RSGB BULLETIN

JANUARY 1966
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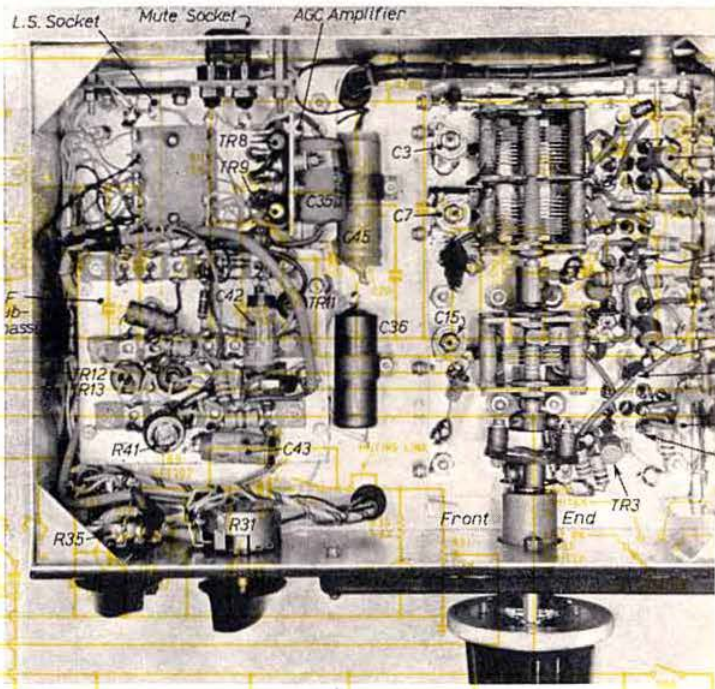
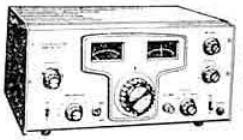


V.H.F. RECEIVER
TUNABLE I.F.

JOURNAL OF THE RADIO SOCIETY OF GREAT BRITAIN

SUPERB LAFAYETTE AMATEUR EQUIPMENT

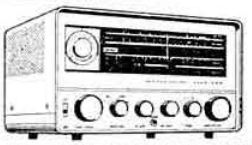


H.A. 350 10-80 METRE AMATEUR RECEIVER

A superb receiver. Dual conversion with mechanical filter. 12 valves, crystal controlled osc., product detector, 100 kc/s crystal calibrator, crystal B.F.O., A.N.L., 'S' meter. Rock like stability. Brand new and guaranteed. **75 GNS.** S.A.E. for full details.

HA. 230 DE-LUXE GENERAL COVERAGE RECEIVER

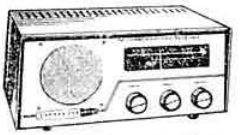
Wonderful value. 8 valves + rectifier. Coverage 550 kc/s-30 Mc/s. I.R.F. and 2 I.F. stages, 'Q' multiplier, B.F.O., A.N.L., 'S' meter, electrical bandspread, aerial trimmer etc. Brand new and guaranteed. **£33** S.A.E. for full details. Also available in easy to assemble Semi-kit form at **25 GNS.**



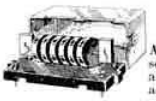
HA-63 GENERAL COVERAGE RECEIVER

7 valves + Rectifier. 4 Bands 550 kc/s-31 Mc/s. "S" Meter-BFO-ANL-Bandspread Tuning 200/250v. A.C. Brand new. **24 GNS.** carr. paid.

HA-55 AIRCRAFT RECEIVER.



108-136 Mc/s. High selectivity and sensitivity. Incorporates 2 RF stages including 6CW4 Nuvistor, 8 tubes for 11 tube performance, solid state power supply, adjustable squelch control, slide rule dial, built-in 4 in. speaker and front panel phone jack. 220/240V. A.C. Supplied brand new and guaranteed. **£19.17.6.** Carr. 10/-.



PRECISION MECHANICAL FILTER

As used in HA. 350 Receiver. For superb selectivity. For 455 kc/s I.F. provides 60db attenuator at 2·5kc either side. Complete adjacent channel rejection **£9.19.6.** post paid.

NUVISTOR GRID DIP METER

Compact true one hand operation. Frequency range 1·7-180 Mc/s. 230V. A.C. operation. Supplied complete with all coils and instructions. **£12.10.0.** Carr. 5/-.

TM-59'er "S" METER

Signal strength meter using VTVM principles. Calibrated in S units. Sensitivity and zero adjustments. For any superhet receiver with ACV. Requires 150/200 volt and 6 or 12 volt. Complete with valve and full instructions. **59/6.** Post and packing 2/6.

DE-LUXE V.F.O.

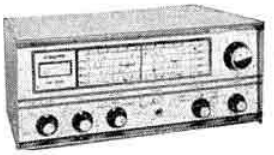
5 bands covering 80-10 metres. Employs high 'Q' series tuned Clapp Osc. High output 10-20 volts to drive any TX. Large slide rule dial. Dual impedance O/P. 250V. A.C. operation. Size 6½" × 5½" × 7½". Supplied complete with all instructions. **16 GNS.** Carr. 7/6.

TRANSISTORISED FIELD STRENGTH METER

3 bands 2·5 to 57 Mc/s, permits easy tune up for max. transmitter output. Earphone jack to monitor audio. 200μA meter, cal. 0-10. Supplied complete with battery, telescopic aerial. **£5.19.6** each. P. & P. 3/6.

CODAR AMATEUR RADIO EQUIPMENT

MAIN LONDON STOCKISTS



CR. 70A GENERAL COVERAGE SHORT WAVE RECEIVER

7 valves. 550 kc/s-30 Mc/s.
Only **£19.10.0.**

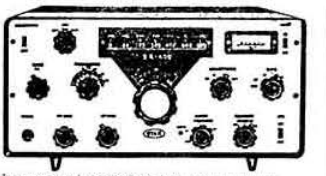
A.T.5. TRANSMITTER

160 and 80 metres. 12 watts.
Only **£16.10.0.**
New T.28 2 band 160/80 metre Transistor Receiver. **£15.10.0.**

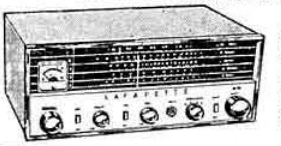
PR.30 Preselector	£5	10	0
PR.30X Self powered	£7	4	0
R.Q.10 "Q" Multiplier	£6	15	0
R.Q.10X Self powered	£8	8	0
A.T.5 Amateur TX	£16	10	0
A.T.5 Mains P.S.U.	£8	0	0
A.T.5 12v. Trans. P.S.U.	£11	5	0
A.T.5 Remote control and Aerial Switching Unit	£2	7	6
C.C.40 Station Control Unit	£6	10	0

Postage Extra.

STAR SR.600 AMATEUR COMMUNICATION RECEIVER



New crystal controlled triple conversion de luxe 80-10 metre band receiver. Extremely high sensitivity, selectivity and stability. Special features include 3 I.F. stages, crystal controlled oscillator, 4 section L.C. filter, "S" meter, BFO-ANL, 100 kc/s crystal calibrator, etc. Supplied brand new and guaranteed. **95 GNS.** S.A.E. for full details.



STAR SR.40 GENERAL COVERAGE RECEIVER FOR S.W.L's

4 Bands 550 kc/s-30 Mc/s, "S" Meter-BFO-ANL-Bandspread Tuning—Built in speaker. 200/250v. A.C. Brand new. **£18.19.6. GNS.** Carriage 10/-.

SWAN-350 10-80 METRE AMATEUR TRANSCEIVER

The most reliable complete transceiver available to the Amateur yet. 5 bands. 400 watts P.E.P. Price complete with A.C. supply/speaker console **£250.** S.A.E. for brochure.

Appointed London Agents.

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First grade quality, Moving Coil panel meters, available ex-stock. S.A.E. for illustrated leaflet. Discounts for quantity. Available as follows. Type MR. 38P. 1 21/32in. square fronts.

2mA	.. ..	22/6	3V. DC	.. ..	22/6
5mA	.. ..	22/6	10V. DC	.. ..	22/6
10mA	.. ..	22/6	20V. DC	.. ..	22/6
20mA	.. ..	22/6	50V. DC	.. ..	22/6
50mA	.. ..	22/6	100V. DC	.. ..	22/6
100mA	.. ..	22/6	150V. DC	.. ..	22/6
150mA	.. ..	22/6	300V. DC	.. ..	22/6
200mA	.. ..	22/6	500V. DC	.. ..	22/6
300mA	.. ..	22/6			
500mA	.. ..	22/6	15V. AC	.. ..	22/6
750mA	.. ..	22/6	50V. AC	.. ..	22/6
1·0-1mA	.. ..	22/6	150V. AC	.. ..	22/6
1A.DC	.. ..	22/6	300V. AC	.. ..	22/6
2A.DC	.. ..	22/6	500V. AC	.. ..	22/6
5A.DC	.. ..	22/6	"S" Meter 1mA	..	29/6

50μA	.. ..	32/6	
100μA	.. ..	29/6	
200μA	.. ..	27/6	
500μA	.. ..	25/-	
50-0-50μA	.. ..	29/6	
100-0-100μA	.. ..	27/6	
500-0-500μA	.. ..	29/6	
1mA	.. ..	22/6	

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ILLUMINATED "S" METER. 1 21/32in. square front. Cal. in 8 units. 6V. lamp. **29/6.** P. & P. 1/-. Ditto 2 5/16in. square **39/6.** P. & P. 1/-.

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230v. A.C. or Battery operated **£16.10.0.** P. & P. 6/-. also Precision automatic bug keys. **£4.10.0.** P. & P. 3/6.

COLLIN'S R-278/GR RADIO RECEIVERS

High quality military UHF crystal controlled receiver providing reception of AM and CW signals on any one of 1,750 Channels in the frequency range of 225-399·9 Mc/s. Power requirements 115-230V. A.C. size 13in. × 19in. × 20in. Output 3 watts into 600 ohms. Original cost, hundreds of £££s. Available in "as new" condition fully tested. Complete with all crystals £60. Carriage 50/-.

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High quality portable American 'scopes. General purpose 2 Mc/s Bandwidth. As new **£25.** (115/230v Transformer 15/6) Carr. 7/6.

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200 P.I.V. 200 mA	2/6
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1,000v. P.I.V. 650 mA	7/6
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200-250v. Primary. 600-0-600v. 250mA. 6·3v. 2½ amp. 4v. 7 amp **39/6** Carr. 5/-.

28.5 Mc/s TRANSCEIVERS

9 transistor, hand held, complete with all accessories. **£25** per pair. P. & P. 3/6.

NOMBREX TRANSISTORISED SIGNAL GENERATOR

150 kc/s-350 Mc/s. **£9.10.0.** Post paid

TYPE 13 DOUBLE BEAM OSCILLOSCOPES

0·750 kc/s. T.B. 5·5 Mc/s Bandwidth 115/230v. A.C. Guaranteed perfect. **£27.10.0.** Carr. 20/-.

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Volume 42 No. 1

January 1966

4/- Monthly

RSGB BULLETIN

CONTENTS

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The closing date for copy for the February issue January 7.

Joystick ANTENNA SYSTEM

SPANS THE ATLANTIC ON 160 METRES!

W2EQS worked G3RBP on 160

W2EQS—Charlie O'Brien writes—Stop presses'—this worked a few minutes ago. G3RBP 160 metres!!! Gave me RST 339—Joystick—this was December 7th at 23.15 Z or 18.15 local time, here, just before dinner. Needless to say I ate a cold meal—HI! At 160 I have now worked G.VP2, VP9 6Y5, W1, 2, 3, 4, 8, 9, 0, and VE1, 2, 3 . . . with the Joystick.

Read these extracts of letters from Joystick enthusiasts . . .

G4HZ reports: "I decided to stand my de luxe 'Joystick' in a corner on the landing by the bedroom door and ran a wire into the Joymatch Unit by the bedside. From the other end of the Joymatch I took a short piece of wire, about 3 ft. to the centre of a co-ax socket. From the outer (earth) side of the socket I fixed 6 in. of wire with a croc clip at the end to the metal frame of the bed forming a capacity earth. Having already made up a piece of twisted flex with co-ax plugs at each end, I plugged one end into the aforementioned socket and the other into a socket which was link coupled to the ferrite rod antenna housing of the Pilot Pal. The Pilot Pal has an 'S' meter, which enables the tapped inductance of the Joymatch to be adjusted accurately and then the series condenser tuned for optimum signal. The results are fantastic, 80 metre stations just pour in as though one was on a big communications receiver, and it is equally good on Top Band. I thought these notes might be of interest and encouragement to Listeners who have a portable—or any other receiver and wonder what to do about a receiving aerial."

W. SHAW: 30 Canklow Road, Rotherham: ". . . the signal was very powerful, more so than most Sheffield stations. The operator said he was using a 'Joystick'."

W7OE: "Had it tried by a MARS member who reported it superior by at least 25% to his customary 'Windom' at MARS frequencies; he was real enthusiastic."

J. R. COWLEY, G10739, Lancs.: "I have read many testimonials from 'Joystick' users, and having had one now for two years or so I think it's time I said my little piece in praise of their FB little antenna. Many amateurs have requested details of my 'Joystick' system in use here and wherever possible I have replied with a diagram and description. Two of these in particular a JA6 and WB6 are pen pals of mine now and if it would not be asking too much I'd like two sets of data, etc., to forward on to these two chaps. I have many DX QSL's, among these are 12 JA's all using less than *50* watts and a card from VK3NC who uses *8* watts only. The very first QSL from VS6FF was sent to me being the first report from G —long before he worked a G. At that time the 'Joystick' was leaning against the shack wall. For the last year I've used the 'Joystick' strapped to a chimney 20 ft. up 60 ft. Feeder. My QTH is very low and in a heavily built up area. My RX is only a 7 tube one—nothing spectacular. So many thanks and wishing you and the 'Joystick' continued success."

G3SXO/A: "In registering his satisfaction with the 'Joystick's' performance, states that his equipment is 'ALL TRANSISTOR'."

L. Linkins, Malta G.C.: ". . . The G3 was a very good signal here, which surprised me originally as I know his QTH very well and it is renowned as being a poor spot.

DX—I gave him a conservative report of 579 on receipt of his QSL card and I got rather a surprise when I learned he was using an indoor 'Joystick'. The KZ5 contact was on 21 Mc/s at 14.45 GMT on a recent date, and I received his signals at 579 —I was 569 to him. He was also using a 7 ft. indoor 'Joystick'."

You must have read the many testimonials for the Joystick that have appeared in our recent advertisements—probably you noticed the ZL4GA—G5WP contact on 80 metres using an indoor Joystick? These letters are the undeniable truth that the Joystick Antennas really do work!

GUARANTEE
Partridge operate a rigid, 100% Money Back Guarantee if you're not completely satisfied!

Read all about this amazing antenna in the new brochure:— Send this coupon today for your copy!

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.....RSGB/1

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If you are a licensed Radio Amateur, have experience in one of the fields listed below, would like to work in Ealing, London N.W.10 in the field of Insurance, or in Shoebury, Essex in the field of Electronics, write immediately giving full details of your experience, present salary and prospects for the *personal attention* of the Deputy Chairman.

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NATIONAL
NCX5 MKII
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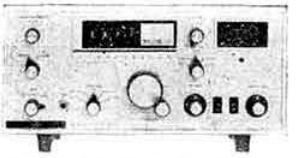

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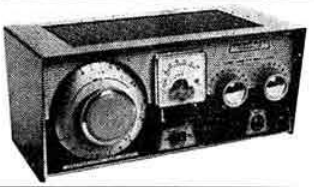
250/S mains p.s.u. **£8.** P.P. 5/-.

12 M/S 12v. p.s.u. **£11 . 5 . 0.** P.P. 5/-.

12 R/C control unit. **£2 . 7 . 6.** P.P. 2/6.



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R.C.A. AR88LF 75-550 kc/s & 1·5-30 Mc/s. **£35.**
R.C.A. AR-88D 540 kc/s-32 Mc/s. **£42 . 10 . 0.**
Hallicrafters SX140 10/15/20/40/80m. **£35.**
Hallicrafters HT40 75w. to a 6DQ5. 10-80m. **£35.**
GEC BRT400 £60.
Hallicrafters SX24 £25.
Lafayette HA63 £18.
National NC173 540 kc/s-32 Mc/s **£65.**
Hammarlund SP600 540 kc/s-54 Mc/s. Double conversion **£169.**
BC348 200-500 kc/s & 1·5-18 Mc/s. **£16 . 10 . 0.**
KW160 £19 . 10 . 0.
Also several second-hand SSB transmitters and transceivers in stock.

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35/- each. P.P. 1/6.

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1 21/32" square front. Calibrated S1-9 and up to 40 dB over S9. F.s.d. = 1 mA. **29/6.** P.P. 1/6. Ditto 2⅞" square front, **39/6.** P.P. 1/6.

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Current Comment

discusses topics of the day

It's Votes that Count

FROM September to November, 1965, a Plenipotentiary Conference of the International Telecommunication Union was held in Montreux, Switzerland. As its name implies the Conference was concerned with the structure of the Union, its finances, its administration and its policy. It did not discuss frequencies or technical matters yet decisions reached at Montreux could have important effects on the Amateur Service as well as on other Services in the foreseeable future.

On this page in October, 1960, *Current Comment* drew attention—for the first time in any Amateur Radio publication—to the marked effect on the " balance of power " that had then recently emerged at the United Nations due to the votes of the newly admitted African and Asian states. It was predicted that most, if not all, of those new states would eventually apply for, and obtain, membership of the ITU and would, in due course, use their votes at future ITU Conferences perhaps to the disadvantage and against the advice of the older and more experienced members.

Just two years ago *Current Comment* surveyed briefly what had happened a few weeks earlier in Geneva when, at the Administrative Radio Conference on Space Communication, the newly admitted member Nations had lost no opportunity in making their voices heard, often vociferously, and of recording their votes against those cast by older members. At that time the ITU comprised 119 full and two associate members.

One year later the African L.F./M.F. Broadcasting Conference in Geneva was abandoned, almost as soon as it started because the delegates of the newly admitted African Member nations voted not to sit at the Conference table with those of South Africa and Portugal.

And now, one more year later, a much larger and more significant Conference has come and gone with results which should make every amateur in Region I stop and reflect once again on how the " balance of power " has changed. At the time of the Geneva Radio Conference in 1959 the strength of the Union amounted to 85 Members. Since then 43 new nations have been admitted. In 1959 the newcomers were in the main colonial territories administered by what used to be called the Great Powers. Today they are independent sovereign states—33 in Region I—and every one of them has a vote equal to that of any other nation—large or small, old or new.

Let us see what happened at Montreux last autumn. Within a few hours of the Conference being opened proposals, supported by the African group, that South Africa should be debarred from participation and Portugal condemned for her colonial policy, were adopted. A proposal by the new and developing countries to increase the size of the all-important ITU Administrative Council from 25 to 29 was successful. The four new seats were taken by newcomers to the international scene. At future meetings of the Council the balance of power could be so evenly poised that " a cold in the head " might affect a vital decision, if the cold resulted in a member's absence.

The voting for the new Secretary-General (Dr Sarwate of India, who had been deputy to Mr Gerald Gross) went to four ballots. It must have been a matter of great disappointment to Mr John Gayer (one-time Chairman and for years a member of the International Frequency Registration Board) and his many friends in the International Amateur Radio Club, that he could muster no more than two votes out of the 115 cast for the office of Secretary-General and no more than five out of the 116 cast for the office of Deputy Secretary-General (filled by Mr Mili of Tunis).

In the light of recent developments the decision to reconvene the African Broadcasting Conference next September cannot be treated lightly. Until the terms of reference are known the scope of the Conference cannot be assessed but amateurs in Region I would do well to remember that it is the declared intention of the new and developing countries to project their national image on as wide a scale as possible. It is unlikely that the short wave-bands will come under review at that particular Conference but we should be foolish to pretend that no dangers lie ahead.

There can be no possible doubt that the balance of power has shifted very considerably in the higher echelons of the ITU. To ignore that fact would be most unwise.—J.C.

Transistor Tunable I.F. for V.H.F. Converters

By T. J. FISHPOOL, G3KEF*

WHEN a heavy, bulky, valve receiver forms the basis of the main station equipment, operating portable on v.h.f. or u.h.f. is particularly inconvenient. The writer felt a need for a small i.f. strip, into which existing converters could be plugged, and this induced him to design and build the transistor tunable i.f. and audio output unit shown in Fig. 1.

The main requirements for the receiver were:

(i) Performance equal to or better than a valve receiver using two i.f. stages on 1·6 Mc/s.
(ii) To be self-contained with batteries and loudspeaker simply requiring connection to the aerial socket (i.e., converter output) and muting.
(iii) The tuning range would be 26·5 Mc/s-30 Mc/s, with an appropriate crystal in the 70cm converter to correspond with 431·5 Mc/s-435 Mc/s.
(iv) Provision of effective a.g.c., signal strength meter and noise limiter.

It was decided to use double conversion, with a final intermediate frequency of 470 kc/s, thus obtaining adequate selectivity for this application, and at the same time using readily available i.f. transformers.

The first i.f. is 1·6 Mc/s which, besides being a convenient frequency, enables use to be made of medium wave oscillator and aerial coils.

The Front End

When the receiver was still being mentally planned, the writer considered that two r.f. stages would be necessary in order to obtain the desired sensitivity and image ratio. It was not possible, however, to obtain a suitable four gang capacitor of both reasonable price and small overall dimensions and so the work proceeded with one r.f. stage. The results obtained with the completed receiver, however, show that the one r.f. stage is sufficient.

The r.f. amplifier TR1 uses an OC170 in the grounded base configuration, as it was felt certain that a common emitter stage with a variable tuning range would be very difficult to neutralize. The d.c. stabilization uses an emitter resistor returned to a positive bias, which is varied to adjust the r.f. gain.

Silicon diodes CR4 and CR5 in Fig. 1 are fitted across L2 to protect TR1 from high power signals.

The mixer, TR2, operates in the common emitter mode and is perfectly stable. It is emitter coupled to the local oscillator TR3. When the receiver was first tested oscillator injection was from the oscillator collector to mixer base, but it was found impossible to even approach the desired oscillator injection level, resulting in poor sensitivity.

It will be noted that the collectors of TR1 and TR2 are taken to the hot end of their respective coils, no advantage being found in tapping them down.

Capacitor C16 in the local oscillator is a negative temperature co-efficient type to compensate for changes in C17 and L8 with varying ambient temperature. One source of drift in a transistor receiver which cannot be cured by this means is due to damp in the tuning capacitor C17 (in a valve receiver the valve heat quickly dries out any moisture). The drift is most noticeable in an outside shack, particularly in winter, and the only cure is to fit a small heater under the chassis (or leave the shack fire on all the time!). This drift, whilst noticeable, is in practice, not much of a drawback.

Zener stabilization at 4·7V is used for the oscillator h.t. If a 6V supply were used, the Zener would have to pass a high current when the battery is new, to make sure that it would still stabilize when the supply is down to 5V. Consequently a 7·5V h.t. line is used, the battery being discarded when it is down to about 6 volts.

The I.F. Amplifier Unit

The first mixer is coupled to the second mixer TR5 by 75 ohm cable. L9 and L9a have 75 ohm coupling windings. Top coupling via a 5 pF capacitor was also tried, the cable capacity appearing across one of the tuned circuits. This method was found equally effective and is an alternative if 1·6 Mc/s coils are not available with 75 ohm input windings.

The second mixer TR5 and local oscillator TR4 are quite conventional, separate stages being preferred to prevent frequency pulling on strong signals. Stabilized h.t. was not found necessary for TR4. The i.f. amplifiers TR6 and TR7 are also straight forward; the second stage using a GET 875 not requiring neutralization. These stages are biased by taking the emitters to a positive bias, i.e., the gain control line, but note that neither mixer is taken to this control line.

The detector and noise limiter CR2, CR3, is a type used successfully in several valve receivers and is scaled down for the semiconductor impedances. The noise limiter is very good, without an excessive insertion loss. The noise limiter switch S1 is combined with the b.f.o. switch to save panel space.

The b.f.o. circuit (TR10) was chosen because a tapped coil is not required. B.f.o. injection is by a 5 pF capacitor, C46, from TR10 collector to TR6 base. The end of the capacitor at TR6 base is not connected directly to the base, but the lead is wrapped around the base lead to provide an effective capacity rather less than the 5 pF. If the coupling is too great, pulling of the b.f.o. is liable with strong signals, therefore the output from the b.f.o. is lower than the desired amount, thus requiring low r.f. gain when copying s.s.b. It is, incidentally, the intention of the writer to rebuild the b.f.o., to a circuit similar to that of TR4.

A.G.C. Amplifier

When no signal is being applied to the receiver, TR9, which is connected in series with the negative lead of the bias battery B1, is turned on by R29, and in this condition nearly all B1 voltage appears across the r.f. gain control R31.

When a signal is received, some of the d.c. component at the detector, CR2, is passed via R28 to TR8. This negative going voltage begins to turn TR8 on, hence removing drive from TR9 base, so that TR9 is no longer heavily conducting and bias voltage is dropped across it, thus reducing the voltage across R31. Capacitor C35 decouples the a.g.c. system from the detector. The meter, M1, with its multiplier, R30, monitors the a.g.c. voltage, giving "S" meter indication, and with the a.g.c. off, this meter reads the bias battery voltage. When a strong signal is being received, the voltage on R31 slider is virtually constant whatever the position of the slider.

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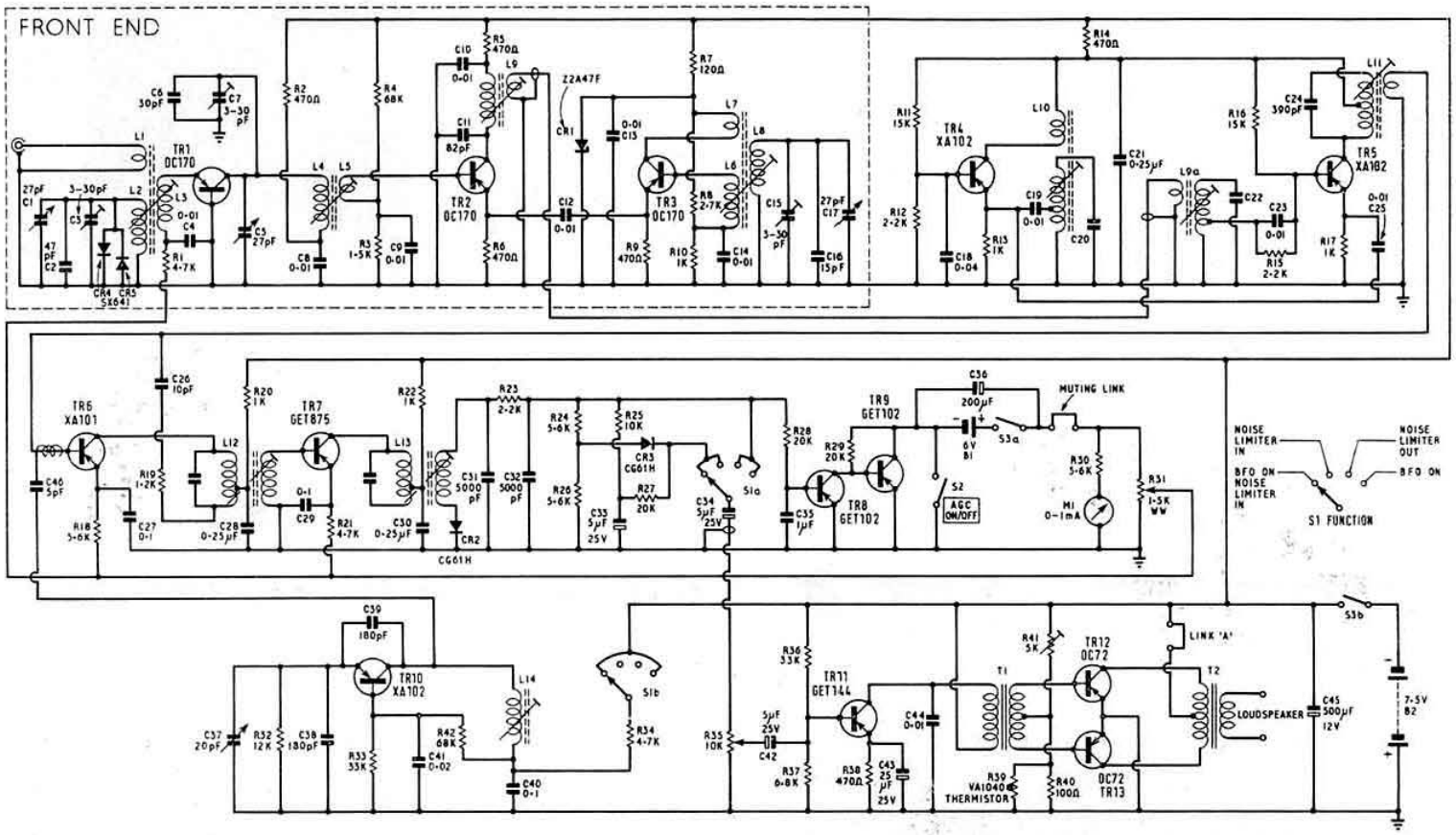


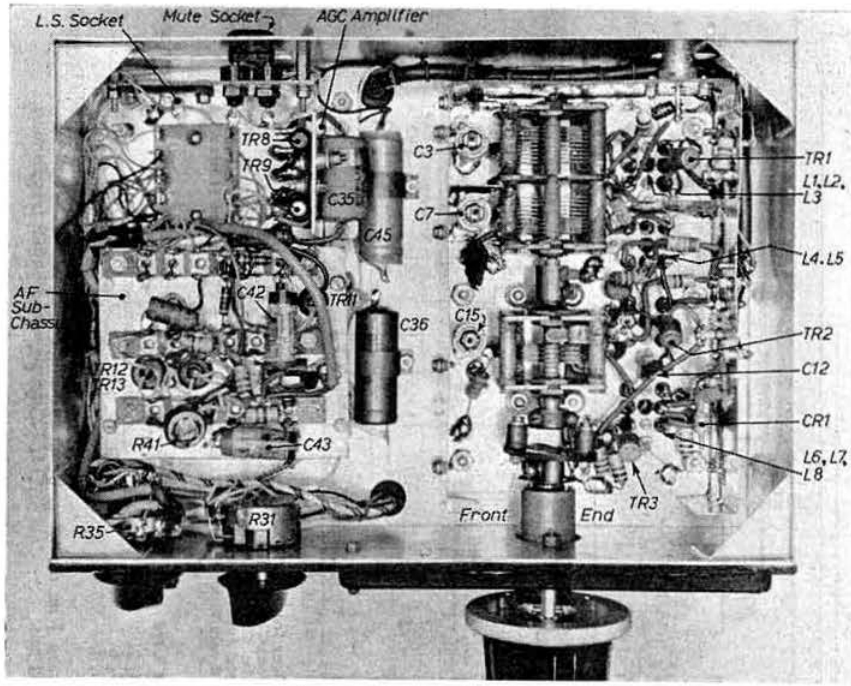
Fig. 1. The complete tunable i.f. with a.g.c. and audio amplifiers. C1, 5 and 17 are a three gang capacitor from an RF27 unit, with vanes removed to provide 27 pF for each section; C4, 8, 9, 10, 12, 13, 14, 31 and 32 are 30 volts working disc ceramics; C2, 6, 26, 38 and 39 are silvered mica; C16 is a 15 pF N750 ceramic; C18, 19, 21, 23, 25, 27, 28, 29, 30, 35, 40, 41 and 44 are metallized paper; C33, 34, 42 and 43 are 25 V. wkg electrolytic and C45 is a 12 V.wkg electrolytic. R31, 1·5 K ohm wirewound variable; R35, 10 K ohm carbon, with S3; R39 is a Mullard Thermistor type VA1040 and R41 is a 5 K ohm pre-set miniature potentiometer. All fixed resistors are Erie type 9, 5 per cent tolerance. M1 is a 1mA panel meter. GET114 matched transistors could be used in place of OC72s for TR12 and TR13. B1 is a 6 volt Vidor VT1, and B2 is 7·5 volts using a VT1 and a V11 in series.

Tunable I.F. Coil Table

Coil	Turns	Pins Used
L1	2	1, 4
L2	7	3, 2
L3	1	5, 6
L4	7	3, 2
L5	2	1, 2
L6	1½	1, 2
L7	2½	1, 6
L8	7	3, 4

L1-8 are wound with 24 s.w.g. wire on ¼ in. diam. Haynes formers with core and short can.

L9, L9a, medium wave aerial coil with emitter tap and low impedance input winding.
L10, medium wave oscillator coil.
L11, 12, 470 kc/s i.f.t.
L13, 470 kc/s i.f.t. (second detector type).
L14, 470 kc/s i.f.t. (for valve use) with one winding and all capacitors removed.
T1, T2 interstage and output transformers.



Underneath view of receiver.

When the receiver is being used normally, the a.g.c. is always left on.

The receiver is muted by disabling the bias supply, and with this system the receiver is completely silent when muted.

It should be noted that if lower gain transistors than those specified for TR8 and TR9 are used, R29 and R28 will have to be reduced in value, placing more load on the detector.

Front-end Construction

The layout of the front-end is clearly seen in the underside photograph. It is built on a 6 in. × 4 in., 16 s.w.g. tinplate chassis, which is fitted with sides and screens of 20 s.w.g. tinplate.

The tuning dial is an Eddystone type 598, fitted with an extra epicyclic reduction unit so that slow 60 : 1 reduction is available. The extra knob was turned from aluminium, the edge being knurled, and the resulting dial is very pleasant to use.

It will be noted from the photograph that the wiring to the front-end is adjacent to the main chassis wall. This wiring was put on and laced before fitting the sub-unit.

I.F. Amplifier Construction

The i.f. amplifier is built on a sub-chassis 6 in. × 2¾ in. × 1½ in. deep of 20 s.w.g. tinplate, and a screen is soldered across the width to make a 2¼ in. long compartment for TR4 and TR5. An L-shaped screen forms a 2¼ in. wide by 2½ in. long compartment for TR6 and TR7, the layout being shown in the underside of the i.f. amplifier photograph. The b.f.o. is rather cramped as is the noise limiter, and it was originally intended to fit the a.f. gain control R35 in the i.f. amplifier, but again space was short.

The chassis has ¼ in. flanges at each side and if these were turned inwards, instead of out, and fitted with captive nuts, then the chassis could be 3 in. wide. This would still allow room for the loudspeaker magnet.

The connecting leads to the i.f. amplifier are made sufficiently long to enable the chassis to be withdrawn from the rear, although the lead to the b.f.o. pitch control C37 has to be unsoldered.

The a.g.c. amplifier is built on a small bracket, TR8 and TR9 being held in small cable cleats.

