅜in or ⅜in by ¼in. 6d ea or 4/6d dozen. Over 100 types of old valves, list your requirements (sae pse), 1s ea plus p and p. Harvey, 22 Elm Grove, Norton, Bromsgrove, Worcs.

CR100, ex cond, £20. Pye fixed station, 25W, convtd for 2m, £5. Home-built tt 160m tx, 3W, £3. G3ISK, 84 Granger Ave, Maldon, Essex. Tel Maldon 2988.

BC348 rx, gd cond with int psu and S meter, £18. AR88D, vy gd cond with S meter, resprayed and lettered front panel. £25. G3YFG, QTHR.

Pc board, approx 13in by 2¾in, 4s per piece. 5A change-over type micro switches, 1s ea. Extension cords, 3 way with spade terminals each end, 54in long, 6d ea. Pp extra. Dufrane, 44 Hazelton Road, Marlbrook, Bromsgrove, Worcs.

Furzehill 0-100, needs attention, £10 ono. Psu, 2kV at 5mA, 350V at 200mA, 6·3V at 17A, gd cond. £3 10s ono. Collaro transcription pick-up diamond lp stylus, £2 10. Buyer to coll or arrange own transport. G8AFA, QTHR.

Heathkit GR64E, recently factory aligned and tested, £20 ono. Wanted: Mohican, EC10 or similar transistor rx. 57·6MHz xtal. G8DAD, Easter Hill, Christchurch Lane, Lichfield, Staffs.

Philco freq meter BC906D comp with charts, 500μA meter and batts in self contained portable cab, 35s. RF24 tuner, 10s. Wanted: 23cm convtr. G8AQZ, 1 Alford Road, Bristol, BS4 3HS. Tel Bristol 77348.

Pen recorder, 1in per hour, with paper, £8. Fm tuner, £2. Photodip auto headlight dipper, £3. 2 speed 3 motor tape recorder, £6. Post extra. G3SJX, QTHR. Tel 01-656 9054.

Clearing Shack: psus, meters, convtrs, atus, valves (some new vhf pa types), £10 the lot. G3XBE, 39 Oakdale Drive, Wrose, Shipley, Yorkshire. Tel Shipley 57490.

AR88LF with hndbk, switchable a.m./fm/product detectors, fast/slow agc, realigned, white enamel front panel, gd cond, offers over £30 considered. G8CEC, QTHR.

Sphinx ssb tx with matching Delta control unit, £45. G3WWJ, 5 Pakenham Close, Cambridge, CB4 1PW. Tel Cambridge 64044.

Cannonball Mk2 160m ssb tx, 6146 pa, 25W pep, £20. Psu for same, £3. Delta ant changeover unit, £1. CR100, ex cond, new psu, S meter, xtal cont cio, product detector, £10. KW Vanguard, 160-10m, £18. G3YJP, QTHR. Tel Letchworth 6392.

G56 wavemeter, brand new, £6. Testset 253, £4. TS92AP, brand new, £4. TS110AP, £5. Pair Tele Ls, brand new, £3. Tropicalised wirewound pots, various values, 1/6d ea. 16 for £1. Please sae. G3IUD QTHR.

Eddystone 840C, 14 months old, still as new, cost £70, sell for £45. Complete with spare set of valves. G8BEO, 120 Nuneaton, Warks. Tel Nuneaton 66976.

Heathkit DX40 with VF1U, latest models, very nice cond, £25. Heathkit RA1 with spkr, Q mult and preselector, £35. Will separate. G3UQZ, QTHR. Tel 021-373 8806.

Trio JR500SE, brand new in box, £40. Capell, 7 Osmund St, East Acton, London W12. Tel 01-749 1863.

Heathkit HW30 2m trnscvr comp with mic, 250V transfmr, 12V psu, 5 ele beam and /M halo, any trial, £28 ono. New Advance transistor tester, £15. Thermocouple potentiometer, offers. G8BPA, 185 Bedford Road, Wilstead, Beds.

Class D wavemeter with mains psu and phones, £6. Heathkit sig gen RF1U with manual, factory aligned, new, £12. Callers only. G3WXT, QTHR.

Jap bug key, gd cond, £2 15s. Pair BD123 transistors, new and unused, £1. Wanted: trap vertical for 10-40m. G3KZC, QTHR. Tel Bristol 673026.

CR100/2 rx in gd wkg order, £12. Will deliver locally. G3MEH, QTHR. Tel 01-660 6263.

DX40 and VF1U, £20. Top band tx, £5. G3VDG, QTHR. Tel Aldridge 51377.

RCA AR88D, gd cond, £25. G3PQX, 61 Netherton Grange, Netherton, Liverpool 10.

