FEBRUARY 1968

Radio Communication

JOURNAL OF THE RADIO SOCIETY OF GREAT BRITAIN

THE NEW MASTER CONTROL AREA AT THE TWW STUDIOS, CARDIFF (*Photo by courtesy of TWW*) see page 91

ANGLIA TELEVISION'S BELMONT TRANSMITTING MAST
(*Photo by Courtesy of BICC and ITA*) see page 91

incorporating RSGB BULLETIN

No Price Increase on any KW Equipment

KW 201 AMATEUR BANDS COMMUNICATIONS RECEIVER

BASIC PRICE **£105**

Now with 2 detectors (i) product detector for SSB and CW (ii) diode detector for A.M. The KW 201 has been specifically designed for optimum performance on Single Sideband. 11 ranges give coverage in the amateur bands from 1.8 Mc/s to 30 Mc/s. A mechanical filter gives an I.F. selectivity of 3.1 kc/s at 6 db and 6 kc/s at 60 db. A 'Q' multiplier is available giving a variable range of 3.1 kc/s to 200 cycles selectivity.

additional extras if required

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Transmitter for all H.F. Bands, 220 watts PEP, SSB, AM CW now in full production complete with PSU.

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1200 watts PEP complete with built in PSU and SWR indicator.

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RADIO COMMUNICATION

ASSISTANT EDITOR
Trevor R. Preece, G3TRP

EDITORIAL ASSISTANT
John J. Adey, A4663

CONTRIBUTING EDITOR
Pat Hawker, G3VA

DRAUGHTSMAN
Derek Cole

ADVERTISEMENT MANAGER
Mrs P. D. Harvey

EDITORIAL OFFICE
RSGB Headquarters
28 Little Russell Street,
London, WC1
01-405 7373
01-405 2444

ADVERTISING OFFICE
Sawell and Sons Ltd.,
4 Ludgate Circus,
London, EC4
FLE 4353

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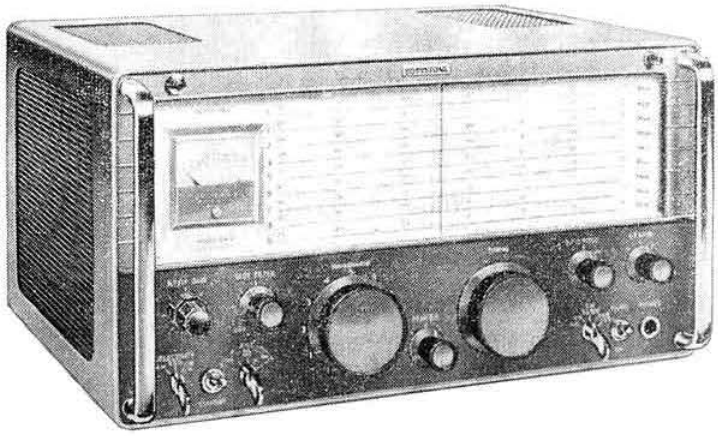
FEBRUARY 1968
VOLUME 44 No. 2

A *

Eddystone

Amateur communications receivers

EA12



An amateur bands double-conversion superheterodyne receiver, for a.m, c.w, and s.s.b reception. For all amateur channels between 1.8 MHz and 30 MHz in nine 600 kHz bands with 28 MHz tc 30 MHz in four bands.

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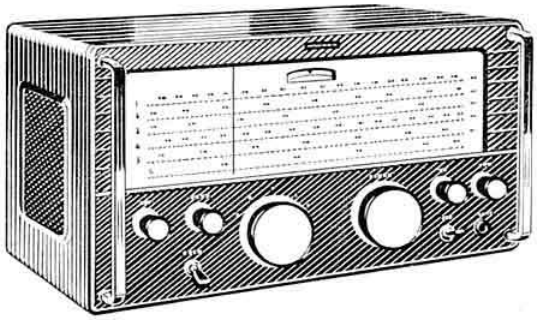

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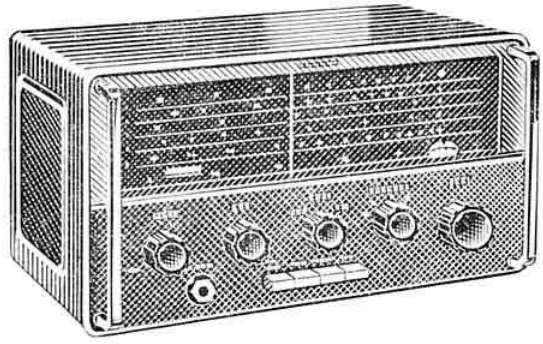
An 8-valve receiver with gap-free coverage from 500 kHz to 30 MHz metres providing excellent reception of broadcast programmes and all major s.w channels including marine and international distress frequencies. The famous Eddystone extended band spread and logging scale is an essential feature. Suitable for a wide range of a.c and d.c voltages. Fully tropicalized. **£66.**



EC10 communications receiver

The fully transistorized EC10 communications receiver, supreme in its class, covers both medium-wave broadcasting and all shortwave service to 30 MHz. Incorporating the famous Eddystone tuning drive, with logging scale and auxiliary vernier, shortwave reception is particularly simple. Battery operated or from optional a.c mains unit. **£53.**

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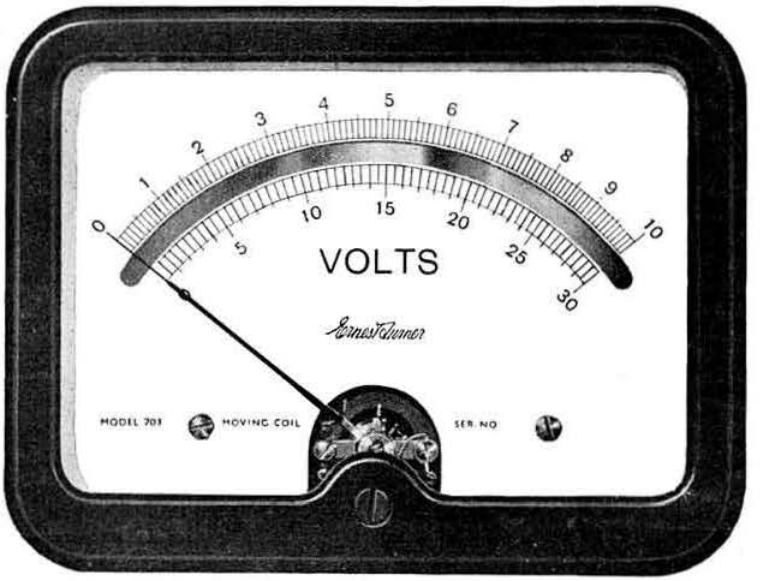

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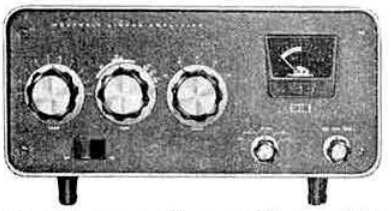
Kit SB-101, 23 lbs., **£185 . 12 . 0** **Assembled £225 . 12 . 0**



SB-200 KW SSB linear Amplifier . . . 1200 watts PEP input SSB, 1000 watts CW on 80 through 10 metres. Built-in antenna relay, SWR meter, and power supply. Can be driven by most popular SSB transmitters (100 watts nominal output).