The audio amplifier is contained on an 18 s.w.g. plate, and the layout can be seen from the underside view photograph.

Audio Amplifier

This unit was built about four years ago, but as the chassis size was ideal for the new receiver it was pressed into service. A maximum undistorted output of 220 milliwatts is obtained for 4mV input. Nowadays, rather more output could be obtained in the same space, although at the expense of increased battery consumption.

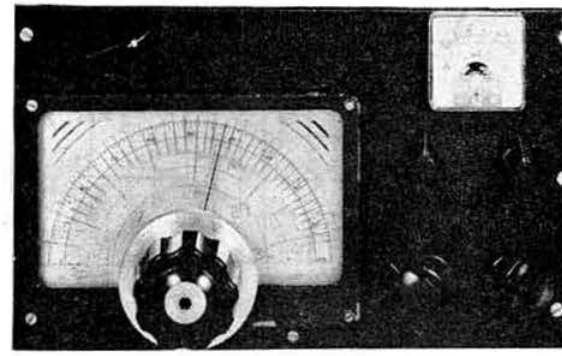
General Construction

The receiver was constructed as a number of sub-units to simplify the development work. The main chassis has a cut-out to enable the front-end unit to be fitted from underneath with the tuning coils protruding through the cut-out. The front-end is fully accessible for servicing without requiring removal from the main chassis and in any case, the dial assembly has to be dismantled to free the tuning capacitor before the front-end can be removed.

The i.f. amplifier is built on a sub-chassis, bolted on top at the right hand side of the main chassis. The wiring to the i.f. amplifier is made into a cableform of sufficient length to enable the sub-chassis to be withdrawn from the rear.

The audio stages and the a.g.c. amplifier are both built on plates which locate on pillars underneath the main chassis and underneath the i.f. amplifier.

The main chassis is a standard 10 in. × 7 in. × 2½ in. item to which is bolted the ⅛ in. thick aluminium front panel, 6 in. high and 10 in. wide. The side plates are of ⅜ in. Tufnol, drilled and tapped 4BA on the edges to enable them to be bolted to the chassis and panel. A 16 s.w.g. aluminium base



Front view of receiver. The controls are: above dial—a.v.c. on/off; below meter, top left—SI, b.f.o./a.v.c., top right—b.f.o. pitch, lower left—r.f. gain, lower right—a.f. gain. The loudspeaker is mounted in the top cover

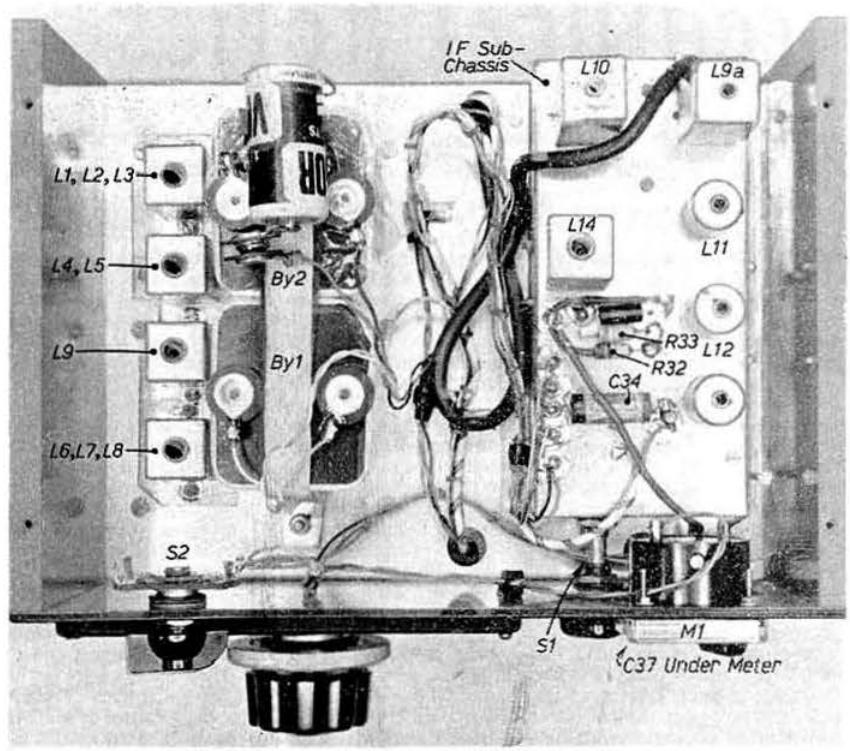
plate with turned up flanges is fitted to the main chassis, and the flanges of this base plate are equipped with 6BA captive nuts.

All the "hot" wiring is completely screened by this method of construction, which is desirable to prevent pick up of spurious signals in the tunable range of the receiver.

The top cover carries a 5 in. round loudspeaker, the magnet of which fits between the batteries and the i.f. amplifier.

The batteries occupy the space above the tuning gang, the centre line of the batteries also being the centre line of the tuning gang. The batteries are held in place by a strap.

The bias battery voltage is indicated by the "S" meter, as explained in the description of a.g.c. system, and this battery is fitted nearest the front panel. The collector supply battery is then at the rear from which position it can be checked easily.



Top view of receiver, with components identified.

Alignment Procedure

Before switching on for the first time, set R41 to maximum resistance. Open link "A" and insert an ammeter to monitor TR12 and TR13 collector current. Switch on and set R41 such that the total collector current of TR12 and TR13 is 8mA. Switch off and re-connect link "A."

Feed in 470 kc/s to L9a, and adjust L13, L12, L11 for maximum output. If these transformers are a long way off tune, however, it may be necessary to inject the 470 kc/s signal, via a 0·1 μF capacitor, to the base of the preceding transistor.

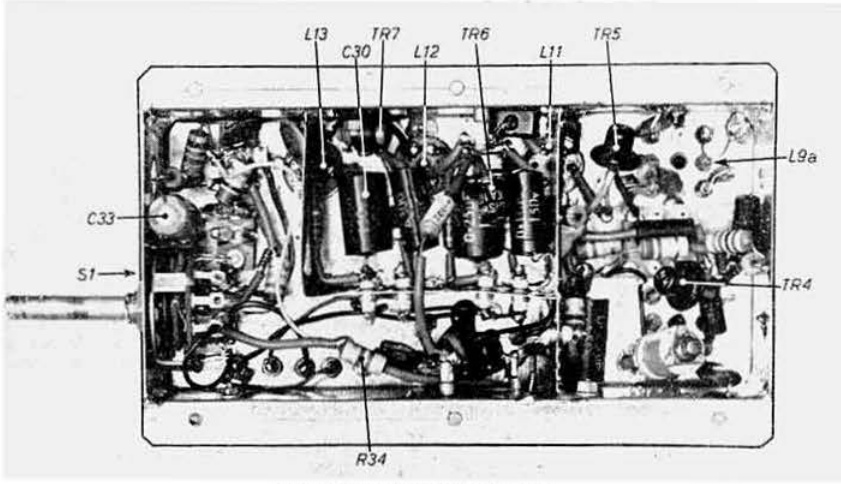
Feed in 1·6 Mc/s to L9a and tune L10 until the signal is found, then adjust L9a for maximum output. L10 operates on the high side, i.e. at 2·07 Mc/s, and this can be verified by checking that the image is at approximately 2·5 Mc/s.

With the tuning gang set to maximum capacity, feed in a 26·4 Mc/s signal to L1. Adjust L8 to tune in this signal, then peak the signal with L4 and L2. Set the tuning gang to minimum capacity, re-set the signal generator to 30 Mc/s and adjust C15 to tune in this signal, and then peak the signal with C7 and C3.

Repeat the above procedure, for the oscillator only, i.e. L8 at 24·4 Mc/s and C15 at 30 Mc/s (dial readings) until the band edges are set.

The mixer and r.f. circuits are then peaked up, which is best done at frequencies inside the band edges, e.g., 26·7 Mc/s and 29·7 Mc/s. Repeat these adjustments until no further improvement can be obtained.

The oscillator works on the low side, and this should be verified by image frequency measurement.



Underneath view of i.f. amplifier.

Performance

Sensitivity at 28 Mc/s:

Less than 1μV for 6db signal to noise ratio.

(*Continued on page 22*)

TECHNICAL TOPICS By PAT HAWKER, G3VA

Microelectronics . Transistor Combinations . Transistor Cascode Amplifier . Transistor Oscillators Microwave Power Generation by Varactors and TPM . Heater Regulated Power Supply Clamp Modulation . Reed Relays . Aerial Topics

THOSE of us who endeavour to keep in touch with current trends in communications equipment for commercial as well as for amateur purposes are hard put to keep up with the current rate of progress on the research side—even though many of the newer ideas now in the laboratories will probably take appreciable time to come into common usage.

For example, hard on the heels of the semiconductor revolution is the advance of microelectronics in which whole stages of circuitry may be contained in single transistor packages or in small flat packs. At first most of the production devices were for the type of circuits used in industrial and computer applications, but now there is appearing a distinct trend towards the use of such " integrated circuits " in communications units. Experimental frequency synthesizers, hand-portable walkie-talkies, i.f. strips and—as we saw demonstrated recently by STC—compact microwave communications terminals; all have appeared using various forms of microcircuits though few of these equipments have yet reached operational use.

A complete h.f. frequency synthesizer providing output at 1 kc/s intervals from 2-30 Mc/s in a volume of less than 10 cubic inches or the even smaller one providing 2000 channels in 50 kc/s steps from 100-156 Mc/s as used in the American military equipment AN/PRC65 (one of the first truly microminiature transceivers to be field tested, and using integrated thin film circuits throughout). Meanwhile, on the market for some time, have been hearing aids in which the complete three-stage amplifier is a single microelectronic device of " pin-head " size.

The interesting point from the amateur angle is that as production increases there seems to be every reason to believe that eventually such microcircuits will gain a price advantage over conventional designs with discrete components—and then they will certainly begin appearing in domestic and amateur equipment.

Meanwhile, there is already a tendency towards packaged modules of components. Packages with a number of capacitors and resistors have been around for some time; and now quite a few of the current transistor portable receivers are using sealed i.f. modules in which three h.f. transistors are incorporated together with all i.f. components and crystal detector diode. When combined with similar packaged a.f. units, only a few external components are needed to form a complete receiver. And one maker is now using what is termed an " integrated switch pack " with push-button wavechange switches combined with printed circuit wiring to eliminate the usual " jungle " of switch wiring and, more significantly, to reduce performance variations in mass-produced receivers.

This tendency to divide up equipment into modular building blocks could become an important factor in future amateur equipment, and one that need not necessarily lead to inflexibility. It may well be that all the old problems of alignment without good test gear will vanish. There is however a very practical limit to the scope left for any further size reduction in equipment—already some designs are leaving only barely sufficient knob room for those of us with large fingers and thumbs.

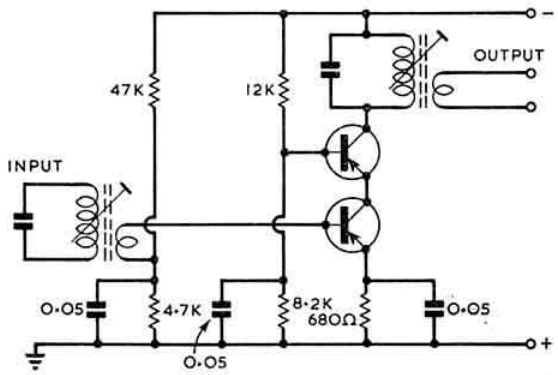


Fig. 1. Cascode i.f. amplifier for 36 Mc/s using two germanium transistors (2G414 or AF114). A few components can be saved by making a single bias potentiometer chain.

Transistor Combinations

One feature of some integrated circuitry is that it becomes possible to use almost as many transistors as one wants since they use up much less of the silicon slice than for example the associated capacitors. This seems to be leading to a greater interest in circuits using combinations of transistors. Recently we listened to a Marconi engineer make a very strong case for using cascode circuits in integrated circuit i.f. strips.

He pointed out that, rather surprisingly, the cascode circuit, though popular in valve form, has been largely neglected in transistor circuitry, though in fact they possess the most important advantage that they enable one to dispense with neutralization or unilateralization, because of the extremely good isolation between input and output circuits. Now that surplus transistor prices permit the use of two transistors for a single stage, there is a lot to be said for greater use of the cascode configuration in i.f. and r.f. stages.

Fig. 1 shows a representative circuit of a 36 Mc/s i.f. stage (readily adaptable for other frequencies) from a new book *Transistor Pocket Book* (Newnes) by R. G. Hibberd which includes a good deal of practical information on the use of transistors.

There are several other useful combinations of transistors; the Darlington (super alpha-pair) connection provides a useful way of increasing the input impedance of a transistor stage. What appears to be a single transistor, but which in fact contains a dual Darlington pair, is in development to provide what is effectively a very high gain transistor.

There are innumerable useful ways of exploiting the complementary pairs of *p-n-p*/*n-p-n* transistors now available. An unusual application of a complementary pair is shown in Fig. 2 (from *Radio-Electronics*, October 1965) giving the equivalent of a silicon controlled rectifier for control applications.

Another potentially interesting combination is that of power transistors with built-in Zener diodes between the collector and emitter to protect against high voltage transients and secondary breakdown.

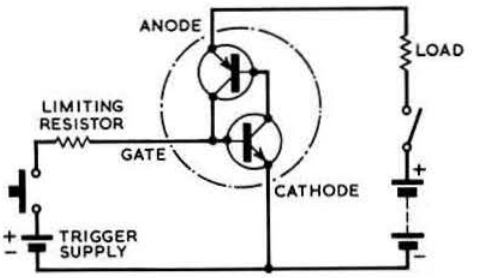


Fig. 2. How a complementary pair of transistors can be used to form a control device of the type generally associated with silicon controlled rectifiers. (*Radio-Electronics*)

Transistor Oscillators

During the past few years several short articles have been written by Mr P. J. Baxandall in *RRE Newsletter and Research Review*. These have included his now famous Class D high-efficiency sinewave oscillators, and also more conventional crystal oscillators for high stability. A good deal of this information is brought together in *The Radio and Electronic Engineer* (April, 1965).

Among the useful practical points on transistor crystal oscillators is his conclusion that forms of the Miller circuit are less desirable than variations of the basic Pierce arrangement, which he shows to be closely related to the Clapp/Gouriet oscillator. He points out that the Pierce circuit "which is not usually described as employing the crystal as a series-resonant element—though this is a matter of viewpoint—is capable, when transistors are used, of a far better performance than might at first be supposed, despite its simplicity and widespread use in not-very-exacting applications." The circuits he describes (Fig. 3) are capable

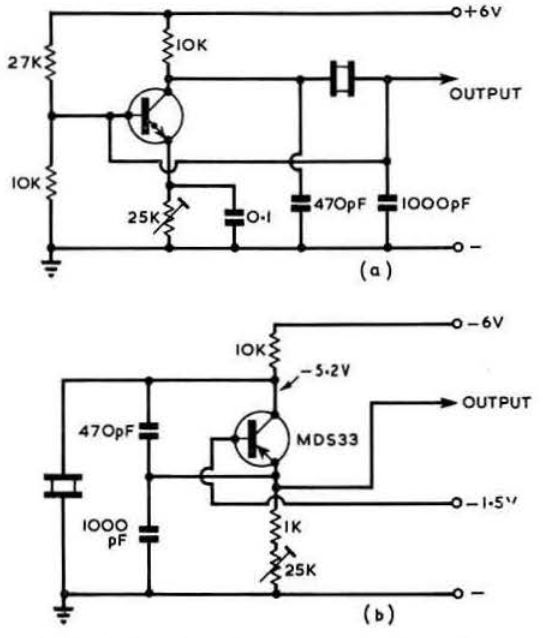


Fig. 3. Practical high stability Pierce arrangements for (a) *n-p-n* and (b) *p-n-p* transistors suggested by P. J. Baxandall.

of a frequency stability variation of only about five parts in 1000-million for a 10 per cent supply voltage change —and are capable of operating with a crystal dissipation of only about one microwatt.

Baxandall has also evolved a two-transistor series-resonance oscillator of extremely high performance (of the order of one part in 10^{10}) and anyone in need of this degree of stability (1 c/s in 10 Gc/s) will find the article of considerable interest.

An interesting advantage of low power crystal and tunable transistor oscillators is that it becomes practicable to run them even when receiving, thus simplifying the old problem of "oscillator" keying for break-in operation. This point is emphasised by W8VWX (*QST*, October 1965) in presenting a simple crystal-oscillator adapter intended for use with conventional crystal-controlled transmitters using cathode keying. His oscillator draws about 1 mA from a 1·5 volt battery and "because of the complete shielding of the unit and the low power level, the signal cannot normally be heard in the receiver, so that the break-in feature is not sacrificed." We have previously referred to the possibility of using this type of arrangement with transistor v.f.o.s (and it is of course one of the most useful features of heterodyne-type v.f.o.s). But problems can arise where the signal leaks through the keyed stage into stages which may not be operating under cut-off conditions.

We feel that there is a lot of opportunity for useful development work on solid-state exciters providing a couple of watts output on all bands.

Microwave Power Generation

To many of us, the amateur microwave bands are something we read about in the licence but little else—though the 23cm (1296 Mc/s) band has been receiving increased attention in recent years. But one thing is certain—any empty spaces in the frequency spectrum are not going to remain empty very much longer and if we do not fill them someone else will.

The interesting point is that a number of recent ideas are developing which make it much more practicable to obtain stable r.f. output in the gigacycle regions. The Varactor chain is becoming quite well known, and we have noted that a regular advertisement for a Varactor parametric tripler unit capable of putting out some 12 watts on 432 Mc/s when fed with a 144 Mc/s signal (all power comes from the r.f. input so that no additional d.c. power supplies are needed) appears regularly in *QST* with an American price tag around £20. All solid-state systems for use up to 7000 Mc/s using these techniques have been developed commercially in the UK by Microwave Associates.

G3TAE has also pointed out that the circuit we gave in *TT* (Fig. 7, July, 1965) with little explanation is in fact a form of the increasingly interesting technique of transistor-parametric-mode (TPM) operation. This is basically similar to the Varactor multiplier but with the Varactor diode, in effect, formed by the depletion layer of the collector-base capacitance of the transistor. The transistor thus acts both as an amplifier and as a Varactor multiplier.

RCA have recently published a good deal of information on TPM in conjunction with their "overlay" r.f. transistors such as the 2N3375 and 2N4012. A technical description will be found in *RCA Review* (June 1965) and several practical designs in the *RCA Application Note SMA-40* (RCA, Electronic Components and Devices, Harrison, New Jersey, USA) are based on the 2N4012. Circuits are given for a doubler (800 Mc/s output, 400 Mc/s input) with up to some 3 watts output, a tripler (340 Mc/s input, 1020 Mc/s output) with about 2·8 watts maximum output, and a quadrupler (300 Mc/s to 1200 Mc/s) with some 1·9 watts output. Details are also given of a 150 Mc/s to 450 Mc/s tripler providing an output of up to almost 3 watts on 450 Mc/s for an input of 1 watt at 150 Mc/s, obviously of interest to amateurs.

An experimental microwave communications terminal using thick-film micro-electronics and weighing 17 lb. Varactor multipliers provide some 200 milliwatts at 4500 Mc/s The equipment was developed by ITT Federal Laboratories and demonstrated in the UK by the associated company STC.

It will be appreciated that a feature of this technique is that it extends the upper limit of the frequency range of the transistors concerned " far beyond that possible from the same transistor in a power-amplifier circuit and well into the microwave region" to quote RCA. At present, the maximum output is appreciably below what can be obtained with the best Varactor multiplier chains, and we believe that the stability problems are rather more difficult.

Incidentally, using a series of Varactor multipliers a couple of milliwatts output has been achieved as high as 60,000 Mc/s. Varactors can also be used the other way round and we noted recently (*Electronic Design*, 27 September, 1965) a subharmonic Varactor design which accepts some 125 watts input at 50 Mc/s and provides output on 25 Mc/s at an efficiency of some 80 per cent.

Also coming up over the horizon is the extraordinarily interesting Gunn-effect device—currently the subject of much commercial research—in which microwave signals are actually generated inside a semiconductor device; already c.w. powers of some 15 milliwatts at 4000 Mc/s have been achieved, and the possibility of using such techniques to provide the local oscillator for microwave receivers seems fairly bright.

With Varactors and other solid state amplifiers and multipliers there would seem to be advantages in abandoning a.m. techniques in favour of f.m.—or even going over to microwave pulse modulation systems, the surface of which—as W2BVU has pointed out (*QST* September 1965, and in a series of *QST* articles in 1963)—has hardly been scratched.

It is worth pointing out that an article in *Point-to-point Telecommunications* (October, 1965) shows that a 10 watt, 960 Mc/s solid-state transmitter, using Varactor multiplier output, when used with a 10 ft. dish aerial, is capable of regular troposcatter ranges of the order of 150 miles for teleprinter circuits when used in conjunction with receivers having tunnel diode pre-amplifiers with a noise figure of around 4·5db.

Several papers on u.h.f. propagation were presented at the recent International Conference on U.H.F. Television in London, including a detailed account of the reception at various points along the East Coast and at Lerwick of 500 Mc/s and 774 Mc/s signals radiated from a 1 kW transmitter at Scheveningen (Holland). It was consistently observed that field strengths over distant sea paths tended to be a little greater *on the higher frequency*—both under normal and abnormal conditions.

Heater Regulation

For those who remain faithful to valves for v.f.o. applications, some useful points are made in *QST* (November 1965) by K6KWX/7 in his description of a Nuvistor (7587) unit for 5 Mc/s in which the entire stage is enclosed in an Eddystone die-cast box. Not only the small size of the Nuvistor but its low heater wattage is of interest for this application, and we were interested to note further support for the viewpoint expressed several times in *TT* that one of the main sources of frequency variation in v.f.o.s is variation in the heater line supply voltage. K6KWX completely overcame this problem by powering the Nuvistor heater from a stabilized d.c. supply using a voltage doubler rectifier arrangement on a 6·3 volt winding to give ample initial voltage to allow the use of a Zener diode stabilizer; see Fig. 4. It would of course be possible to use silicon diodes of lower p.i.v. rating in the low voltage supply.

A relatively simple method of improving the stability of transistor oscillators, for example, used in receiver and converter applications, has been suggested by Shigeaki Mabuchi of Tokyo in *Electronic Design* (24 May, 1965) who claims that instability caused by changes in ambient temperature can be substantially mitigated just by feeding the stage through a high resistance from a higher than normal supply potential. He states that using a 125,000-ohm resistor and a 26 volt supply, variations were reduced by a factor of the order of 7 : 1 due to the suppression of variations of emitter current. In using this technique one would have to make

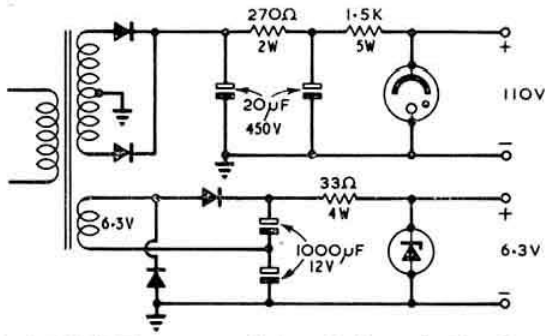


Fig. 4. K6KWX/7's power supply for a Nuvistor v.f.o. Transformer rating is 250-0-250 V at 25 mA. All diodes are IN4005 (600 p.i.v.) but other types could be used. The Zener diode (IN1521) is rated at 6·8 V but a suitable type within the 10 per cent heater tolerance can be used.

sure that the collector voltage rating of the transistor was not exceeded but this should not be difficult in view of the improved collector voltage ratings of modern transistors. Incidentally, one reads of really high voltage devices coming along with breakdown ratings measured in hundreds of volts.

When considering mains power supplies for transistors, the need to reduce ripple in fairly high current supplies can give some headaches. Mallory suggest that a useful move is to use a full-wave bridge rectifier because of its fairly low ripple content and to follow this up with a brute force filter with the large capacitances now available, mentioning their units of 115,000 μF at 3 volt rating, 10,000 μF at 6 volt, 7500 μF at 25 volt and 1000 μF at 50 volt. A far cry from our old ideas of filter capacitances.

Clamp Modulation

In the November *TT* we included two transmitter circuits from BRS26039 and mentioned that he had also tried out some clamp modulation systems. One of these is shown in Fig. 5 and has been air-tested by G3PKW on transmitters up to about 40 watts. The circuit as shown is suitable for use with a carbon microphone, but BRS26039 says that with a crystal microphone, the triode portion of the ECL80 is

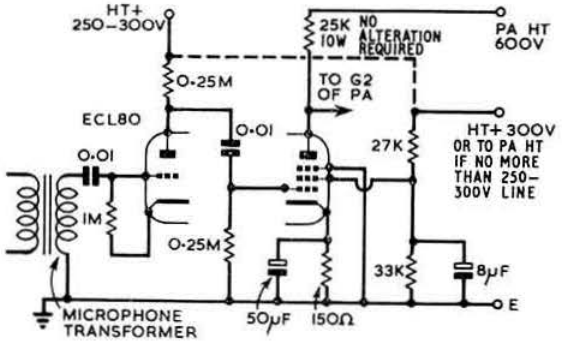


Fig. 5. Clamp modulation system suggested by BRS26039. Note that the ECL80 has common cathode connection.

not used but the signal after amplification by say an ECC83 double triode can be fed directly to the grid of the pentode stage. The degree of modulation can be adjusted by altering the potential on the screen grid (g2) of the clamp valve, but at no time should it exceed the anode voltage otherwise limiting will occur.

Aerial Topics

Several follow-up notes on aerials which have been already mentioned in *TT* have been spotted recently, likely to be of interest to anyone investigating them.

Further information on the Ehrenspeck "backfire" aerial (*TT*, September, 1965) appears in the form of a letter in *Proc. IEEE* (August, 1965) including what promises to be a particularly useful form of "short-backfire aerial." In this there is only the large back saucepan lid reflection plate (2 λ diameter) and the small front disc reflector (0·4 λ diameter) plus the dipole, and the overall length of the structure is only 0·5 λ. Yet it is claimed that the array is capable of some 15db gain over isotropic or equivalent to a conventional Yagi of over 20 elements. The large reflector plate in fact has changed the overall shape of the Yagi so that its physical dimensions are much more like those of a parabolic dish aerial—but without the problem of obtaining an accurate parabola. In this form the array would clearly be of interest primarily to v.h.f. and u.h.f. operators.

We wonder how many of the users of Yagi aerials are aware that they have a much longer history than might be imagined—the aerial was developed originally by Professor Hidetsugu Yagi and S. Uda of Tokoku Imperial University in connection with original experiments on wavelengths of between 60 and 200cm, and first described by them in 1928! Dr Yagi was elected to the Japanese House of Councillors in 1953 and, in his old age, is still a much respected figure in Japan.

Another new variation of the Yagi, incorporating a built-in balun by the use of a ground-plane reflecting plate and with the excited element as a $\frac{1}{4}$ λ monopole conductively connected to the central boom with a gain over a frequency range of 30 per cent was described at the u.h.f. television conference already mentioned.

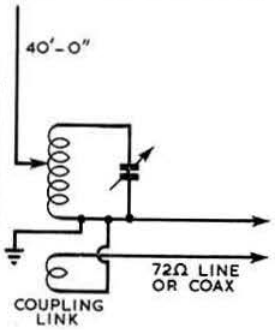


Fig. 6. G3TMA's 40 ft. vertical aerial. For 1·8 Mc/s, the tuning coil is 120 turns on a 2 in. diam. former, tapped every 5 turns. The link coil is 5 turns. 7 Mc/s: 25 turns, 1½ in. diam. former, tapped every turn, with 3 turn link. 14 Mc/s: 9 turns, 1½ in. diam. former, tapped every turn, with 3 turn link. The tap is adjusted with an r.f. ammeter in base of aerial or a field strength meter with transmitter on low power.

Some modifications to the Maria-Maluca multiband amateur beam aerial—described in *TT* and *TTfiRA*—in order to optimise performance have been proposed by ON4XZ and F5GF in *Radio-REF* (November, 1965).

A further reference to the hula-hoop aerial but using a larger loop appears in the IEE's *Electronic Letters* (September 1965). This has been investigated in Italy and uses a $\frac{1}{2}$ λ instead of the $\frac{1}{4}$ λ loop as in the original Boyer system described in *TT* and *TTfiRA*. Again there is emphasis on the need for a good ground plane (in this case aluminium sheet some 3 λ diameter) but the system still seems to have practical value particularly for mobile operation.

G3TMA comments on the recent description of vertical ground plane aerials and sends along a description of a 40 ft. aerial he uses on 1·8, 7 and 14 Mc/s fed against ground with separate aerial tuning units on each band, relay switched from the shack. His earth system consists of four 40 ft. lengths of insulated wire laid on the ground, each at right angles to its neighbour. Details of his tuning arrangements are shown in Fig. 6.

Most conventional ground plane aerials use four radials as above, and it may not be known generally that it is quite possible to use three radials spaced at 120° and sloping at about 60° ("the triple leg aerial"); this tends to give a radiation pattern with nulls along the line of the radials and maxima along the bisection of the angle between each pair of radials.

Reed Relays

There has been increasing interest recently in the dry-reed contacts now being used in the experimental quasi-electronic telephone exchanges on trial in Britain and Germany, and we note that one British manufacturer has sufficient belief in their application to amateur radio to advertise them in the BULLETIN. We have been fortunate enough to see a number of the electronic telephone exchanges in the UK and also in Stuttgart—and they have made a profound impression especially in the tremendous reduction of noice compared with the continuous clicking of the relays and uniselectors one hears in normal automatic exchanges. This absence of operating noise could indeed be a most valuable feature to the amateur who operates in shared domestic rooms.

While in Stuttgart we met Heinz Rensch of Standard Elektrik Lorenz, one of the leading experts in reed relays and the author of a most useful article "Characteristics and Applications of Reed Contacts" (*Electrical Communication*, Vol. 40, No. 3, 1965) and it soon became clear that there is a great deal more to the design and understanding of these devices than might appear at first sight. We are however convinced that they will come to replace conventional relays in many applications and if used correctly are capable of giving a far higher degree of reliability.

Already there are various size reeds in manufacture; we suspect that for general use the larger sizes (about 80mm in length) are likely to prove the most useful, although many of the reeds now being made are the shorter type about 46mm long.

The small contact tongues which overlap have gold diffused into the metal, and there is still a good deal of interest in exactly what currents and voltages can be switched without reducing reliability too greatly. In practice it has been shown that the life depends very much on the switching loads, and the degree of spark quenching. A representative figure for the STC Herkon H80 reed is at least a million operations when switching 1 amp at 60 volts, with many more operations at lower currents.

For switching h.f. circuits (and one has in mind particu-

(Continued on page 47)

NEWS . . .

Collated by John Clarricoats, O.B.E., G6CL

Haystack, first of a new generation of high-precision aerial systems, is so accurate that it can detect a pellet a quarter of an inch in diameter at 100 miles, track a square yard target at 20,000 miles and direct its beam at a small crater on the moon. It can communicate with space ships 100 million miles from the earth and can study earth-orbiting satellites in great detail. The antenna is protected from the elements in the world's largest radome on top of a hill 25 miles outside Boston and is operated by the Lincoln Laboratory of the Massachusetts Institute of Technology. One of its first jobs was to trace a belt of copper needles which were recently put in orbit round the earth in a communications experiment. Searching for needles in the haystack of space!

Baird Museum is to be set up at Strathclyde University, Glasgow, by Radio Rentals Ltd who, over a period of years, have collected historical Baird equipment, documents and photographs. The new Hall of Residence at Strathclyde has been named after John Logie Baird, the television pioneer.

Boston or Bust! This year, for the first time, New England will be host State for an ARRL National Convention. Venue—the newly built Sheraton-Boston Hotel. Dates: 22-24 April. Reservations to, and details of package deal from, John McCormick, RFD No. 1, Berkley Street, Taunton, 1, Mass.

Walkie-Talkie Sets. Because of the practical difficulties involved, the Board of Trade is unable to ban the import of walkie-talkie sets which operate in the 27 Mc/s band. Questions in the House of Commons elicited the information that legislation to control the imports of these sets would be a matter for the P.M.G. (The GPO has already warned that the use of these sets is illegal).

ITU Centenary Commemorated. During the course of the recent I.T.U. Plenipotentiary Conference the Swiss Government held a ceremony in Berne to commemorate the centenary of the Union. Main feature was the unveiling, by the President of the Swiss Confederation, of a tablet bearing the names of all States which were Members of the Union on 17 May, 1965.

Paint-on Plastic Conductors. Plastics which conduct electricity have been invented in the USA thereby adding an entirely new dimension to the use of these versatile materials. Applied in liquid form, almost like paint, to give an electrically-conducting coating to the surface of insulating materials (including ordinary plastics) they should be suitable for printed circuits. Plastics now in use are virtually incapable of conducting electricity and are, therefore, widely used as insulators.

Smallest Known. What is believed to be the smallest known television receiver using both thin-film and silicon integrated circuitry has been introduced by Westinghouse to demonstrate the firm's research facilities. The set measures only 21 cubic inches. All circuitry is microelectric with the exception of the video amplifier and sweep circuits. The receiver is operated from rechargeable silver-cadmium batteries on a separate a.c. supply.

Mullard Meetings arranged and managed by the Mullard Films and Lectures Organisation are designed to keep the trade abreast of current technical developments in the radio, television and electronics industries. The programme for January is as follows: 11th, Ipswich (Great White Horse Hotel); 12th, Colchester (Red Lion Hotel); 18th, Brighton and Hove (Town Hall, Hove); 25th, Sheffield (Montgomery Hall); 26th, Doncaster (Earl of Doncaster Arms Hotel). Society members are invited to attend these meetings but a postcard should be sent well in advance to Mr. Ian Nicholson, Mullard House, Torrington Place, London, W.C.1. who will extend a formal invitation. The talk at each meeting will be on Transistor Topics and the films to be shown are entitled *Thin-film Microcircuits* and *Electromagnetic Waves—Part II.*

IEE elect New Officers. President of the Institution of Electrical Engineers for 1965-66 is Mr. L. Drucquer, divisional director and general manager, Heavy Plant Division, Associated Electrical Industries Ltd. Professor A. I. Cullen, professor of electrical engineering at the University of Sheffield is the new Chairman of the Electronics Division.

LDX. Typed letters, drawings and sketches are now being transmitted via microwave radio, telephone lines, coaxial cable or a combination of these, over long distances by a method as fast and easy as the telephone. Networks of facsimile stations, known as Long Distance Xerography (LDX), make this possible. A particular network will permit employees at one office to transmit anything typed, drawn or sketched to any other office almost simultaneously. Each office is equipped with a scanner for sending and a printer for receiving purposes. Facsimiles can be moved through the system at a rate of eight pages (each 8½ by 11 in.) a minute and 3800 pages in an eight-hour day.