Tiger 200 tx, mint cond. Trio 9R59 rx, new. No reasonable offer refused. Reply by letter to G3LES, c/o Edwards, 29A Aughton Road, Southport. Tel Southport 68064.

Wavemeter No10, 1·5–10MHz, £4 ono plus post. Gates, 16 Summerhill Cres, Liverton, Devon.

120W cw/a.m. tx and other gear. Offers by callers only evenings. G2OF, 40 Northwood Road, Harefield, Middx. Tel Harefield 3647.

Cossor 89D crt, ex-govt, as new cond and performance, £5 inc post and packing. Also many valves, trnsfmrs etc. Sae for lists. Wardle, 13 Lynn St, Chester-le-Street, Co Durham.

Linear amp, class AB2 813, fully metered and screened, screen and grid regulated, home made. No psu, own bias supply. For the cost of the components, £20 collected. G2CNW, 56 Rectory Park Road Sheldon, Birmingham 26. Tel 021-743 2864.

Eddystone 840C, ex cond, owner going trnscve, £35. Benwell, 61 Rutherwyke Close, Ewell, Epsom, Surrey. Tel 01-393 9361.

Eddystone EB35 rx, 150kHz–22MHz and 88–108MHz, mains or batt £50 ono. Juliette NA5018 rx, 54kHz–174MHz, £23 ono. Pilot 11, a.m./vhf, mw, 108–130MHz, £9 ono. Rial, 1 Buckfast Close, Hale, Altrincham, Cheshire. Tel 061-980 3249.

WS38 Mk3 trnscvr, requires ATP4, ARP12 valves and possibly alignment, otherwise perfect. Offers. Watts, 74 Belvedere Road Taunton, Somerset.

Heathkit GR78 rx, mint cond, cost £68, will exchange for EC10 with 2m convtr. Solartron CD568 scope, £17. Labgear tv cross-hatch generator, new, £40. 25W Pye base station, 2m, hndbk, £20. Wanted: cc tv gear, monitors, cameras etc. Part exchanges welcome. Hill, The Flat, Parkfields, Pontshill, nr Ross-on-Wye, Herefordshire.

Sommerkamp FLDX500, gd cond, £115. Star 550, no mods, £29. Buyer coll. G3WGG, QTHR,

Codar T28 with int psu, variable bfo, spkr and jack for phones. Can be used on batts (12V) or mains, £15. Williamson, Avon More, Antrim Road, Ballymena, Co Antrim, N Ireland. Tel Ballymena 41468.

CR100/2, revalved, £14, 1155 with psu and output stage, £4. Radionic set No4, used once, £8. G8CLG, QTHR. Tel 01-778 2739.

Cossor 1035 double beam scope, £10. Electroniques QP166 coil pack, £10. New Canadian 19 set, £4. Variable psu, stabilized 0–300V, 200mA, £13. Callers only or phone after 6pm. G8BZY, QTHR. Tel Otley 2269.

Two 4CX250Bs with bases and chimneys, all new, £8 ono the pair. 250kHz 3kHz bandwidth Marconi mechanical filter, £5. G3MGW, QTHR. Tel Brightlingsea 2382.

Petrol electric gen, 12V 80W, with new siliencer and silicon rectifier, £10. G3KSU, 11 Grange Ave, Ryde, IW. Tel Ryde 5551.

Transistors, 2N2369A exact equiv, brand new, 1s ea. 24 for £1 post free, otherwise add 6d. G3WVT, 109 Heywood Lane, Austerlands, Oldham, Tel 061-652 2306.

Cannonball ssb 80m tx, brand new and unused, £24. G3ODG, 20 Bevan Ave, Talke Pitts, Stoke-on-Trent.

B40 revalved to B40D standard, realigned, with manual and mountings, £30. CR100, many mods, manual, £20. B29 vlf rx, £5. 12V/mains psu for 52 rx, 30s. Ex-RAF sig gen/wavemeter, 140–240MHz, £3. Jackson, 38 Haslemere Road, Thornton Heath, Surrey, CR4 7BE. Tel 01-672 3854 (day).

Trix pa amp T103, £10 10s. Hi fi spkr in vented cab, 12in woofer, 2in tweeter, crossover, £5 10s. Communications dynamic hdphns, stereo or mono with chamois padded earmuffs, 29/6d. Please add carr. G3KPO, QTHR. Tel Eye 351.

Cossor 339A double beam scope, £6. AR88 case, £2. Labgear wideband multiplier, 35s. Buyers coll. G3VW, QTHR. Tel 01-205 1443.

Voltage regulators: OD3, VR150, VR105 STV280/40, GV5A–1600, 6D4, EN93, QS150/15, OB2, 5s ea. Wanted: Ranger PTC2007, must be unmodified. G2XV, 165 Cambridge Road, Great Shelford Cambridge.