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Kit SB-610E, 14 lbs. **£41 . 14 . 0** Assembled **£51 . 14 . 0**

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Kit HP-13, 7 lbs., **£37 . 2 . 0** (+ earth available) Assembled **£44 . 2 . 0**

Kit HP-23E, 19 lbs., **£30 . 18 . 0** Assembled **£36 . 8 . 0**

MODELS
HW-12A
(80m.)

HW-32A
(20m.)

HW-12A and HW-32A Filter-Type SSB Transceivers . . . 200 watts PEP input TX. 1μV sensitivity RX. PC Board. Pre-aligned circuits. Power required: 800v. D.C. at 250 mA., 250v D.C. at 100 mA. —125v. D.C. at 5 mA., 12v A.C. or D.C. at 3·75A.

Kit, either model, **£60 . 3 . 0** Assembled **£74 . 13 . 0**

GH-12 Push Talk Microphone Assembled **£4 . 3 . 0**

DX-100U Transmitter . . . 120 watts CW, 100 watts Phone. Built-in VFO and all power supplies. Band coverage: 160, 80, 40, 20, 15 and 10 metres.

Kit DX-100U £81 . 10 . 0 Assembled **£106 . 15 . 0**

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Kit DX-40U £29 . 19 . 0 Assembled **£41 . 8 . 0**

RG-1 High Sensitivity General Coverage Receiver . . . High performance at lowest cost. Covers 600 Kc/s. to 1·5 Mc/s., 1·7 Mc/s. to 32 Mc/s. Full specifications available.

Kit RG-1, 18 lbs., **£39 . 16 . 0** Assembled £53

RA-1 Amateur Bands Receiver . . . Covers 10-160m. Half-lattice crystal filter at 1·6 Mc/s. Switched USB and LSB for SSB. Provision for fixed, portable or mobile uses.

Kit RA-1 £39 . 6 . 6 Assembled **£52 . 10 . 0**

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Kit SB-301E, 23 lbs. (less speaker) **£140 . 12 . 0** Assembled **£170 . 12 . 0**

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Kit SB-401E, 34 lbs., **£157 . 10 . 0** Assembled **£192 10 . 0**

SBA-401-1 crystal pack, 1 lb., **£17 . 3 . 0**

HW-30 2 Metre Transceiver . . . For fixed, portable, or mobile. Ideal for local and RAEN purposes. Input 5 watt. CC. Tunable regenerative RX. Size 9¼"w. × 8"h. × 6" deep. (For 230v. operation if required).

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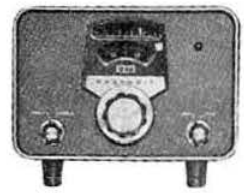
Kit GP-11 (Power Supply 6 or 12v. D.C.) **£10 13s.** Assembled **£13 13s.**



SB-640 External LMO for SB-101 . . . Provides Linear Master Oscillator frequency control or either of two crystal controlled frequencies for a total of five frequency control options. Power supplied from SB-101 Trans.

Kit SB-640, 9 lbs., **£51 . 6 . 0** Assembled **£56 . 6 . 0**

HA-14 The World's Smallest Kilowatt Linear . . . 80-10m. Only 3 3/16 × 12 3/16" × 10" deep.

Kit HA-14 £55 . 13 . 0

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Kit HD-10, 6 lbs., **£23 12 . 0** Assembled **£30 . 12 . 0**

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Kit GR-64E £22 . 9 . 0 Assembled **£29 . 9 . 0**

GC-1U "Mohican" General Coverage Receiver . . . 10 transistors, 5 diode circuit. Tunes 580-1550 Kc/s. and 1·69-30 Mc/s. in 5 bands. 6" × 4" speaker.

Kit GC-1U £37 . 17 . 6 Assembled **£45 . 17 . 6**

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12v DC in. 390v DC 200ma out.: or 160v at 145ma. Alternative output and DC input relay controlled. Built on chassis 8 in. × 5 in. × 2½ in. with Toroidal transformer (2⅞ in. h. × 2¼ in. w. × 2½ in.) and large heat sink mounted on top of chassis.
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12v DC in. 400v DC 200ma out plus 250v at 150ma: or 250v only. Outputs and input relay controlled. Built on aluminium chassis 8 in. × 5 in. × 2½ in. with Toroidal transformer (3¼ in. h. × 2¾ in. w. × 2¼ in.) and heat sink mounted on top of chassis.
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All units are fully fused. Transformers are completely potted. Negative or Positive earth without change, complete and working with 3 months Guarantee. Delivery 7 days. Outputs are measured with mobile vehicles. With static vehicle they will be a little lower.

MOBILE SOLID STATE POWER UNIT KITS
Kits are based on ready built units less chassis. All components, Toroidal transformer, relays and circuit supplied.

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COMPACT	Postage 4/6	**£5 10 0**
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A QQV03-10 mod. kit will be available next month. Price in next issue.

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	6AQ5	**2/6**
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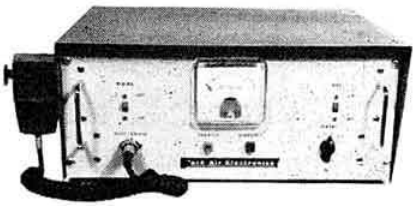

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Size 16 in. × 12 in. × 7 in.
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George Parsons (G3NJI)

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Writing this at Christmas, it seems like a good idea to gaze into my crystal filter (crystal ball are out for '68) and see what the next 12 months will bring. Provided you lads continue to squander your hard-earned bread on the crummy old junk I peddle, thus pandering to my insatiable greed, I will undoubtedly grow a bit fatter and a bit richer. The latter pleases me no end. One thing for sure, I'll continue to expand my stocks of stuff which I consider good value for money—new stuff in the pipeline include a low priced SSB ham-band Rx, a medium priced SSB Rx and matching Tx, a high-priced but tip top transistor hambander, sundry new and cheap xtal filters, reasonably priced converters for 20, 15, 10 and 2m., a very nice stand mike with built-in transistor audio amplifier and PTT—the perfect answer for the man who wants to use a quality mike with a rig which requires a fairly high audio input. All kinds of stuff about which I am haggling over prices with the manufacturers. As soon as I start getting these juicy things in quantity, I'll give you a yell. Also, I have some 100kc/s xtals coming, they may be here when you read this. These are of current manufacture (not surplus) to military spec. and so are a bit more expensive, but worth it. In the usual HCB/U case which fits the HA350, FR-100-B, RAI calibrator etc., and cost £2.0.0. each. Incidentally, because these are to military spec. they are classed as " Strategic War Material "—you've no idea of the fun and games I've had getting the necessary import licence etc.! Sorry, you UA's, I'm not allowed to flog you a 100kc/s xtal! Nothing in the Regulations to say I can't flog you a complete xtal calibrator, but a 100 kc/s xtal, niet. Marvellous, isn't it?