Electrical Engineers Exhibition, organized by Phil Thorogood, G4KD, on behalf of the Association of Supervisory Electrical Engineers, is due to be opened at Earls Court, London by the Prime Minister on 23 March, 1966. Firm bookings have been received from more than 500 exhibitors representing at least 12 countries.

Radio Aid Scheme for Drivers. According to *The Daily Telegraph* a country-wide radio link in which a lorry driver can summon help in the event of a theft or other emergency is to be launched by Securicor, the commercial security organisation. Securicor will use its 80 radio-controlled centres to receive calls from drivers who have radio-equipped lorries. The scheme will be called HELP—Haulage Emergency Link Protection.

Pay TV Ltd start a three-year subscription television experiment on 7 January when programmes will be transmitted over the British Relay network to subscribers in Southwark and Westminster.

Television and Radio Show 1966, to be held at Earls Court, London, from 22 to 26 August, will be for trade visitors only. Participation will be open to home and overseas manuturers.

Audio Fair. More space for exhibitors and better facilities for handling the crowds will be features of the International Audio Festival and Fair to be held at the Hotel Russell, London, W.C.1 from 14 to 16 April, 1966. There will be a trade-only period between 11 a.m. and 4 p.m. on the opening day.

Nuvistor Preamplifiers for 432 Mc/s

The author of this article, Mr R. S. J. Smith, G2DCI, now lives at 85 Heath Croft Road, Sutton Coldfield, Warwickshire, and not as shown in the footnote on page 778 of the December 1965 issue.

Tunable I.F.

(continued from page 17)

Image at 30 Mc/s 40 db down.
Spurious beats: none.
Tracking errors: < 1db.

In use, the receiver gives excellent results, normally being used as the tunable i.f. for a 70cm converter. Compared with the valve receiver previously used, the transistor version is slightly better on weak c.w. signals, probably due to its better selectivity. Both G3LHA and G3NBQ have handled the transistor receiver and have commented favourably upon it.

KEEPING TRACK OF OSCAR

By W. BROWNING, M.I.A.A., M.I.M.I., F.M.I., G2AOX*

NOW that the satellite *OSCAR III* has completed its task, and proved that Amateur Radio Space Communication can successfully be achieved, it is quite certain that in the near future similar satellites will be put into orbit, and the following simple method of calculating their times and positions should enable all interested to do their own predictions, and also to use any officially issued figures to the best advantage. The system has been evolved and developed after five years of research and development, and has been brought down to its utmost simplicity to enable immediate predictions to be produced without reference to any complicated formulae or calculating machinery.

It is recommended that anyone taking up this subject reproduces the graphs shown on the largest possible scale; the writer uses 21 in. × 28 in. graph sheets with 1 in. × $\frac{1}{10}$ in. rulings, and with the thinest lines from a very sharp hard pencil extreme accuracy can be achieved.

It is also helpful to obtain an ordinary world globe, the larger the better, though even the smallest will do, provided it rotates on a spindle passing through the North and South Poles. A strong clip is made to lock onto the curved support that joins the ends of the spindle, and a ring of stout wire fitted to this clip made to encircle the globe on a full circumference. This ring, which can then be set to the inclination angle of the satellite, will represent its orbit path, with the globe free to rotate inside it. In order to correctly visualize the essential facts of objects in orbit, this ring should remain stationary, and the globe rotated inside it in an anti-clockwise direction when looking down on the North Pole.

Terms used for Tracking Satellites

It should be noted that all times are always given in GMT in hours, minutes and decimals of a minute, and all positions are in degrees and decimals of a degree.

The Inclination Angle is measured up from the Equator, i.e., a satellite with an inclination angle of 0° would be going round and round the world, always directly over the Equator, and one on 90° would go over the North and South Poles alternately. In order to appreciate the examples given for *OSCAR III*, the ring should be set at 70° up from the Equator, as in the photograph.

The Period is the time taken in minutes by the satellite to complete one revolution of its own orbit path, and this must always be calculated from the same degree of latitude, when going in a similar direction, i.e., when going S/N and crossing the Equator, or, more conveniently for Great Britain and Northern Europe, at latitude 50°N.

The Track Separation is the amount in degrees that the world will turn during the period of one complete revolution of the satellite, and is 0·252 of the period when measured along any line of Latitude.

The Height for a near circular orbit is in direct proportion to the period, with a minimum of 115 miles (Statute) for an 88 minute period, rising approximately 30 miles for every minute the period increases.

*47 Brampton Grove, Hendon, London, N.W.4.

Orbit Calculations

Reference should now be made to the four graphs in Fig. 1 which cover all periods from 87 minutes to 115 minutes (87·5 minutes is the minimum possible as a satellite is then entering the Earth's atmosphere and burning up).

A simple calculation shows that 90 minutes is exactly one sixteenth of 24 hours (1440 mins.), and so any satellite with an exact 90 minute period would revolve round the Earth 16 times in 24 hours, and so the prediction times would be the same every day; if, however, the period is 91 minutes, after every 16 orbits the time would be 16 minutes later every day.

The actual figures for *OSCAR III* are shown by the dotted lines, and reading across from the period of 103·51 minutes to the diagonal line and then down to the lower scale shows that after every 14 orbits it will be 9·14 minutes later each day. Now reading up to the top scale shows a daily movement of the position of 2·293°, further west after 14 orbits. To this figure must be added 0·9856°, as the world actually rotates 360·9856° per day. Also, the precession of the orbit must be added, and reading out left from the period of 103·51 shows the height as 580 miles.

The Precession is the rotation of the orbital plane around

The globe used by the writer for plotting orbits. The ring is set to the inclination angle of the satellite.

the Earth's axis, and is in the opposite direction to the satellite's motion, i.e., it is always to the west except for the very few satellites whose inclination angle exceeds 90°, and the amount of movement in degrees per day is relative to the height and inclination angle.

Now from Fig. 2 it will be seen that an inclination of 70° at a height of 580 miles gives the precession figure of 2·112° per day. The daily change in position will therefore be

Original daily movement	2·293°
Plus world movement	0·985°
Plus precession	2·112°
Therefore daily change	5·39° further West.

Returning now to Fig. 1, and reading across to the right shows a figure of 26·1° as the track separation, and so all the essential figures for continuous predictions are to hand.

It will now be seen that if the place and time of the launching, and the period are known, predictions are easily calculated, and the actual figures of *OSCAR III* will serve as an example. The launch was from Vandenberg Air Force Base in California (approximately 100 miles NW of Los Angeles) at longitude 120°W and latitude 35°N. Set up the orbit ring at 70° inclination, with the ring passing over this spot, and going down the Pacific Ocean and just passing the southernmost tip of South America. Cut a small arrow from plastic tape and stick it on the ring with the point of the arrow facing south, and the tip just where the ring crosses lat. 35°N; this serves as an indication of the direction, and the timing point for the initial figures. It will then be seen that the satellite passes down west of S. America, past the Antarctic, up the east side of India going north, then over Siberia and Alaska and back down the Californian coast. But during the time it has taken for this one orbit, 103·51 minutes, the world has turned round the amount of the track separation, 26·1°, and so the actual position at the end of one revolution is 146·1°W at 35°N, going N/S.

Set the globe so that the tip of the pointer crosses this spot, and this is then the position for the start of the second revolution. Do this twice more, so that orbit No. 2 ends at 172·2°W and then orbit No. 3 at 198·3°W, when it will be seen that when going north on orbit No. 3, three-quarters of the way round, the track passes over latitude 50°N approximately 20° East of Greenwich. This is easily within range of any station in Great Britain.

Stick another plastic arrow, pointing north, at the point where the orbit ring crosses Latitude 50°N. The calculations for the exact time and position of this point are as follows

	GMT	*Longitude*	*Latitude*	*Direction*
	hr. min.			
Launch	18.30	120°W	35°N	N/S
Add 3 Periods	5.10·5			
Add 3 Separations		78·3°		
End of orbit would be	23.40·5	198·3°W	35°N	N/S

Note that this time and position is for three *complete* orbits, finishing up at 35°N going N/S. As, however, only 2¾ orbits are required to predict the time at 50°N going S/N,

(*Please turn to page 27*)

Fig. 1. Orbit path plots for a period of 87 to 115 minutes

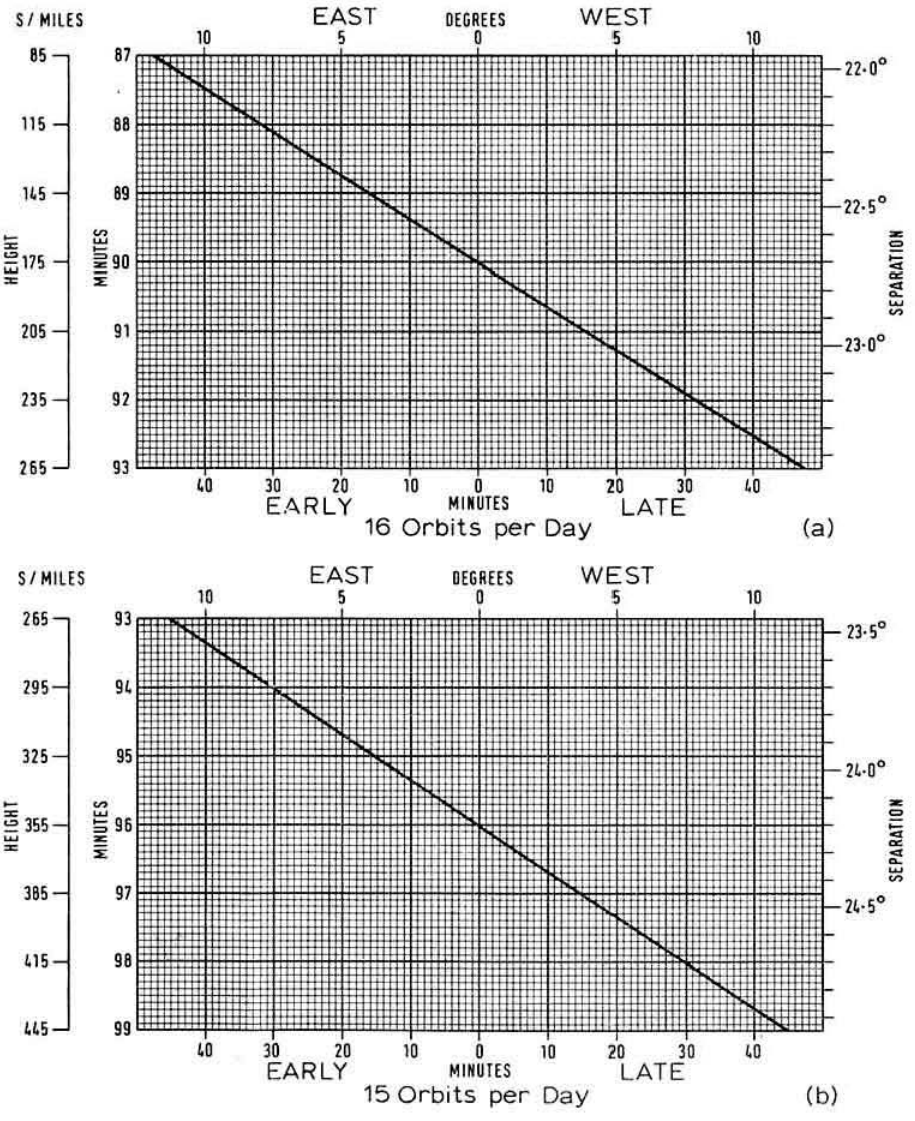
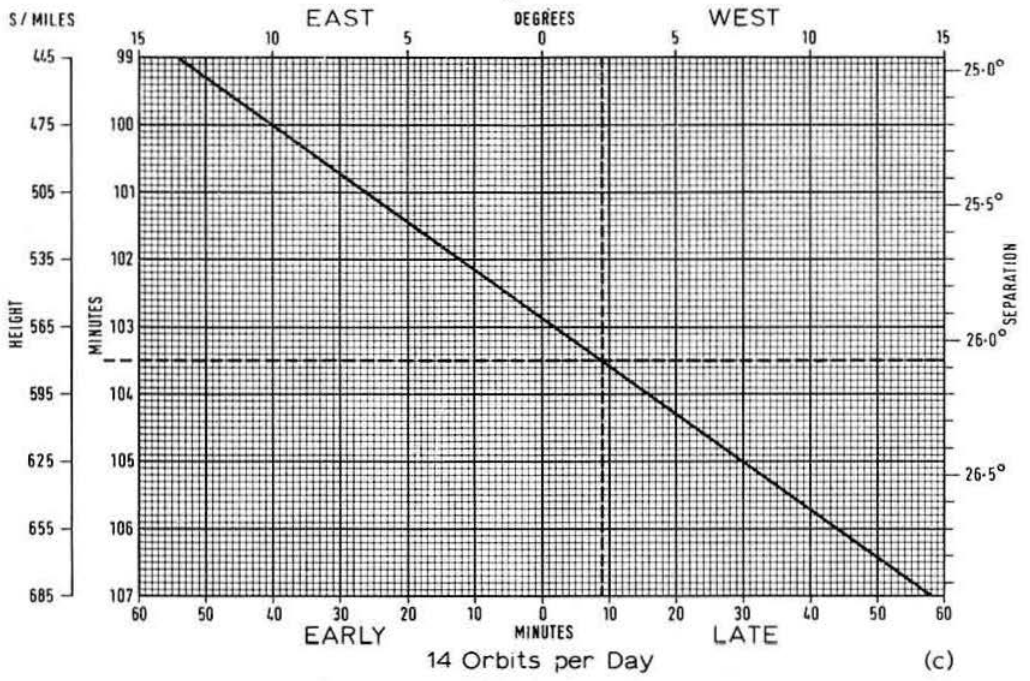
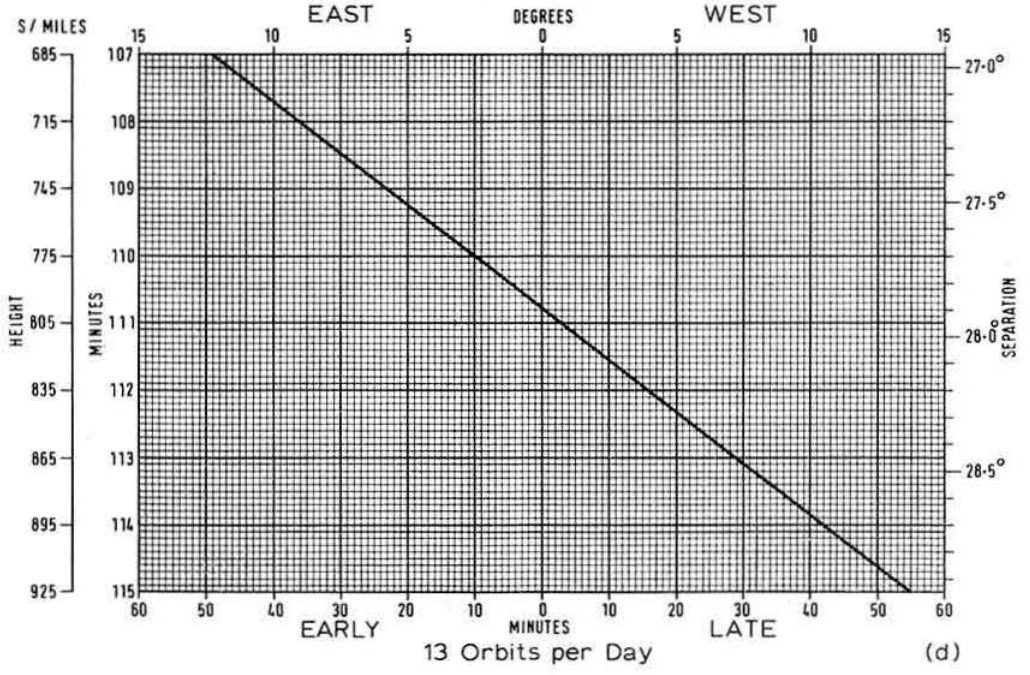


Fig. 1 (a) and (b). See facing page.

Fig. 1





Marker points for drawing large scale graphs from the printed examples.

Fig. 1	(*a*)	88	minutes	equals	32	minutes	early	(*c*)	100	,,	,, 40 ,, early
		92	,,	,,	32	,,	late		105	,,	,, 30 ,, late
	(*b*)	94	,,	,,	30	,,	early	(*d*)	107	,,	,, 49 ,, early
		98	,,	,,	30	,,	late		115	,,	,, 55 ,, late

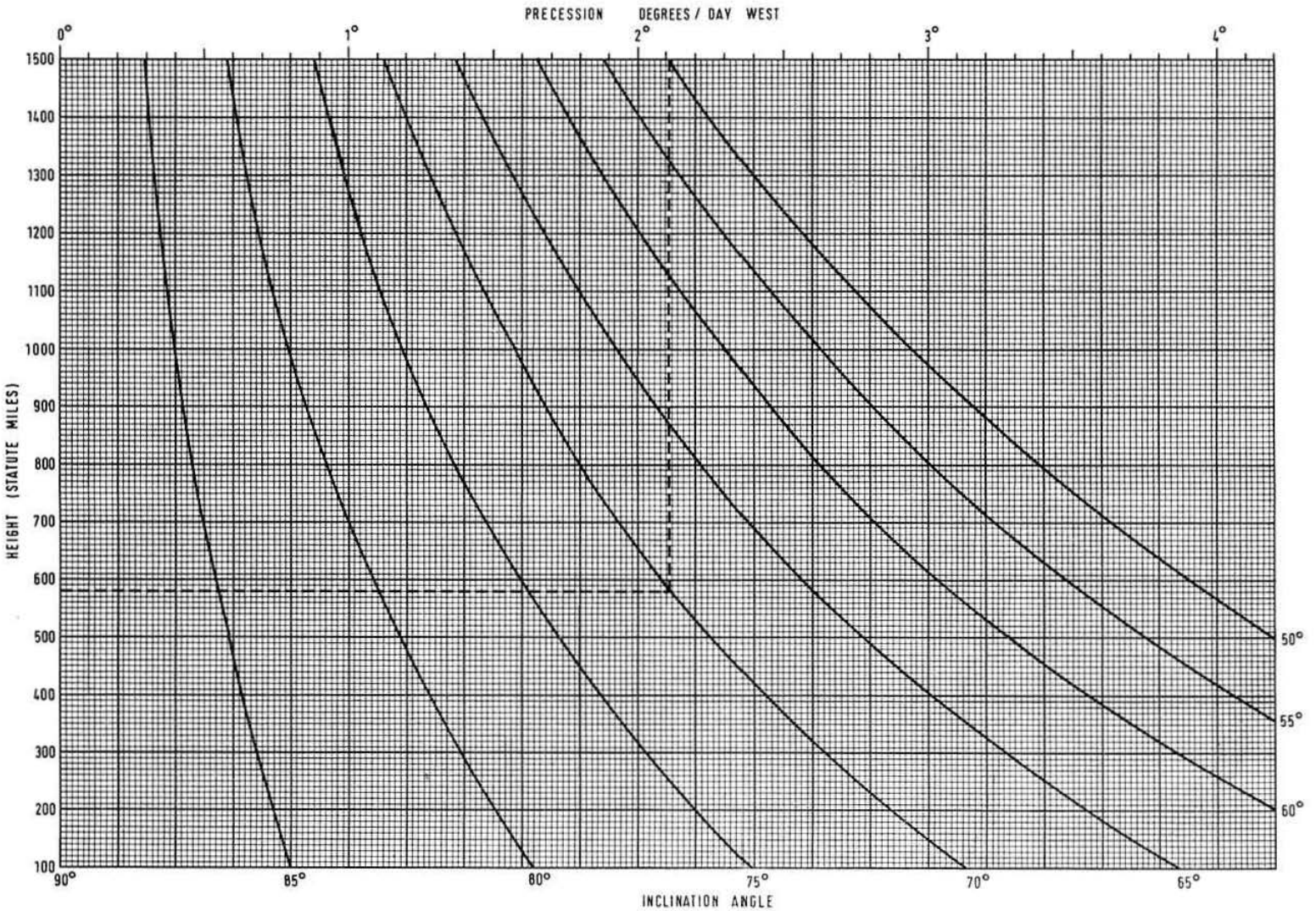


Fig. 2.

Height (S miles)		100	300	500	750	1000	1250	1500
Inclination Angle	50°	—	—	4·20	3·50	2·95	2·48	2·10
	55°	—	—	3·75	3·11	2·63	2·23	1·88
	60°	—	3·86	3·28	2·71	2·30	1·94	1·65

	100	300	500	750	1000	1250	1500
65°	3·85	3·27	2·77	2·30	1·93	1·63	1·37
70°	3·13	2·64	2·25	1·85	1·57	1·33	1·12
75°	2·38	2·03	1·72	1·41	1·18	1·02	0·88

	100	300	500	750	1000	1250	1500
80°	1·63	1·38	1·17	0·96	0·80	0·67	0·58
85°	0·80	0·68	0·59	0·48	0·40	0·34	0·30
90°	0	0	0	0	0	0	0

one quarter of the period of 103·51 minutes must be deducted, and a similar correction made for the position, as follows:

	GMT	*Longitude*	*Latitude*	*Direction*
	hr. min.			
End of orbit 3 as above	23.40·5	198·3°W	35°N	N/S
Less quarter of period	25·9			
Actual time	23.14·6		at 50°N	S/N

Observation on the globe shows that if the original arrow is set to 198·3°W at 35°N pointing in a N/S direction, the ring crosses 50°N going S/N at 20°E of Greenwich. It is therefore only necessary to move this position back one quarter of the separation, i.e., 7·5°, to establish the exact position of 27·5°E.

Therefore the first audible S/N orbit is as follows:

	GMT	*Longitude*	*Latitude*	*Direction*
	hr. min.			
Orbit 3 as above	23.14·6	27·5°E	50°N	S/N
Add one period	1.43·5			
Plus one separation		26·1°		
Orbit 4	0.48·1	1·4°E		
Add one period	1.43·5			
Plus one separation		26·1°		
Orbit 5	02.41·6	24·7°W		

Now in order to predict the N/S orbits, by far the easiest way to start calculations is at the launching, and if the previously mentioned method of picturing each successive orbit is adopted, it will be seen that orbit 8 comes within range of Great Britain, and can be calculated as follows:

	GMT	*Longitude*	*Latitude*	*Direction*
	hr. min.			
Launch	18.30	120°W	35°N	N/S
Add 8 periods	13.48			
Add 8 separations		208·8°		
End of orbit 8 is	08.18	328·8°W	35°N	N/S

It will be noted that this is the time and position at 35°N, and so to correct to 50°N it will be necessary to subtract 15/360 of the period (103·51 minutes), approximately 4·3 minutes, and the time of crossing 50°N is therefore 08.13·7 GMT.

Observation of the orbit ring set to 328·8°W, which equals 31·2°E at 35°N shows that at 50°N the position is 21·3°E. The exact time and position for orbit 8 is then:

	GMT	*Longitude*	*Latitude*	*Direction*
	hr. min.			
Orbit 8	08.13·7	21.3°E	50°N	N/S
Add one period	1.43·5			
Add one separation		26·1°		
Orbit 9	09.57·2	4·8°W		
Add one period	1.43·5			
Add one separation		26·1°		
Orbit 10	11.40·7	30·9°W		

For the next day's predictions, it is then only necessary to add on the daily change of 9·1 minutes after 14 orbits, and move the position 5·4° further west.

For example:

9 March, orbit 3	23.14·6	27·5°E
Daily change	9·1	5·4
10 March, orbit 17	23.23·7	22·1°E

It will be appreciated that methods as simple as those described here may not result in satellite position being known to a sufficient degree of accuracy to satisfy visual observers. However, given a near circular polar orbit and adjustment when necessary according to observed times of nearest approach, the system will result in figures which are sufficiently accurate to suit the needs of radio amateurs as all who have depended on G2AOX for OSCAR information in the past will be able to testify.

Now move the southpointing arrow from 35°N where it was originally set, up to 50°N, and then the tips of the two arrows will always show the satellite's direction and the exact point where the time and position predictions refer, in each case now at 50°N. At this stage, a strip of paper should be cut to cover the distance between the Equator and the North Pole, and this should be divided into 26 equal divisions (one quarter of the period) which, when placed on the orbit ring, represents minutes. The ring can be suitably marked each side of the arrow points with paint or cotton.

(To be concluded next month)

Silent Keys

We record with much sorrow the passing of the following amateurs.:

F. N. Holmes, G3DTD, Crewe, Cheshire.
J. Nuttal, G3PYT, Blackpool, Lancs.
B. W. Harrison, G3TUH, Pinner, Middlesex.

Obituaries

Tom L. Franklin, G2ARN

The sudden death of Mr Tom L. Franklin, G2ARN (ex G5HO) of Upper Nazeing, Essex, came as a great shock to his many radio friends, particularly those of the Harlow Net, of which he was their very efficient controller, and with whom he was closely associated. Well liked for his cheery and friendly manner, on and off the air, he was always ready to share with others, particularly newcomers to the hobby, his great fund of technical knowledge.

A retired radio and electrical engineer, he had been active in the amateur radio field since 1924, first holding the call G5HO on behalf of the Hoddesdon Radio Society (now defunct) and more recently reverted to his original AA call. Equipped for all bands 160m to 2m he had an extensive aerial " farm " and was particularly active on Top Band, and in the RAEN activities. Besides his shack in the garden he had remote-control operating positions in the house, the greenhouse and even outside the garden shed, so that he could still maintain his radio contacts while engaged on horticultural pursuits!

He gave of his talents generously and many old people in the locality have him to thank for the fact that they are today equipped with radio receivers, for which he organised the raising of funds and built the equipment. He was also an expert photographer, his 16mm cine films being used to good effect in raising money for charity. Sincere sympathy is extended to his widow and sister.

His call will be sadly missed by his many friends.

William Short, G2HNP

It is with deep regret that we have to report the passing of W. Short, G2HNP of Ilford on 22 November after a painful illness. " Shorty " as he was known to his intimates was of retiring nature but would be very militant in the face of unjustice to anyone. It was this side of his nature which surprised everyone, for he joined a special services branch of the Army during the last War, although considerably over age.

Although a very old member, he was little known on the air although he was an assiduous listener. Our sympathies are extended to his daughter and her family with whom Bill lived, after the loss of his wife, to whom he was particularly attached.

Component Ratings in Class C Modulated Amplifiers

By GEORGE W. McDONALD, G2OX*

MANY transmitter constructors appear to neglect the fact that high peak values of voltage occur in modulated class C amplifiers. The result of such neglect very often causes unexpected breakdown of capacitors, particularly in the initial test stages of development of a newly-built transmitter. Judging from the reports one hears over the air of minor or major " blow-ups " it would appear that the subject of peak voltages requires further airing although it has been covered many times in the past.

The usual approach to component rating seems to be that if the rating is about twice the h.t. voltage of the supply it will do. This is far from being correct generally and this article is directed towards spreading a better knowledge of the subject without dragging in a lot of mathematics and formulae. To the more advanced practitioner in the craft of Amateur Radio this treatment may seem to be over-simplified but it is hoped that omissions will be over-looked in the interests of a simple approach to a rather involved subject.

The simple circuit of an anode modulated single ended amplifier is given in Fig. 1 and the voltages which will appear across various parts of the circuit will be investigated.

Three important voltages appear in this circuit:

(i) The d.c. anode supply voltage;
(ii) The radio frequency voltage which appears in the anode circuit due to the r.f. grid drive,
(iii) The audio frequency voltage which appears in the anode circuit due to the modulator.

These voltages may appear singly or more or less together across any component in the anode circuit.

To simplify the description generally it will be assumed that the d.c. voltage supplied to the valve anode is 1000 and that the stage is working at 100 per cent modulation. This means that at 100 per cent modulation a peak voltage of 1000 volts is supplied from the modulator. The derivation of this latter fact will not be gone into here but for those who wish to develop the theory, it can be found in almost every textbook and handbook on radio engineering. The final assumption is that the anode swing of the valve, that is its anode voltage variation at radio frequency due to the grid drive, will be 0·8 times the d.c. anode voltage, in this case 800V. Having decided the working conditions, a brief description of what happens when the above voltages are developed across various circuit components will now be considered.

The behaviour of voltages of various frequencies on capacitors and inductors is well known to the transmitting amateur, thanks to the Radio Amateur's Examination, and the repetition of some facts will be sufficient to our purpose.

An anode circuit consists of a network of capacitors and inductors, mostly the former, and we require to know with a fair degree of accuracy how much voltage appears across these components under working conditions. To appreciate this we must know how the component reacts to an applied voltage at various frequencies because we are handling a mixture of frequencies from zero (that is d.c.), through all the audio range to radio frequency (that is the carrier frequency). The following theoretical facts should help in the understanding of this apparently rather involved subject. The voltage across a capacitor is equal to the applied voltage but inversely proportional to the current and to the capacitor's value. The voltage across an inductance is equal to the applied voltage but proportional to the frequency of the current and to the value of the inductance.

It will be seen that when considering the voltage across a component the value of the capacitor or inductor as well as the frequency of the applied voltage must be considered, and the whole idea is an application of Ohm's Law applied to alternating current circuits in which the resistance value becomes a reactance value. It is assumed that the reader's knowledge of a.c. theory will enable this to be understood. It is this aspect of having always to consider the effect of all three components, d.c., a.f., and r.f., that causes miscalculation of the actual working voltage developed across a component.

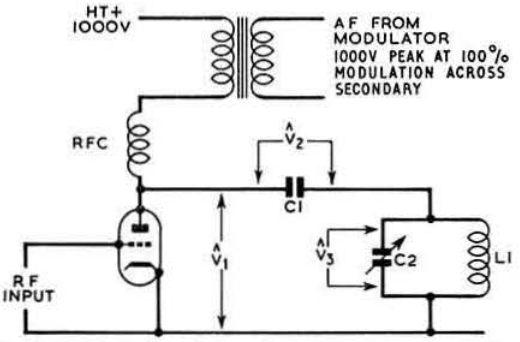


Fig. 1. Simple single-ended anode-modulated power amplifier.

The practical aspect of some of the more usual class C r.f. amplifier circuits will now be considered in detail.

Fig. 1 shows a single-ended anode modulated r.f. amplifier, in which the working conditions are as follows:

H.t. voltage to the anode—1000V;

Peak a.f. voltage across the secondary of the modulation transformer at 100 per cent peaks of modulation—1000V;

The r.f. component of the anode voltage is 800V, that is an anode swing of 0·8 times the d.c. anode voltage. On the 100 per cent modulation peaks this figure of 800 doubles to 1600 volts. It is important to keep this in mind.

The peak anode to cathode voltage V_1 at the moment of 100 per cent modulation is made up of 1000 volt d.c. component, the 1000 volt a.f. component and the 1600 volt r.f. component, making a total of 3600 peak volts. The voltage across the coupling and blocking capacitor C1 will be 1000 volts d.c. and the 1000 volts a.f. because the tank coil offers zero impedance to the a.f. component. This total peak voltage will be 2000 volts and is given as V_2 in Fig. 1. No r.f. appears across C1 because its impedance to r.f. is negligible. It can therefore be seen that it is important to select a capacitor of sufficiently high rated working voltage for C1. It is this component which appears to be the most common source of trouble in home-constructed equipment and we now realize why it is more than a simple d.c. blocking capacitor.

What happens in the tank circuit will now be considered in detail. The components concerned are L1 and C2 in Fig. 1, the voltage being marked V_3. This peak voltage is entirely r.f. and will total the 1600 volts anode swing of the valve on the 100 per cent peaks of modulation. The very small r.f.

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voltage drop which will be inevitable across C1 has not been considered.

C2 is normally an air-spaced capacitor and the spacing should be such that there is no danger of flash-over at the 100 per cent modulation peaks. The values of the capacitance C2 and its associated inductance L1 plays a very large part in determining the power output of the amplifier. On the ratio of inductance to capacity depends the optimum value of anode load. We have already considered the voltage across a capacitor being inversely proportional to the capacitance value, and this follows in this case of r.f. voltage across C2.

The actual value of C2 is not so variable as it appears to be. Should the capacitor in use as C2 tend to flash-over on modulation peaks, the immediate cure would appear to be to increase its capacitance value and reduce that of L1 to maintain resonance. This would certainly solve the flash-over problem but at the same time, having altered the inductance to capacity ratio, the optimum load facing the valve is reduced. This causes a drop in anode swing and a lower power output from the amplifier. Such coincidences make life difficult for the radio amateur!

The circuit shown in Fig. 2 is the push-pull version of that in Fig. 1.

The peak anode-to-cathode voltage is, by the previous reasoning, the same as that in Fig. 1. but the d.c. and the a.f. anode to cathode voltage components are divided between C1 and C2 in inverse proportion to the capacitance values. Only a very small r.f. voltage will appear across C1.

$$V_2 = 1000 \frac{C2}{C1 + C2} + 1000 \frac{C2}{C1 + C2}$$
$$= 2000 \frac{C2}{C1 + C2} \text{ volts.}$$

The total peak voltage across C2 will be equal to the sum of the d.c., a.f., and the r.f. components as follows.

$$V_3 = 1000 \frac{C2}{C1 + C2} + 1000 \frac{C1}{C1 + C2} + 1600$$
$$= 2000 \frac{C2}{C1 + C2} + 1600 \text{ volts.}$$

Fig. 2 incorporates a modification to the way in which the

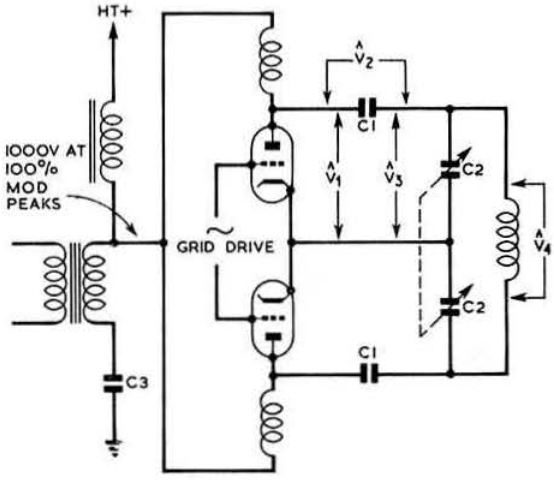


Fig. 2. Push-pull power amplifier. This circuit illustrates how the various voltages across components are calculated and should not be taken to be the circuit of a practical amplifier. The text makes clear the practical necessitity for a d.c. return path from the coil.