Two 813s, £1 10s ea. One base, 5s. Woden fil trnsfmr, 10V at 10A ct, £5. One 832, 10s. Three bases, 5s ea. Five 807s, 4s ea. Five bases, 2/6d ea. All plus post. G2GM, QTHR.

SWM vols 18 to 27 inc. *Bulletins* vols 19 to 29 inc. £1 per vol. AR88D hndbk, £1. G3KLD, QTHR. Tel 021-777 7177.

CR100, gd cond, £20. Cossor 339 scope, £10. Marconi sig gen 390G, mint, £20. 100W tx and 100W mod, £5. G3HBM, QTHR.

Trio rx 9R59DE, as new, £30. ono. Wanted: Two QQVO6–40As. G3LQB, QTHR. Tel 090-63 577.

Must sell. Offers invited for £100 Lambda. Will split. G3KHA, 3 Cherry Grove, Yatton, Bristol. BS19 4DJ.

Harrow 4 channel mono mic mixer, hardly used, inc batts, £2. Unused recording tapes, 23 5½in and 21 5in, excellent quality, £25 inc carr. Will split—offers. Shirley, 22 West Heath Drive, Golders Green, London NW11.

HC6/U xtals: 16·000, 43·766, 43·883, 20s ea. 6 uhf elbows M359, 7/6d ea. 80/40m atu and fs meter, suit beginner, 10s inc post. GM3POK, 123 Moubray Grove, South Queensferry, West Lothian.

Shack clearance. HROs, vhf and uhf rxs, a.m. txs, digital counters, test equipment, many other oddments. Ring for details. G3WRU, tel Potters Bar 52544.

Heathkit Q mult QPM16, vy gd cond, with hndbk, £5. Books: *Fun with radio* and *Fun with short waves*, both 2/6d ea less pp. Pick, 30 Marlin Grove, Beckenham, Kent.

Heathkit RA–1 rx with xtal calib, ldspkr and manuals, like new, £35. G3RKQ, QTHR.

AR88D, £25. DX40 with VF1U, £25. Both with hndbks, buyer coll. Owner going ssb. G3BNI, QTHR. Tel Highworth 703.

Eddystone EC10 and hdphns in ex cond, £39 ono. GEC 8 waveband portable rx, vhf, 4 sw, 2 mw, lw bands, £25 ono. Clayton, Greengarth Hall, Holmrook, Cumberland. Tel Seascale 333 ext 6189 (9am to 5pm).

Hygain 12AVQ trap vertical, almost new. G3UDR, Horseshoes, Stretton-on-Fosse, Moreton-in-Marsh, Gloucestershire. Tel Shipston on Stour 8439.

Hallicrafter SX122A, mint cond, accept reasonable offers. Smith, Southwall, Charterhouse Road, Godalming. Tel Godalming 21442.

2C39A valves, ex-equipment, tested, 12/6d. Please add postage. G3OBD, 16 Talbot Drive, Poole, Dorset, Tel Bournemouth 511267.

KW Vespa Mk2 with 6LQ6 pa, comp with psu, one year old, gd cond, £100. GW3WSU, Decca Navigator Transmitting Station, Llancarean nr Barry, Glam.

AR88 rx, £30. GM3MUQ, 17 Brunstane Road, Edinburgh.

Lafayette HA600 rx, new cond, £38. Pheasant, 43 Station Road, Great Wyrley Walsall, WS6 6LH.

Rf fs meter, new, £3. 2m 8 ele beam, £2. 28 rpm reversible motor, 230V, new, £2 10s. Brind, 122 Aylward Road, Merton Park, London SW20. Tel 01-623 7511 ext 16.

Sinclair Z12 amp, £3. G2YS, 29 Beacon Way, Rickmansworth, Herts, WD3 2PF. Tel 76864.

HRO with 9 gc and 1 bs coil, psu and spkr. Echo Monaural, phones, manual and 10 spare valves, £15 pref buyer coll. Robbins, 17 St Georges Cres, Aycliffe, Dover, Kent. Tel Dover 2839.

Cabinet type plinth with clear plastic cover for Garrard SP25 or Goldring GL70 turntables. Motorboards for both. Teak finish, £5. G3KDK, Chaddlewood, Barton Rise, Chilton Polden, Bridgwater, Somerset. Tel Chilton Polden 531.

Mosley Elan 3 ele beam, £20. G3XZF, QTHR. Tel Hackthorn 520. Mullard 5–10 amp with Partridge output trnsfmr and two valve preamp, £14. Furzehill valve voltmeter 281B/2 with 1·5, 5, 15, 50 and 150V ranges, £8. G3KAG, QTHR. Tel Ellastone 393.