Anyway, let's start flogging. At the time of writing I have the following at pre-devaluation prices:

3 only National 200's, complete with p.s.u. kit at £185.0.0 each. This is National's latest 80-10 200W p.e.p. AM/CW/SSB rig. 2 only Sommerkamp FT-100-B's—like the FT-100 but with built-in VOX. 80-10 150W p.e.p. AM/CW/SSB transceiver All transistor except driver and PA. Built-in 240V a.c. and 12V d.c. power supplies, £190.0.0. each.

3 only Paros 3 band transceivers, 80, 40 and 20, 80W p.e.p. AM/CW/SSB transceiver. These are a very nice rig indeed—no optional extras whatsoever. Complete with xtal calibrator, VOX, transceive vernier, adjustable noise limiter etc. I honestly think that these are exceptional value at £120.0.0 complete. A cracking good RX and a stable nice sounding Tx.

3 only FL-1000 Sommerkamp kilowatt linears at £90.0.0. each. Other imported new stuff, unfortunately, has gone up in price:

SOMMERKAMP—The new FT-150 transceiver is a real top notch effort—technically improved and now covering all of 10m, it really is a beautiful little rig. With both d.c. and a.c. power supplies built-in it is equally at home mobile or fixed station. As it is transistor except for driver and PA, battery drain is only 14 amps *peak* for 150W p.e.p. Even at the increased price of £215.0.0 it is still incredible value for money.

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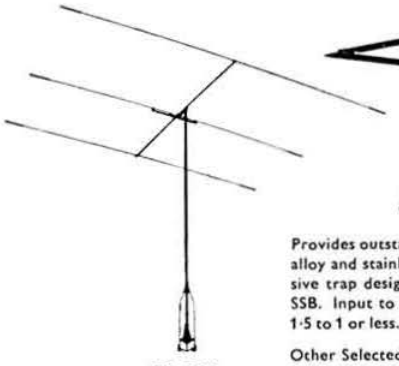

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CURRENT COMMENT

DISCUSSING TOPICS OF THE DAY

An Amateur in Place

Amateur Radio has long recognized that the well-being of the hobby depends, to an important extent, on the goodwill of the public, not least to ensure continuous recruitment to its ranks.

In recent months, our Society has—with the appointment of its energetic Honorary Public Relations Officer—increasingly recognized the need to encourage the spread of information about the activities of Amateur Radio among the public at large.

But there is one particular and significant aspect of such activities which must, in the end, depend primarily upon the members and the local clubs and groups—and especially on those associated with schools, technical colleges, universities, broadcasting organizations, the Services, commercial communications firms and " carriers." This is to see to it that those youngsters who are likely in the future to occupy positions of leadership and influence in the radio communications field are knowledgeable of, well disposed towards, and preferably actively interested in Amateur Radio.

This can, perhaps, best be achieved by showing them that the hobby still provides unrivalled opportunity for serious, but low-cost, personal or co-operative research and experimentation, at whatever level of intellectual involvement that one cares to put into it. In other words, we must be at some pains to show that there is more to Amateur Radio than just an interesting, pleasant, reasonably useful and sometimes exciting way of passing the time. That there are still, for those who wish to take advantage of them, genuine opportunities for the development of new communications techniques, equipments and aerials, and for the investigation of still unexplained puzzles of radio propagation, as well as for relating textbook studies with solidly practical investigations.

Such youngsters, it should be remembered, could be put off rather than attracted by the type of " fancy that—a real transmitter which can reach Australia in your own home " approach that may be quite appropriate in interesting other sections of the community. Rather they want to see real evidence that Amateur Radio can still be found at the fringes of the state-of-the-art.

Amateur Radio has long benefited to an enormous extent from the fact that many of the most able " professionals " who entered radio in the pioneering days passed—even if only for a time—through the amateur sphere.

The world's intelligence services, it is said, have a phrase about having " an agent in place "—persons who are well disposed towards them and who at some future time may be able to render assistance. By interesting now those youngsters who are drawn towards the world of communications we should be ensuring that in the years to come there will always be " an amateur in place."

Front Cover

The first of a new type of BICC aerial mast is floodlit at the ITA Belmont transmitting site. Situated 7½ miles south-west of Louth, Lincolnshire this relays Anglia Television on Channel Seven with 30kW peak vision power. This site is also used by BBC1 television on Channel 13 and by BBC Radio 2, 3 and 4 on FM, v.h.f. It is also thought that u.h.f. transmissions may commence from this site.

On the top floor of a three storey extension to the TWW Studios in Cardiff is this new Master Control sytem. It was designed to operate two separate, simultaneous transmissions, seven days a week: a unique responsibility for a single Independent Television company, and is the result of a three year £250,000 development project. The switching system provides for separate control of the two transmissions, with a further separation for the South Wales transmitter of the Welsh network to obtain a similarity of advertisements broadcast from the two transmitters at St. Hilary. The facilities are being acquired by the new ITA contractor, Harlech TV, in July.

A Gated Two-tone Oscillator and Linearity Checker

By R. C. MARSHALL, M.A., M.I.E.E., G3SBA *

THIS article describes a two-tone oscillator in which the tones are produced by mixing a pilot frequency with the supply frequency in a balanced modulator. When the resultant signal is applied to an s.s.b. transmitter and the r.f. displayed on a c.r.t. against a 50 Hz sinewave timebase, a trapezoidal display results that easily shows up transmitter faults. The mean power during this test can be reduced to one quarter of the peak power by removing alternate half-cycles of the test waveform. The circuit uses only five transistors and draws its power from the transmitter heater supply.

The oscillator was designed as part of an " all transistor but the p.a." transceiver, in which a cathode ray tube was built into the p.a., sharing its 1·2 kV h.t. supply. One Y plate was capacity coupled to the p.a. anode, and one X plate fed with 50 Hz a.c. This arrangement displayed speech waveforms adequately and facilitated tuning up, but it was also desired to assess linearity and power output using the conventional " two tone " test. For this test equal amplitudes of tones at, say, 300 and 400 Hz are mixed, as shown in Fig. 1 a, b, and c. When the mixed signal is used to modulate an s.s.b. transmitter the r.f. output has the form shown in Fig. 1d. Inspection of this waveform will reveal any poor carrier suppression, overloading, or parasitic oscillation. However, with a 50 Hz sine-wave timebase a stable pattern cannot be obtained, as the difference frequency between the tones cannot be synchronized with the supply frequency. Since a variable frequency sawtooth timebase is quite complex, the writer resolved to design a two-tone oscillator whose difference frequency was inherently locked to the supply frequency.