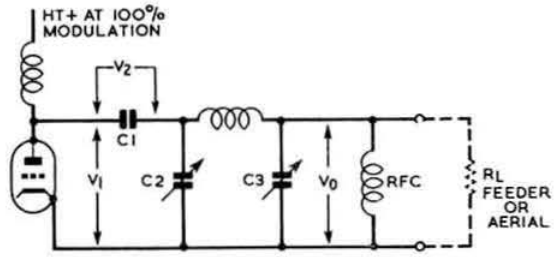


Fig. 3. Power amplifier employing a pi-network output stage.

modulation is applied to the amplifier. This parallel feed arrangement was used by the writer some years ago when a suitable modulation transformer would have set the finances back a bit too far. A good quality mains transformer was pressed into service with quite satisfactory results except that the d.c. flowing through the secondary winding caused magnetic saturation of the core. Parallel feeding was used to keep d.c. from flowing through the windings.

This method is useful when a modulation transformer of correct design cannot be used such as one which has not been designed to carry d.c. The primary consisted of the centre tapped winding of the mains transformer connected to the anodes of a normal push-pull modulator. The problem of direct current saturation does not arise in this winding because the direct current flows in opposite sense in each half of the winding, but this is not so for the secondary winding in Fig. 1; it carries the r.f. amplifier anode current from one end of its winding to the other and direct current saturation can occur. The parallel feed method in Fig. 2 avoids this trouble. The rating of the blocking capacitor between one end of this secondary winding and earth must be rated to withstand the combined a.f. and d.c. voltages, in this case a total of 2000 volts at 100 per cent modulation peaks.

Referring again to the r.f. tank circuit in Fig. 2 it will be obvious that connecting an r.f. choke from the centre of the coil to earth will remove the d.c. and a.f. voltage components from the tank capacitors. The presence of this choke is very important from the safety point of view. Consider what happens should C1 develop a leak: the coil would then be connected to the anode supply and be highly dangerous to handle if it were not for the choke providing a path to earth. A direct earth connection to the centre of the coil is permissible provided the rotors of the tuning capacitance are not earthed. This arrangement does not alter the r.f. voltage distribution across the coil.

Most modern transmitter circuits use the pi-type output circuit shown in Fig. 3. The anode to cathode voltage across the valve and the voltage across the coupling capacitor are as found by reference to Fig. 1. The voltage across C3, the output loading capacitor, will be r.f. of a value depending on the value of the feeder impedance or aerial load resistance. It should be noted that here again we have a low impedance path to d.c. by the presence of the r.f. choke between the output lead and earth. This removes the d.c. and a.f. components from the tank capacitors as well as providing a safety leak to earth if the h.t. blocking capacitor should suffer insulation breakdown.

It is interesting to consider the peak voltage across the tank coil in Fig. 2. The two ends of the coil are equipotential as far as d.c. and a.f. are concerned, and the voltage across the ends of the coil are purely r.f. and equal to the sum of the r.f. anode-to-cathode voltage of both valves, i.e. 1600 volts.

Finally it should be pointed out that this treatment of the subject assumes that the amplifier is modulated at 100 per cent all the time. This is of course very far from the truth, but it was thought that approaching the problem from the

(Continued on page 47)

The Short Wave Listener

By BARRY J. CURNOW, G3UKI*

IN past decades the listener had an important role to play in reporting on amateurs' signals, but now the position has changed: just where does the s.w.l. stand in this dynamic age of DXpeditions, managers, QSLs, certificates and awards? In the early days of wireless an operator could call for days on end without knowing whether his signals were going anywhere: in such a case reports from listeners were invaluable and welcomed with open arms. However, the amateur population has proliferated, and technological progress now enables one to contact all continents at the push of a switch, which makes one wonder whether the s.w.l. is now redundant.

Of course the listener's place has changed but then so has the amateur operator's (more so if anything). Much has been written on good and bad s.w.l. reporting: some amateurs condemn it wholesale but then, they are probably those who decry any type of QSLing, even amongst their fellow licensed operators. It is true that " bad " short wave listening and reporting is abundant; being responsible for the QSL duties of several amateur stations, no one is more aware of this than the writer. However, one cannot help but wonder how many operators are like the following example.

There were two s.w.l. cards in an envelope from his RSGB Sub-Manager, and having filled in two QSLs for the listeners concerned he promptly deposited the reports in the ash can. On retrieving them from that most undignified resting place both he and I were more than pleased to note that one bore comprehensive details of a 2m CQ call, heard over two hundred miles away, from a transmitter which had since been scrapped as useless. From that day the person involved has always read his reports and what is important has found more than a few of them exceedingly helpful. This incident is self-explanatory and no further comment is required except to remind those listeners that might be falling into a rubber-stamp complacency, fatal to their own existence, that reports carrying comprehensive details of repeatedly unanswered CQs, indicating defective transmissions and giving details of unheard callers are the ones welcomed by stations, bringing the replies they deserve.

However, the function of the s.w.l. extends far beyond the rather hazy definition of an amateur band signal reporter. During my travels to many radio clubs in various parts of these islands, and especially in the North, it has been amazing and somewhat disappointing to note the lack of short wave listener membership in some of them. While talking, in those parts, to a DX operator of renown, he was surprised to hear of the prominence of listeners in the South-West, and said, " Our listeners up here simply aren't like that. They rarely leave their shacks, and in fact I am not sure of the whereabouts of the nearest one to me and have certainly never met him." (Presumably that listener, whoever he might be, could not read Morse—a sadly unfortunate state of affairs—or otherwise my brass-pounding friend would have been inundated with reports.)

It is true to say that many clubs would not survive, save for the devoted service of unlicensed members who arrange the transport for NFD, erect the tents and aerials, logkeep, execute that all-important duty of being assistant mate to the Chief Tea Stirrer, and indeed do all but operate the station. Similarly, many of the newly qualified G3T/Us, listed as club officers are not raw recruits to the hobby but middle-aged listeners whose years of amateur band experience prove an invaluable asset in the efficient administration of a club which rests, not so much upon the holding of a ticket but on a knowledge of ham ways and sobriety of outlook: two things which are sometimes far from synonymous.

Furthermore, one wonders whether the triband quad and stacked arrays of a local operator would still be lying on the ground but for the 10 or 15 strong work force of short wave listeners which can be summoned to right the damage wreaked by the winter gales from the English Channel.

In contests the services of a keen s.w.l. DXer can be a Godsend to the licensed entrant. The former is well-versed in log-keeping and amateur band procedure and frequently knows more about the stations worked than the operator himself. More often than not, if the amateur misses a serial number his logger will have read it and there will be no need to ask for a repeat, which usually leaves one more uncertain than the first time anyway. When discussing the subject with a top c.w. man he commented that the presence of a competent logger can make all the difference in the world. The logger can read the call-signs of other calling stations while the operator works one of them and half a dozen QSOs can be effected without a further call.

Another example presented itself while this article was partly completed. G5ZT (a famous old-timer with many " firsts " in different spheres to his credit) was giving a lecture on his experiments with *OSCAR*. Lamenting the lack of several pairs of hands, he firmly believed that the only barrier to establishing a QSO with a station heard calling was the absence of a team of short wave listeners, who by manipulating the aerials and adding extra pairs of highly tuned ears to the receiver would have made identification possible.

We are extremely fortunate in this country for the RSGB pursue a most understanding and progressive policy towards the s.w.l. to the extent of having an Education Committee actively engaged in promoting the hobby amongst the youth of this nation. Unfortunately, and strange as it might seem to many readers, there are National Societies who do not even recognize the existence of listeners' in their own right. The best advice an amateur can give a new listener is to sign his RSGB application form.

Numerous old hands constructively assist the novice. One well-known G2 in the South-West distributes reprints of an article on s.w.l. QSLing with his direct QSLs. Perhaps one might suggest to the other operators who have an understandable dislike of the 59+ traits of some reporting that the listener can, if encouraged and helped, perform sterling service which more than mitigates the foolish mistakes of untrained minds which would after all, do better if only they knew.

Enough has been said in recent years about useless and " bad " reporting by listeners, without the critics realizing the tremendous untapped potential dormant in short wave listeners throughout the country. Let us see more of the enthusiast, soaked to the skin in traditional NFD weather, enjoying every moment of it as he scales the 40 ft. mast to replace broken or forgotten halyards; more of the DX listener who, armed with a comprehensive knowledge of the h.f. bands, manages to pull the call-sign of a VR4 from the contest pile-up, when the ageing eardrums of the chief-op cannot quite decipher the 229 signals from the depths. These are only a few of the multivarious functions, activities, responsibilities and chores to which the enterprising amateur can direct the energies of a keen young helper, mentioned here. However, they should suffice to put the s.w.l. into a true perspective which he has long been lacking. Let every amateur give thorough training and sound experience to the listeners of today in whose ranks are the Gus Brownings and Dick McKerchers of tomorrow. Future champions of the cultivated art of globe-trotting, nascent kings of travel who will sling their dipoles between the palm-trees and satisfy countless DX pile-ups.

* 112 Mountgould Road, Lipson, Plymouth, Devon.

MATTERS MOBILE

BY PAUL HARRIS, G3GFN*

A Review of circuits and information of particular interest to Mobile Operators

FROM G3UDW comes a useful suggestion concerning commercial car radio aerials used as the basis for a mobile installation. As many of us have discovered, sometimes one or more sections may show a tendency to slide downwards from the optimum length position, and while such movement is of no consequence for BC reception, the resulting detuning in transmission applications can be exceedingly irritating.

The way in which G3UDW overcomes this is to fit a bicycle valve rubber over each joint in the aerial. These are a tight fit and will retain the aerial at the desired length, but not so tightly that they prevent the length being adjusted as required.

G3IES passes on the information that the Lafayette HA55 receiver, which covers 108 Mc/s to 136 Mc/s, lends itself to modification for a 144 Mc/s or 70 Mc/s base station receiver. This receiver is constructed in such a manner that the r.f. section may be removed for modification. To shift the receiver 10 Mc/s h.f. merely entails opening out the oscillator coil and re-peaking the r.f. coils. G3IES finds that the scale calibration holds good—not forgetting to add 10 Mc/s of course—and achieved his modification using the v.h.f. beacon GB3VHF at Wrotham as a marker.

To place the receiver on 70 Mc/s is a little more complicated, and entails employing the *LC* tables in the *Handbook* or the *Radio Data Reference Book*. Nevertheless, it is still a worthwhile undertaking and would seem to hold the potential of making an excellent fixed station receiver for the 4m band.

Power-a-Plenty

While the advent of transistorized equipment has considerably reduced the demands on the limited power available under mobile conditions, every so often mobilers come face to face with a flat battery. As a result, we have heard the cry, " If I could only run the gear from a separate battery."

Some mobilers convert desire into reality, and fit a second battery, but are then faced with the problem of keeping it fully charged and/or restricting the operating periods to a time determined by the capacity of the secondary supply. Charging at home is not usually any problem but charging while mobile poses many difficulties. Two batteries cannot just be connected in parallel, for one is bound to show a higher state of charge than the other, and the higher battery will discharge into the lower. This is the simplest of the difficulties. Such an arrangement is not only bad practice, but fraught with real dangers.

Of course one could fit a second generator, but this is expensive, often not practical. What is required is a method of connection which will allow each battery to be charged according to its needs; leave the car's electrical system virtually intact; and most important of all, prevent any possibility of one battery discharging into the other.

The neatest solution so far seen by the writer, and due to one of our American friends, is shown in Fig. 1. In this, two silicon charging rectifiers are wired in series with the output from the B connection of the voltage regulator unit, one rectifier in series with the lead to each battery. From the point of view of the generator, all that has happened is that a small series resistor—actually the forward resistance of the diode—has appeared in series with the battery supplying the

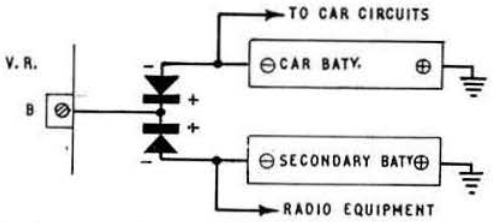


Fig. 1. Method of fitting an additional battery to operate mobile radio equipment. Note that the diodes used as current gates must be silicon types rated at 50 amps, a suitable type being the Ferranti ZR31C, with a 100 p.i.v., 50 amp rating.

car system, and another in series with the secondary battery. From the point of view of either battery, current trying to flow from one to the other will encounter the reverse resistance of one or other of the diodes, and thus the current will be limited to microamperes.

With this arrangement, the car's voltage regulator will continue to operate in its normal manner, but it will need some slight adjustment to compensate for the voltage drop across the diode forward resistance. This entails either (a) adjusting the voltage regulator to give 0·75V more at the B terminal or (b) adjusting the voltage regulator to give 14·5V across the *car battery* terminals with the engine running at a speed equivalent to a road speed of 30 m.p.h.

Unless you are completely familiar with the operation and adjustment of the voltage regulator, it is strongly advised that this re-setting is entrusted to a competent automobile electrical engineer, and before wiring in such a system, check with him that your generator will take the extra load. The great majority of generators will do so, since it is now fairly usual practice for makers to standardize on one generator which they fit to a wide range of vehicles. Thus it will not be abnormal to find that your car generator is the same type as that fitted to a heavy commercial vehicle.

One part of the voltage regulator will not function normally when this system is employed, and this is the reverse current cut-out. When the engine speed drops, and the generator voltage falls below that of the battery, current tends to flow back from the battery to the generator. If this were allowed to happen, two things would occur. First, the generator would try to motor, and secondly, the generator could become reverse magnetized, following which its output would either be nil or of the wrong polarity. To avoid these eventualities, a current cut-out is fitted. As current starts to flow from the battery back to the generator, this unit breaks the circuit. The exact mechanics of operation are unimportant, but its function is essential to the normal sequence of operations.

In the modified circuit given in Fig. 1, the magnitude of this reverse current is limited by the back resistance of the diodes and it will be so small as to cause no damage. Equally, it will not operate the current cut-out. However, once the car engine stops, the cut-out will open in any event, for part of its operation depends on the voltage output of the generator.

Note particularly that the circuit calls for *silicon* rectifiers. Selenium types are quite unsuitable. When testing this arrangement the writer was unable to secure 50 amp rectifiers, but used instead four 10 amp units in parallel in each leg. These were rated at 50V p.i.v.

Power for Peanuts

Whilst on the subject of power supplies, there can be no doubt that the transistorized inverter is the most efficient method of transforming the 12V car system up to the voltages required by valves. Unfortunately, they are also expensive, due mainly to the cost of toroidal transformers.

A simple, but efficient supply for power outputs of 250/275

* 94 Aldwick Road, Bognor Regis, Sussex.

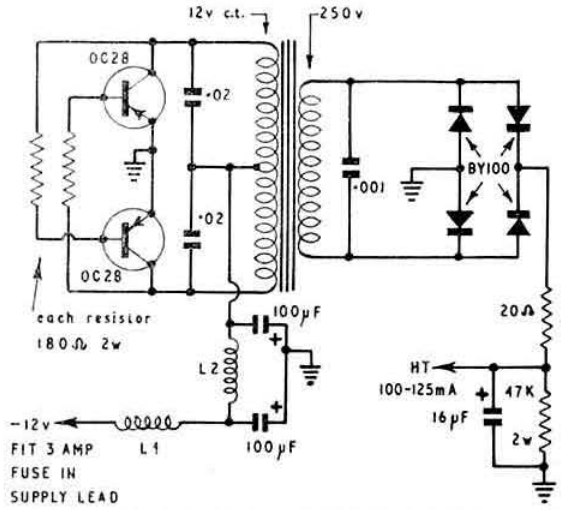


Fig. 2. Transistorized inverter employing a standard 12V c.t. mains transformer. Filter chokes, L1 and L2, are 14 s.w.g. enamelled wire wound on ½ in. formers for a length of 2 in.

volts at currents of up to 125mA and using a *standard* transformer is shown in Fig. 2. This is based on an original design by K9IBZ.

The transformer is a standard 12V c.t. heater transformer rated at 3 amps, a suitable item being the *Radiospares* heavy duty filament transformer, which is provided with two separate 6V windings each rated at 5 amps. If this transformer is employed, the unit should be operated from a.c. mains to determine the correct manner in which the two secondaries have to be connected to provide 12V output overall. This transformer is somewhat over-rated electrically, and a smaller—and less expensive—3 amp unit will be equally satisfactory.

It will be seen that the 12V winding is used as the primary with OC28's performing the switching; forward bias and feedback being derived from cross connected 180 ohm base resistors. The secondary—which is the original primary—functions in conjunction with bridge connected silicon rectifiers to provide the h.t. output.

The input filtering is quite essential and both sections must be employed to give full protection against car generated switching and ignition transients which could otherwise destroy the transistors. This filter also prevents " hash " from the unit reaching any receiver via the 12V line. Equally, the unit must not be used without a load of at least 50mA on the output circuit to keep the self-developed transients within the peak voltage rating of the OC28. If an oscillosope is available, the waveforms should be examined and the 0·02μF capacitors on the primary and the 0·001μF capacitors on the secondary varied in value. The object is to find values which reduce the amplitude of the self-switching transients—the leading edge of the switch-on pulse—but which do not slow down the switching action unduly.

The transistors must be mounted on an insulated heat sink, but so long as the output is restricted to 30 watts maximum, this heat sink can be the chassis/box in which the whole unit is constructed. If this course is adopted, the transistors should be mounted in such a manner that each is approximately central to half of the available area of metal.

It is particularly worth noting that this circuit will operate with the B44 vibrator transformer.

Tyre Static

Certain cars using tubeless tyres exhibit chronic wheel static under dry road surface conditions on warm air days. What is especially aggravating about this particular effect is that one cannot say car *A*, model *Y* will always show this symptom. Experience has lead to the conclusion that it is the tyres themselves, rather than a particular make and type of car.

The writer well remembers one particular car where this noise was absolutely appalling, making reception on the BC set impossible. All the usual remedies were tried, but to no avail. In his only flash of inspiration the writer had the tyres removed and a little powdered graphite placed in each; about one tablespoon to each tyre. It worked, and the noise never re-appeared.

From that time onwards, this treatment was used as a panacea for all peculiar noises which seemed to be associated with the wheels of a car revolving. In over three-quarters of all the cases it effected a cure.

No explanation is offered, nor is this dodge put forward as a sure-fire cure for all noises. However, it is certainly worth while trying, especially as it was found to work in the case of a similar sounding interference which blanked out a 2m mobile receiver.

Transistor Detector, AGC and "S" Meter

Contained in the *Handbook of Selected Semi-conductor Circuits* published by the USA Government Printing Office (No. b.s.r.73231) is a very economical transistor circuit which not only detects and provides a.g.c., but in addition, operates an " S " meter into the bargain.

The circuit is shown in Fig. 3 and should need no special comment. The 2N136 transistor does not seem to be generally available in the UK, but any transistor with an α cut-off frequency of about 6 Mc/s (for an i.f. of 465 kc/s) and a β of 50 to 100 should be suitable. An OC45 appears to be a fairly natural choice.

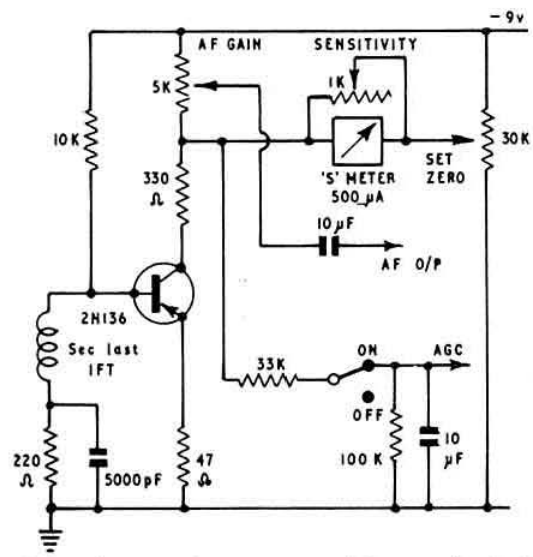


Fig. 3. Transistor a.m. detector, a.g.c. and S meter circuit. The a.g.c. circuit provides varying forward bias for the controlled stage(s).

Cheap Metal Boxes

In a recent edition of *Cambeam*, G3PTB came up with the interesting suggestion that MK electrical switch and junction boxes make a fine housing for all sorts of little gadgets. The " knock-outs "—that is the pre-stamped but not removed

(*Continued on page 47*)

THE MONTH ON THE AIR

By JOHN ALLAWAY G3FKM

AS most readers will already be aware, this month sees a new writer in charge of your monthly DX offering. It is not easy for a newcomer to take over a task of this kind, particularly when such a high standard has been set by his predecessors. May he take this opportunity to ask all who have any news items of any kind to send them in, and also to ask for the continuing help of the regular contributors who helped the article along in the past?

Last year saw a record amount of activity in the DX field, in spite of the fact that it was in the trough of the sunspot cycle. There was activity from more than 280 DXCC countries during the twelve months. It is interesting to recall that in a competition to see who could work most countries in 1958—at the peak of the last cycle, the highest total was just over 200. Let us hope that the new year will bring even better results, together with the promised improvement in propagation on 21 and 28 Mc/s. It is hardly possible that anyone will produce an expedition of the kind just completed by Gus Browning, W4BPD, who was due to have completed his marathon and to have returned to the USA by mid-December. The writer would like to pay tribute to the way Gus has given so much of his time to give all of us so many fine DX contacts, on all bands, and at all times.

This being January, the time of good resolutions, would seem to be an appropriate time to examine some of the ways of influencing people *without* making friends, which should be avoided whenever possible. One or two procedures which may be considered to be included in this category would include: (i) Calling a directional CQ *on the known frequency* of a rare station or expedition *before* he becomes active. (ii) Calling CQ on the same frequency *after* the station has commenced operating, presumably in the hope that a QSO will result in order that the frequency may be cleared. (iii) While on s.s.b., holding a round table rag chew on the said frequency again hoping that in order to clear his frequency, the DX man will break in and contact the knitting circle first. (iv) Tuning up the transmitter zero beat with the other station. (v) Having repeat contacts with rare DX, just to show one's friends how well one is getting out.

It would be boring to continue, but the writer never ceases wondering just why so many people who should know better, continue to do these things!

News from Overseas

Peter Sandiford, G3STF, who is now **7Q7PS**, writes to say that he is now in Malawi with the Voluntary Service Overseas Scheme, and will be there until next September. At present he is running 90 watts to a 6146. He is normally active on 14,050 kc/s from 14.30 to 16.30 GMT on Mondays, Wednesdays and Fridays. He invites anyone who would like to fix a sked with him to contact him at the QTH given in *QTH Corner*.

Our much travelled correspondent **5N2AAF** will be back in Nigeria by now, and hoped that he would be back on the air by the middle of December. Mike has been out in Thailand, and has evidently been a keen SWL whilst out there. He reports hearing the following UK stations on 7 Mc/s during the RSGB 7 Mc/s C.W. Contest, G2QT, G3APN, G3DYY, G3CEG, G3EYN, G3FM, G3NBP, G3TIR, G3TLK, G4OD, G4QD, G5DQ, G8PB. On s.s.b. G3FPQ, G3DYY, G3NAC, G3NRY, G3PEU, GI3CDF, GI3OQR, and GW3AX. These were all heard between 19.00 and 22.00 GMT. Ten metres has been opening, but the only European heard so far is DL7AA. An opening to Europe was suspected when the well-known voice of G6LX was heard, but it transpired that Ron was visiting VK3BM!

One of the more sought-after stations on 21 Mc/s recently has been **VK9PL**. Jim has sent along a picture of himself at the operating position, and says that he has been having a whale of a time with the European DX gang recently, although he has not heard quite as many UK signals as he would have wished. Apparently signals from Europe are reaching Papua regularly on 21 Mc/s between 09.00 and 12.00, sometimes at considerable signal strength; he hears the W's between 22.00 and 01.00 GMT. These times apply to the autumn and early winter months. At present he is confined to 21 Mc/s, although he is considering adding a 28 Mc/s element to his quad when he returns from leave in VK5 next February. His parting comment is that the higher frequency bands are like fishing—you never know quite what you are going to hook, and usually when you do get it, it's a whopper!

A recent conversation heard on 14 Mc/s s.s.b. illustrates the difficult nature of the English language. It ran like this: UB5 station (rather poor English) calls CQ. A 4X4 station with an American voice answers, and QSO continues as follows—UB5: " Station calling UB5, please your call-sign and handle OM." 4X4 gives the required information. Dead silence. 4X4 tries again several times. Suddenly the UB5 comes back with " Please your call-sign and handle." 4X4 again gives the information and says " What happened to you before? " UB5: " No OM, not UB4, call-sign here UB5 . . ." 4X4: " OK OM, I have your call-sign correct, but what happened to you before? . . . " UB5: " No, No, OM, this is UB5——, all stations UB5, no UB4. . . ."

In a letter to G3HCT, Tom Christian, **VR6TC**, says that he

F2MO operating 4U1ITU, the International Amateur Radio Club's station in Geneva.

* 10 Knightlow Road, Birmingham, 17.

Presentation of Foxhunt Trophies, left to right: VS6BJ, VS6FF, VS6FJ, VS6FO and VS6DS.

is building a 110 volt battery bank to enable him to store enough electricity from the diesel generator to come on the air more often. When he obtains a d.c./a.c. converter to go with the batteries he will come on the air at times when it is more likely that the band is open to Europe. At the moment his usual operating hours are 20.00 to 22.30 GMT every Monday, and at this time he has great difficulty in hearing signals from Europe through the QRM from the USA. He concluded his letter with the remark that the mail service from Pitcairn is very bad these days. Bob, W5OLG, has a Viking Ranger and a Heath Apache, both of which he is testing with a view to sending out to VR6TC by the middle of this year.

George, **ZD7IP,** has QSL problems. He bought up the entire stock of post cards on the island, and had them overprinted. Then he received a batch from home which enabled him to deal with the enormous demand. There is no air mail service, and ships arrive about every six weeks. It is not possible to answer a letter received from a calling boat by return, as the outgoing mail closes the night before the boat arrives. The only hope in this direction is a clandestine arrangement with a member of the crew. Owing to this delay, George frequently receives original and follow up QSL's in the same delivery. One time he received three letters from the same person—" one most polite, one slightly irate, and the third quite nasty." As it was then five weeks before he could send a reply off the island, he imagines that he was being written off as " another of those beastly types who never QSL." Keep an ear open on 3·5 and 1·8 Mc/s, as George is being supplied with crystals from the USA for these bands.

In an interesting letter from G3TA (**VP7TA**) some of the hardships caused by hurricane " Betsy " are described. Jack was over in VP7 early last year, working with the " Thunderball " film unit. He says that when the Telecommunications Dept. lost their microwave link equipment, VP7NS took over with his amateur gear and handled all the essential traffic himself. On returning home he found that his own beam had been ripped off its tower. There is a local club, the Bahamas Radio Society, which has a membership of 16, but not all are active. **VP7NQ,** who appears quite often on 7 and 14 Mc/s c.w. is particularly interested in having G contacts. **VP7NY** is suffering from YL QRM. **VP7NW** is a new arrival, and is G3HBN.

A review of 28 Mc/s at present, as seen from Singapore, comes from Bob, **9M4LP.** He operated on that band only during the *CQ* Worldwide Phone Contest, and worked all continents except North America. The band was open to South America and Africa even at midnight local time. The strongest signals heard from Europe came from DL7AA and G3NMH who were both S9 plus. A total of 34 countries were worked. Let us hope that *we* shall be seeing this kind of activity on ten soon.

1966 International Amateur Radio Convention

IARC have announced that this event will be held at Geneva between 21 August and 27 August. They hope that this will enable more amateurs to fit a visit to the Convention in with their summer holidays. During the week there will be informal get-togethers, fox hunts, operation of IARC stations, and visits to places of interest in the neighbourhood. The more formal proceedings include dinners and receptions, and addresses by well-known amateurs. The Headquarters will be the Intercontinental Hotel, Geneva, and the organizers advise early reservation of travel tickets and hotel accommodation. Last year's Convention was attended by amateurs from all over the world, and it is interesting to note that the Swiss authorities " jumped the gun " over reciprocal licensing by issuing temporary HB9 portable licences on the spot to a number of the overseas visitors, a very generous gesture of good will, and a happy augury for the future.

Top Band News

From **W1BB**'s news sheet comes news that the first of this season's **Transatlantic Tests,** on 5 December, coincided with some exceptionally good conditions. DL1FF, OKs, EI9J, EP2IW, PA0PN, HK4EB, ZB2AM, GI3PDN and many Gs took part. After 07.00 many contacts between Europe and W9/W0 took place with excellent signal strength. It is understood that many Gs made first time W/VE QSOs. Stew asks European amateurs to listen more often for Ws as quite often they are hearing our local ragchews clearly, but are unable to break in! It is announced that US military personnel in Japan have been authorized to operate on the spot frequency of 1910 kc/s with an input of 200 watts. Stew considers that conditions this year are better than expected,

This picture shows Cliff Corne, K9EAB, operating his station whilst in an iron lung. Cliff contracted polio in 1949, and remained in hospital until 1952, when he was discharged paralysed from the neck down. With the help of his parents Cliff tried a number of hobbies until his cousin, K9CDC, interested him in Amateur Radio. The wiggle in his right thumb was sufficient for him to operate a key and in 1955 he passed the Novice examination and three months later obtained a Conditional Licence. Since then he has been active on the DX bands taking part in contests, traffic handling and collecting awards. In the latter field he was awarded the first *US County Hunters' Award* for contacting all 3078 US counties. Cliff coloured a special replica of this award which was displayed at the recent International Radio Communications Exhibition and which will be shown on the RSGB stand at the *Daily Mail* Schoolboys' and Schoolgirls' Exhibition which commenced on 27 December, 1965.

Cliff may often be heard on the DX bands and frequently acts as M/C for the CHC Net which takes place daily on 14,075 kc/s. He would welcome hearing from any UK stations who would like to call in.

and may even turn out to be the best yet. He has worked 83 different DX stations in 16 countries so far this year, compared with 66 in 16 countries last year.

The next tests take place on **2** and **16 January**, and on **6** and **20 February**, commencing at 05.00 and finishing at 07.30 GMT. North American stations will call CQ during the first five minutes of each hour and during the third, fifth, etc., five minute periods. All other stations will call during the second, fourth, etc., five minute spells. East Coast W/VE stations may be found between 1800 and 1825 kc/s, West Coast between 1957 and 2000 kc/s, VKs between 1800 and 1860 kc/s, and Europe in the 1825 to 1830 kc/s sector. On 6 February there is the second " First Timer's " morning, when all those Europeans who have ever had a transatlantic QSO are asked to stay off. On the far side all the regulars will be on, listening hard, and trying to give as many as possible their first American contact. It is suggested that between 1823 and 1827 kc/s is the best place for the Europeans to be. On **9 January** and **6 March** there will be first timer's mornings for the US/Canadian boys—procedure in this case is reversed.

4U1ITU started the 1965/66 season on 13 November following the erection of a new dipole, by working W1BB/1, W1BU, W1HGT, VO1FB, ZB2AM, and some fifty Europeans. On this occasion the station was operated by Philo, HB9CM and Gerald G3OOH. Gunter, HB9UD, will also be one of the team during the winter. Gerald asks that all QSLs should be sent via the bureau, not direct with IRCs, as the paper work is considerable and they prefer to spend as much time as possible operating.

The owner of one of the outstanding transatlantic signals, **VO1FB,** confirms W1BB's opinion that conditions are good, and that the outlook for the winter is good.

In a most interesting letter, Bob, **9M4LP,** tells of his recent experiences on 160. On 12 November he heard DL1FF (RST 589) working G3RZI at 22.45. Unfortunately he could not hear G3RZI. At the same time next day G2PL and 4U1ITU were 479, a QSO with G2PL resulted. On the 18th a sked with G2FPQ produced a contact, David being RST489. The same time the next day he was 499! In view of the signal strength G3FPQ went on s.s.b. and was S8. Unfortunately the static crashes were so severe in Singapore that Bob could not resolve David's signal during his short transmission, and by the time he had made a short a.m. transmission in reply the band had faded out. Apparently this often happens quite suddenly about five minutes after its sunrise peak is reached. G3FPQ reports having heard VK5KO twice, and VK3BM several times, but no contacts have been made yet.

Owing to academic commitments, John Robson, G3PAI, will not be able to operate as **GC3PAI** during the *CQ 160 C.W. DX* Test on **29/30 January**. However, he hopes to be there for next year's event. As mentioned in an earlier *MOTA* the Gibraltar gang are hoping to activate one station during the contest.

The **CQ 160 Metre World Wide C.W. Contest** will take place between 02.00 GMT Saturday, 29 January and 14.00 Sunday, 30 January. The rules are identical to those of 1965. Logs may be sent either to *CQ Magazine, Attention 160 Contest*, or to **W2EQS**, the contest chairman. The last contest produced a good entry from UK stations and it is hoped by the organizers that the participation in the current event will be high.

Awards

The Amateur Radio Society of India, Western Zone, is sponsoring an attractive certificate in memory of the late Rev. R. Conesa, S.J., VU2SX, who was their founder. Applicants from Asia need to have worked 10 Western Zone VU stations; those in the rest of the world need only five. All contacts must have been made since 9 November 1957. There are no band or mode restrictions or endorsements. The Western Zone consists of the states of Maharashtra, Gujarat, and Kerala, and also includes the Laccadive Islands. There are nearly 90 amateurs listed as being in this area. QSL cards need not be sent, but a certified list signed by either another amateur or a club official, should be sent together with R 3.50 (in the case of Indian amateurs) or 6 IRCs, to: Awards Manager, Dady S. Major, VU2MD, Petit Mansion, 85 Sleater Road, Bombay 7, India.

VK9PL, Papua. See " News from Overseas."

OE1IU sends details of a new award to be obtained by contacting a number of Vienna districts. It is issued in two classes, Class 1 for contacts with all 23 Vienna districts, and Class 2 for contacts with at least 15 districts. All contacts must have been since 1 April, 1954. All bands and modes are accepted. Applications, consisting of GCR list and £1, or 8 IRCs, should be sent to OE1IU, Ernst Reisenauer, Vienna 16/107, PO Box 24, Austria. It is noted that the *Wien-Diplom* is also available to SWLs under the same conditions.

The *Diploma dell'Unita d'Italia* is being offered by the Turin section of ARI for contacts with at least 18 stations in different Italian regions, and one with Turin and province. On v.h.f. five regions are acceptable. Contacts must have been made since 27 March, 1961, and the requisite number of QSLs, which must not have any alterations on them, should be sent to: Associazione Radiotecnica Italiana, Casella Postale 250, Turin, Italy. This award is also available to SWLs. No mention of charge is made on the leaflet describing this award, copies of which may be obtained from G3FKM.

The Guayaquil Radio Club wishes to publicize its " W.HC " award, which it grants to any radio amateur who can produce evidence of having contacted a minimum of five of the HC1-HC8 districts. There is a de-luxe certificate available to those who have QSLs from all eight districts. five of the HC1-HC8 districts. There is a de-luxe certificate available to those who have QSLs from all eight districts. The certificate may be obtained by sending either the QSLs, or a certification by a radio club testifying that the required contacts have been made, to Guayaquil Radio Club, PO Box 5757, Guayaquil, Ecuador. There is no mention of a fee, but presumably return postage would be appreciated.