J Beam ants: 2m 4/4 slot. 70cms: 2 Parabeams, 1 phasing harness 1 4 square skeleton slot stack, Offers. G8AUE, Farm Close, Pentrich, Derbys. Tel Ripley 3883.

Shack clearance: Numerous pieces of equipment for sale. Psus, vhf gear, top band tx, relays, valves etc. Come and see after 11am on Saturday 12 September. G3VRJ, 84 Mount Park Avenue, South Croydon. Tel 01-660 5717.

Heathkit GR64 rx, gd cond, but requires new S meter, £18, post extra. Booer, Goffs House, Copthorne, Crawley, Sussex. Tel 03-425 2463.

CR100, vgc, new valves, with manual, £15. Will deliver 50 miles for £1. Alexander, 51 High Street, Bottisham, Cambridge. Tel Bottisham 404.

Heathkit RA1, professionally built, factory aligned and checked inspection invited. With ldspkr and atu, 2 years old, £30 ono. Cossor model 39 scope, db, gd cond, £8. View as above. Russell, 14 Mavisbank Street, Newmains, Wishaw, Lanarkshire.

Selling station. LG300 tx with home-made mod, psu etc, all relay controlled, with spare 813. Also AR88LF rx. The lot, £50. G3FWD 126 Renton Road, Oxley, Wolverhampton, WV10 6XH. Tel Fordhouses 2404.

Various valves: 6K6, 2E26, and a few foreign sounding ones. Definitely not junk. Send sae for list. Braund, Poynings, Ellington Rd, Taplow, Maidenhead, Berks. SL6 OBA. Tel Maidenhead 20100.

HC-18 xtals. 35MHz (3), 33·092 (1), 33·5 (1), 44·6666 (1), 34·8333 (8), 35·3333 (2), 82·5 (1), 95·35 (1), 43·0 (3), 33·6666 (1), 34·0 (6), 43·3333 (4), 32·932076 (2), £1 ea or £29 the lot. G3OPX, 5-15 Thorold Road, London, N22 4YE. Tel 01-889 1290.

Eddystone EC10, vgc, with Eddystone catalogue No CP2924 and headphones, £39. GEC 8 waveband /P radio, vhf/lw/2mw/4sw bands, £25 ono. Clayton, Davy Hall, Oaklands Road, Salford, M7 OPX. Tel 061-736 1709.

Cossor 1045K kit scope, mains trnsfmr missing otherwise perf, with two unused 27MHz handi-talkies. Would swop for gc rx 348, 342 etc. G3FUJ, QTHR. Tel Derby 24472.

Uhf and vhf gear, all types, convtrs, rxs, valves etc, SB100, SB600, HP23A. Xtals, sell or swop. G3LPB, Marlborough Farm, Falmouth, Cornwall.

Tavasu /M ant comprising 100in whip, telescopic, coils for 80m, 20m, 15m, mint cond, £7 ono. GW3TMP, QTHR.

Berco variac, 2A, ex cond, £3 15s. Also 1A, brand new, £3 10s. Many bargains in trnsfmrs, chokes, meters, resistors, condensers etc. Send sae for lists. Kilner-Smith, 101 Oxford Road, Marlow Bucks.

Sphinx tx control unit, £40. G3UPZ, 7 Baxter Close, Coningsby Lincs.

KW Vespa Mk2 with ac psu, little used, exc, £95. Cascode 2m convtr, A2599/A2521, 16-18MHz i.f., £6. BCC69D trnscvr for 4m, unmod, £6. Marconi CR100, used cond, £14. Goodwin, Chestnuts, Holmer Green Rd, Hazlemere, High Wycombe. Tel 23984.

Coiled expanding mic cable, astatic type xtal mic. Wanted: 4CX250B and mains trnsfmr, secondary 2,000V 500mA, state overall size. Electrolytic capacitors, 200 mfd, 450V wkg. G3KH, 133 Station Road, Cropston, Leicester, LE7 7HH.

Tavasu whip with 160m and 20m, coils. Xtals: 27·7MHz, 9050, 8250, 5205, 84·94kHz. Brand new 453·6, 454 and 456·6. Wanted: 2m xtals. Why. GM3RKO,QTHR.

Txs: Sphinx ssb. LG300, a.m./cw, with psu. (Will sell psu on own). Psu RA34G, 1100V dc at 500mA. Star SR550 rx. Offers with sae. Carr extra. GW3ASW, QTHR.

SR200 hamband rx with xtal filt, prod det, one year old in ex cond, with handbk, £33 ono. Buyer coll. Watson, Beulah, Dartford Road, Horton Kirby, Dartford, Kent.