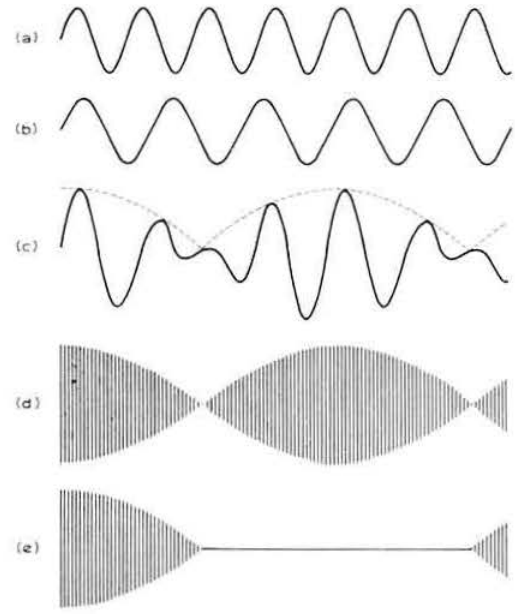

Fig. 1. Waveforms associated with a two-tone oscillator.

The Technique

Now suppose a 350 Hz pilot tone is modulated at 50 Hz in a balanced modulator that suppresses both the pilot and 50 Hz signals. The resultant will be a mixture of 300 and 400 Hz exactly as in Fig. 1c, but the difference frequency is now 100 Hz irrespective of variations in the pilot tone frequency. If this mixture is used to modulate a s.s.b. transmitter the oscilloscope pattern is still that of Fig. 1d. However, if a 50 Hz sinewave is used instead of a linear timebase a " bow tie " pattern is produced as shown in Fig. 2a. Curvature of the sides of the triangles indicates non-linearity just as in the " trapezium test " for a.m. transmitters explained on page 287 of the RSGB *Amateur Radio Handbook*.

Because a two-tone signal has a mean-to-peak ratio of $\frac{1}{2}$, which is greater than that of speech, some power amplifiers will overheat if such a test is continued for too long. Consequently " gated two-tone " oscillators are used in which the signal is periodically turned off to rest the p.a. If the balanced modulator oscillator is disabled for half the period of its 50 Hz supply, the output becomes that shown in Fig. 1e, which has a mean-to-peak power ratio of $\frac{1}{4}$. The " bow tie " pattern becomes a single triangle as shown in Fig. 2b, which provides all the information necessary for linearity checking. Thus, to obtain two audio tones as the sidebands of a pilot tone modulated at the supply frequency has the advantages of simplifying the companion oscilloscope, easing the study of linearity, and giving an easy choice of mean-to-peak ratio. It now remains to be shown that it is simpler than the usual technique.

A Practical Unit

The design uses five transistors, all operated as switches. In this mode only two states are of interest: the transistor is

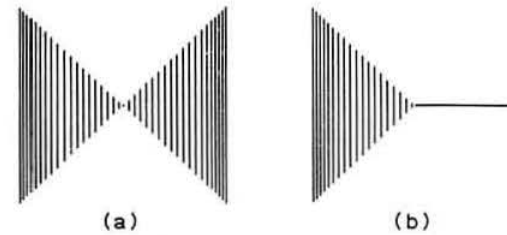

Fig. 2. Oscilloscope traces with 50 Hz timebase.

* 30 Ox Lane, Harpenden, Herts.

" turned on " when current flows through the base, and the collector-emitter path is then regarded as a short-circuit, the transistor is " turned off " when the base is reverse-biased, and the collector-emitter path is then open-circuit. In circuits where very low resistance in the " on " state is more important than high switching sensitivity, transistors are generally used " inverted," that is with collector and emitter interchanged and the collector used as the earthy terminal.

The balanced modulator is shown in Fig. 3. TR3 and TR4 alternately short out opposite sides of the push-pull 50 Hz supply, effectively reversing at the pilot frequency the polarity of the 50 Hz signal transferred to the output. As can be seen from the output waveform in the figure this is equivalent to balanced modulation.

Fig. 4 shows the low pass filter R12, C5 and C6 which removes the sharp corners of this output, reducing its harmonic content to less than 3 per cent. The following transistor TR5 can short out alternate bursts of output if it is turned on and off by a 50 Hz supply via R13. C7 and R14 ensure that there is no direct voltage across the transistor, as such a voltage would superimpose a 50 Hz square-wave upon the output. TR5, R13, R14 and C8 could be omitted if the gating feature was not required. The final output is about a tenth of a volt peak, and should feed a load exceeding 200 kohms.

The push-pull square-wave pilot tone required by the modulator is conveniently provided by the multivibrator shown in Fig. 5. Here the transistors take it in turns to be switched on, and are then turned off for a period $T = 0{\cdot}7\,CR$, where C and R are the coupling capacitance and total resistance in the base circuit. So far, we have considered a 350 Hz pilot tone to simplify the drawing of Fig. 1. In practice, 1250 Hz is used, as this is well in the middle of the passband of all transmitters, yet high enough to ensure that any remaining odd harmonic distortion in the oscillator output is removed by the transmitter filter.

To combine these circuits the current flowing through the emitters of the multivibrator is taken directly to the bases of the modulator. A centre-tapped a.c. supply is used both for the modulator push-pull drive and for a full wave rectifier. The latter gives a negative supply for the multivibrator and, after a second stage of filtering, for the modulator bias. The complete circuit is shown in Fig. 6. The voltage across C1 is about 3·9 volts, and that across C2 3·3 volts. All these voltages apply to 6·3 volt centre-tapped operation, and will be doubled at 12·6 volts. If no centre-tap is available, it may be made by connecting two 5 ohm resistors in series across the supply (higher values cause distortion of the waveform). In view of the higher power loss in such resistors, they are to be avoided if possible—for example, by series connecting two 6·3 volt windings to give 12·6 volts centre-tapped. After checking the voltages on C1 and C2 the waveform should be studied, and the two potentiometers adjusted (with the gating turned off) until positive and negative peaks of consecutive bursts of tone are of equal amplitude.

Construction and Component Selection

Multivibrator and modulator transistors should be p-n-p germanium r.f. devices; audio types will not do. TR5 is used in a rather high impedance circuit, and should be silicon, although the only effect of changing from p-n-p to n-p-n is to reverse the phase of the gating. If an n-p-n planar transistor such as the 2N706 is used here a diode must be

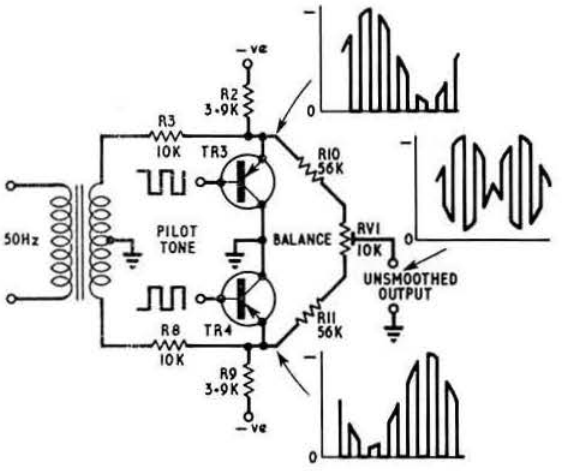

Fig. 3. Basic circuit of balanced modulator.