Information on current certificates and awards will be found in the **Directory of Certificates and Awards,** which deals with between 600 and 700 awards, both for the transmitting amateur and SWL. This volume is produced in loose leaf form, suitable for a three ring binder, by C. Evans, K6BX, and publication is quarterly from 1 January each year. Each issue is self contained, and amendments are not issued. Stocks of this book are not held to ensure that only current volumes are distributed, but orders for direct

delivery from K6BX may be placed with G2BVN. The non-profit cost per issue is 18s. 6d. post paid, with a binder costing a further 7s. 6d. if required.

DXCC News

It is reported that VP5, Turks and Caicos Islands, is shortly to be incorporated with the Bahamas for administrative purposes. Presumably this will lead to the deletion of this territory from the ARRL list.

The writer is pleased to say that QSL cards issued by W4ECI for the operations by **K7LMU** and **W9WNV** are being accepted by W1WPO although there is no mention of a contact having taken place!

DXpeditions

A great deal of speculation continues to take place concerning the next moves by Don and Chuck, W9WNV and K7LMU. At the time of writing Don was operating from **VR2EW**, and Chuck from **HS1ZZ.** It was reported that a ZL, possibly ZL2AWJ, would be joining W9WNV and that operation from VR5, ZK2, ZK1 (Manihiki), FW8, and other places would follow. No doubt by the time this is read the position will be a little clearer. The present need to monitor 14045 kc/s and the low end of the phone band every morning is causing quite a strain. The author has never heard so many "CQ DX Pacific" calls being made between 14,100 and 14,115 kc/s at breakfast time!

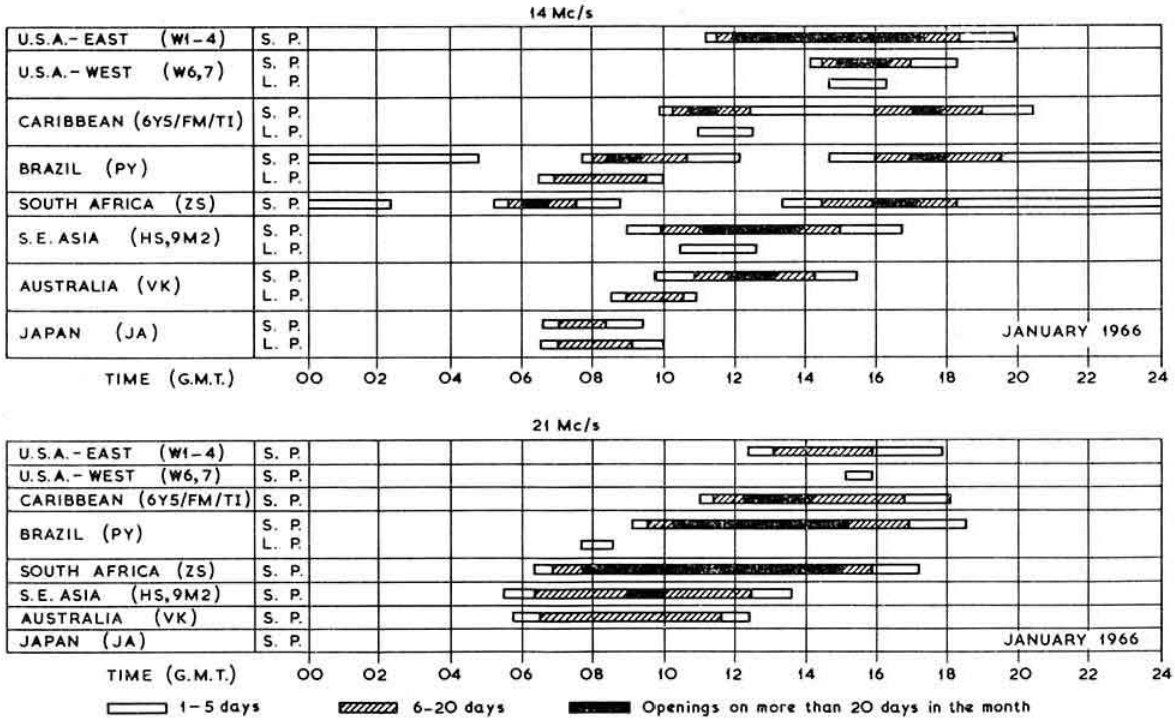
AWARDS

Information on current certificates and awards will be found in the *Directory of Certificates and Awards* which deals with between 600 and 700 awards, both for the transmitting amateur and the s.w.l. This volume is produced in loose leaf form, suitable for a three ring binder, by C. Evans, K6BX, and publication is quarterly from January 1 in each year. Each issue is self contained and amendments are not issued. Stocks of this book are not held to ensure that only current volumes are distributed, but orders for direct delivery from K6BX may be placed with **G2BVN.** The non-profit cost per issue is 18s. 6d. post paid, with a binder costing a further 7s. 6d. if required.

Further conjecture concerning the future movements of Iris and Lloyd Colvin suggests that they will be leaving Ebon shortly before Christmas for **Nauru,** where they will use the call **KG6SZ/VK9.** It is hoped that their signal from there will be better than the one from the last expedition (undertaken by VK3AHO), and indeed that they will have a stronger signal in Europe than they have had from Ebon.

The proposed trip to **Ifni** by EA7JQ has run into difficulties as some of the gear was having trouble clearing the Spanish customs. Anyone who has shared the writer's experience of trying to get a motor car spare part cleared by these gentle-

Propagation Predictions



During the month of January the propagation conditions will differ little from those of the previous month. Towards the end of January the h.f. bands may remain open a little longer in the evenings, otherwise the forecast for December again applies.

The provisional sunspot number for November was 15, with the period of greatest activity lying between the 1st and the 15th of the month. The predicted smoothed sunspot numbers for March, April and May are 27, 28 and 30 respectively.

QTH Corner

FK8BH	Box 637, Noumea, New Caledonia
FL8MC	via W7WLL, 9216 S. W. Fir Grove Lane, Portland 25, Oregon.
GB2USA	via G3UKI, or RSGB.
HL9KF	via W0GZZ, 4251 Janesville, Wichita, Kansas.
HV1CN	25 to 28 November only—via K9BPO, 207 Mandel Lane, Prospect Heights, Illinois.
K4JFA/KS4	Robert J. Fausett, Star Route B, Ellijay, Ga. USA.
W0YKD/KS4	via WA4PXP, 612 Ellison Avenue, New Smyrna Beach, Fla. USA.
KG6SZ/VK9	via YASME.
KX6SZ/Ebon	via YASME.
OA8V	PO Box 4492, Lima, Peru.
OD5EG	Box 4848 Beirut, Lebanon.
PJ5BC/BD	K0GZN, K. A. Bush, P.O. Box 184, Harper, Kansas.
PY9HL	PO Box 93, Corumba, Matto Grosso, Brazil.
PY7ACQ/0	PO Box 842, Recife, Pe, Brazil.
TU2AP	via DJ1LP, Werner Pentalsky, Im Suedfeld 4, 4812 Brackwede, Germany.
TY3ATB	W4PBD operation via Hammarlund.
TY3ATB	Regular operation via VE2ANK, Guy Reynolds, 95 Demontigny, Three Rivers West, Quebec, Canada.
TZ5H	via Hammarlund.
VK9RH	Box 97, Norfolk Island, South Pacific.
VP2SY	*CQ* Contest Operation—K1IMP, 51 Gulliver St, Milton, Mass. USA 02186.
VP3AA	Dave Packard, PO Box 337, Georgetown, British Guiana.
VP5RB	via W4RC, Box 322, Boca Raton, Florida.
VQ8BFA	via G8KS.
VR2EW	via W4ECI.
VR4CR	A. W. Carter, c/o Weather Centre, Honiara, British Solomon Is.
XE4 expedition,	via W2SAW, 466 Weaver Road, Webster, NY, USA 14581.
XT0H	via Hammarlund.
YA1AW	After 1 November, K5GOT, 106 North Munn St. Warren, Ark. USA.
ZD7RH	via G2IO, J. Lees, 17 Trevose Gardens, Sherwood, Nottingham.
ZD8RD	via W0MLY, Box 369, Perry, Iowa.
ZD8WZ	via W4TVQ, 4416 Fletcher Street, Panama City, Fla, USA 32401.
ZF1EM	6Y5EM, Edward Metcalf, Wingfield PO, Constant Spring, Jamaica.
ZS8G	PO Box 379, Maseru, Basutoland.
5R8AS	via W6ZPX, 2206 West Boulevard, Los Angeles 16, Calif.
5T7H	via Hammarlund.
7Q7PS	Peter Sandiford, Police Training School, PO Box 299, Limbe, Malawi.
9K2AX	G8AIU, J. F. Gentry, Gailey Vicarage, Stafford.
9L1HX	via VE4OX, 647 Academy Rd, Winnipeg 9, Manitoba.

QSL Managers

Hammarlund	Box 7388, GPO, New York, NY USA 10001.
W4ECI	3101 Fourth Avenue South, Birmingham, Ala., USA 53233.
YASME	Box 2025, Castro Valley, Calif, USA.

* * *

RSGB QSL Bureau, G2MI, Bromley, Kent.

men will realise just what this can mean. The call to be used is **EA9IC.**

A trip to **Soccoro Island** by a number of W2s was due to take place as this article was being written. Round the clock operation was promised for up to four days, using the call **XF5L**, on all bands 7 to 28 Mc/s c.w. and s.s.b. The participants were to be Elmer, K2LAF, Roger, WA2HOK, Floyd, WA2WVL, and Sax, W2SAW, to whom QSLs should be sent. (See *QTH Corner*.)

DX Briefs

ZD7RH is now active from St. Helena. He is G3FNF, and he is using a KW2000 transceiver, and aerials including a TA33 beam, G5RV, and Joystick. QSLs should be sent to G2IO, who will despatch cards as soon as logs arrive. Please be patient, the mail service from ZD7 is very erratic. QTH in *QTH Corner*.

According to ZL2GX, there will soon be a new station on from Campbell Island in the person of Peter, **ZL4CH.** He is expected to be active on 14 Mc/s s.s.b.

6Y5EM was issued with the first and only ZF1 call on 6 November, and operated for a few days from the Cayman Islands with the call **ZF1EM.** He was on 14 Mc/s s.s.b., but heard no Europeans. He hopes to operate from there fairly frequently in the near future.

9M4JW, who expects to be in Singapore for another year and a half, has obtained permission to operate from **Brunei.** He hoped to be there in the latter part of December.

French Somaliland. It is reported that VS9AWR expects to be operating for one week during January, using s.s.b.

8J1RL/MM has been en route to Antarctica and should have arrived on 26 December. He will be active until mid February on c.w. and s.s.b. from the Japanese base at Showa.

Latest news of the proposed s.s.b operation from South Georgia is that the Hammarlund gear has again missed the boat from Montevideo.

LA4FG/P is now active from Spitzbergen on 14 Mc/s c.w., and it is said that he is hoping to have a s.s.b. transmitter soon.

The current activity on Swan Island by **W0YKD/KS4,** who has a Globe Scout, and seems to be confined to 14,334 kc/s a.m. phone, is causing interest over here. He has been heard working c.w. stations, but it is not certain that he is able to operate on c.w. himself. His a.m. appears to have a very low level of modulation.

A new station on Tristan da Cunha, **ZD9BE,** is reported on 14,045 c.w. at 17.00 GMT.

Band Activities

In spite of the gradual onset of mid-winter conditions, there has been no lack of DX on any band. This is illustrated by the fact that VK has been heard on all bands, 160 to 10m, at some time during the month. Although the h.f. bands have been closing in the late afternoon, the l.f. bands have been available, and have contained a considerable amount of real DX for those hardy types who can copy through Radio Pakistan, and all the other illegal intruders. The occurrence of a world wide contest makes it obvious that there are openings to areas at times unsuspected normally as there is no activity at these times. An example was supplied by VR2EW, who as audible on 7 Mc/s at 07.30 and also at 14.30. There was a very good opening of 3·5 Mc/s to the USA on the Sunday morning of the *CQ Contest*, when the West Coast was being worked with no great difficulty between 08.00 and 09.00, and the East Coast was stilll audible at nearly 11.00 GMT.

The strange goings-on in the Marshall Islands still remain unexplained. Pending an official explanation of the true status of Ebon Atoll, and of the legality or otherwise of the two expeditions who are alleged to have been operating there, your scribe prefers to reserve his judgment! However, it seems a little odd that Ebon should count as anything other than KX6 unless it does in fact belong to Ecuador, in which case it is difficult to see how it could be administered by the KX6 authorities.

Our trusty friend Gus, W4BPD, finished his latest long expedition, and should by now be back home. He terminated his trip in a blaze of glory from 5T7, XT0, and TZ. It is quite extraordinary how he has managed to keep churning out so many thousands of QSOs throughout his trip, has worked everyone without fear or favour, and has even spent half his nights on the l.f. bands, just to give us all new countries on 40 and 80m. The writer has spent many hours listening to (and calling) Gus, and has never heard him lose his temper or say an unkind word. Truly one of the greatest amateurs. We look forward to his next trip!

There has been no further response to the suggestion that

this column should run a QRP section, which is rather disappointing. We all know what the big signals can do, but it would be very revealing to hear just what can be done with low power and perseverance. The number of reporters also shows a sharp falling off this month, a number of previously regular contributors having failed to deliver the goods. Let us hope that this is merely a temporary absence due to pressure of Christmas shopping etc. The writer cannot recall crossing swords with any of the absent ones! Grateful thanks to the following who did send in some excellent reports: G2BOZ, G2LB, G3FPQ, G3HCT, G3HDA, G3JVJ, G3SML, G3UOL, G4MJ, G8JM, BRS20317, BRS26928, A3699, and A4489.

1·8 Mc/s C.W.: F5DP (00.00), SP9LP (00.01), VO1FB (23.50), VP9EU (05.40), W4KFC (06.45), ZB2AM (00.48), 4U1ITU (17.50), 6Y5XG (05.40), 9M4LP (22.45).

3·5 Mc/s C.W.: CM2BL (09.00), EP2BQ (18.05), ET3USA (01.00), HI3PC (08.30), HP1IE (08.05), KP4BBN (08.00), W1FZJ/KP4, (09.56), PY5XQ (07.30), UA9s in Zone 18 (15.40 to 23.50), UD6KZZ (16.10), UI8KAF (19.45), UJ8KAA (18.00), UL7s from 16.00 to 24.00, VE2NI (09.24), VK5NQ (19.14), VP2SY (07.00), VP9EU (23.00), K1AI (20.45), K2GL (10.47), YV9AA (24.00), 5T7H (02.15), 6Y5BB (07.10), 7G1A (22.40).

3·5 Mc/s S.S.B.: CN8AW (22.35), HS1WL (21.13), MP4TBO (22.30), OH0NI (20.45), VO1FX/GW/OW/CF (21.54), VS9AFR (23.00), ZL4LM (07.45), 5T7H (01.30), 9M4LP (23.00).

7 Mc/s C.W.: CE1ED (00.20), CO6PP (23.30), CR6DA (20.30), ET3USA (23.30), HI8RVD (23.40), HM1BB (12.32), JA1AEA, 2DN, 3EGW, 6AK etc, (between 11.15 and 21.30), KR6DB and DI (14.15), KR6MM (19.35), KX6BQ (08.35), UA0KKB, KKC, KFG, PY, (between 11.15 and 21.30), VP2KJ (23.55), VP5AR (07.20), VQ9TC (23.30), VR2EW (14.30), VS6FF (14.50), VS9ADF (18.25), W6RW (12.19), ZD7IP (21.40 to 23.30), ZD8AR (06.30), ZL2AWJ (17.45), ZL4BO (14.30), 5VZ8CM (23.45), 9K2AD (14.48).

7 Mc/s S.S.B.: EP2BU (21.47), HS1WL (20.00), VK2AVA (19.15), 9M4LP (20.00),

14 Mc/s C.W.: BV1USA (08.15), CR3AD (09.45), CR8CA (07.55), FB8XX (15.00), FR7ZG (14.30), FU8AG (08.20), HZ1BC (07.05), KX6SZ (07.31), KX6SZ/Ebon (08.25), PY7ACQ/Fernando de Noronha (17.55), TY3ATB (17.45), VP8HX (Antarctica) (20.30), VR2EW (05.10), YJ1DL (07.50), ZD7IP (08.15), ZD8RD (01.10), ZD9BE (17.45), W9WNV/ZM7 (08.17), 5T7H (09.10).

14 Mc/s S.S.B.: FK8AC/AZ/BB/BG/BH/AT (07.50-10.45), FL8AA (18.50), FR7ZD (15.15), FY7YL (09.50), HK0AI (15.30), HK0QA (17.13), HM2BD (08.10), HM5BF (08.39), HR1JMF (13.20), HR1MD (13.00), KC6CB (08.43), KC6FM (08.04), W6IBU/KG6 (Guam) (10.55), WA4QKY/KG6 (Iwo), (09.38), KG6SB (08.07), KM6CE (08.00), KS6BR (07.58), KX6AO (07.58), KX6CD (07.15), KX6SZ/Ebon (08.10), PY7ACQ/F, de N. (08.10), TY3ATB (08.00), UA0YE (07.33), UA0YP (08.44), VK9GN (T.N.G.), (09.12), VP1PV (17.10), VP1JKR (17.53), VP3YG (10.15), ZD7RH (08.00), ZL3DX (21.00-over S. Pole), W9WNV/ZM7 (08.40-12.40), 5VZ8CM (08.30), 9Y4RS (11.00).

14 Mc/s A.M.: FB8WW (often around 16.30), W0YKD/KS4 (13.50-18.00).

21 Mc/s C.W.: CE1AD (16.33), CR4DB (12.50), CR6HH (09.55), CR7IZ (15.15), FL8MC (14.57), FR7ZD (13.15), HC2SB (16.15), HI8XAL (13.42), HK3RQ (16.30), JA3API (12.40), TT8AE (12.10), TY3ATB (09.08), VK6RH (12.45), VK7SM (10.30), VQ8AW (12.39), VS6FF (08.15), VS6FO (09.37), VS9AMD (08.15), VS9OSC (10.57), XE1OE (15.00), XW8BD (08.50), YV9AA (16.00), ZD5M (08.00), ZD7IP (11.25), ZD8AR (07.50), ZE3JJ (09.15), ZL1HY (07.15 L.P.), ZL4BO (09.32 S.P.), 5R8AS (15.30), 5R8CQ (10.30), 7G1A (12.55), 7X2AH (11.32), 9K2AD (10.35), 9L1TL (08.05), 9M4MY (09.35).

21 Mc/s S.S.B.: JA2CWX (09.45), KG4CQ (14.05), KR6DJ (09.10), KV4CX (12.49), MP4TBO (10.20-13.45), VK4RO (10.00), VK9PL (Papua) (10.25), XE1CCW (15.43), XW8AZ (11.00), ZD7RH (12.15), ZL2BCG (08.40), ZS6AOU (12.11), 9N1MM (09.00), 9M8RO (10.25).

28 Mc/s A.M.: CR7DF (14.34), CX2CN (15.35), ZE2JF (10.50), ZS6AYG (10.21), 9H1HE (11.00), 9J2VX (10.15).

28 Mc/s S.S.B.: TL8SW (11.40), VK3ATN (09.07).

Commonwealth Call Areas Table

	1·8	3·5	7	14	21	28 Mc/s	Total
G3KSH	—	26	33	92	37	—	188
5N2AAF	—	6	14	65	43	16	144
G8JM	4	—	3	88	35	4	134
VO1FB	12	18	16	55	20	6	127
G3DYY	—	9	31	55	19	7	121
G3LHJ	4	5	9	32	34	7	92
G3AAE	—	—	7	57	26	1	91
G3UKI	7	7	9	11	13	1	48
G3JVJ	7	10	15	12	1	1	45
A3633	9	9	18	78	29	8	148
A4038	3	8	8	69	34	16	138
A4452	—	2	—	58	64	12	136
A2498	2	8	10	76	29	7	132
A4048	5	13	9	63	30	3	123
A4431	3	8	6	53	38	5	113
A4311	1	10	2	72	20	5	111
A2340	6	13	22	51	18	1	111
A3699	6	11	14	44	29	7	111
A3942	5	16	34	45	8	—	108
A3902	4	15	5	45	26	11	106
A4431	3	8	4	41	34	1	91
A4391	4	6	2	32	20	4	68

Next month's *MOTA* will contain the final table. It is hoped to run a similar competition this year, but scoring DXCC countries instead of Commonwealth prefixes. It is proposed to alter the listing so that calls will appear in order of scores on different bands each month, totals to start from 1 January, 1966.

* * *

The writer would like to finish by wishing all readers a very happy and successful New Year, and as one DXer to another to congratulate Steve, G2BVN, on his appointment as President of the Society in 1966.

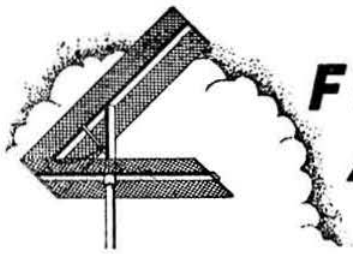
Correspondents are thanked for their co-operation, and acknowledgment is made to the *West Gulf DX Club Bulletin* (W5IEJ), the *LIDXA Bulletin* (W2FGD/W2MES), *DX'press* (PA0FX), *The DX'er* (Northern California DX Club), and the *Florida DX Report* (Florida DX Club). Please send all items to RSGB Headquarters to arrive not later than 12 January for the February issue, and 4 February for the March issue.

QSL Bureau

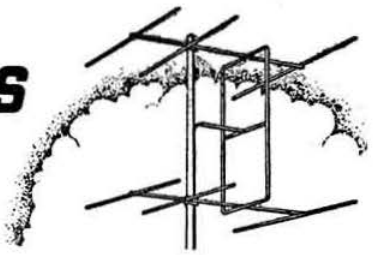
The RSGB QSL Manager, Mr A. O. Milne, G2MI, is holding a large quantity of cards for 7Q7EX and VS9AJR which are awaiting collection. The address of the QSL Bureau is G2MI, Bromley, Kent.

Broadstairs Publicity Tour

G3RAD and his wife will be travelling with the vehicle making the Broadstairs 1966 Publicity Tour. He will be taking a 160m transmitter, and hopes to make several local QSOs on the journey. QSL cards may be collected at the following sites: 17 January, Luton; 18th, Watford; 19th, Edgware; 20th, Enfield; 21st, Harrow; and the 22nd, High Wycombe.



FOUR METRES AND DOWN



By F. G. LAMBETH, G2AIW*

SUCCESSFUL and enjoyable operation in the 144-146 Mc/s spectrum calls for the performance of two mechanical operations. One of them is rotating the receiver tuning control, the other rotating the beam aerial.

Because the 2m band is 2 Mc/s wide, any receiver tuning knob will require an unconscionable number of turns to cover the whole band. For example, the widely used BC348 needs no less than 66 turns at the popular 4 to 6 Mc/s intermediate frequency; while even the little BC454, much used in portable and mobile applications, covers 4 to 6 Mc/s in as many as 18 rotations.

If a northern station, say, can expect to find a southern station anywhere within the 2 Mc/s span of the band, he is going to have to tune the whole of it. But if he can expect the wanted station to be in *a certain part* of the band, he will need to tune over that area only. Tuning at the receiving end is quick. Calling from the sending end is short.

Why not, thought G3CYY a decade and a half ago, suggest that stations should voluntarily group themselves into geographical areas so that everyone knows where to look if he wishes to work into a particular region?

Another advantage flowing from this proposal was that beam aerials could be pointed precisely at the desired region while the operator was searching its frequency limits. Random turning of the beam, compulsory if stations are scattered willy-nilly all over the band, would be obviated.

The G3CYY Two Metre Band Plan, initially publicized by *The Short Wave Magazine*, gained almost universal acceptance, and has continued to this day basically unchanged except for some detailed modifications which the licensing authority requested the RSGB to make some years ago.

In probably no other field of Amateur Radio activity does there exist a comparable example of voluntary self-discipline. In consequence, 2m has proved to be one of the most enjoyable and ' civilized ' bands on which anyone could work.

Three Factors

Just lately three developments have occurred to disturb the tranquility of the existing scene, two of them man-made and the third natural.

One was the arrival of active satellites, and the need for 2m operators to transmit at the l.f. end of the band if they were to use them.

The second was single sideband, valuable for working people beyond the local zone simply because its DX potentialities are so good. Rather than allocate an s.s.b. sub-zone in every *geographical* zone, the sensible thing to do seemed to be to place sideband at the junction of two populous zones and as near as possible to the middle of the band. Self discipline by the 2m sidebanders has already ensured that this arrangement works admirably.

The third " development," if it can be called that, is the natural phenomenon of 2m DX openings of unprecedented magnitude which have been occurring in the last few years—or seem to be occurring, for the fact is that thanks to technical advancement in equipments now in use, the effective range of any v.h.f. band is much greater than it was 10—even five—years ago.

What became evident during these openings was Continental operators' tendency to tune from the low-frequency end of the band up.

This was discouraging to northern stations at the high frequency end. The temptation to " jump zone " to the low end to call the choice DX was great.

Reappraisal

All these considerations suggested that some reappraisal of the band plan might be timely. Members were invited through the BULLETIN to submit their comments. Visitors to the last Communications Exhibition were asked to do the same on a simple questionnaire they could get from the RSGB stand.

Thanks to some diligent homework by Tom Gladwin, G3UFA, who processed the results (and to whom go the grateful thanks of the V.H.F. Committee), the following illuminating facts emerge:

That 158 members responded, nearly all of them well-known users of the 2m band, and that the breakdown of their opinions on the Two Metre Band Plan was as follows:

1. No change	45	(26·9%)
2. Retain existing Plan but permit out of zone operating during European DX conditions	33	(19·8%)
3. Abandon all plans	25	(15·0%)
4. Retain a geographically formulated plan with free zones at each end	45	(26·9%)
5. Formulate a new Plan according to mode	19	(11·4%)

Thus it can be said that 85 per cent of opinion favoured some form of band planning and more specifically that 7 per cent favoured a plan based on a geographic formula.

These results afford a most useful jumping-off point for further consideration of the 2m band plan—but as this consideration is unlikely to occur until the 1966 V.H.F. Committee is convened members still have time to offer further comment. This they are cordially invited to do.

What You Said About the Band Plan

" The distribution of frequency according to number of resident licences seems a fair formula."

" Let us get more flexibility into our outlook. We have become rockbound! "

" By the way, if you are thinking of planning four, DON'T."

" Why change it? The EDX stations have learned it is occupied right up to 146 Mc/s."

" Please keep the s.s.b. portion at 145·1-145·2."

" Suggest s.s.b. boys are parked at one end, not slap in the middle."

" For contests insist on band plan frequencies to be stated on entry form."

" Use v.f.o. and single channel working for all ragchewing QSOs."

* 21 Bridge Way, Whitton, Twickenham, Middlesex. The closing date for the February issue is January 7.

" Many continental stations use our bandplan as a means of restricting their tuning range."

Silent Watchers on " Four "

Did you know that all over the country highly organized groups of licensed amateurs keep a virtually permanent listening watch on 70·375 Mc/s ± 25 kc/s?

Yes, you have guessed right; the group is the Radio Amateur Emergency Network, and the frequency they continuously monitor is the one given official blessing and sanction by being written into the GPO licence.

Whenever a signal pops up on 70·375 Mc/s every RAEN receiver within range responds. Many are fitted with mute circuits which open when a signal appears, and summon their operators to attention.

Always when this happens there is a chance that this will be The Real Thing (it's happened before). Perhaps disaster has struck. Perhaps emergency communication facilities are wanted. Perhaps it is " just another practice," most important for keeping *any* signalling network on the *qui vive*.

Yet perhaps it is some non-participating 4m operator who has strayed on to 70·375 Mc/s quite without intent, and who would never have dreamed of occupying it. Perhaps he puts out a CQ on the frequency and then tunes the entire 600 kc/s of the 4m band oblivious of the concern he has caused on the spot frequency.

The corollary is obvious; keep clear of 70·375 Mc/s. And if you have a crystal for that channel list it in " Crystal Exchange" in "Four Metres and Down." An RAEN member somewhere may be glad of it.

Keep it, of course, if you want to join RAEN yourself, which is not at all a bad idea.

" Why Doesn't He QSL? "

The advent of the first G8-plus-three call-signs in the honour roll of those who have achieved the " Four Metres and Down " certificate suggest a word or two about the QSL situation.

Without submission of QSL cards from the requisite number of counties and countries an operator cannot place a claim for one of these certificates with the V.H.F. Committee.

In particular, one or two of the rarer counties worked on the 70cm band during the last autumnal openings should have produced useful cards towards the coveted 20 which claimants need—but unfortunately they didn't.

Remembering that the RSGB " Four Metres and Down " awards are the most sought after of any by the v.h.f. fraternity—and remembering that " it's cards that count "—will *you* make a point always to send a QSL when requested over the air, and to answer every one received? It's only common courtesy anyway.

V.H.F./U.H.F. BEACON STATIONS

Call-sign	Location	Nominal Frequency	Emission	Aerial Direction
GB3CTC	Redruth, Cornwall	144·10 Mc/s	A1	North-East
GB3VHF	Wrotham, Kent	144·50 Mc/s	A1	North-West
GB3LER	Lerwick	145·996 Mc/s	A1	S
GB3LER	Lerwick	70·305 Mc/s	A1	N/S
GB3LER	Lerwick	29·005 Mc/s	A1	N/S

RSGB V.H.F. BEACON STATION GB3VHF

The frequency of the Society's v.h.f. beacon transmitter at Wrotham, Kent, when measured by the BBC Frequency Checking Station, was as follows (nominal frequency 144·50 Mc/s):

Date	Time	Error
16 November	17.06 GMT	470 c/s high
22 November	17.25 GMT	400 c/s high
30 November	13.16 GMT	400 c/s high
7 December	16.08 GMT	368 c/s high
14 December	16.18 GMT	250 c/s high

Four Metres

G2WS comments that activity is very slight around Coventry and no locals were heard during the recent c.w. contest. The band plan put forward in the December BULLETIN leaves G2WS puzzled and dismayed: (i) The Midlands seemingly have no allocation and are expected to operate here and there in the " wide open spaces." (ii) If 70·45 to 70·62 (about a quarter of the band) is to be free, what is it to be free *for*? The same applies to Zones B and D, except for RAEN and mobile. (iii) Until there is more activity on this band, he hardly thinks members should be asked to buy special crystals, etc. The QRM comes from TV and other unwelcome sources, not from other amateurs.

GM3MXN (Larkhall) joined in the 70Mc/s C.W. Contest, only to find that he seemed to be the only GM on the band on c.w. After calling CQ and listening for 5½ hours he finally gave up and worked the locals on phone. There seems to be no interest in a c.w. contest in Scotland, yet there is quite an interest in the band. To emphasize this, GM3MXN sends a list of known active c.w. stations: GM3HLQ, GM3NRP, GM3NKG, GM3OCV, GM3JJN, GM3GUI, GM3OTF, GM3OJA, GM4HX, GM3EGW, GM3OQI, GM2BRA, GM3KGJ, GM2UU, GM2CHN, GM3FMD, GM3FNF, GM3LAW, GM3GPK, GM3JRP, GM3OFT, GM3OBC.

It is very surprising to note that there are many active 4m stations in the Exeter area. The following list of frequencies was supplied by **G3LMT.**

G2FP 70·17Mc/s, G2FCI 70·26 Mc/s, G3JW 70·2 Mc/s, G3EFY 70·42 Mc/s, G3FHG 70·16 Mc/s, G3FHG/M 70·26 Mc/s, G3HTA 70·2, 70·35 Mc/s, G3HTA/M, G3IYG 70·19 Mc/s, G3LMT 70·19 Mc/s, G3NFT/M 70·32 Mc/s, G3RUV 70·26 Mc/s, G3SKL 70·38 Mc/s, G3TJW 70·21 Mc/s.

Two Metres

G3THC (Wolverton) now has a new aerial system: two 10 element Yagis at 52 ft. which is working out much better than the previous 6-over-6. DX worked with the new beam includes OZ9OT and OZ4EV.

F8DO (Lyons) had a QSO with UA1DZ (Leningrad) on 17 November by meteor scatter.

Seventy Centimetres

G8AIH (Newent) commenced operation on 27 May last and between then and the middle of November, with 27 watts and a 10 element Yagi at 25 ft., worked G8DV (Cheltenham) and no one else! A new tripler p.a. with a QQV06/40A and 40 W input, with a borrowed G2DD converter, led to QSOs during the contest on 14 November with G8ACB (Wolverhampton) and G3HAZ/P (Redditch) and again no one else; he concludes that the QTH is useless for v.h.f./u.h.f. If anyone else heard him, he would like to know!

A further letter says that after the addition of a pair of A2521s (lent by G8ACB and G6FK) to the borrowed G2DD converter, both these stations have been heard and worked, as also have G8DV, G8ACT and G3HAZ. All this is with a completely home built transmitter—6J6, 832, QQV03/20A, QQV06/40A tripler and QQV06/40A p.a. This runs at 40 watts input, but the output needs some improvement. Operation is on 432·1 Mc/s. G8AIH comments on different people's adherence and non-adherence to the band plan, citing the difficulty of obtaining suitable crystals by those forced to use the surplus market. However, we must consider the fact that these band-plans are genuine efforts to secure the proper use of the frequencies in the interests of all, and also to make it easier to determine where to find your DX signals. A little effort to conform can help everyone,

including oneself. G8AIH is looking for skeds and his QTH is in the *Call Book*. He also asks if anyone has thought of cross-band activity between 70cm and 2m. This has, of course, been known, but not lately. It used to be a good standby—but 70cm seems to stand well on its own now.

G8AKN (Denton, Manchester) says he is not yet on the active list as he is still building, and points out that his mention in the 70cm list, on 432·42 Mc/s, is a mistake.

G2WS (Coventry), during a spell of the doldrums for v.h.f./u.h.f., says that the " regulars " of his area appear to have gone into hibernation, but the recent G8 – – –s have saved the situation. It is, in fact, a treat to come on 70cm any evening and to be sure of hearing some signals. The most constant and energetic stations noted by G2WS are G8AGS (Halesowen) and G8ABP (Yardley) who are extremely strong.

Twenty-three Centimetres

G2WS has completed a converter and is now at work on a tripler for the 70cm transmitter, using a 3CX100/A5.