80m ssb trnscvr, part finished construction, Rx wkg, tx to driver. 12VW inverter for final ht. Comp with case 3in × 7in × 11in. £17 10s or exchange for gd broadcast car radio. G3HLG, QTHR. Tel Collingham 384.

Evershed and Vignoles pen recorder, 2mA, mains motor, £5. 21MHz convtr, 5MHz i.f. suit 19 Set owner, £1. Pocket radiation doseimeter and charger unit, £2 10s. Wanted: 12in wide chart paper. G3VFG, QTHR. Tel Leeds 57692.

Trio 9R59DE in ex cond and under guarantee, comp with hdphns and stab tube, £32 buyer coll. Would del to 20 miles, G3YMP, QTHR.

Heathkit RA-1, £28. JXK 2m fet convtr, 28-30MHz i.f., £12. Rough lowband Pye Reporter, offers. G3VQQ, QTHR. Tel Leeds 54122.

Nova Pal transistor df rx, long, medium and 1·6-4·5MHz, rotating ferrite ant, ideal club df events or yachtsmen, comp with hndbk, charts and all accessories, £16 10s ono. Gower, 10 Homethorpe, Hull, HU6 9EU, Yorks. Tel 0482-855436.

AR88LF, Codar PR30X, spkr and hndbk, £35. DX100 and hndbk, £30. GM3XVJ, QTHR. Tel 0-292 42117.

RA-1, one year old, factory aligned, mint cond, £30. R107, gd cond, £10. GW3YIL, QTHR. Tel Dyserth 321.

Lafayette KT340 rx, 550kHz-30MHz, mint, offers over £15. RSGB *Handbook*, 4th edition, as new, £2. G8BLJ, 63 Tilewood Ave, Coventry. Tel Cov 462870.

Empty 2oz tobacco tins, 9d ea post paid. G3UNU, QTHR. Tel 0602-56101 ext 2851.

HRO M, unmod, 9 coils, 5 bndspread 80-10m inc 15m, rack mounted mains psu ditto, £25. B44 Mk3, resprayed, mains psu, tunable rx, needs finishing, £7 ono. Horswell, Park Prospect, Station Road, High Wycombe, Bucks. Tel HW 23172.

WANTED

Mullard ferrite beads type FX1898. How much? Farleigh, 7 Cedar Chase, Heybridge, Malden, Essex.

KW2000 hndbk for copying and return. G3OBW, QTHR.

1132 aircraft rx. Also sw rx for 12V /M operation. Buy or exchange new Phillips portable cassette recorder. Pyatt, 23 Arundel Drive, Orpington, Kent. Tel Orpington 20281.

2m /M gear in exchange for G3HTA rx. All new comps. Needs alignment and spkr. Ham bands only. G8BOH, QTHR.

Pre-war wireless (not ham) annuals, dictionaries, encyclopaedias, handbooks, manuals, year books, and similar. G3IDG, QTHR.

Schoolboy enthusiast urgently requires a reasonable rx: BC348, CR100, S640 etc. Must be cheap. Service work can be done. Also need xtals, 4 off chan 49, 1 chan 47, 6250kHz. 898 dial. G3IKR, QTHR. Tel Bicester 3212 ext 58.

5000Ω phones. Kokusai MF455K filter. Class D wavemeter. Allen, Glen Cottage, Stoke Hill, Bristol, BS9 1EY.

Woden DT1 driver trnsfmr. G3XQN, QTHR.

70cm fet convtr with 4-6MHz i.f. I.f.s between 10 and 30MHz considered. G8CCH, 84 Elmwood Way, Basingstoke, Hants.

160m trnscvr with psu for 12V (TW Communicator or sim). Also 160m /M antenna and gen cover sig gen. GI3AOB, QTHR.

Eddystone S640 hndbk, buy or borrow to copy. If loaned, extreme care taken and promptly returned. G3JQL, 22 Alnwick Road, Newton Hall, Durham. Tel Durham 61116.

Creed 7B motor, any voltage. G8CUO, 13 Fleming Drive, Newark Notts.

High quality 150W 2m tx, cw only or cw with a.m. and/or fm, with psu, commercial or homebrew, adequately metered and controlled. State price. Will coll 100 miles. G3THY, QTHR. Tel 01-551 1467.

770R rx (any cond) or near. Sae pse. G8BXO, QTHR.

2 variable capacitors, gangable ¼in shaft, 270pF, 2000V wkg, suitable for Z match. 1 1000V wkg variable. Class D wavemeter No2 with handbook. Two 7777kHz xtals. G3BSO, QTHR.

TW 2m Communicator in any cond. Also beam rotator. Could coll. G8ABQ, 138 Dollis Hill Lane, London NW2. Tel 01-452 6724.