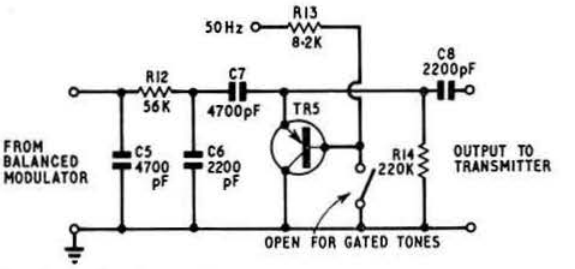

Fig. 4. Basic circuit of filter and gate.

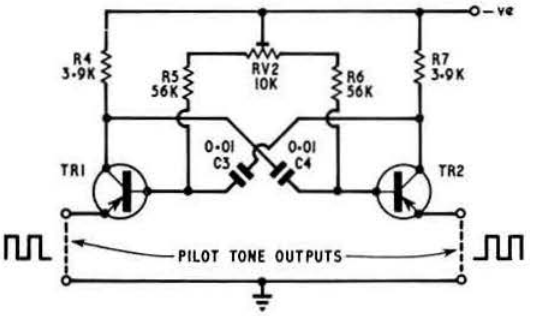

Fig. 5. Basic circuit of multivibrator.

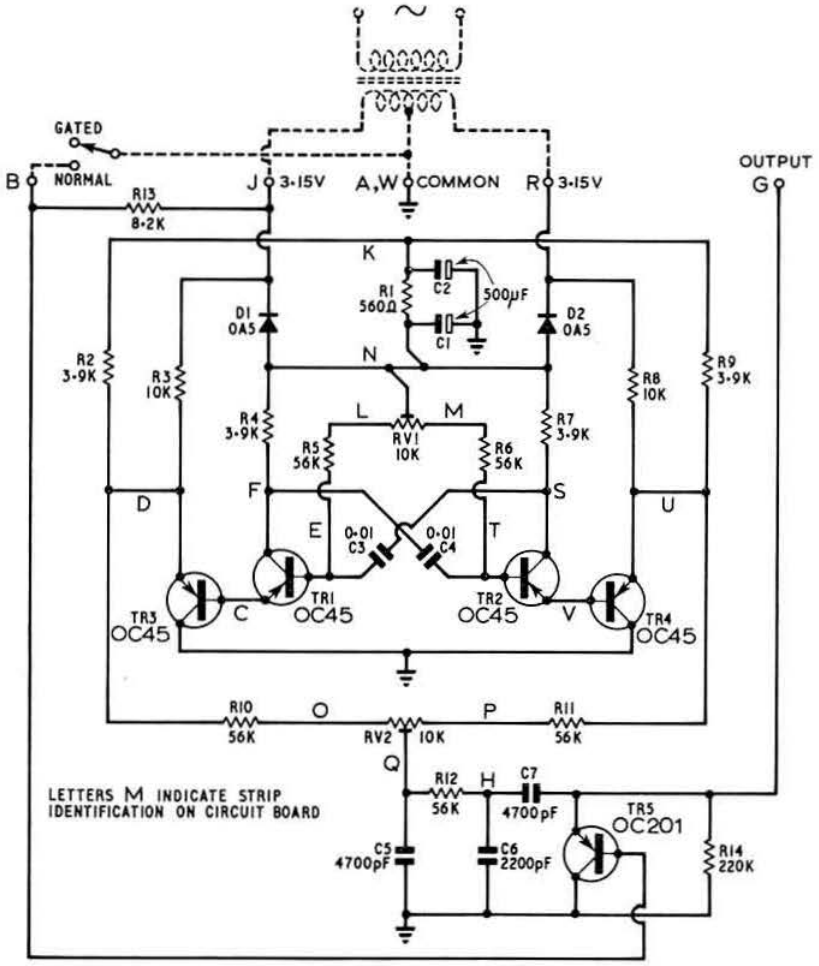

Fig. 6. Complete circuit. The letters on this circuit refer to the connection strips on Fig. 7. C8 should be connected externally in series with the output.

connected to prevent reverse base-emitter breakdown, that is with its cathode to base and its anode to common.

The complete oscillator can be constructed on a piece of "Veroboard," as shown in Fig. 7. The arrangement of the components is such that no cutting of the copper strips is required. Each strip is identified by a letter that also appears on the corresponding node of the circuit diagram. The potentiometer tags should be bent to line up with the appropriate holes, which must be drilled out to 0·051 in. Three holes are drilled out to $\frac{1}{8}$ in. so that the board may be mounted with Nylon screws and insulating spacers to avoid shorting out any copper strips. As both of the extreme edge conductors are earthy, they are connected together by a tinned copper link. The transistors are stuck to the board, and Vero pins used as terminals.

The oscillator can be directly substituted for a "crystal microphone." When it is to replace a sensitive or low impedance microphone an attenuator will be needed, or possibly the oscillator could be connected to an intermediate stage of the microphone amplifier.

If it is desired to obtain the trapezium pattern on an oscilloscope allowance must be made for the delay caused to the signal passing through the transmitter crystal filter. In the writer's case this required a 45° lag to be inserted between the 50 Hz supply and the X plates. Generally some attenuation will also be required and the component values must be found by experiment. As a starting point, the writer's network is shown in Fig. 8.

This oscillator is recommended as a simple transistor circuit that fits nicely into valve equipment, and can usefully aid adjustment of a sideband transmitter. The circuit described is the subject of a patent application; but members may construct it for their own use. It must not be used commercially without permission of the author.

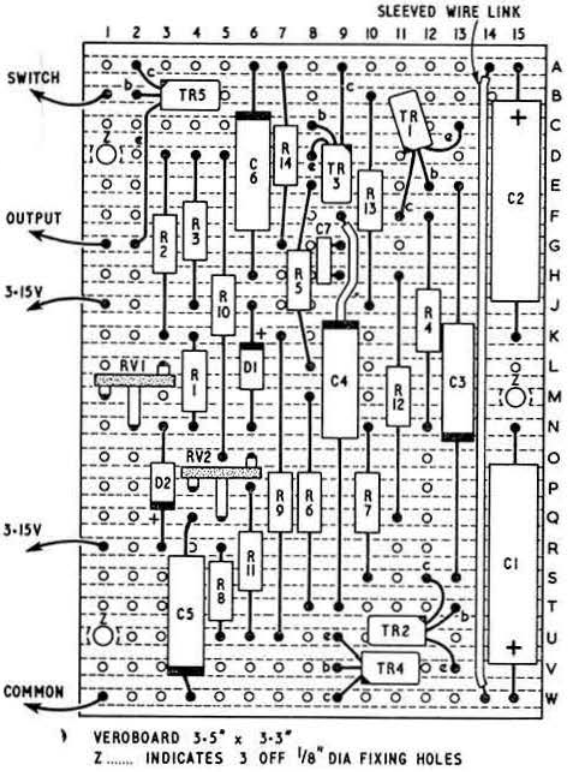

Fig. 7. Layout of the components on the Veroboard.