G3NBQ (Coventry) cannot agree about the "axes which need grinding" comment by G3HWR in the November BULLETIN. It seems to be the general practice, at present, on 23cm to use the band 1296/1300 Mc/s with activity centred around 1298 Mc/s. Surely this 4 Mc/s band is not too wide for most receivers, and in any case, if the receiver only covers 2 Mc/s it simply means using two crystals in the converter. Whilst he realized that 1296/1298 Mc/s is the IARU Region I recommendation, how can operation in the above 4 Mc/s band possibly give rise to technological difficulties? What is the difference between a converter designed for 1296/8 Mc/s and one designed for 1296/1300 Mc/s apart from the i.f. bandwidth? The performance must be equal in terms of images, sensitivity, etc. G3NBQ's experience is that most stations have channels in both parts of the band and can tune at least 4 Mc/s. G3KEF lives only a few hundred yards from G3NBQ and QRM is inevitably a problem. They have both found it necessary to operate outside the band plan so that they do not QRM occupied parts of the band. This is the explanation for their insularity.

General Notes

G3SHZ writes on behalf of the GB2GC expedition group, that they will be returning to the island of Alderney, Channel Islands, again this year for roughly the same period as the last expedition. More gear (more reliable) will be available by then and they hope especially to have the equipment to make greater success on 70cm and 23cm. Bands to be worked will be 4m, 2m, 70cm and 23cm.

During the GB2GC expedition to Alderney last August-September the party (G3HBW, G3OUF, G3PIJ, G3POI, G3PSH, G3SHK, G3SHZ, G3SIT, G3TUX, G8AJU and G8AKO) had 154 contacts on 4m, 413 on 2m and 31 on 70 cm. An attempt on 23cm failed, although their equipment was working 100 per cent. Conditions during their stay were quite flat, their best DX being two contacts with the GM3RUF/P group.

During the Easter weekend of 8-11 April, 1966 the South African Relay League is holding their first V.H.F. Convention in conjunction with their Annual General Meeting. This will be held in East London. The Convention will be organized by the East London Branch of SARL and *Radio ZS* magazine.

IARU Notes

The IARU Region I V.H.F. Working Group met in Brussels on 13-14 November. RSGB was represented by V.H.F. Manager, Ray Hills, G3HRH, and the writer was present as Hon. Secretary of the Group. The major decision reached in principle was to sponsor the transponder equipment developed by DJ4ZC as the gear for inclusion in the *EUOSCAR* European Satellite which is being prepared for launching as soon as the necessary arrangements can be made. DJ4ZC was also there and explained the apparatus, the prototype of which has been successfully balloon-launched from Holland and Germany, under the name *ARTOB*.

The V.H.F. Working Group has formed a sub-committee consisting of DL1LS, G3HRH and DJ4ZC with G2AIW as co-ordinating secretary, to continue with the *EUOSCAR* project as proposed by DJ4ZC.

The matters of a sub-band for s.s.b. on 2m will be discussed at Opatija, as also will band plan reorganization generally.

As regards Committee " B " at Opatija we have received the following note from G6CL:

"The Chairman of the Executive Committee Mr H. A. Laett has decided that ' Committee B-Technical ' shall be renamed ' Committee B- V.H.F.', including miscellaneous questions assigned to it by the Plenary Assembly."

This matter was also discussed with Mr Laett at the Brussels Meeting.

The matter of contacts via active satellites was also discussed, and was referred to Opatija in order to give Societies a chance to form considered opinions on this question. Another question, that of meteor scatter QSOs which extended over long periods, was discussed and it was eventually agreed that provided the QSO is completed during the same shower in which it commences, it shall be accepted as a valid QSO. The original motion, from RSGB, calling for completion within 24 hours, was lost, 2 for, 7 against.

It was agreed that V.H.F. Managers should agree with their subworkers a provisional sub-division of the amateur s.h.f. allocation with a view to agreeing this at Opatija. A new QRA locator map was produced by HB9RG and is hoped to be ready this year.

The question of quick results for the September IARU V.H.F. Contests was raised and it was agreed to endeavour to produce the official first three in each Section by 31 December of the year in which the Contest is held.

F9ND reported that ARI (Italy) is proposing to donate two silver cups (one for fixed, and one for portable 70cm) for the September Contest, and this offer was accepted with thanks.

DL3FM resigned as Chairman of the Group and Committee, as he is no longer the V.H.F. Manager of DARC, and Kees van Dijk, PA0QC, was elected the new Chairman.

News from Abroad

France

Meteor Scatter and Moonbounce. F9ND reports that **F8DO**, a meteor scatter pioneer over there has worked UR2CQ for the first F/UR contact on 17 November, 1965. From August, 1964 F8DO had worked SP5FM, YU1EXY, HG5KBP, UP2ON, SM6CSO and DM2BEL making the number of countries worked by m.s. a total of seven. This includes five French " firsts."

F8DO is also very interested in moonbounce and has built a 1 kW 70 cm transmitter with the aid of F1BE. F8DO, F1BF and F1HR are all ready for OSCAR and *ARTOB* tests.

Holland

The writer recently had a personal QSO with PA0LQ (Leiden) who says he is second operator of the VERON station PA0AA (Sassenheim). The chief operator is PA0YZ. This station at present runs only 50 watts, but a new transmitter is being built and will be on the air in the spring. This runs 300 watts phone and 500 watts c.w., and the final will be a pair of 4X250Bs with anode and screen modulated. The

frequency is 145·14 Mc/s and transmissions take place every Friday evening at 19.00 GMT. The 50 watt station will run until the new one comes into operation.

At a time when home activity is at a minimum (blame the conditions after all the openings), it is interesting to hear from 6Y5FH (ex BRS21476) that v.h.f. activity in Jamaica is also very low, but for a very different reason—there only appears to be one other v.h.f. enthusiast within range! The 2m band there is 145-147 Mc/s, and since 6Y5FH has been active from the beginning of 1965, he has only had one QSO (with 6Y5RD) which they claim as the first 6Y5 QSO on 2m.

Increased interest is being shown however, and they hope to add another station before long. The 50-54 Mc/s band is also available, but is not used much at present. 6Y5FH has mobile as well as fixed station equipment for this band, and is working out arrangements to use 52 Mc/s as an emergency network. Despite sporadic *E* on this band, with W4/5 often heard, there have been no QSOs as yet.

Contest Notes

The Contests Committee has asked us to remind readers that the 144 Mc/s C.W. Contest will take place on Sunday, 30 January.

The Fifth Jubilee v.h.f. contest of Serbian Radio Amateurs, under the auspices of SRJ commenced on 27-28 November. It will be continued each Sunday up to 27 February from 08.00-12.00 hours (Middle European time). The third period will be held on 5/6 March from 19.00 hours to 19.00 hours (MET). All v.h.f. bands and types of emission may be used and logs should be sent to: Savez Radio Amatera, Srbije, PO Box 64, Belgrade, not later than 20 March, 1966.

The OH-award for v.h.f. is announced by SRAL. 150 pionts at 1 point per full 10 km of distance, are required for contacts with Finnish stations to gain this certificate, which is free to foreign applicants.

Region I V.H.F Contest 1964

At the IARU Region I V.H.F. Working Group meeting at Brussels on November 12, ON4TQ announced the results of the IARU Region I V.H.F./U.H.F. Contest held on September 5/6, 1964.

The first three places in each section are as follows:

Call-sign		Scores (points)	Call-sign		Scores (points)
Section 1			*Section 4*		
1 SM7ZN/7	—	25502	1 OK1AHO/P	—	3215
2 SM7BZX	—	24621	2 OK1SO/P	—	2955
3 F9NJ	—	24146	3 OK1VBN/P	—	2577
Section 2			*Section 5*		
1 OK1DE/P	—	36842	1 HB9SV	—	473
2 G3OHF/P	—	34801	2 I1ER	—	93
3 DL6TU/P	—	34138			
Section 3			*Section 6*		
1 OK1KKD	—	1724	1 I1BOC/P	—	786
2 HB9SV	—	1417	2 HB9LG/P	—	295
3 OZ9AC	—	1370			

Only three British Stations are mentioned in the results, namely:

(Section 2)
G3OHF/P (2nd with 34801 points)
GW3KMT/P (13th with 24200 points)
G2DHV/P (201st with 1017 points)

UBA received 618 contest logs plus 73 check logs from 14 countries.

PROJECT OSCAR

By W. H. ALLEN, M.B.E., G2UJ*

OSCAR IV was not launched on 2 December as planned owing to the requirements of the *Gemini* programme which took pride of place at Cape Kennedy. The next date in prospect was 21 December or failing that, around 6 January, 1966.

The new satellite will, as previously intimated, be launched into a near-synchronous orbit along the equator at a height of 18,200 *nautical* miles and will have an eastward drift of 28·53° every 24 hours and remain within radio range of a given station situated within the limits 81° North or South latitude for approximately four days at a time.

Oscar IV will be spin-stabilized, turning at about 33 r.p.m., and should be activated over the Galapagos Islands between 20.00 and 03.00 GMT or approximately six hours after launch.

At the time of writing the article in the December BULLETIN it was not known which of the four pieces of electronic equipment being developed would, in fact, find a place in the satellite, but it is now known that the first on the list has been chosen—a linear translator constructed by the TRW Radio Club of the Thompson-Ramo-Woolridge Corporation of Redondo, California, in conjunction with Project Oscar. John Chambers, W6NLZ, is project manager.

The package will be a 27 in. cube weighing 35 lb. and have solar cells on its outer surface. The input centre frequency of the translator will be 144·1 Mc/s with output on 431·972 Mc/s with a passband of 10 kc/s and peak power output of 3 watts. A beacon will operate on 431·962 Mc/s. The translator output will be gated by the beacon signal about once every 10 minutes for a period of 32 seconds to include 12 seconds of peak c.w. carrier followed by one " HI," the whole sequence then being repeated. No telemetry will be included.

It is estimated that a c.w. transmitter having 100 watts output and an aerial with 12db gain will be sufficient to operate *Oscar IV*. Reception of the 70cm signal will require a receiver having a 4·5db noise factor, 12db aerial gain and a bandwidth of 3 kc/s to produce a 7db signal to noise ratio.

While *Oscar IV* will translate any type of signal it is urged that c.w. should be used to conserve the restricted bandwidth of the translator.

Reports of reception of signals via *Oscar IV*, contacts made and any blackout periods noted, should be sent to G2UJ or direct to Project Oscar, Foothill College, Los Altos Hills, California, USA.

No special report forms will be used for this exercise but reports will be most useful if the strength of translated signals is related in db to that of the beacon signal, i.e. " W2XXX 3db down on beacon."

The launch duly took place at 14.00 GMT on 21 December, 1965, but owing to a fault in the final stage of the rocket it failed to place its four satellites, one of which was *Oscar IV*, into near synchronous orbits. Instead, a highly elliptical orbit resulted and it is reported that the height of *Oscar IV* is varying between 18,174 and 105 statute miles. It is unlikely that the satellite will have a long life under these conditions. It is understood, however, that contacts have been effected between W6 and W4, but the beacon, which is on 431.028 Mc/s, is not gating the translator as planned. The translator frequencies are as stated. No further information as to inclination was available at the time of going to press.

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*Project Oscar Co-ordinator, 24 Arundel Road, Tunbridge Wells, Kent.

1296 Mc/s Test 1965

The year 1965 saw what was probably the last 1296 Mc/s Test. Instituted in September 1956 the Tests have produced the results intended and will be replaced by two contests: one in May during the IARU Region I U.H.F. Contest and one in October.

This report is therefore partly a summary of the past decade on this band in the UK and begins with some notes on the early Tests. The first test brought in five entries listing contacts among nine stations at a maximum distance of 20 miles. Noteworthy were entries from GM6WL and GM6ZV —the only occasion when reports have been received from outside England—and a note from G5CD on the 2C39 and DET24 as triplers from 432 Mc/s—10 years later these valves are still the only types available for high power on this band. The receiving equipment verged on the primitive and the aerials were obvious scale models of current 432 Mc/s practice.

Subsequent years produced little more activity (and often less) and an attempt to run a contest in September 1959 proved premature, there being no entries!

In 1963 the Contests Committee produced a report which grossly inflated the significance of the meagre results during the Tests and this policy was repeated in 1964; also in 1963 the band was added to those available in V.H.F. NFD. Whether these moves encouraged activity or whether the band was ripe for development anyway is an open question, but today the band is an active one and this state is likely to continue. In 1965 22 stations submitted logs for RSGB 23 cm events—14 for the May contest, seven for the Tests and 12 for V.H.F. NFD with some stations entered for more than one event. These list contacts among 38 operational stations and a perusal of *Four Metres and Down* reveals at least another dozen partly equipped or building. These figures make a reasonable allowance for duplication (i.e. the same equipment under two call-signs) and may be a little low.

Equipment

As noted in the report on the 1964 Tests equipment design is hardening. We have now reached a stage equivalent to the late 1950's on 70cm with limited transmitter powers, converters of only moderate performance and some very large aerials which cannot be kept in position for more than a few days. In spite of appeals in the last two reports no test equipment has been described. Some members appear to have access to commercial transmitter power meters but no claims have been made concerning receiver performance.

Transmitters

A typical transmitter uses modern developments of the 2C39 or a DET24 as a tripler, with a simple matching arrangement in the cathode and either a strip line or a radial cavity for the anode circuit. Power amplifiers capable of delivering useful power at 150 watts input present serious problems at this frequency; manufacturers data on the TDI-100A indicates a maximum input of 125W on A1 falling to 60W on A3 and even the newer ceramic types are limited to 100W on A3. A stage gain of 5db seems to be typical at this power level implying that both the p.a. and the tripler driver must be run at their maximum ratings.

It is therefore not surprising that the current technique is to generate the high power on 432 Mc/s and run only a tripler to 1296 Mc/s accepting the low r.f. output in the interests of simplicity. For A3 quite good results can be obtained by modulating only the 432 Mc/s stage.

Slightly higher stage gain can be obtained with the DET24 in the p.a. (an output of 8W with a drive power of 1W can be obtained but the maximum input of 28W means that more power can be obtained from a 2C39 tripler if sufficient 432 Mc/s drive is available.)

Smaller valves of very high gain are available (e.g. EC157 or DET29 with >20db gain) but these are very limited in their power handling capacity and are rather expensive for amateur use.

Receivers

Silicon crystal mixers with low noise i.f. amplifiers are almost standard, with the most popular design that due to K6AXN. This converter might almost be called the " G2DD of 23cm "; many entrants report on the simplicity of this design both electrically and mechanically and on its straightforward alignment.

G3NNG uses a Texas GM0290 transistor r.f. stage but it is not clear whether this gives any improvement in noise figure though it may well simplify the adjustment of the mixer. This transistor may be worth considering as an r.f. head amplifier for stations with long feeder runs.

Tunnel diode and parametric amplifiers with noise figures of 3 or 4db are feasible (compared with perhaps 8 or 10db for a mixer) but suffice it to say that none of those sending in logs this year actually used one.

Aerials

The adjustment of parabolic or corner reflector type aerials is so easy that these aerials are first choice for a newcomer on the band. However, for many, such an aerial presents serious mechanical problems and a sound design for a Yagi is needed. Can anyone who has a successful multi-element array please publish the dimensions as a guide for someone starting on the band; a list of element lengths and spacings with matching arrangement will suffice.

Paraboloids or corners need not be large; however, G3RPE and G5FK use dishes of only 18 in. diameter while G3EFX has one a little over 2 ft. The gain from such aerials is necessarily small (in fact it is doubtful if the smallest paraboloids actually act as focusing structures), nevertheless G5FK's best DX is 48 miles and G3FP and G3RPE can work easily over a path of 30 miles.

Contacts made during the 1296 Mc/s Tests

Call-sign	QTH	Contacts	
		Complete	Crossband
G2CIW	Birmingham	6	2
G3FEX/P	1 mile SW Storrington	1	2
G3NNG/P	6 miles W Wantage	5	2
G3KEF/P	8 miles E Rugby	4	5
G5FK	Wembley	8	1
G3HWR	Hampstead	3	1
G3RPE	Hemel Hempstead	5	2
G3LTF	Danbury	2	2

Conditions

Conditions during the 1965 Tests were good and several contacts were made which would not be possible under " normal " conditions. The best contacts were between G2CIW (Birmingham) and G3FP (Croydon) and G3LTF (Danbury) at about 110 and 119 miles and a crossband contact between G3FEX/P (Storrington) and F8MX/A (St. Valery) at 88 miles. The following contacts were also in the 50 miles plus category: G3FEX/P with G3MCS (High Wycombe), G3KEF/P (nr. Rugby) with G3NNG (Wantage) and G3BNL/P (Buxton) and a very difficult near-contact between G2CIW and G3MCS. The table shows the number of contacts each station made during the Tests. This should be read with the corresponding table on page 678 of the October BULLETIN showing contacts during the May Contest. In assessing the number of stations worked during the Test it must be noted that some of the well established stations did not bother to work their locals on 23cm (or at least did not report the contacts) but spent their time attempting contacts further afield.

(continued on page 47)

News from Headquarters

Region 4 Lecture

Local Members of the Radio Society of Great Britain and their guests attended a lecture on colour TV at Derby and District College of Technology on Friday, 26 November when Mr R. S. Roberts, M.I.E.R.E., Sen. M.I.E.E.E., G6NR, substituted at the last moment for the advertised lecturer, Mr B. Rogers of Rank-Bush Murphy Ltd., who was indisposed. Mr Roberts, who is Deputy Head of the Department of Telecommunications at the Northern Polytechnic, London illustrated his lecture with slides which covered the mechanism of colour vision and showed how the shortcomings of the human eye are exploited by practical colour TV systems.

An interesting point made by the Lecturer was that when colour TV arrives in this country it will be introduced nationally from the start, unlike other TV innovations which have all appeared first in the London area and then spread to the remainder of the country.

Unfortunately owing to bad weather conditions the attendance was not as high as anticipated, however, the 36 in the audience were keenly interested and the question time was all too short.

Mr T. Darn, G3FGY, proposed a vote of thanks on behalf of those present thanking Mr Roberts for taking on the Lecture with less than 24 hours' notice.

Licence Obtained by Fraud

Although he had been interested in radio for 36 years, Mr Gerald Scott, of " Wayside," West Auckland Road, Shildon, Co. Durham, could not master the Morse code and his nerve failed every time he wanted to take a Post Office Morse Test. He had passed the Radio Amateurs' Examination, and in an effort to obtain a licence persuaded a friend, Mr Gordon Victor Douthwaite, of 1 Aclett Close, Woodhouse Close Estate, Bishop Auckland, Co. Durham, to take the test for him. Mr Douthwaite, in Mr Scott's name, entered and passed the test, and a licence was issued to Mr Scott.

The fraud was discovered, however, when the Post Office noticed a difference in writing between the application forms and the examination sheets, and consequently both Mr Scott and Mr Douthwaite were charged under Section 32 (1) of the Larceny Act, 1916, at Newcastle Magistrate's Court on August 16, 1965. They both pleaded guilty and were each fined £25 and ordered to pay Advocate's fees of £5 5s.

The Newcastle-on-Tyne *Evening Chronicle* for August 16 reported that the Defending Counsel had said, " he had passed Post Office Tests in other subjects and tried to learn the Morse Code, which was not strictly necessary as most messages between ' hams ' were in speech."

RSGB Amateur Radio Call Book

The following are corrections to the 1966 edition of the RSGB *Amateur Radio Call Book*.

G4AG, C. F. Turner, 56 Westwood Avenue, Brentwood, Essex.

G3TAY, A. B. Yarker, 1 Sandhall Avenue, Highroad Well, Halifax, Yorkshire.

G3TND, C. Toogood, Felacre, Felton, Somerset.

G3PBC, C. D. Craythorne, 34 Briar Walk, Oadby, Leicester.

Affiliation

The following are now affiliated to the RSGB:

CHILTERN RADIO CLUB:
c/o A. P. McGrath, Chiltern Street, Deyes Lanes, Maghull, Nr Liverpool, Lancs.

EALING AND DISTRICT AMATEUR RADIO SOCIETY:
c/o A. P. Teale, G3SGT, 16 Whitestile Road, Brentford, Middlesex.

GT. YARMOUTH AMATEUR RADIO CLUB:
c/o A. D. Besford, G3NHU, 49 Blake Road, Gt. Yarmouth, Norfolk.

NORTH AYRSHIRE AMATEUR RADIO CLUB:
c/o W. A. F. Davidson, GM3NYY, 13 Irvine Road, Kilmarnock, Ayrshire.

Professor R. C. Jennison

Dr Roger C. Jennison, Senior Lecturer in Physics, Manchester University and well-known for his work at Jodrell Bank Radio Observatory, is to be Professor of Physical Electronics at Kent University, Canterbury from 1 April, 1966. Those with long memories will recall that in the Eddystone S640 Receiver Essay Competition organised by Stratton & Co. Ltd. shortly after the war the winner was Roger Jennison. who was then resident at Grimsby. His subject was " Applications of the new Microwave Radio Channels."

MULLARD AWARD FOR 1966. NOMINATIONS INVITED

In accordance with Rule 5, the Council invites nominations for consideration for the Mullard Award for 1966. Such nominations should be sent in writing to the General Manager at RSGB Headquarters to arrive not later than February 28, 1966.

The terms and conditions governing the Mullard Award, are as follows:

(i) *The Award is offered annually by Mullard Limited during the pleasure of the Directors of that Company.*

(ii) *The Award will take the form of a gift in kind (preferably electronic or electrical apparatus and/or books) to the value of* £25, *and a plaque.*

(iii) *The Award will be made to the member of the Radio Society of Great Britain resident in the United Kingdom who in the opinion of a Committee consisting of three representatives of Mullard Limited and three representatives of the Council of the Radio Society of Great Britain, has, through the medium of Amateur Radio during the preceding calendar year, rendered outstanding personal service to the community by his own endeavour or by his own example of fortitude and courage.*

(iv) *The presentation of the Award will take place during the month of April each year on a date and at a place to be decided by the Committee.*

(v) *In January of each year, the Radio Society of Great Britain shall, through its official journal, invite nominations for the Award. Each such nomination shall be supported by at least three Corporate Members of the Society and shall be accompanied by a brief factual account of the personal service rendered by the nominee.*

New Maritime Mobile Licence

At the Society's Annual General Meeting in London on 17 December, 1965, the President, Mr E. W. Yeomanson, G3IIR, announced that a new Amateur (Maritime) Licence has now been agreed with the Post Office. The new licence will authorize operation in the 7, 14, 21, 28 and 144 Mc/s bands and in the 21,000-22,000 Mc/s bands.

Wirral Amateur Radio Society

Members who visited the RSGB International Radio Communications Exhibition will be pleased to know that so much interest was shown in the Wirral Amateur Radio Society's construction project that an article describing the scheme is in preparation for publication in an early issue of the RSGB BULLETIN.

SRAL—New Address

As from 1 January, 1966, the address of SRAL, the National Amateur Radio Society for Finland was changed to Post Box 10306, Helsinki 10.

This is also the new address of the SRAL QSL Bureau.

Can You Help?

● S. K. Marphatia, 26 Walkshwar Road, Malabar Hill, Bombay 6, India, who requires information on the BC348 receiver?

● J. Burgon, G3TII, 36 King Street, Winterton, Nr. Scunthorpe, Lincs., who wishes to buy or borrow the schematic diagram for the E52b-1 receiver using RV2000 valves throughout?

● A. G. Coker, 48 Charlock Way, Burpham, Guildford, Surrey, who requires information on a v.h.f. receiver known as type 62H, R.1392, P.104 or AP.61357 and the associated power supply type 234.A?

● G. E. Westwood, BRS27341, 114 Pettits Lane, Romford, Essex, who would like to hear from other members using the Star SR600 receiver?

● B. A. Jones, BRS 26659, 12 Woodside Road, Larkhill, Worcester, who wishes to purchase or borrow a circuit diagram and instructions on the E.M.I. Research Laboratories Ltd. Waveform Monitor Type 5032 C?

● D. Bowers, BRS 26760, 95 Grenfell Avenue, Saltash, Cornwall, who wishes to borrow the circuit and details of the National 1 to 10 metre receiver?

A reciprocal Amateur Radio licensing agreement was signed and exchanged on Friday, 26 November 1965, at the Foreign Office by Mr. Willis C. Armstrong (left), USA Minister of Economic Affairs, and Lord Walston (right), British Parliamentary Under Secretary for Foreign Affairs. Forms of application for American licences will be available from RSGB Headquarters early next month. US citizens wishing to obtain UK licences will be able to obtain forms of application from the Radio Services Dept., GPO Headquarters, London, E.C.1, later this month.

Installation of President

Mr R. F. Stevens, G2BVN, will be installed as the 32nd President of the Society during the course of a General Meeting and Social Evening to be held at

Kingsley Hotel,

Bloomsbury Way, London, W.C.1

on

Friday, January 7, 1966

Commencing at 7 p.m.

Admission will be by ticket, available on request (with s.a.e.) from Headquarters. (Tickets restricted to two per member.)

Jamboree-on-the-Air

The Eighth Boy Scout World Jamboree-on-the-Air held between 16 and 17 October was as successful as in previous years. In the UK over 140 stations took part with 105 contacts abroad in 22 countries. Among the more popular stations worked was VE3WSB—the World Scout Bureau station in Ottawa. VE3WSB made nearly 600 contacts in 32 countries including two in Australia. It is reported that over 400 Scout stations took part in Canada and Australia.

Red Cross Test Transmissions

A series of International Red Cross Test Transmissions will take place at 06.00, 11.30, 15.00 and 21.00 GMT on the following dates: 10, 12, 14 January; 21, 23, 25 March; 9, 11, 13 May, 4, 6, 8 July; 19, 21, 23 September; 21, 23, 25 November. The frequency will be 7·21 Mc/s, with a radiated power of 100 kW during the first two transmissions, and 25 kW for the remaining times on each day.

Reports, which will be QSLd, should be addressed to Mr E. G. Gregory, The British Red Cross Society, 14-15 Grosvenor Crescent, London, S.W.1, and the envelope marked "Radio Report." The following information should be included: date, time, signal strength, intelligibility, fading, interference (high or low side of signal, and nature), receiver, aerial, and a general indication of how other stations in the band are received. The name and address of the person submitting the report should be printed clearly.

Copies of the schedule are available from the Honorary Organizer, G. A. Allcock, G3ION, 71 Bassett Green Close, Southampton, Hants, on receipt of an s.a.e.

LONDON LECTURE MEETING

WEDNESDAY, 9 MARCH, 1966 — 7 P.M.

AERIAL FARMING IN A MONASTERY

By Rev Paul Sollom, G3BGL

Royal Society of Arts, John Adam Street, London, W.C.2. Buffet tea before lecture

Letters to the Editor

Neither the Editor nor the Council of the Radio Society of Great Britain can accept responsibility for views expressed by correspondents. Letters for inclusion in this feature should be concise and preferably not more than 200 words in length.

QSL Managers

I feel that the time has come for something to be done about this business of " QSL Managers "—people who make out and despatch cards for others. Unfortunately I believe that I started it many years ago by acting as QSL Manager for ZD9AA, in the days when Tristan de Cunha had only one mail per year.

Nowadays, any lazy so-and-so seems to be able to find some mug willing to make out his cards for him, ostensibly after comparison with the log. Frankly I think the whole business smells!

Why the ARRL, who will reject a card which has been obviously altered—by the sender, should accept cards purporting to come from amateurs who have never seen them and with no guarantee that the log has been checked or that the QSL ever took place, I just do not understand.

Admittedly, there is a case for a QSL Manager for people like Gus, who are wandering all over the world and whose Agent/QSL Manager is well known, but this new craze, especially in the USA, to be someone's QSL Manager should be stopped. When ordinary run-of-the-mill G's have an American QSL Manager, I think the limit of absurdity has been reached.

Apart from any other consideration, how is a Bureau Manager, like myself, and his poor assistants to remember that G7——'s cards go to WA4——! It is an interesting fact that only two people have written to instruct me to send their cards to a third party. One of these was an individual who was the QSL Manager for a British Crown Colony but didn't handle his own cards!

Quite often, one finds a conflict of published information. In one magazine, the QSL Manager for " A " is WA4—— and in another one finds it listed as a W8. Then, when cards arrive, they may be marked " Via W2."

I had some cards returned from a listed American QSL Manager for a DX station, marked " Try W2——. I have logs only between such and such dates."

It is high time that individual amateurs accepted the making out of their own QSL as one of the responsibilities of holding a licence, and that societies who issue the various certificates refuse to recognise third party QSL's.

A. O. MILNE, G2MI
RSGB QSL Manager.

Bromley, Kent.

National Field Day

I cannot agree with the NFD bonus system: the results on 1·8 Mc/s show what an unfair advantage this conferred on the GW stations. My sympathy—as an ex-member of both clubs—is with Oxford and Croydon.

In Scotland, on the other hand, it is not merely on 1·8 Mc/s that we labour under a disadvantage. I note with interest that many 599 contacts were made with W6-7 and VE7 on 14 Mc/s. We heard precisely one VE7, and gave him S6. Many of the East Coast W's we worked came straight back to us and gave us low serial numbers: they were obviously not working G's at the time. In other words, as I have remarked before, we stand no chance of winning NFD because the stuff simply isn't there. I therefore suggest that next year GW stations should receive no bonus, and that GM stations should receive a bonus for *all* contacts: 10 points a go would be encouraging!

J. B. ROSCOE, GM4QK

Strathaven, Lanarkshire.

The primary object of Field Day is to set up, under emergency conditions, a station which will establish contact with as many other stations as possible to prove its efficiency. In the review of the 1965 NFD we read about the few stations using batteries and "the increasingly popular petrol electric generators producing 250V a.c. at from 1 to 4 kW." Is it not time that the RSGB ceased proving to the world that we are the most incompetent, or hypocritical, group of amateurs in existence, requiring 4 kW of power to produce, say, 90 watts for the receiver and driver stages, and 10 watts for the p.a. Undoubtedly credit should be given to the operators who manage to get rid of the remaining 3900 watts or so without radiating it. The excellent meter reading ability of operators is commented on in the review, but surely where 300V h.t. was used the meter reading was 33·3 mA?

Why cannot the RSGB be realistic and now introduce the obvious classes of stations in NFD, for example, below 5 watts, 30 watts, and up to 150 watts? The magnifying glass for meter readings could then be left out of the standard NFD equipment.

A. STUART MCNICOL, GM3UU

Aberdeen.

Publication of NFD results will inevitably provoke lengthy discussions on what one did badly last time, how one can improve next time and so on. It will also raise the question of what the other groups did and in this respect we in the Bagshot Society would like to register a plea for more careful observance of the rules governing NFD.

Particular reference is made to the rule regarding power input. We cannot expect the Contests Committee to visit each site armed with test equipment, but observation of comparative signal levels showed much more variation than can be reasonably accounted for by differences in aerial efficiency. We feel that this aspect should receive some attention from the Contests Committee and suggest that consideration be given to specifying types of p.a. valve (or transistor), that would be acceptable, or at least to limitation of the p.a. valve anode dissipation figure. The foregoing remarks apply to a very small minority, undoubtedly most of the participants in the 1965 NFD did not exceed the specified power limit.

Do other participants share our views on this subject and what are the feelings of the H.F. Contests Committee?

One final point—all the clocks appear to be accurate on Saturday but it is interesting to hear the number of QSO's taking place after the last "pip" at 6 p.m. on Sunday. BRS members could no doubt confirm this, and penalty points for QSO's "squeezed" into the time limit would be a good deterrent.

NFD is one of the high spots in our calendar. Let us make it even more popular by observing all the rules.

G. J. BENNETT, G3CYL

Fleet, Hants.

Top Band Transmitter

In the December issue of the BULLETIN, Mr Hackney comments on the article describing the Top Band transistor transmitters by G3FEW and G2BCX.

In his letter G6YP queries the switching action of the p.a. stages. The transistors used in the p.a. do work as a 2 Mc/s switch, and a good oscilloscope connected between collector and ground will show a pulsed wave form as shown and not as stated by G6YP "a sinewave".

During the experimental work, a p.a. coil with a tap at every five turns was used, and tapping the oscilloscope down the coil, from collector to tuning gang, clearly showed the pulses at the collector changing shape along the coil until a sinewave was produced at the tuning gang end. This is a fact and can be seen on any good oscilloscope.

The other query raised by G6YP was about d.c. power input.

The current pulses at the collector are of short duration when compared with a full cycle. In fact it is possible to get these pulses down to only a tenth or so of the total duration of one cycle. It follows from this that the indicated current from the supply will depend on the type of meter used, and in practice may be lower than the true average current drawn.

The output from the tank coil, however, is a sinewave, so a power meter used on a dummy load will read the true r.m.s. power output. During the early stages of development, when the overall efficiency was checked, a "measured" d.c. input of ten watts produced 12 watts output from a single 2N1907. This is obviously impossible.

However, when the peak collector current was measured on an oscilloscope and averaged over the whole cycle it was found that the actual d.c. input was 14 watts, i.e. 86 per cent efficiency. Hence the reason for caution when checking d.c. inputs.

It is respectfully suggested that before criticising the effort of the writers, that the transmitter be built and the facts checked for themselves.

E. A. RULE, G3FEW

Chingford.

RTTY News

The British Amateur Radio Teleprinter Group held its AGM in London on Saturday, 30 October, when the following members were elected to the various offices for 1966. *Chairman*, R. W. Addie, G8LT; *Vice-Chairman*, L. E. Newnham, G6NZ; *Honorary Secretary*, A. Walmsley, G2HIO; *Honorary Treasurer*, A. T. Morton; *Newsletter Editor*, A. W. Owen, G2FUD; *Committee Members*, W. M. Brennan, G3CQE, L. A. Crane, G3PED, J. Scarborough, G3MBQ, R. B. Tunney, G8DD and E. W. Yeomanson, G3IIR.

The Committee is now considering a suitable date for the BARTG Spring Contest; details will be announced as soon as they are available.

The first RTTY signals from Estonia have been heard in Britain now that UR2KAX has adapted his s.s.b. rig for f.s.k. His name is Endel, and he operates from Tikemetsa, near the city of Paernu.

Component Ratings (Continued from page 29)

very worst conditions was the best way to illustrate just how high voltages can run to on signal peaks. A supply giving 1000 volts may be a little high for the average amateur but it must be admitted that it is a nice round figure to use in an article such as this because it makes mental calculation easy; and it is hoped, the article that much easier to follow.

Technical Topics (Continued from page 21)

larly their use for aerial change-over relays as already suggested in various amateur articles), the conventional reed has some skin resistance effect (of the order of 1 ohm contact resistance at 1 Mc/s for the H80) but low power switching up to 50 Mc/s is considered practical and still higher frequencies can be switched with silver coated contacts.

Failure of a reed is likely to be in the form of "sticking" (which may be due to a cold weld because of metal migration) and this can occur immediately or after only a few operations if really excessive currents are switched. All these devices have extremely short switching times so that they can take high speed keying in their stride. There seems to be plenty of scope for experimenting with these reed contacts, and some useful control circuits can be anticipated.