Eddystone 898 dial, cheap and in gd cond. 1520kHz HC6/U xtal. G3PNJ, 49 Windy Ridge, RAF Marham, Kings Lynn, Norfolk.

Motor-generator or just generator. Pref 250V. Anything considered. G8DFJ, 46 Cromwell Road, Cleethorpes, Lincs. Tel 62873.

Circuit, photostat copy or manual for Murphy tx/rx unit RF 902/25. G2AMV, QTHR.

Heathkit 10-12U scope, must be mint cond. *SWM*s 1955 to 1967 inc. G3YJI, 17 Meadowside, Walton-on-Thames, Surrey. Tel Walton-on-Thames 23228.

Sommerkamp FR500 rx. Shilvock, 14 Green Lane, Lye, Stourbridge, Worcs. Tel 021-643 4854 (office hours).

Star SR700 rx. Details to G2UZ, 2 Cliff Road Gdns, Leeds, LS6 2EY. R1224 circ. HB166T. Gdo. A3 psu, Valient. P/e generator, Honda pref. Minimitter /M rx. 14AVQ. DST 100. Historic gear and valves. G2BAM, Woolland, Blandford, Dorset.

30ft sectional mast, pse state cond, price and material. Davis, 17 Harwood Ave, Hornchurch, Essex, RM11 2NR. Tel Hornchurch 42820.

Info (circ, manual or any gen) on Hallicrafters S38. Will buy or copy and return. Finn, 37A Wrotham Road, Gravesend, Kent. Tel Gravesend 66234.

Hy-Gain TH3, Mosley TA33snr, Mustang MP33. G3ZAU, 3 The Rise, Oldham, Lancashire. Tel 061-652 6090.

Mohican or similar transistor rx. GM3WJF, 4 Teviot Road, Hawick Rox. Tel 0450 3719.

FT243 xtals: 7·003 to 7·15MHz. State freq and price. GW3ZFY, 46 Landor Ave, Killay, Swansea, Glam.

HRO gc coils, 2 × 14·4 to 30 MHz, 1 × 7 to 14MHz, 1 × 3·5 to 7·1MHz 1 × 1·7 to 4MHz in wkg order. Also 18AVQ vertical all band ant. G8CTS, 15 Lindsay Road, Sprowston, Norwich, NOR 92P, Norfolk. Tel Norwich 44602.

Eht trnsfmr for Cossor 1049 scope, or scrap 1049. Coll any distance. G3PDT, QTHR. Tel 021-454 1825.

Joystick ant and type 4 or 4RF matching unit. 2m beam and wall bracket mountings. Sale or exch 36in by 19in rack cab. S27 rx. Hallicrafter 1MHz 100kHz, 10KHz freq standard. Gallagher, 24 Sunnybank Ave, Whitley, Coventry. Tel Coventry 301494.

Circ diag and any gen on R209 Mk2 rx. Borrow to copy or buy. Rose 52 Crossways, South Croydon, CR2 8JN. Tel 01-657 6702.

Cheap tape recorder suitable for slow morse lesson tapes. Heckley 4 Dean Gardens, Shildon, Co Durham.

Details please of successful TA33 jnr type erection permission so that appeal for planning authority can be made to Minister. G3ZDC, 76 Wavendene Avenue, Egham, Surrey. Tel Egham 4704.

TA33 jnr or similar beam. G3VNG, 4 Thornyville Villas, Oreston, Plymouth, PL9 7LA. Tel Plymouth 41511.

Electroniques hamband valve coilpack QP166. Martindale, 20 St Conans Road, Lochawe, Dalmally, Argyll. Tel Dalmally 304.

Manual and/or circuit for Cossor 1035 scope. Will copy and return. Williams, 31 Sherborne Way, Hedge End, SO3 4GZ.

Handbook, circuit or any other info on Industrial Electronics dc scope model 2300. G3IVG, QTHR.

14-30MHz coil for HRO. Write or phone RSGB HQ. Tel 01-837 8683.

Pye 5 channel wideband fm rx, 440-500MHz. Solid state convtrs for 2m, 70cm and 136MHz. G8AFN, QTHR.

Supply unit No1 Mk3, control unit E, control unit Nos 1, 2 and 10, junction box No 3, WS19 Mk3, plus all connectors. All unmodified. Please state price. Howard, 2 Castle Close, Reffley Estate, Kings Lynn, Norfolk.

Early wireless gear: army sets 1914-18, Marconi V2 or other 1920-1930 manufactured sets, Cosmos (Met-Vick) Croute set and early Cosmos mains valves. Any early gear and also *Popular* and *Amateur Wireless*, copies or vols. Not for resale but for museums and lecturing. G3DFW, Westfield, St Margarets Road, Altrincham Cheshire. Tel 061-928 2984.