Components List

R1	560 ohms ± 10 per cent ¼ watt carbon composition.
R2, 4, 7, 9	3·9k ohms ± 10 per cent ¼ watt carbon composition.
R3, 8	10k ohms ± 5 per cent ¼ watt HYSTAB
R5, 6, 10, 11, 12	56k ohms ± 5 per cent ¼ watt HYSTAB
R13	8·2 k ohms ± 10 per cent ¼ watt carbon composition.
R14	220k ohms ± 10 per cent ¼ watt carbon composition.
C1, 2	500μF 6V electrolytic
C3, 4	0·01μF ± 5 per cent metallised polyester or polythene or mica.
C5	4,700pF ± 20 per cent metallised polyester or ceramic
C6	2,200pF ± 20 per cent metallised polyester or ceramic
C7	4,700pF ceramic disc.
C8	2,200pF
RV1, 2	10k ohms linear ¼ watt skeleton printed circuit preset.
D1, 2	Germanium junction diode, e.g. OA5.
TR1, 2, 3, 4	OC45 see text.
TR5	OC201 see text
Veroboard	3·3 in. × 3·5 in. Perforated on 0·2 in. × 0·156 in. matrix (Proops Bros. Limited).

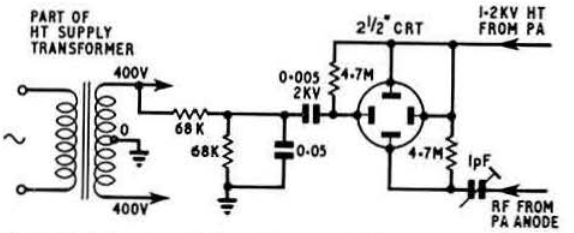

Fig. 8. Skeleton circuit of oscilloscope deflection arrangement.

Resonance Simplified

By Martin C. Osment, G8AIP

Resonance is a phenomenon which occurs at the frequency where inductive reactance X_L is equal in value to capacitive reactance X_C.

Under this condition input voltage and current are in phase with each other. At resonance, a magnification of either voltage or current will occur. In the series circuit, voltage is magnified, and in the parallel circuit current is magnified. The ratio of this magnification is called the Q factor.

Where Q is greater than 10, it is normal to take the series and parallel resonant frequencies as the same figure. With very low impedance, Z, circuit losses are relatively high and a value of less than 10 will not be obtained in normal amateur practice. The lowest Q value normally encountered is 12 to 14 for a pi-network where this figure gives appropriate flywheel effect with good harmonic attenuation.

Useful formulae

$$X_C = \frac{1}{\omega C} = \frac{1}{2\pi f C} \text{ ohms} \qquad X_L = \frac{1}{\omega L} = 2\pi f L \text{ ohms}$$

and at resonance,

$$X_C = X_L$$

therefore

$$\frac{1}{2\pi f C} = 2\pi f L$$

and $1 = 4\pi^2 f^2 LC$ giving $f = \dfrac{1}{2\pi\sqrt{LC}}$ which is designated f_o.

It is usually more convenient to use the form:

$$f^2(\text{Mc/s}) = \frac{25330}{C(\text{pF}).\ L(\mu\text{H})}$$

It is worth noting that, for single tuned circuits,

$f_o = Q_o\ BW$ where Q_o is the unloaded Q at f_o and BW is the 3dB or ½ power bandwidth.

f = operating frequency
$\omega = 2\pi f$
$\pi = 3{\cdot}142$ approx.
C = capacity in Farads.
L = inductance in Henries.

BASIC THEORY AND APPLICATION OF TRANSISTORS

Beginning with an explanation of atomic theory in relation to semiconductor materials, this manual takes one through a course on equivalent circuits parameters of devices and biasing into complete circuits such as various configurations of audio amplifiers, oscillators, pulse circuits and modulation. It is a good and quite complete introduction to the transistor.

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Design of T-Networks for Series Tuned Transistor Power Amplifiers

By M. M. BIBBY, G3NJY

IN Technical Topics, May 1967, attention was drawn to the increasing practice of using series tuned circuits in the main output tank circuits of power amplifiers. The main advantages claimed for this system are improved collector efficiency and harmonic rejection. Motorola(1) have recently proposed a method for calculating the values necessary for transferring power from a transistor to a given load. Their report forms the basis of what is to follow.

The Problem Stated

The problem consists in transferring the power from the collector of a transistor to a load which will absorb the power delivered to it. The transistor output characteristics should be given by the manufacturer and the load will be assumed to be the resistive load of a matched coaxial cable. The circuit will then be as shown in Fig. 1.

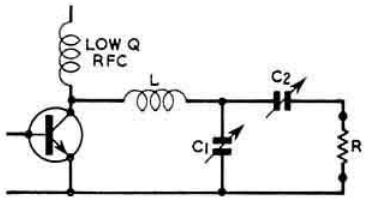


Fig. 1.

Normally the transistor output capacitance will be stated by the manufacturer in the form of a capacitance versus power and frequency graph. Motorola show quite clearly that small signal parameters do not apply for large signal application and that large signal values must be used. A typical graph is shown in Fig. 2, and see also Table 1. The quoted capacitance will be stated as the parallel output capacitance of the device and the equivalent parallel resistance of the transistor is evaluated from the formula

$$R_p = \frac{V_{ce}^2}{2P}$$

where V_{ce} is the d.c. voltage applied and P is the average power output.

The Solution

The first calculation consists of mathematically converting the parallel resistance and capacitance combination to an equivalent series circuit. The parallel circuit of Fig. 3(*a*) and the series circuit of Fig. 3(*b*) will be electrically equivalent