Matters Mobile (Continued from page 32)

cut-outs intended for conduit—will accept standard control spindles provided that they are backed and faced with washers. Being provided with a lid retained by screws in each corner, a fully screened enclosure results.

While these boxes may not be particularly aesthetic, for certain applications this is not especially important, and functional considerations, coupled with low cost, make them ideal.

* * *

To those mobilers who took the trouble to send their ideas, our grateful thanks—even if the material has not been used so far. To all members of the mobile fraternity may we say that if you are prepared to pass on the benefit of your experience and so help others, then your conductor would be very pleased to have a brief line from you.

1296 Mc/s Test 1965 (Continued from page 43)

The relatively large number of crossband contacts (i.e. which were successful in one direction only) indicates that equipment on 1296 Mc/s can still be improved even within the present state of the art.

The Award

This year the Arthur Watts Trophy is to be awarded to J. F. Moseley, G2CIW, not only for his work on the band but for his reports both to the Contest Committee and for the amateur press. The level of activity in the Midlands on 23cm revealed by the contests this summer is very much higher than was indicated by the meagre reports received in the past.

The Arthur Watts Trophy, donated initially for the 420 Mc/s Contest, is now used to recognize achievement in the u.h.f. bands. The V.H.F. Committee and V.H.F. Contests Committee are considering the future of this award. Present thoughts run on the lines of an award for work on still higher frequencies; possibly it is too soon for this, possibly this is just the little bit of encouragement needed. Suggestions will be welcome.

List of Award Winners

1956	A. L. Mynett	G3HBW	Arthur Watts Trophy
1957	A. L. Mynett	G3HBW	Arthur Watts Trophy
1958	C. J. Beanland	G3BVU	Certificate of Merit
1959	W. F. Neal	G3FUL	Certificate of Merit
1960	B. R. Arnold	G3FP	Arthur Watts Trophy
1961	No award		
1962	R. A. Dabbs	G2RD	Joint Arthur Watts Trophy
	G. V. Farrance	G3KPT	
1963	B. R. Arnold	G3FP	Arthur Watts Trophy
1964	R. A. Dabbs	G2RD	Arthur Watts Trophy
1965	J. F. Moseley	G2CIW	Arthur Watts Trophy

DAILY MAIL SCHOOLBOYS' AND GIRLS' EXHIBITION

27 December, 1965 to 8 January, 1966

The RSGB is organizing an Amateur Radio stand at this exhibition to interest young people in the hobby of radio. Two transmitting stations will be in operation, plus a workbench, displays and information for the newcomer.

GB3SBG—GB3RS

A Heathkit SB400/200 s.s.b. transmitter/linear amplifier will be driving a TA33JR beam, installed by SVS Masts Ltd. This station, using the call-sign GB3SBG, will concentrate on contacting amateurs overseas. The 80m station, GB3RS, will be a home-constructed installation loaned by David Cree.

Workbench

Several young people will be constructing apparatus including superhets to a design by G3HBW, Heathkits and Philips Electronic Engineer kits. There will also be displays of completed equipment built by members of several clubs including Newark (Magnus) and Harrow.

NATIONAL HALL, OLYMPIA, LONDON

CONTEST NEWS

RESULTS — REPORTS — RULES

The 1966 V.H.F./U.H.F. Listeners' Championship

The 1965 Championship having been proved a success the rules of the 1966 event are practically unchanged. Provision has been made for entrants who may move their station during the year or acquire transmitting licences. Also some provision has been made for incomplete entries or the reception of important non contestants; it is difficult to legislate for these borderline cases and they will be treated on their merits.

The suggestions in the preamble to the 1965 Championships (points for distance and multi-operator stations) has not proved any response and will not be proceeded with.

1. **Eligible Entrants.** The Championship is open to all non-licensed fully paid up members of the RSGB resident in Europe. Only the entrant may operate his receiving station, which must remain at one site for the duration of each contest, though the same address need not be used for each contest of the Championship. Entries will continue to be accepted from newly licensed members provided that the contestant was unlicensed at the time of his first entry in 1966 and that no transmitter is used during any period for which he submits a listener log.

2. **Duration.** The Championship will run from January to December 1966 on those dates and times when RSGB v.h.f. and/or u.h.f. contests and tests occur.

3. **Scoring.** Points are to be scored as follows. For each station logged in the entrants own county or an adjacent county—10 points (see list on page 50).

For each station logged in other counties in the entrants own country—20 points.

For each station logged outside the entrants own country—30 points.

For an incomplete entry or an entry of a station not taking part in the event (and therefore not giving serial numbers) half the above points may be claimed and may be awarded at the discretion of the Contests Committee.

Bonus points. For an entry of a telegraphy transmission double points may be claimed. For each British Isles County received an additional 20 points may be claimed. The whole score of a log (including bonuses) for the 427-450 Mc/s band is to be multiplied by three and the whole score for any frequencies above 1215 Mc/s is to be multiplied by ten.

4. **Entries.** Entrants may submit logs for any or all RSGB v.h.f. and u.h.f. contests in 1966. The scores of the best six logs from each entrant will be totalled at the end of the year; not more than four of these six logs will be for v.h.f. (i.e. 4m or 2m) bands.

5. **Logs must show in columns:** (i) date/time (GMT), (ii) call-sign of station heard; (iii) my report on signal heard; (iv) report and serial number sent by station heard; (v) call-sign of station being worked; (vi) county of station heard (British Isles Station); (vii) points claimed. (Stations not sending a serial number may be logged at half points see rule 3 above). Points can only be claimed once in any log in respect of any station heard. In the case of multiband events (e.g. V.H.F. NFD) separate logs are required for each band and the same station can be logged on different bands.

6. **Entries.** Entries must be set out on RSGB Contest Log Sheets (available from RSGB Headquarters on request), or, one side only of foolscap paper and posted within the period allowed for the appropriate transmitting contest. Entries for the 70 Mc/s and 144 Mc/s Listener Contests will be automatically credited to the Championship.

7. **Awards.** At the discretion of Council the Hanson Trophy will be awarded to the leader of the Championship and certificates of merit will be awarded to the runners-up and for particularly meritorious logs for individual events. (These awards are in addition to the awards for the listeners' contests).

R.S.G.B. CONTEST LOG SHEET

Contest V.H.F.N.F.D. 430 Mc/s Sheet No. 1 of 5 Call-sign BRS987654

Date & Time (G.M.T.)	Call-sign of Station Worked	My report on his signals and Serial No. SENT	His report on my signals and Serial No. RECEIVED	Station Worked	County	Remarks	Points Claimed
3/9/66					Total from previous sheet		
1931	G5XYZ	58	59 003	G5ABC/P	SUSSEX		10
1933	G5ABC/P	45	58 008	G5XYZ	DORSET		20
1943	GC5HIT	44	57 005	G5ABC/P	GUERNSEY		30
2048	F9CQT	569	589022	G5ABC/P	—		60
2057	G5MNO	58	57	G5BCD	SUSSEX	non-contest	5
2116	GW5XYZ	33	560?3	G5XYZ	GLAMORGAN	incomplete	15
2147	G5BCD	57	58 013	G5XYZ	HANTS		10
2153	G5PQR	569	57031	G5XYZ	SURREY	A1/A3 QSO	20
						TOTAL	170
		AND 6 COUNTIES AT 20 POINTS					120
							290
		MULTIPLY BY BAND MULTIPLIER			X3		870
		Claimed score for 430 Mc/s 870 points					
		Logs also entered for 70 and 144 Mc/s.					

A typical contest log sheet.

Listeners' 144 Mc/s Contest 1966

The following are the details of the Listeners' V.H.F. Contest to be held at the same time as the 144 Mc/s Open Contest. Entries for this event will be automatically credited to the V.H.F. Championship.

1. **When:** The contest will commence at 18.00 GMT on Saturday, March 5 and end at 18.00 GMT on Sunday, March 6, 1966.

2. **Eligible Entrants:** The contest is open to all fully-paid up members of the RSGB resident in Europe. Only the entrant may operate his receiving station for the duration of the contest. Holders of amateur transmitting licences are eligible to take part if they do not own transmitting equipment for the 144 Mc/s band.

3. **Scoring:** Entrants will be required to log stations operating in the 144-146 Mc/s band. Each station heard may be logged once only in column ii. Points are to be scored for each complete log entry, with bonus points for each new county received and for c.w. reception. For each station logged in the entrant's own **county** or an adjacent **county**: 10 points; for each station logged in other **counties** in the entrant's own **country**: 20 points; for each station logged in any other **country**: 30 points, for a log entry of any station not taking part in the contest: 5 points. Bonus points: for an entry of a telegraphy transmission double points are to be claimed. For each British Isles County received an additional 20 points may be claimed. The whole of the London Postal Districts will count as one county only.

4. **Entries:** (a) to count for points, logs must show, in columns, (i) Date/Time (GMT); (ii) Call-sign of station heard; (iii) Report and serial number sent by station heard; (iv) My report on the signal heard; (v) County of station heard; (vi) Call-sign of station being worked; (vii) Points claimed.

(b) Entries must be set out on RSGB Contest Log Sheets available from RSGB Headquarters or on one side only of foolscap paper.

(c) The cover sheet must be made out in accordance with RSGB Contest Rule 4 and must certify that the entrant does not possess transmitting equipment for the 144 Mc/s band.

(d) Entries must be postmarked not later than March 21, 1966.

5. **Awards:** At the discretion of Council certificates of merit will be awarded to the leader and runner-up.

Second 144 Mc/s Contest (Open) 1966

The scoring of this contest has been amended on the basis of distances in kilometres rather than miles, otherwise the rules are unchanged. Check logs from listeners are invited and may be credited towards the V.H.F. Listeners' Championship. Any comments on the rules will be welcome and will be considered when the rules for the next similar contest are made.

1. **When:** 18.00 GMT on Saturday, March 5, to 18.00 GMT on Sunday, March 6, 1966.

2. The General rules of RSGB Contests as published in the January 1966 issue of the RSGB BULLETIN will apply except as superseded by the rules of this contest.

3. **Contacts** may be made on any mode permitted in the Amateur (Sound) Licence A except A2 (m.c.w.).

4. **Scoring** will be on the basis of one point per km.

5. **Contest Exchanges:** RST or RS reports followed by the contact number and location (e.g. RST 599001, 4 north Macclesfield, Cheshire). This location must be accurately identified on the Ordnance Survey "Tenmile" map. Alternatively, five-character QRA locators may be exchanged. It is the responsibility of the receiving operator to obtain the information necessary to calculate his distances correctly.

6. **Entries** (a) Logs should be tabulated in columns headed in this order: "Date/Time (GMT)"; "Call-sign of station contacted"; "My report on his signal and serial number sent"; "His report on my signal and serial number received"; "Location of stations received"; "Points claimed."

(b) To satisfy Amateur (Sound) Licence A requirements frequencies in use should be recorded on the reverse side of the cover sheet.
(c) The cover sheet must be made out in accordance with General Rule 4. The QTH as sent, QRA if used, and the NGR full eight character reference should be recorded. Stations outside the area of the National Grid should show 5 character QRA locator.
(d) Entries must be post-marked not later than Monday, March 21, 1966.

7. Awards. At the discretion of Council the Mitchell-Milling trophy will be awarded to the winner and a certificate of merit to the runner-up.

Region 1 Field Day 1965

For the second year running this event was won by a small group of comparatively young amateurs led by G3RTU.

They staged a small expedition and set up their station on very high land. Their activities were confined to the 7 and 14 Mc/s bands on which they scored a total of 197 points, and their achievement in the last two years will no doubt give food for thought to the other competitors. The runners-up in this year's record entry were Chorley/Leyland (G3RFN/P) with 143 points, followed closely by Stockport (G3NBN/P) with 142 points. It is gratifying to see a brand new group, Allerton Boy Scouts Association (G3TZR/P) following up in fourth position with 141 points.

A report on the contest and detailed results have been sent to all participants and representatives in Region 1.

—G2AMV

Masonic Lodge

Radio Fraternity Lodge No. 8040 has now been formed. The Master is Mr John Clarricoats, O.B.E., G6CL, and the Secretary, Mr A. V. Tillin, G3MES, 1 Frogmore Gardens, North Cheam, Surrey, to whom all enquiries should be addressed.

CONTESTS DIARY

January 15-16	- Affiliated Societies' Contest (see page 679 October, 1965)
January 29-30	- CQ WW 160 DX Contest
January 30	- First 144 Mc/s (C.W.) Contest (see page 825 December, 1965)
February 12-13	- ARRL DX Contest (Phone)
February 13	- First 70 Mc/s (Open) Contest (see page 825 December, 1965)
February 19-20	- First 1.8 Mc/s Contest (see page 825 December, 1965)
February 26-27	- ARRL DX Contest (C.W.)
March 5-6	—Second 144 Mc/s (Open) and 144 Mc/s Listeners' Contests* (see page 48)
March 12-13	—ARRL DX Contest (Phone)
March 19-20	—BERU (see page 609 September 1965)
March 26-27	—ARRL DX Contest (C.W.)
April 3	—Low Power Contest
April 16-17	—CQ WW DX SSB Contest
April 16-17	—Second 70 Mc/s (Open) and 70 Mc/s Listeners' Contests*
April 24	—D/F Qualifying Event
May 8	—Third 144 Mc/s (Portable) Contest*
May 22	—D/F Qualifying Event
May 28-29	—First 420 Mc/s (Open) Contests*
May 29	—1296 Mc/s Contest*
June 4-5	—CHC/FHC/HTH QSO Party
June 4-5	—National Field Day
June 19	—D/F Qualifying Event
July 3	—Fourth 144 Mc/s (Portable) Contest*†
July 9-10	—1·8 Mc/s Summer Contest
July 17	—D/F Qualifying Event
July 24	—Third 70 Mc/s (Portable) Contest*†
July 31	—D/F Qualifying Event
September 3-4	—V.H.F. NFD*
September 11	—80 Metre Field Day
September 18	—D/F Final
September 24-25	—21-28 Mc/s Phone Contest
October 16	—Second 1296 Mc/s Contest*
October 15-16	—Second 420 Mc/s Contest*†
October 29-30	—7Mc/s DX (Phone) Contest
November 12-13	—7 Mc/s DX (C.W.) Contest
November 19-20	—Second Top Band Contest
December 4	—Fourth 70 Mc/s (C.W.) Contest*

* Qualifying contests for V.H.F./U.H.F. Listeners' Championship
† Dates subject to revision

General Rules for RSGB Contests 1966

The following rules apply to all RSGB Contests except where modified in individual events and are to be read in conjunction with the details for each contest published in the RSGB BULLETIN.

Rule 1. **Entrants** must operate in accordance with the terms of their licences.

Rule 2. **Unlicensed Stations.** Contacts with unlicensed stations will not count for points.

Rule 3. **Contacts.** Only one contact on each band may be claimed with a specific station, whether fixed, portable, mobile or alternative address. Mobile stations are stations installed in motor vehicles or vessels on inland waterways and so equipped that they are capable of operation in motion without any alteration. Duplicate contacts must be logged and clearly marked as duplicates without claim for points. Cross-band contacts may not be claimed. Proof of contact may be required.

Rule 4. **Entries** must be clearly written or typed ON ONE SIDE ONLY of RSGB contest log forms or on foolscap or quarto paper and must be set out in the form prescribed in the published details for the contest concerned. The **cover sheet** of an entry must be made out in the following form:

Contest.....Date.....Claimed Score.....

Section (if any)..... Call-sign.....

Name .....

Home Address.....

.....

Address of station or Portable Location.....
(if other than home address above)

.....

QTH as transmitted.....
National Grid Six Figure Reference, QRA Locator County Code Letters

or other co-ordinates (see contest details).....

Transmitter(s).....Input Power.....

Receiver(s) .....

Aerial(s) .....

DECLARATION: I declare that this station was operated strictly in accordance with the rules and spirit of the contest, and I agree that the decision of the Council of the RSGB shall be final in all cases of dispute. I certify that the maximum input to the final stage of the transmitter was.....watt(s)

Date..... Signed.....

Failure to complete the cover sheet or sign the declaration may involve disqualification of the entry.

Rule 5. **Entries.** All entries become the property of the Radio Society of Great Britain. In the event of any dispute the ruling of the Council of the RSGB shall be final.

Rule 6. **Multiple Operator Entries.** Unless otherwise stated, single operator entries only will be accepted. A single operator station is one manned by an individual operator who receives no assistance from other persons during the contest periods. A multi-operator station is one which does not conform to this definition. In those contests where multiple operator entries are allowed, such entries will only be accepted provided that:

(*a*) The call-sign of the operator concerned is indicated for each contact.
(*b*) The declaration is signed by only one operator who will be regarded as the entrant.
(*c*) The names and call-signs of all operators are listed on the cover sheet.

Rule 7. **Portable stations** must operate from the same site for the duration of a contest and may not be located in a permanent building. Power must not be derived directly from public or private supply mains. No apparatus may be erected on the site prior to the day of the event.

Rule 8. The details relating to specific contests published in the RSGB BULLETIN shall be regarded together with these general rules as the rules of the contest.

Rule 9. All entries will be acknowledged by Headquarters within seven days of receipt but it is the responsibilty of the entrant to refer to Headquarters if an acknowledgment is not received.

For V.H.F./U.H.F. Contests Only

Rule 10. All entrants must be fully paid-up members of the RSGB resident in Europe.

Rule 11. Multi-operator entries will be accepted (see Rule 6 above), provided that:

(*a*) only one call-sign is used.
(*b*) the call-sign of the operator concerned is indicated for each contact.
(*c*) the declaration is signed by only one operator who will be regarded as the entrant.
(*d*) the names and call-signs of all operators are listed on the cover sheet.

Rule 12. Contacts via any form of repeater or reflector devices will count for points.

List of United Kingdom Counties for RSGB Contests

County Code Letters	County	Code Letters of Adjacent Counties
AD	Alderney	
AG	Anglesey	CV
AL	Argyllshire	AY, BU, DU, IS, PH, RW
AM	Antrim	DW, LY
AN	Aberdeen	AS, BF, IS, KE, PH
AR	Armagh	DW, TE
AS	Angus	AN, KE, PH
AY	Ayrshire	AL, BU, DF, KB, LK, RW, WG
BD	Bedfordshire	BS, CE, HF, HN, NR
BE	Berkshire	BS, GR, HE, OX, SY, WE
BF	Banff	AN, IS, MY
BR	Brecknock	CA, CR, GN, HD, MH, RN
BS	Buckingham	BD, BE, HF, MX, NR, OX, SY
BU	Bute	AL, AY
BW	Berwick	EL, MN, ND, RH
CA	Cardigan	BR, CR, MG, MR, PK, RN
CD	Cumberland	DF, DH, LE, ND, RH, WD
CE	Cambridge	BD, EX, HF, HN, LN, NK, NR, SF
CH	Cheshire	DB, DY, FT, LE, SD, SE, YS
CL	Cornwall	DN
CN	Clackmannan	FE, KS, PH, SG
CR	Carmarthen	BR, CA, GN, PK
CT	Caithness	SU
CV	Caernarvon	AG, DB, MR
DB	Denbighshire	CH, CV, FT, MG, MR, SE
DF	Dumfries	AY, CD, KB, LK, PB, RH, SK
DH	Durham	CD, ND, WD, YS
DN	Devon	CL, DT, ST
DT	Dorset	DN, HE, ST, WE
DU	Dunbarton	AL, LK, PH, RW, SG
DW	Down	AM, AR
DY	Derby	CH, LR, NM, SD, YS
EL	East Lothian	BW, MN
EX	Essex	CE, HF, KT, LD, MX, SF
FE	Fife	CN, KS, PH
FH	Fermanagh	TE
FT	Flintshire	CH, DB, SE
GN	Glamorgan	BR, CR, MH
GR	Gloucester	BE, HD, MH, OX, ST, WE, WK, WR
GY	Guernsey	
HD	Hereford	BR, GR, MH, SE, WR, RN
HE	Hampshire	BE, DT, SX, SY, WE
HF	Hertford	BD, BS, CE, EX, LD, MX
HN	Huntingdon	BD, CE, NR
IM	Isle of Man	
IS	Inverness	AL, AN, BF, MY, NN, PH, RY
JY	Jersey	
KB	Kirkcudbright	AY, DF, WG
KE	Kincardine	AN, AS
KS	Kinross	CN, FE, PH
KT	Kent	EX, LD, SX, SY
LD	London (Postal District)	EX, HF, KT, MX, SY
LE	Lancashire	CD, CH, WD, YS
LK	Lanark	AY, DF, DU, MN, PB, RW, SG, WN
LN	Lincoln	CE, LR, NK, NM, NR, RD, YS
LR	Leicester	DY, LN, NM, NR, RD, SD, WK
LY	Londonderry	AM, TE
MG	Montgomery	CA, DB, MR, RN, SE
MH	Monmouth	BR, GN, GR, HD
MN	Midlothian	BW, EL, LK, PB, RH, SK, WN
MR	Merioneth	CA, CV, DB, MG
MX	Middlesex	BS, EX, HF, LD, SY
MY	Moray	BF, IS, NN
ND	Northumberland	BW, CD, DH, RH
NK	Norfolk	CE, LN, SF
NM	Nottingham	DY, LN, LR, YS
NN	Nairn	IS, MY
NR	Northants	BD, BS, CE, HN, LN, LR, OX, RD, WK
OX	Oxford	BE, BS, GR, NR, WK
OY	Orkney	
PB	Peebles	DF, LK, MN, SK
PH	Perth	AL, AN, AS, CN, DU, FE, IS, KS, SG
PK	Pembroke	CA, CR
RD	Rutland	LN, LR, NR
RH	Roxburgh	BW, CD, DF, MN, ND, SK
RN	Radnor	BR, CA, HD, MG, SE
RW	Renfrew	AL, AY, DU, LK
RY	Ross & Cromarty	IS, SU
SD	Stafford	CH, DY, LR, SE, WK, WR
SE	Shropshire	CH, DB, FT, HD, MG, RN, SD, WR
SF	Suffolk	CE, EX, NK
SG	Stirling	CN, DU, LK, PH, WN
SK	Selkirk	DF, MN, PB, RH
SL	Shetland	
SR	Sark	
ST	Somerset	DN, DT, GR, WE
SU	Sutherland	CT, RY
SX	Sussex	HE, KT, SY
SY	Surrey	BE, BS, HE, KT, LD, MX, SX
TE	Tyrone	AR, FH, LY
WD	Westmorland	CD, DH, LE, YS
WE	Wiltshire	BE, DT, GR, HE, ST
WG	Wigtown	AY, KB
WK	Warwick	GR, LR, NR, OX, SD, WR
WN	West Lothian	LK, MN, SG
WR	Worcester	GR, HD, SD, SE, WK
YS	Yorkshire	CH, DH, DY, LE, LN, NM, WD

Rules for National Field Day 1966

Complete rules for NFD 1966 are as follows (RSGB General Rules do not apply):

1. Duration. The contest will commence at 17.00 GMT on Saturday, 4 June, and end at 17.00 GMT on Sunday, 5 June, 1966.

2. Eligible Entrants. Any group of members within the British Isles, which for the purposes of the contest comprises the prefix zones G, GC, GD, GI, GM and GW, may enter. The group may be a local RSGB group, a group of RSGB members, a club or an affiliated society. Entrants must operate within the terms of their licences.

3. Operators. Operators of portable stations competing in the contest must each hold a current British Isles (GPO) Amateur (Sound) Licence A or a valid PO Amateur Radio Certificate and must be fully paid-up Corporate Members of the RSGB at the time of the contest.

4. Stations. Each competing group will be permitted to place two stations ("A" and "B") in operation. The station operating on the lowest frequency employed shall be designated the "A" station. Such stations must operate in not more than three of the bands 1·8, 3·5, 7, 14, 21 and 28 Mc/s; the other three frequency bands will be allocated to the "B" station, i.e., no group may operate two stations on any one frequency band. Both stations may operate from the same site or from different sites, provided that they are located within the agreed limits of the area covered by their Regional Representatives. It will be permissible for two groups within a Region, or adjoining Regions, each operating a single station, to amalgamate for the purpose of scoring; if this is done, frequency bands must be allocated between the two stations as detailed above. Single-station entries will be accepted from stations operating on not more than three of the frequency bands listed above.

5. Licences. Each station must be licensed to use a different call-sign.

6. Applications. Each group intending to compete must notify the RSGB H.F. Contests Committee, 28 Little Russell Street, London, W.C.1, of the name of the group, location and the name and full postal address (in BLOCK LETTERS please) of the AR, ASR, or member, responsible for its entry, not later than **Wednesday, 27 April, 1966.** Stationery and the latest information on the contest will be sent to this member.

Details must be set out as follows:
Call-sign station "A" ..... Call-sign station "B" .....
The bands to be used by these stations are:

Band	1·8 Mc/s	3·5 Mc/s	7 Mc/s	14 Mc/s	21 Mc/s	28 Mc/s
Call-sign						

7. Tents. Stations must be operated from tents.

8. Apparatus. No apparatus may be erected on the site prior to 12.00 GMT on 4 June, 1966. This rule includes aerials and aerial fittings as well as tented accommodation for the stations. A tent to be used for storage purposes only may, however, be erected prior to 12.00 GMT.

9. Aerials. Any aerials may be used, subject to the following limitations:

(*a*) All aerials must be constructed from wire of total cross-sectional area not greater than 14 s.w.g. with the exception, however, that vertical radiators of any construction may be used.

(*b*) No part of the aerials shall exceed a height of 45 ft. above ground level.

10. Transmitters and Receivers. Equipment at any "A" or "B" station must not exceed three transmitters and one receiver. Reserve equipment may be kept available but not connected.

11. Power Input. Total d.c. input power to the valve, valves or other devices energizing the aerial, or to any previous stage of the transmitter, shall not exceed 10 watts.

12. Power Supply. Power for any part of the station must not be derived directly from supply mains.

13. Type of Emission. The contest is restricted to the use of c.w. (A1) only.

14. Contest Exchanges. An exchange of reports must be made and acknowledged before points may be claimed. In contacts made by competing stations the report must include a rising serial number commencing with 001 and increasing by one with each successive contact, irrespective of band, made by the station (e.g. RST579001, etc.), and such serial numbers, both incoming and outgoing, together with signal reports, must be entered on the log sheets. Only the signal report from a non-competing station need be logged. Proof of contacts may be required.

15. Contacts. Only one contact with each station, as defined by its basic call-sign, may count for points on each band during the contest. Duplicate contacts must be logged without claim for points.

16. Group Contacts. Points must not be claimed for contacts made by a competing station with members of its own group, whether fixed, portable or mobile.

17. Scoring. Points will be scored on the following basis:

(*a*) Fixed stations in the British Isles .. .. .. 1 point
(*b*) Fixed stations in the rest of Europe including Eire .. 2 pcints
(*c*) Fixed stations outside Europe .. .. 3 points
(*d*) Fixed stations in the British Commonwealth .. .. 6 points
(*e*) Portable and mobile stations in the British Isles .. *3 points
(*f*) Portable and mobile stations in the rest of Europe including Eire .. .. 4 points
(*g*) Portable and mobile stations outside Europe .. .. 6 points
(*h*) Portable and mobile stations in the British Commonwealth .. .. 12 points

* An additional 2 points may be claimed on 1·8 Mc/s ONLY for contacts with a portable or mobile station in any other British Isles prefix zone (e.g., GM-G, GM-GD, G-GI, GW-GC contacts on 1·8 Mc/s score 5 points). The six British Isles prefix zones are listed in Rule 2.

18. Summary Sheets. An entry will be accepted as valid only if the complete summary sheet has been signed by the member solely responsible for the conduct of the event within his group, however constituted.

19. Operators. Contacts made by an operator whose name and call-sign does not appear on the cover sheet(s) of the appropriate log(s) will be disallowed. *Operators' call-signs must be shown on the logs against all contacts made by them.*

20. Entries. Each station's entry shall consist of a copy of the station log on the printed sheet, separate sheets being submitted for each band worked, together with a cover sheet for each band, and a summary sheet. The points claimed must be totalled for each band. Forms for this purpose will be supplied by Headquarters. Entries must be addressed to the RSGB H.F. Contests Committee, 28 Little Russell Street, London, W.C.1 postmarked not later than 20 June, 1966. LOGS MUST BE KEPT AND ENTRIES SUBMITTED IN GMT.

In the event of any dispute the ruling of the Council of the RSGB shall be final.

21. In addition to the **National Field Day Trophy** and miniature replica which will be awarded to the group obtaining the highest combined score, the **Gravesend Trophy** will be awarded to the runner-up. Miniatures and certificates will be awarded to the groups with the highest score for each frequency board.

The **Frank Hoosen, G3YF, Memorial Trophy** will be awarded to the leading 14 Mc/s station.

22. The Scottish NFD Trophy will be awarded to the Scottish group scoring the highest number of points.

23. The Bristol Trophy will be awarded to the group which, having entered only one station, shall obtain the highest number of points in comparison with other groups entering on a similar basis.

24. A certificate will be awarded to each of the following:

(*a*) The chief operator of the overseas station whose check log shows that he contributed the most points to competitors.

(*b*) The non-transmitting British Isles member whose check log is adjudged the most useful by the H.F. Contests Committee. This log should show: Date/Time (GMT); call-sign of station heard; call-sign of station worked; report and serial number sent by station heard. Where both sides of a contact are heard they should be recorded on separate lines.

Care of trophies. The Trophies will be handed to the representatives of the groups concerned, who will be responsible for their safe keeping and their return when requested by RSGB Headquarters.

GB2RS SCHEDULE

RSGB News Bulletins are transmitted on Sundays in accordance with the following schedule:

Frequency	Time	Location of Station
3600 kc/s	9.30 a.m.	South East England
	10 a.m.	Severn Area
	10.15 a.m.	Belfast
	10.30 a.m.	North Midlands
	11 a.m.	North West England
	11.30 a.m.	South West Scotland
	12 noon	North East Scotland
145·10 Mc/s	9.30 a.m.	Beaming north from London
	10.00 a.m.	Beaming west from London
145·8 Mc/s	10.15 a.m.	Beaming south from Belfast
145·30 Mc/s	10.30 a.m.	Beaming north west from Sutton Coldfield
	11.00 a.m.	Beaming south west from Sutton Coldfield
145·50 Mc/s	11.30 a.m.	Beaming north from Leeds
	12 noon	Beaming east from Leeds

News items for inclusion in the bulletins should reach Headquarters not later than first post on the Thursday preceding transmission. Reports from affiliated societies and from non-affiliated societies in process of formation will be welcome.

CLUBROOM

A Monthly Survey of Group and Club Activities

For further information on membership or the activities of a particular club, application should be made to the person whose Call-sign is indicated at the end of the item. Full addresses may be obtained from the Call Book.

Aberdeen ARS in the production of its Journal *The Voice of Blenheim* has attained an almost unbeatable standard. Containing 46 quarto pages between its covers it is a very impressive production indeed and goes to show what can be created on the much maligned duplicators. What is especially interesting is the high proportion of technical contributions which follow a little-bit-for-everybody pattern. *GM3HGA.*

AERE (Harwell) seem to feel that their affairs and activities are over a crest and beginning to drift towards a trough. As they observe, the fortunes of all clubs and societies tend to be cyclic, and that these ups and downs can, at times, be quite violent. However, sensing the situation, the club's committee is not content just to let matters drift, rather, as with all good management, they are proposing to take steps to formulate new and progressive policies and so infuse a greater sense of purpose into its activities. There can be but little doubt that they will succeed for they have the courage to acknowledge the situation. *G2HIF.*

Bangor University College ARS will be holding the first meeting of the Spring Term on 13 January. Owing to a large crane which toppled over, the club has had to move its location, and once it is re-established, the club station should be on the air each Wednesday afternoon. *GW3UCB.*

Basildon and District ARS is holding its next meeting on 20 January at the Restaurant of Van Gogh, Paycocke Road, starting at 8 p.m. A Mullard film show has been arranged, and all visitors will be most welcome. The Society project for a transmitter for NFD is now well under way. *G8AAO.*

Basingstoke ARC is holding a meeting at Immanuel Hall on 8 January when a talk on aerials will be given by Mr Hartopp of J-Beams Aerials Ltd.

Bedford and District ARC now meets at its new headquarters at Westfield School where prospective members are assured of a hearty welcome. *G3OWQ.*

Belfast and District Group, although rather late news, on 20 November, 1965 the group held a "Teach-in" at Girton Lodge Hotel. This function was a great success, not only from a technical standpoint, but also the following Dinner and Dance. *GI3CDF.*

Bristol ARC is holding meetings on 20 and 27 January, the former being on v.f.o. c.o. mixers and test gear, and the latter an introduction to computers. *G3SXY.*

Bradford RS is meeting on 6 January for a lecture by G3ADQ on s.s.b., and on the 18th for a visit to the Bradford telephone exchange. *G3OTO.*

Members and guests photographed at the Burton-on-Trent Radio Society's Annual Dinner.
(Photo by courtesy of the Derby Evening Telegraph)

Barnsley and District ARC has enjoyed a year of well attended meetings, and has set up a sub-committee to look into ways and means of making the 1966 NFD a better effort than in previous years. *G4JJ.*

Burton-on-Trent and District RS held its annual dinner late in November at which the Guest of Honour was the Mayor of Burton. With an attendance of 60, the event proved to be one of the most successful of recent years. *G3ACR.*

Cambridge and District ARC recently held a " Natter Evening" for which there was a record turn-out, and to which it gave them particular pleasure to welcome half-a-dozen American visitors. Another successful evening was devoted to showing transparencies, several of which were of local amateur radio stations. *G5BQ.*

Cheltenham ARS meets each Wednesday, and in addition to the 160m station they hope to have a 2m station operating soon. A very full programme has been arranged for the winter months to which visitors and prospective members are welcome. *G3LDA.*

Cheshunt and District RC had a demonstration in December of a laser used for laboratory experiments or communications purposes. The next meeting of the club will be on 7 January when it is hoped that Labgear Ltd. will give a talk and demonstration. *G3GBL.*

Clifton ARS operated G3JKY/A on 160, 80 and 4m at the HQ of the Brockley Scouts during the Jamboree-on-the-Air. *G3JKY.*

Cornish ARC reports a continuing high level of support for its activities, and is looking forward to a good year in 1966. *G3OCB.*

Crawley ARC continues to thrive and maintain a high level of activity and has laid plans for the 1966 Annual Dinner and Dance. *G3FRV.*

Cray Valley RS reports that the revival of the Dinner and Dance was a real success, and enabled YLs and XYLs to commiserate on the way in which Amateur Radio puts them out to grass from time to time. Joking aside, the layout of the tables encouraged a truly informal and friendly atmosphere. Under the title of " With the New Year in Mind " that stout fellow " Anon " waxes poetic in the current issue of *QUA* and to good effect. *G3KYV.*

Crystal Palace and District RC is hoping that following a lecture by G3POI on " V.H.F. DXpeditions," even more of their members will be imbued with determination to assist the club in its participation in v.h.f. portable events during the coming year. *G3FZL.*

Dorking and District RS held a final " noggin night " at the Wheatsheaf in December to wind up the proceedings for 1965. The club sends best wishes to everyone for 1966. *G3UJU.*

Dudley ARC holds its meetings fortnightly at the Art Gallery, and to which prospective members and visitors are always welcome. On 31 January the club will probably be visiting the Birmingham Tape Recorder Club to give members a talk on Amateur Radio.