Top band rx for 12V dc, valve or transistor. Convtr for 160m to mw car radio, 1·6MHz i.f. small size Belling-Lee sockets with gen on circ diag details otherwise for construction. G2DHV, QTHR, Tel 01-300 1649.

Student G3 requires cheap hf bands lin amp or parts for one and a 2m tx. Any offers of gen on 1155 tx and Command rx. For sale: 1155 rx, 160 ac psu. Offers. G3YSG, 22 Shortbutts Lane, Lichfield, Staffs. Tel Lichfield 4954.

Dec 69, Jan, Feb, March 70 *Radio Communication*. Roche, 66 Havard Road, Kings Heath, Birmingham, B14 7PQ.

Gen cover rx. 10, 15, 20m beam ant. GW3NKZ, 71 Station Road, Llanishen Cardiff, Tel 75743.

Side-swiper morse key. GC2CNC, QTHR. Tel Jersey 31447.

Manual and/or service data for Trio 9R59 or Lafayette HA230 rx. G8DKE, 26 Norman Road, Sale, Cheshire, M33 3DF. Tel 061-962 1763.

Headset AKG K60 or sim. G3UXA, 9 Oakway, Feltham, Middlesex.

Trio spkr, gdo and unmod R220. GI3HCG, QTHR. Tel Lisburn 2473.

The amateur radio handbook (RSGB), first and second editions wanted. Will buy or swap early wireless books. K8IKO, Box 222, Worthington, Ohio 43085, USA.

2m/M station, will pay up to £40. Tx can be remote, Neat appearance essential. G3HLW, c/o Casa Mia, Holybrook Park, Bordon, Hants.

Pair of 2m walkie-talkies. Please send full details with price etc. GW8CGH. QTHR. Tel Pencoed 444.

Pye AP110 D or B high band. G3ISQ, QTHR.

Gen on radio sonde equipment. Manuals, books or gen. Borrow or will purchase. GI3VNL, c/o 2349 Sqdn ATC, Nemense, Ballymena, Co Antrim Tel 41468.

AR22 rotator and TA33 beam. G3HQH, QTHR.

CT38 rf probe lead. 898 dial. Cook, The Old Lodge, Seven Hills Road, Cobham, Surrey. Tel 3117.

TW low power tx for 2m comp with modulator. G2MR, 3 Waverley Ave, Surbiton, Surrey. Tel 01-399 5572.

701A crt. G3XPU, QTHR. Tel 01-837 8688 during day.

Cossor ganging oscillator. 100kHz and 1MHz HC6/U (10 or 80 C). G3VQN, Caverley, 39 Silverdale Road, Burgess Hill, Sussex. Tel 6471.

Hndbks or tech info for 22 Set and ZC1 tx/rx. Buy or loan. Cousins, PO, Guyhirn, Wisbech, Cambs, PE13 4ED.

Circuit or pref manual for Marconi CR150/2 rx. Buy or borrow. Caston, 22 Pentrepoeth Road, Bassaleg, Newport, Mon, NP1 9LL.

Dust or silence cover for Creed 7A teleprinter. Also af terminal unit. Details and price please. G3NPF, QTHR.

Echelford Communications

32 FELTHAM HILL RD., ASHFORD, MIDDX.

Ashford (MX) 55265 (up to 9.30 p.m. any evening)

HOLIDAYS' 70—WE SHALL BE CLOSED FOR ALL BUSINESS UNTIL SATURDAY SEPTEMBER 5th, 1970.

We regret the delay in forwarding full details of our new 2 metre solid state receiver, the Echelcom 2401, this has been due to our desire to give you the fullest details, together with photograph of a production unit—the prototype looks hideous! If you wish to have details when they are available and are not on our mailing list, please send a S.A.E.

NEW ITEMS IN STOCK

Trio 9R 59DE receiver	£42. 10. 0d	10/- P. & P.
Tavasu mobile whips and coils, set for 160M or 80M	£5. 7. 6d	5/- P. & P.

We hope to have a full range of KW Electronics equipment in stock by the time of the appearance of this advert.

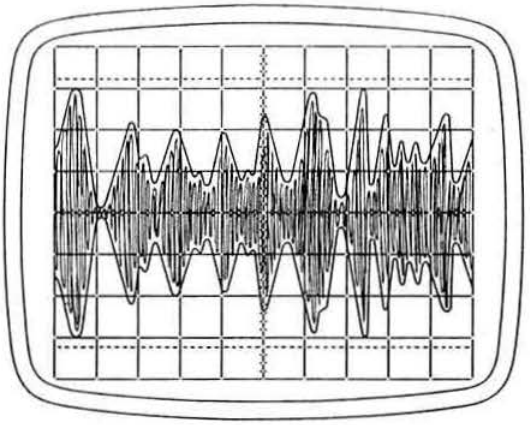
KW2000B with PSU	£240. 0. 0d	carriage extra
KW Atlanta with PSU	£230. 0. 0d	carriage extra
KW E-Zee Match ATU	£13. 16. 0d	inc. P. & P.