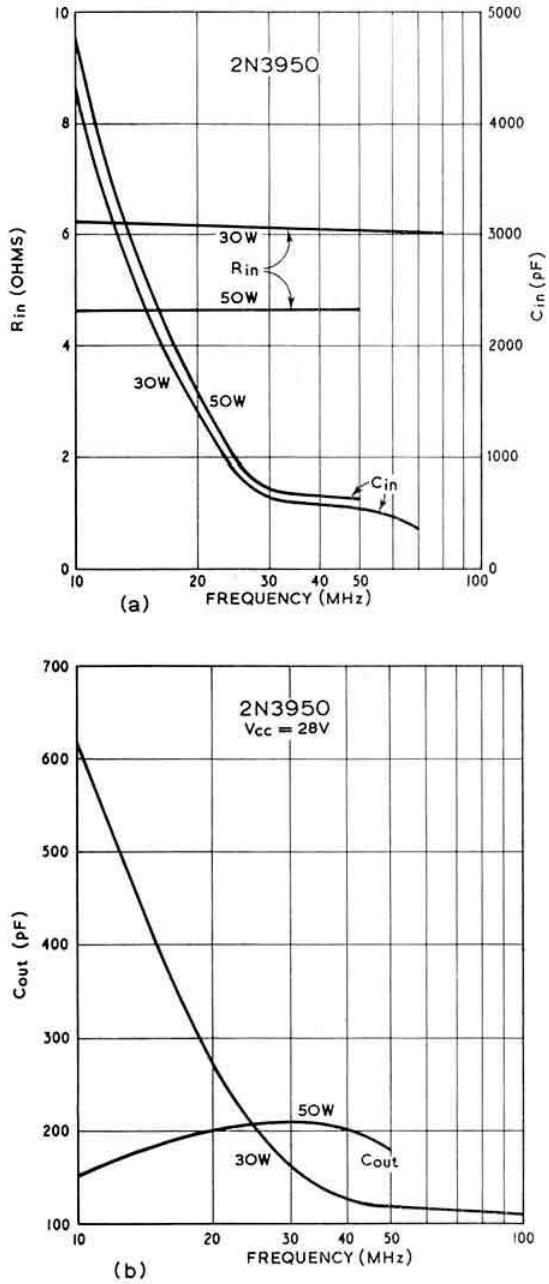


Fig. 2.

when R_s and X_s have the following values

$$R_s = \frac{R_p \cdot X_p}{R_p^2 + X_p^2} \cdot X_p \qquad X_s = \frac{R_p \cdot X_p}{R_p^2 + X_p^2} \cdot R_p$$

As R_p can be calculated and X_p is known, R_s and X_s can both be calculated. It must be noted, however, that a reactance X is frequency dependent and hence the calculation of X_p, X_s and R_s are good for one frequency (band) only.

Fig. 3.

Now for maximum transfer of power the load and the matching network must have a resistive component equal to the source resistance, i.e. R_s and have a reactive component of equal magnitude but opposite sense to the source reactance. That is, if the source has resistance plus capacitance the load and network must exhibit resistance and inductance. This is illustrated in Fig. 4.

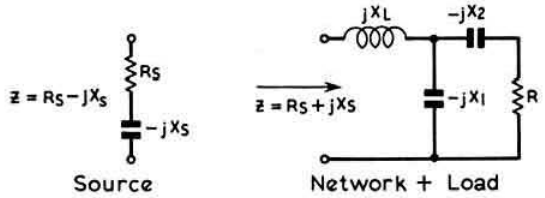


Fig. 4.

The Q of the circuit is determined by well established reasoning (see RSGB *Amateur Radio Handbook* or *Radio Data Reference Book*). This allows X_L to be calculated from

$$Q = \frac{X_L}{R_s} \text{ or } X_L = Q.R_s$$

So X_L has been established.

Now we have to calculate X_1 and X_2. The problem is reduced to solving the circuit of Fig. 5. If we designate $A = R_s$ and $B = X_L - X_s$ then it can be shown that

$$X_2 = \sqrt{\frac{R}{A}(A^2 + B^2 - AR)}$$

and $$X_1 = \frac{R(A^2 + B^2)}{(BR - AX_2)}$$

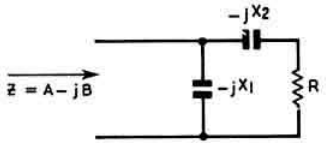


Fig. 5.

It will be seen that X_1 and X_2 are defined in terms of three known parameters A, B and R (the output cable impedance).

It can be seen that X_1 and X_2 can only be calculated if

$A^2 + B^2 > AR$

TABLE 1

	CLASS A Small-signal amplifier Vce = 15 Vd.c.; Ic = 80 mA; 300 MHz	CLASS C Power amplifier Vce = 13·6 Vd.c.; Pc = 1 W
Input resistance	9 ohms	38 ohms
Input capacitance or inductance	0·012 μH	21 pF
Transistor output resistance	199 ohms	92 ohms
Output capacitance	4·6 pF	5·0 pF
Gain	12·4 dB	8·2 dB

Small- and large-signal performance data for the 2N3948 show the inadequacy of using small-signal characterization data for large-signal amplifier design. Resistances and reactances shown are parallel components, that is, the large-signal input impedance is 38 ohms in parallel with 21 pF, etc.

This can be shown to be the same as saying

$$Q > \frac{X_s}{R_s} + \sqrt{\left|\frac{R}{R_s} - 1\right|}$$

$$> \frac{R_p}{X_p} + \sqrt{\left|\frac{R}{R_s} - 1\right|}$$

At frequencies below a few hundred MHz transistor parameters are such that this condition is well satisfied and need not normally be considered. However, at u.h.f. X_p is very small and may force the adoption of an excessively high Q in which case the circuit becomes undesirable (see Appendix).

To summarize the procedure the calculations are made in the following order:

1. Establish R_p and $X_p \left(= \frac{1}{2\pi f C_p}\right)$
2. Calculate R_s and X_s
3. Choose a Q value and calculate X_L and hence L
4. Put $A = R_s$ and $B = X_L - X_s$ and knowing the output cable impedance (R) calculate X_2 and X_1. Then convert these to C_2 and C_1.

The network calculations are now complete.

Worked Example

Using the design data for the Motorola 2N3950 transistor the T-network components are calculated for the 70·1 – 70·7 MHz band.

For 30 watts output from a 28 volts d.c. supply

$R_p = 13{\cdot}05$ ohms

From the 2N3950 data sheet $C_p = 115$ pF at 70·4 MHz.

i.e. $X_p = 19{\cdot}7$ ohms at 70·4 MHz.

This gives:

$R_s = 9{\cdot}2$ ohms; $X_s = 6{\cdot}1$ ohms.

If $Q = 10$ $X_L = 92$ ohms and $L = 0{\cdot}21$ μH.

Now $A = 9{\cdot}2$ and $B = 86{\cdot}4$.

Hence $X_2 = 232$ ohms.

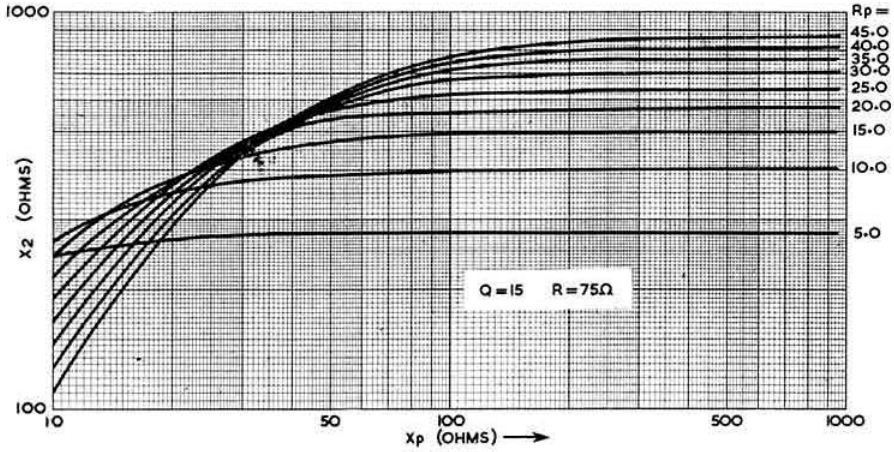
$X_1 = 136$ ohms.