Ealing and District ARS held a successful junk sale in November. Regular nets are held each Monday at 9 p.m. on 1970 kc/s, or near, and slow Morse transmissions take place each Friday evening at 9.30 p.m. At the AGM to be held this month, it is hoped to map out a programme of regular meetings. *G3SGT.*

East Worcestershire ARG continues to thrive. GB3RSG was operated successfully for the Scout Jamboree-on-the-Air, and in November the club put up a good show in the MCC contest. *G3HZG.*

Echelford ARS of Ashford, Middlesex, held its main meeting on 15 December when a general natter took place, accompanied with cries of " down the hatch " and " bottoms up " which must have satisfied the landlord. The club is now participating in most of the inter-club contests under the call-sign G3UES. *G3RHF.*

First Class Operators' Club now has details of the " Gateway of India " award. Direct information can be obtained from G3JLB provided an s.a.e. is enclosed with the request. *G3JLB.*

Grafton Radio Society re-opens on Friday, 7 January with a general get-together at its usual venue, Room 35, Montem School, Hornsey Road, N.7. Thereafter meetings are weekly commencing at 7.30 p.m. Through the efforts of several members, the 160m transmitter and aerial are back in commission, and attention is now being turned to the h.f./v.h.f. beams. The club extends a warm and sincere welcome to visitors. *G2CJN.*

Harlow RS. In addition to the regular club meetings on Tuesdays and Thursdays, a special evening for junior members will be held on Fridays, starting in January. The Essex Education Authority will be employing G3PRN as instructor, and with this backing how can the idea fail? *G3TLJ.*

Harrow RS will be holding its AGM on 14 January, and the retiring Committee hopes that as many of the 115 members as possible will attend. Meetings are held every Friday from 8 p.m. to 10 p.m. in the science lab of the Roxeth Manor School, Eastcote Lane, S. Harrow. *G3TUX.*

Liverpool and District ARS is holding a Top Band Phone Contest in January: anyone who is enthusiastic to take part is welcome to contact the new Honorary Secretary, A. D. H. Rooney, 149 Page Moss Lane, Liverpool 14. A full club programme has been arranged covering every weekly meeting until 22 February at least.

Magnus Grammar School RS has been particularly active of late, with RAE classes under way, a party visit to the Communications Exhibition, a tour of the Nottinghamshire Police Communications Centre, on 9 November, and a visit to the Newark STD telephone exchange. Eric Box, G3TJO, gave an enlightening talk on the value of Amateur Radio to blind people on the 23rd, and the month was rounded off with a demonstration of electrostatic experiments. *G3PAW.*

Manchester and District ARS now has three newly issued calls amongst its membership, and, a strictly local joke, it looks as though G3IOA may be active shortly as he now appears to have found the transmitter which he mislaid. *G3RTU.*

Mid-Ulster Group, although newly formed, has got off to a flying start. It is the intention of the group to foster Amateur Radio activities in the area and to promote a variety of functions. The younger members will be well catered for, and visitors will be welcome at meetings. *GI3CDF.*

Mid-Warwickshire ARS reports having made over 60 contacts during the Jamboree-on-the-Air, some 20 of which were with other Jamboree stations.

Midland ARS has provisionally fixed the date of the 1966 Rally at Trentham Gardens for 24 April and a sub-committee is hard at work getting things under way. On a 70cm note, the *MARS Newsletter* notes that the difference between the BBC2 and ITV Midlands frequencies produces an interesting (?) signal unless your receiving equipment is up to scratch. Bubble-bubble, toil-and-trouble. *G3JDJ.*

Moray Firth ARS is visiting the RAF station at Kinross on 3 January. A full and varied programme has been drawn up for 1966 which includes tapes, talks and films on subjects ranging from transmitters to marine radar. Prospective members are always welcome, as too are visitors. *GM3KHH.*

Newark SWC held a very successful Dinner late in November which was as much enjoyed by the XYLs and YLs as by the OMs. Tuesday evenings have been set aside for the construction of a club transmitter. As a receiver has now been purchased and a 100 ft. long wire hoisted skywards, it may not be long before the club is airborne under its call G3UEB. *G3TWV.*

Northern Heights ARS is holding its meeting on 5 January which will be devoted to a talk on the laying out of an Amateur Radio station. Like many other clubs, a party paid a visit to the Communications Exhibition in London. *G3MDW.*

North Ayrshire ARC is a recently formed club with its own QTH. The next meeting on 16 January coincides with the Affiliated Clubs' Contest, and the club station GM3RXT will be participating. Subsequent meetings will be on the first Sunday in each month commencing at 7.30 p.m., and visitors and prospective members are assured of a most cordial welcome. *GM3NYY.*

North Kent RS has, we are glad to note, solved the urgent question of a club Secretary. Percy Barber has offered to take over the job, an offer which was accepted with enthusiasm in view of his drive and personality. The club dinner is to be held on 26 February, and all members are urged not to miss this event. *G3PUI.*

Peterborough ARS listened to a talk on Civil Defence Radio at their December meeting. The club meets each Friday from 8 p.m. onwards at the Old Windmill, which is near the Peacock on the London Road. *G3KPO.*

Purley and District RC report that their membership is increasing and that all their activities are well supported. At the moment they are busily engaged in making arrangements for a DXpedition to Wales at Easter when they expect to operate a v.h.f. station, a 400 watt p.e.p. s.s.b. station—mainly on 20m—and also a Top Band station. In the more immediate future they hope to have a 4m station in operation at the Clubroom. Meetings in January will be on the 7th and 21st and at the latter a colour movie film of Gibraltar will be screened. *G3FTQ.*

Plymouth RC kept its activities at a minimum in December so that all club members could assist in getting the club station on the air in double quick time. Why the haste? Apart from the publicity they hope to get from the GB2USA venture across the " pond " it was felt that there might be a slim chance that the press and local TV might take an interest in the operation, in which case the club station might well end up on display to the public. One special date for members' diaries is 12 February when the Annual Dinner is being held. *G3SVC.*

Radio Amateur Invalid and Bedfast Club has, thanks to a tremendous amount of hard work by G3KQK, and Peter Bates of Lancing, a complete course of instruction for the RAE available on tape with associated photostat illustrations. Covering a total of seven 5½in. reels, and recorded at 3¾ i.p.s., those with experience of producing taped programmes will readily appreciate the monumental amount of work needed for this production. Members of the club interested in this course should refer to No. 9 of Vol. II of *Radial* dated November 1965. *G3LWY.*

Reading ARC has now commenced to produce a News Sheet bi-monthly for which thanks are due to G8AAG. Recent meetings have been somewhat of a mixed bag with something for everyone. *G3TOQ.*

Reigate ATS is holding its seventh AGM on Thursday, 27 January at the George and Dragon, Redhill. All members are earnestly requested to make a special effort to attend. An equally important date is 25 February when the Annual Dinner and Dance will take place. Looking ahead, plans are already in hand for the 1966 NFD. *G3NKT.*

Saltash and District ARC has meetings fixed for 14 January, which is a constructor night with prizes awarded, to be followed by a Surplus Sale, while on the 28th a film show is to be given the " main feature " being " The Magic Tape " produced by BASF Ltd. *G2DFH.*

Scarborough ARS is in the process of collecting tools for a communal tool chest. Four meetings were held in December and at one a sale of surplus took place. The club is pleased to report that membership is increasing once again after the usual summer lapse. *G3RIX.*

Severn Valley ARC held its AGM in November, and is looking forward to further progress in 1966. *G3ENY.*

South Birmingham RS now has a new QTH at the Scout Hut in Pershore Road, and with its AGM behind them, members are looking forward to another year of progress. One point that your conductor has noted, and this is the inclusion of a " Junior Representative " on the list of officers. This is an idea having considerable merit, for so often it can happen, quite unintentionally, that the interests of junior members can be overlooked. SBRS are obviously aware of this danger and are to be congratulated in taking steps to avoid it. *G3RUK.*

South London Mobile Club has had a change of secretary, and until the AGM in March, G3LXN is filling the post. Meetings, which are held at Clapham Manor Baths, S.W.4, during January will be on the 15th and 29th. *G3LXN.*

South Shields and District ARC is holding a meeting on 7 January at which G3RKL will be introducing a transmitter which he has converted to d.s.b. operation. Members are pleased to report that the local Technical College is running a course for the RAE, and that a dozen of their members are attending. *G2BCY.*

Southgate, Finchley and District Group is meeting on 13 January which will be the first meeting organised by the new committee. *G3TDM.*

Surrey Radio Contact Club. Subject to confirmation as this is written, the January meeting will take place on the 11th when G6ABA/T will travel from East Molesey to lecture on, and to demonstrate, Amateur Television. All members are especially requested to attend this meeting, not only because it promises to be unusually interesting, but as a gesture of thanks to John for coming from so far afield. *G3KGA.*

Torbay ARS reports that P. Hunt was the winner of the *G3LHT* swl cup for the second consecutive year. At a recent joust with Plymouth RC, they came away the winners of the

(Continued on page 55)

Forthcoming Events

Details for inclusion in this feature should be sent to the appropriate Regional Representatives by the first of the month preceding publication. A.R.s and club secretaries are reminded that the information submitted must include the date, time and venue of the meeting and, whenever possible, details of the lecture or other event being arranged. Standing instructions cannot be accepted.

REGION 1

Ainsdale (ARS).—5, 19 January, 2 February, 8 p.m., 77 Clifton Road, Southport.

Allerton (Liverpool).—Thursdays, 8 p.m., 3rd Allerton Scout Group Headquarters, Church Road, Woolton, Liverpool.

Blackburn.—Fridays, 8 p.m., West View Hotel, Revidge Road.

Blackpool (B & FARS).—3 January ("The Engineer and Society" tape lecture by P. P. Eckersley), 10 January (Open Night), 17 January ("Transceivers" by H. Fenton, G8GG), 24 January (Evening meal at Stuart Hotel), 31 January ("Hints on mobile operating," tape lecture by C. H. L. Edwards), 8 p.m., Pontins Holiday Camp, Squires Gate. Morse tuition from 7.30 p.m.

Bury (B & RRS).—11 January, 8 p.m., Old Boar's Head, Crompton Street (private room).

Chester.—Tuesdays except first Tuesday in each month, 8 p.m., YMCA.

Crewe.—3 January, 7 February, 8 p.m., Earl of Crewe Hotel, Nantwich Road.

Eccles (E & DAC).—Every Thursday Club Top Band net at 8.30 p.m. Tuesdays, 8 p.m., Patricroft Congregational Schools, Shakespeare Crescent, Patricroft, Eccles.

Liverpool (L & DARS).—Tuesdays, 8 p.m., Conservative Association Rooms, Church Road, Wavertree.

Macclesfield.—4, 18 January, 1 February, The George Hotel, Jordongate.

Manchester (M & DARS).—Wednedsays, 7.30 p.m., 203 Droylsden Road, Newton Heath, Manchester 10.

Manchester (SMRC).—Fridays, 7.45 p.m., Rackhouse Community Centre, Daine Avenue, Northenden.

Morecambe.—5 January, 2 February, 125 Regent Road.

Preston.—11, 25 January (Morse practice at 7.30 p.m.), St. Paul's School, Pole Street.

Southport (SRS).—Wednesdays, 8.30 p.m., Sea Cadets Camp, The Esplanade.

Stockport.—12, 26 January, 19 February, The Blossoms Hotel, Buxton Road, Stockport.

Wirral.—5, 19 January, 2 February, Harding House, Park Road West, Claughton, Birkenhead.

REGION 2

Bradford.—4 January ("S.S.B." by A. W. Walmsley, G3ADQ), Bradford Technical College, Great Horton Road, 18 January (Visit to Bradford Telephone Exchange).

Catterick.—Tuesdays and Thursdays, 7.30 p.m., Club Room, Vimy Road.

Durham.—Alternate Thursdays, Vane Tempest Community Centre, Gilesgate.

Northern Heights.—5 January ("Station layout," by Mr. H. Makin, G3FDC), 19 January (Sale of Surplus Equipment), 7.30 p.m., Sportsman Inn, Ogden.

Scarborough.—Thursdays, 7.30 p.m., Rear of 3 Trinity Road.

Spen Valley.—13 January (to be arranged), 27 January (Film Show), 7.30 p.m., Heckmondwike Grammar School.

REGION 3

Birmingham (MARS).—18 January, 7.45 p.m., Birmingham Library, Margaret Street, Birmingham, 1.

(Slade).—14 January, 28 January, 7.30 p.m., The Church House, Erdington.

(South).—20 January, 8 p.m., The Scout Hut, Pershore Road, Birmingham, 29.

Cannock. (CCARS).—6 January, 8 p.m., The Bridgtown Social Club, Walsall Road, Cannock.

Coventry (CARS).—Mondays, 8 p.m., TA Centre, Westfield Road, Coventry.

Dudley (ARS).—Fridays, 8 p.m., Art Gallery, Dudley.

Leamington Spa (MWARS).—Mondays, 7.30 p.m., 7 Regent Grove, Leamington Spa.

Redditch (EWARG).—13 January, 8 p.m., Redditch Old People's Centre, Park Road, Redditch.

Salop (ARS).—13 January, 7.30 p.m., Morris Hall, Bellstone, Shrewsbury.

Stratford-upon-Avon (S-u-AARS).—7 January (Tape "Ham Radio in the Antarctic"), 7.30 p.m., Masons Arms, Sanctus Road, Stratford-upon-Avon.

Stourbridge (STARS).—4 January, 7.45 p.m. ("Transistorized Receiver," by Bob Barrett), Stourbridge Conservative Club (temporary meeting place).

Wolverhampton (WARS).—Mondays, 8 p.m., Neachells Cottage, Stockwell Road, Tettenhall.

REGION 4

Chesterfield (C & DRS).—12, 26 January, 7.30 p.m., Barnett Observatory, Newbold, Chesterfield.

Derby (D & DRS).—5 January (Surplus Sale), 12 January (Film show), 19 January (Open Evening—Committee Meeting), 26 January (Sub-Basement—Discussion), 2 February (Annual General Meeting), 7.30 p.m. Room No. 4, 119 Green Lane, Derby.

Heanor (H & DARS).—11 January (Coffee evening), Club Room, Heanor Technical College, Ilkeston Road, Heanor, Derbyshire.

Loughborough (LARC).—7 January (Night on the air), 8 January (Annual Dinner), 14 January (Film Show), 21 January ("S.S.B. & other modes of communication," by D. A. Winters, G3IPL), 28 January (Equipment sale), 7.30 p.m., Club Room, Bleach Yard, Wards End, Loughborough.

Leicester (LRS).—Mondays, 7.30 p.m., Sundays, 10.30 a.m., Club Room, Old Hall Farm, Braunstone Lane, Leicester.

Magnus GS (ARS).—Tuesdays, 3.50 p.m., Junior Physics Lab., Magnus Grammar School, Newark.

Melton Mowbray (ARS).—20 January (Shack visit—D. W. Lilley, G3FDF), 23 Melton Road, Asfordby Hill, Melton Mowbray, 7.30 p.m.

Newark (SWC).—Mondays and Thursdays, 7.30 p.m., The Hall, Guildhall Street, Newark.

Nottingham (ARCN).—Tuesdays and Thursdays, Room No. 3, Sherwood Community Centre, Woodthorpe House, Mansfield Road, Nottingham.

Peterborough (P & DARS).—7 January, 7.30 p.m., Peterborough Technical College, other Fridays, 8 p.m., The Old Mill Clubroom, London Road.

Worksop (NNARS).—Tuesdays (R.A.E. Class), Thursdays (Lecture), 7.30 p.m., Club Room, 13 Gateford Road, Worksop.

REGION 5

March (M & DRAS).—Tuesdays, 7.30 p.m., 88B High Street, March, Cambridge.

Cambridge (C & DARC).—28 January (Annual Dinner at Dorothy Restaurant, tickets from G3IIT. Mr R. F. Stevens, G2BVN, 1966 President of RSGB, will be guest).

REGION 6

Cheltenham.—First Thursday in each month, 8 p.m., Great Western Hotel, Clarence Street, Cheltenham.

REGION 7

Acton, Brentford & Chiswick (ABCRC).—18 January (AGM and demonstration of Joystick Aerial by Partridge Electronics Ltd.), 7.30 p.m., AEU Club, 66 High Road, Chiswick.

Ashford (Middx.) Echelford ARS.—12 January (Talk by Green Electronics Ltd.), 7.30 p.m., Links Hotel, Ashford. 28 January (Annual Party), Royal Hart Hotel.

Bexley Heath (NKRS).—13, 27 January, 7.30 p.m., Congregational Hall, Chapel Road, Bexley Heath.

Chingford (SRC).—10, 24 January, G3RYF, 17 Forest Drive East, Leytonstone, E.11.

Croydon (SRCC).—12 January, 7.30 p.m., Blacksmith's Arms, 1 South End.

Dorking (D & DRS).—11 January (Informal Meeting), 8 p.m., Wheatsheaf, Dorking. 25 January (AGM), 8 p.m., Star & Garter, Dorking.

Ealing (DARS).—Tuesdays, 7.30 p.m., Northfields Community Centre, Northcroft Road, Ealing, London, W.13.

East Ham.—Tuesdays fortnightly, 7.30 p.m., 12 Leigh High Road, East Ham.

East Molesey (TVARTS).—First Wednesday each month, Prince of Wales, Bridge Road, East Molesey.

Edgware & Hendon (EADRS).—10 January (AGM), 24 January, 8 p.m. John Keble Hall, Church Close, Deans Lane, Edgware.

Enfield.—18 January, 8 p.m., George Spicer School, Southbury Road.

Gravesend (GRS).—19 January, 7.30 p.m., RAFTA Club, 17 Overcliffe Road.

Guildford (G & DRS).—7, 21 January, 8 p.m., Guildford Model Engineering Society in Stoke Park.

Harlow (DRS).—Tuesdays & Thursdays, 7.30 p.m., Mark Hall Barn, First Avenue.

Harrow (RSH).—7 January (G3JUM Stereo Lecture), 14 January (AGM), 21 January (Practical), 8 p.m., Roxeth Manor School, Eastcote Lane.

Holloway (GRS).—Mondays and Wednesdays 7.30 p.m. (RAE and Morse), Fridays, 7.30 p.m. (Club), Montem School, N.7.

Hounslow (HADRS).—10, 24 January, Canteen, Mogden Main Drainage Department, Mogden Works, Isleworth.

Ilford.—Thursdays, 8 p.m., 579 High Road, Ilford (Nr. Seven Kings Station).

Kingston.—14, 28 January, 8 p.m. YMCA Eden Street. Fridays (Morse classes), 2 Sunray Avenue, Tolworth.

London U.H.F. Group.—6 January (U.H.F. Reports and Future Developments of G8), 7.30 p.m., Bull & Mouth, Bloomsbury Way, Holborn.

London Members' Luncheon Club.—12.30 p.m., third Friday every month, Whitehall Hotel, Bloomsbury Square, Holborn.

Loughton.—14, 28 January, 7.30 p.m., Loughton Hall (nr. Debden Station).

New Cross.—Wednesdays and Fridays, 8 p.m., 225 New Cross Road, S.E.14.

Norwood & South London (CP & DRS).—15 January, CD Centre, Catford, S.E.6.

Paddington (P & DARS).—Wednesdays, 7.30 p.m., Beauchamp Lodge, 2a Warwick Crescent, W.2.

Purley (P & DRC).—7 January (4 metre Transmitting Night), 21 January (Mick Roach, G3TWJ, Colour Films), 8 p.m., Railwaymen's Hall (Side Entrance), 58 Whytecliffe Road, Purley.

Reigate (RATS).—27 January (AGM), 7.30 p.m., George and Dragon, Cromwell Road, Redhill.

Romford (R & DRS).—Tuesdays, 8.15 p.m., RAFTA House, 18 Carlton Road.

Science Museum (CSRS).—4 January ("Lasers," by G. Clark of the GPO Research Laboratory), 18 January ("Tape Recording," tape recorded lecture by F. C. Judd, G2BCX), Science Museum, South Kensington. Visitors should contact G. Lloyd-Dalton, 2 Honister Heights, Purley, Surrey.

Scout ARS.—20 January, 7.15 p.m., Baden Powell House, Queens Gate, South Kensington.

Sidcup (CVRS).—6 January, 7.30 p.m., Congregational Church Hall, Court Road, Eltham.

Slough (SARS).—First Wednesday in each month, 8 p.m., United Services Club, Wellington Street.

Southgate & District.—13 January, 7.30 p.m., Parkwood Girls School (behind Wood Green Town Hall).

St. Albans (Verulam ARC).—19 January ("Transmitters for the Beginner," by G3LXP), Marconi Service Works, Hedley Road.

Sutton & Cheam (SCRS).—18 January, 8 p.m., The Harrow Inn, High Street, Cheam.

Welwyn Garden City.—13 January ("Designs for U.H.F. Links," by Geoff Watts of Rank-Bush Murphy), 8 p.m., Vineyard Barn, off Digswell Road.

LONDON MEMBERS' LUNCHEON CLUB

will meet at the White Hall Hotel, Bloomsbury Square, London, W.C.1.

at 12.30 p.m. on Fridays, 21 January and 18 February, 1966

Telephone table reservations to HOL 7373 prior to day of luncheon. Visiting amateurs especially welcome.

Wimbledon (W & DRS).—14 January, 8 p.m., Community Centre, St. George's Road, Wimbledon, S.W.19.
Wembley GEC ARS.—14 January (Visitors ring ARNold 1262 first)

REGION 8

Worthing (WDRS).—10 January (" Talking Books "), 24 January (Ragchew, Morse and Club Station), Adult Education Centre, Union Place, Worthing.

REGION 9

Bath.—21 January, 7.30 p.m., RNR Training Centre, James' Street West, Bath.
Bristol.—Fourth Friday in each month, 7.15 p.m., Small Physics Theatre, Royal Fort, Bristol University, Woodland Road, Bristol 8.
Burnham-on-Sea (B-o-SARS).—Second Tuesday in each month, 8 p.m., Crown Hotel Oxford Street, Burnham-on-Sea.
Camborne (CRAC).—First Thursday in each month, Staff Recreation Hall, SWEB Headquarters, Pool, nr. Camborne.
(CRAC V.H.F. Group).—Third Thursday in each month, 7.30 p.m., The Coach and Horses, Rydar Street, Truro.
Exeter.—First Tuesday in each month, 7.30 p.m. George & Dragon Inn, Blackboy Road, Exeter.
Plymouth (PRC).—Tuesdays, 7.30 p.m., Virginia House, Bretonside, Plymouth.
Saltash (S & DARC).—Alternate Fridays, 7.30 p.m. Burraton Toc H Hall, Warraton Road, Saltash.
South Dorset (SDRS).—First Friday in each month, 7.30 p.m., Labour Rooms, West Walks, Dorchester.
Torquay (TARS).—Last Saturday in each month, Club HQ, Belgrave Road, Torquay.
Weston-super-Mare.—First Friday in each month, 7.15 p.m., Victoria Hotel, Weston-super-Mare.
Yeovil (YARC).—Wednesdays, 7.30 p.m., Park Lodge, The Park, Yeovil.

REGION 10

Cardiff.—10 January (Talks on how [or how not] to modify the CR150/4), 7.30 p.m., TA Centre, Park Street, Cardiff.

REGION 11

Llandudno (CVARC).—14 January (" Amateur Television," by J. E. T. Lawrence, GW3JGA), 7.30 p.m., Cross Keys, Madoc Street, Llandudno.

REGION 13

Edinburgh (LRS).—13 January (" Amateur TV," by A. J. Masson, GM3PSP), 27 January (" Microwave Techniques "), 7.30 p.m., YMCA, South St. Andrew Street, Edinburgh.

REGION 14

Auchenharvie (H & DARC).—Tuesdays and Thursdays, 7.30 p.m., Auchenharvie Community Centre, Stevenson, Ayrshire.
Glasgow.—Second and fourth Fridays in each month, 7.30 p.m., in the Christian Institute, Bothwell Street, Glasgow.
North Ayshire (NAARC).—January 16 (A.F.S. Contest), 7.30 p.m., Ardrossan A.T.C., The Academy, Ardrossan. Details from GM3NYY, tel.: Kilmarnock 23073.

REGION 16

Wickford (WRC).—Wednesday (RAE Instruction), Friday (Practical work), 7.30 p.m., Beauchamps County Secondary School, Hill Avenue, Wickford. Details from G3SLP.

LOOKING AHEAD

27 December-8 January.—Daily Mail Schoolboys' and Girls' Exhibition.
7 January.—RSGB Presidential Installation.
20 March.—RSGB National Mobile Rally.
24 April.—RSGB National Mobile Rally.
12 June.—RSGB National Mobile Rally.
10 July.—South Shields Mobile Rally.
11 September.—RSGB National Mobile Rally.

Basildon (BDARS).—20 January (Film show at Mayflower Restaurant), 1 February (Social evening) Details from G3IJB.
Chelmsford (CARS).—1 February, 7.30 p.m., Marconi College, Arbour Lane, Chelmsford. Details from G3LTF.
Great Yarmouth (GYRC).—Fridays, 7.30 p.m., the Manager's Office, the Old Power Station, South Quay, Swanston's Road, Great Yarmouth. Details from G3HPR.
Ipswich (IRC).—Last Wednesday in each month, 7.30 p.m., Red Cross Headquarters, Gippeswyk Hall, Ipswich. Details from G3UJR.
Norwich (NARC).—Mondays, 7.30 p.m., the Club Centre, 140 Oak Street, Norwich. Details from G3TLC.
Southend (SDARS).—The Executives' Canteen, E. K. Cole Ltd., Priory Crescent, Southend-on-Sea. Details from G3NPF.

CHANGES OF ADDRESS

Four weeks' notice is required to effect changes of address. When notifying Headquarters, please give the old as well as the new address. Advise changes promptly so that you receive every issue of the BULLETIN without interruption.

Corrections

The 17th position in section B of the Second 70 Mc/s Contest (Open) 1965 was gained by G3SPY/P, and not as shown in the November issue results table. In the report, G3JHM/A's name is incorrectly shown as D. Hunter, which should be D. Hayter, and G2SKR should be G3SKR/P.

In the Third 70 Mc/s Contest (Portable) 1965, G3PAI/P should have read G3PIA/P, and G3JKY was, of course, /P.

Clubroom (Continued from page 53)

contest by 53 points to 49 points. A close decision indeed. *G3LKR.*

Uxbridge RS sadly report that they have had to go into temporary suspension due to lack of support.

Wakefield and District RS holds meetings at fortnightly intervals. Although a new club it has some 43 members, and would be very happy to welcome any other interested persons. *G3TQV.*

West Kent ARS meets on alternate Fridays at the Art School, Monson Road, Tunbridge Wells and has a varied and interesting programme arranged. New members are particularly welcomed. *G3PAH.*

Welwyn Garden City ARC. The Group is to hold a dinner at the Roebuck Hotel, Stevenage, on 20 January. Quite informal, and with no speeches. Make a note of the date, but more important, make your reservations now. *G5UM.*

Wimbledon and District RS reports that its Sunday night Top Band net is very well supported. However, not so favoured, so it seems, is the c.w. net held on Fridays. The club has also initiated a 10m net for those fed up with the fishy noises on 160, and this takes place on 28·4 Mc/s every Tuesday evening. All nets are open to non-members of the club. *G3EPU.*

Wirral ARS is holding meetings on 5 and 19 January, the former being concerned with Marine Radio in a lecture by G3UMZ.

Worcester and District ARC meets each Saturday starting at 7.30 p.m. On 8 January some members will be describing " My Shack," and on 22 January a Junk Sale has been arranged. New members and visitors are always welcome. *G3NUE.*

Is your club, society or group getting the fullest advantage from the publicity which it can secure from this column? Those contributions which are associated with a call-sign do. Does yours? If not, why not?

Deadline for the **February** issue will be **January 7.**
Deadline for the **March** issue will be **February 7.**

RSGB Slow Morse Practice Transmissions

The following Slow Morse Practice transmissions are sponsored by the RSGB. Alterations and additions to this list should be sent to the Honorary Organizer, M. McBrayne, G3KGU, 25 Purlieu Way, Theydon Bois, Essex.

Time	Call-sign	kc/s	Town
Sundays			
08.00	G3KLT	1827	Birmingham
09.30 †	G3KZZ / G3TNF	1920	South Shields, Co. Durham
10.00	GW3TMH	1980	Rhyl, Flints.
10.15	G3CGD	1875	Cheltenham
10.30	GI3JEX	1860	Belfast
11.00	G2FXA	1900	Stockton-on-Tees
12.00	GM3HBY	1903	Glasgow
12.00 †	G3HVI / G3OGD	1890	Stoke-on-Trent
12.00	G3SVD	1870	Reading, Berks.
12.00	G3PAI	1825	Ongar, Essex
18.00	GW3TMP	1980	Mold, Flints.
18.30	G3NCZ	1920	Blakcburn, Lancs.
19.00	G3NPB	1875	Hexham, Northumberland
21.00 †	G3LKT / G3PLQ	1892	Salisbury, Wilts.
21.30	G3NQR	1875	Harrow Weald, Middx
Mondays			
18.00	G3SWR	1980	Middlesbro', Yorks.
18.30	G3NCZ	1920	Blackburn, Lancs.
19.00	G3MXS	1875	Birkenhead
19.00	G3NPB	1875	Hexham, Northumberland
19.30 †	G2ATM / G3KTP / G3OKX / G3ONB / G3RTO / G3RUB / G3RWN	1890	Heanor, Derbys.
19.30	G3SRY	1920	Cheam, Surrey
20.00	G3HJG	1980	Manchester
20.00	G3IBJ	1910	Southampton, Hants.
20.15	G3SAZ	1845	Ashford, Middx.
20.30	G3TOF	1925	Harlow, Essex
21.00 †	G3IRM / G3MWO / G3PHW	1981	Bury St. Edmunds
21.00 †	G3LKT / G3PLQ	1892	Salisbury, Wilts.
21.15	G3ADQ	1990	Bradford, Yorks.
21.30 †	G2BSW / G3TBW	1865	Studley, Warks. / Redditch, Worcs.
Tuesdays			
19.00	G3NPB	1875	Hexham, Northumberland
19.00	G3NUE	144·26 Mc/s	Worcester
19.30	G3RFL	1910	Great Harwood, Lancs.
19.30	G3TAG	1970	Cambridge
19.30	G3RPB	1860	Porthcurno, Cornwall
20.00	G3RZO	1865	Redditch, Worcs.
20.00	G3PJI	1910	Southampton
20.00	G3AYJ	1925	Birmingham
20.30	G3NKX	1915	Loughton
21.00 †	G3LKT / G3PLQ	1892	Salisbury, Wilts.
21.30 †	G3HZG / G3TNI	1865 / 1865	Redditch, Worcs. / Bromsgrove, Worcs.
22.00	G3HZM	1925	Manchester
Wednesdays			
18.30	G2FXA	1900	Stockton-on-Tees
19.00	G3GBS	1865	Moseley
19.00	G3GBJ	1870	Redditch, Worcs.
19.00	GW3CJR	1930	Newbridge, Mon.
19.30	GM3SAN	1903	Glasgow
19.30 †	GM3NQB / GM3UBK	3510	Thurso, Caithness

Time	Call-sign	kc/s	Town
Wednesdays			
20.00	G8QU	1950	London N.22
20.00	G3SAD/A	1980	Stevenage, Herts.
20.30	G3KGU	1920	Theydon Bois, Essex
20.30	G3AGN	1875	Felixstowe
21.00 †	G3HVI / G3OGD	1890	Stoke-on-Trent
21.00 †	G3LKT / G3PLQ	1892	Salisbury, Wilts.
21.00	G3POU / G3SFO	1850	Doncaster, Yorks.
21.00	G3RIS	1980	Cromer, Norfolk
Thursdays			
18.00	G3SWR	1980	Middlesbro', Yorks.
18.30	G3NC	1968	Swindon
18.30	G3TMI	1840	Canterbury, Kent
19.00	G3NUT	1875	Wallesey
19.00	G3NPB	1875	Hexham, Northumberland
19.30 †	G2ATM / G3KTP / G3OKX / G3ONB / G3RTO / G3RUB / G3RWN	1890	Heanor, Derbys.
19.30	G3RFL	1910	Great Harwood, Lancs.
20.00	G3NHR	1900	Hounslow
20.00	G5XB	1878	Reading, Berks.
20.30	G3RSF	1925	Harlow, Essex
20.30 †	G3KAD / G3LLZ	1850	Swindon, Wilts.
21.00 †	G3IRM / G3MWO / G3PHW	1981	Bury St. Edmunds
21.00 †	G3LKT / G3PLQ	1892	Salisbury, Wilts.
21.00	G3ADQ	1990	Bradford, Yorks.
21.30 †	G3EVT / G3TOI	1865	Redditch, Worcs.
Fridays			
18.30	G3NZC	1920	Blackburn, Lancs.
19.00	G3NPB	1875	Hexham, Northumberland
19.30 †	GM3NQB / GM3UBK	3510	Thurso, Caithness
19.30	G3PWU	1850	Reading, Berks.
20.15	G3DXA	1845	Ashford, Middx.
20.30	G3TXI	1925	Nazing, Essex
21.00 †	G3LKT / G3PLQ	1892	Salisbury, Wilts.
21.00	G3PKE	1920	Dorking, Surrey
21.00	G3RIS	1980	Cromer, Norfolk
21.30 †	G3RZI / G3TQD	1865 / 1865	Redditch, Worcs. / Droitwich, Worcs.
21.30 †	G3UCZ / G3KSS	1900	Pudsey, Yorks. / Bradford
Saturdays			
13.00	G2FXA	1900	Stockton-on-Tees
14.00	GI3JEX	1860	Belfast
14.00	G3SVD	1870	Reading, Berks.
15.30	G3RFL	1910	Great Harwood, Lancs.
18.00	GW3TMP	1980	Mold, Flints.
19.00	G3NPB	1875	Hexham, Northumberland
20.00	G3KPO	1980	Peterborough
20.30	G3TLJ	1925	Roydon, Essex
21.00 †	G3LKT / G3PLQ	1892	Salisbury, Wilts.

† *Alternately*

Many more operators willing to make Slow Morse Practice transmissions to a regular schedule are required to ensure a country-wide coverage. Members willing to assist should contact the Hon. Organizer at the address given above. Reports from listeners to these transmissions will be welcomed by the operators concerned.

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