H.P. terms available on all items over £30.

SECOND-HAND ITEMS

These change so rapidly we ask you to send a S.A.E. for the current lists.

CLOSED ALL DAY WEDNESDAY.



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When you own an Eddystone communications receiver, you have the broadcasting world at your finger tips—wherever you happen to be—on land or at sea. The reputation these sets have attained is proof of their excellence and reliability and at Imhofs, there is a special Eddystone department, where you can see, hear and compare all models listed here.
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EDDYSTONE EA12 'Ham Band' receiver. Built to professional standards but specifically for the amateur enthusiast. High sensitivity for all reception modes CW, MCW, AM and SSB. FSK adaptor available as ancillary £205.0.0d.

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WANTED

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From the Author of the article in the March issue

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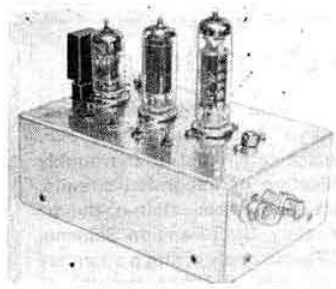

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Tick classification

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Wanted ☐

Callsign or Name and Address

Telephone number

QTHR

DATE ..... *SIGNED* ..... *CALLSIGN, BRS or A No.* .....

The number of words in each advertisement must not exceed 32, not including name and address or callsign and QTHR or telephone number. Four pages of each issue are allocated to Members' Ads at present, and in order to include as many advertisements as possible licensed members are requested to give their callsign and QTHR instead of their name and address. (QTHR means: "My address in the current call book is correct").

Also to conserve space, please keep advertisements as brief as possible consistent with a clear basic description of the equipment. Advertisements will be edited to conform to a set style of abbreviations, so it is unnecessary to submit them in abbreviated form.

Conditions under which Members' Ads are accepted are published on the first Members' Ads page of each issue.

POST TO MEMBERS' ADS, RADIO COMMUNICATION, 35 DOUGHTY STREET, LONDON WC1N 2AE

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Radio Society of Great Britain

FOUNDED 1913
INCORPORATED 1926

PATRON H.R.H. THE PRINCE PHILIP
DUKE OF EDINBURGH, KG

APPLICATION FOR CORPORATE* OR ASSOCIATE* MEMBERSHIP

RADIO SOCIETY OF GREAT BRITAIN,
35 DOUGHTY STREET,
LONDON WC1N 2AE
Tel 01-837 8688
Giro A/C No 533 5256

* I hereby apply for election as a Corporate Member of the Society and enclose a remittance for £2/10/- being the amount of my first annual subscription.

* Being under 21 years of age and not holding a current Amateur Radio Transmitting Licence I hereby apply for election as a Non-Corporate (Associate) Member of the Society and enclose herewith a remittance of £1/5/- being the amount of my first annual subscription.

I, the undersigned, agree that in the event of my election to Membership of the Radio Society of Great Britain, I will be governed by the Memorandum and Articles of Association of the Society and the rules and regulations thereof as they now are or as they may hereafter be altered; and that I will advance the objects of the Society as far as may be in my power; providing that whenever I shall signify in writing to the Society addressed to the Secretary that I am desirous of withdrawing from the Society I shall at the end of one year thereafter after the payment of any arrears which may be due by me at that period to be free from my undertaking to contribute to the assets of the Society in accordance with Clause 8 of the Memorandum of Association of the Society.

Date _____

Signed _____

PERSONAL DETAILS TO BE COMPLETED BY APPLICANT

SURNAME (BLOCK LETTERS) _____

CHRISTIAN NAMES (IN FULL, BLOCK LETTERS) _____

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NATIONALITY _____ *AGE (IF UNDER 21)* _____

CURRENT CALL-SIGN (IF ANY) _____

DETAILS OF PREVIOUS MEMBERSHIP (IF ANY) _____

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PROPOSER'S NAME (BLOCK LETTERS) _____

ADDRESS (BLOCK LETTERS) _____

CALL-SIGN (OR BRS NO.) _____

SIGNED _____

* Please delete where inapplicable.

† If the applicant is not acquainted with a Corporate Member willing to propose him for election he may submit a suitable reference in writing as to his interest in Amateur Radio.

The first subscription of 50/- or 25/- should be enclosed with this application to avoid delay.

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