Hence $C_1 = 16{\cdot}7$ pF and $C_2 = 9{\cdot}8$ pF.

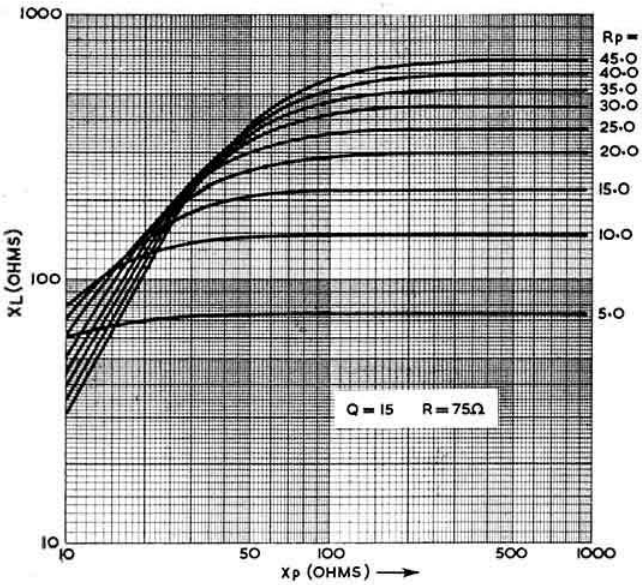
So the network for 70 MHz and a 2N3950 at 30 watts output is as shown in Fig. 6.

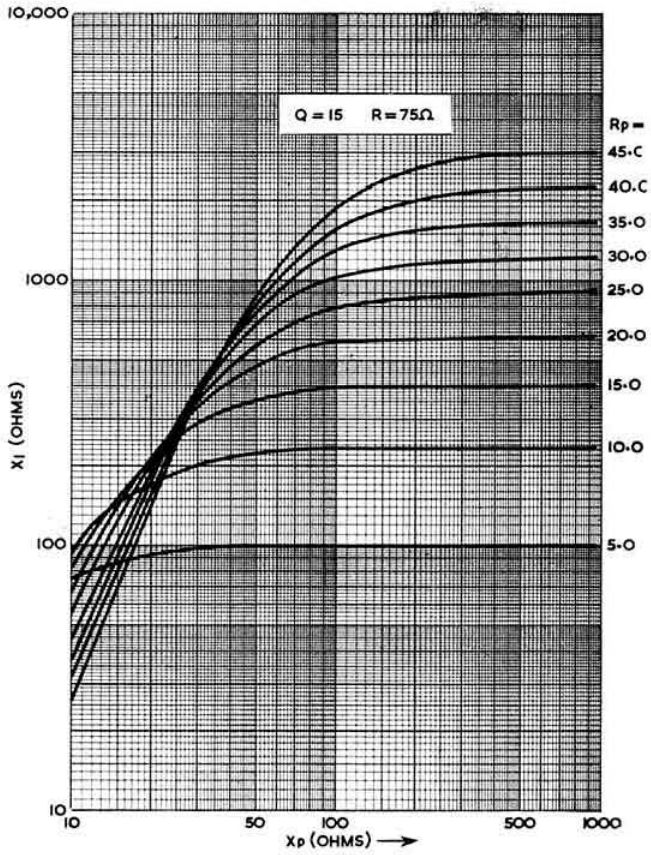
For convenience graphs have been prepared which present values of X_1, X_2 and X_L for values of $Q = 15$ and R_o 75 ohms. In the graphs the vertical axis is the

B *



Three graphs from which it is possible to produce values for X_1, X_2 and X_L, with a Q of 15 and R_O of 75 ohms.





desired reactance and the other axis is for the transistor parallel output reactance. Each graph has a set of curves calculated for values of R_p between 5 and 45 ohms, thus to use these graphs no calculations are required except to determine the device parallel output resistance and reactance.

Interstage Coupling

In coupling from the collector of one transistor into the base of a succeeding transistor we encounter the added complication of coupling not into a plain resistance but a parallel combination of resistance and capacitance. This is illustrated in Fig. 7. Again we must convert from parallel circuits to equivalent series circuits as shown in Fig. 8—using the formulae previously quoted. We observe that X_2 and X^1_b are in series and the circuit can be redrawn as in Fig. 9.

Here $X_3 = \dfrac{X_2 \cdot X_b^1}{X_2 + X_b^1}$ (3)

Now X_3 and X_1 are calculated using the formulae previously derived using the value of R_{b1} as the output resistance of the circuit. Having calculated X_3 we calculate now X_2 from (3)

$$X_2 = \frac{X_b^1 \ X_3}{X_b^1 - X_3}$$

It is shown in the Appendix that the source resistance

should preferably be less than the load resistance, i.e. in Fig. 8 $R_c^1 < R_b^1$.

This may not always be true, for instance the 2N3950 at 30 watts output at 70 MHz has a parallel input at the base of 6 ohms and 400 pF. When converted to the equivalent series values this means 2·7 ohms resistance and 3·0 ohms reactance; not many collector resistances will drop to this value. The solution to the problem is to interchange the position of X_L and X_2 in the T-network; i.e. turn the network around and proceed with the calculation as though the load is now R_c^1 being driven from R_b^1 and X_b^1. Now X_3 will have the value

$$X_3 = \frac{X_2 \, X_c^1}{X_2 + X_c^1}.$$

Appendix

The solution for X_1 and X_2 of network of Fig. 10 is given below:

The impedance, Z, of the network is given by

$$Z = \frac{X_1^2 R - j X_1 (R^2 + X_2 (X_1 + X_2))}{R^2 + (X_1 + X_2)^2}$$

For matching $Z = A - jB$.

Equating real and imaginary parts

$$A = \frac{X_1^2 R}{R^2 + (X_1 + X_2)^2} (1); \; B = \frac{X_1 (R^2 + X_2 (X_1 + X_2))}{R^2 + (X_1 + X_2)^2} (2)$$

Hence

$$R^2 + (X_1 + X_2)^2 = \frac{X_1^2 R}{A} = \frac{X_1}{B} (R^2 + X_2 (X_1 + X_2))$$

$$X_1^2 BR = AX_1 (R^2 + X_2 (X_1 + X_2))$$

$$\text{or } X_1 = \frac{A (R^2 + X_2^2)}{(BR - AX_2)}$$

$$\text{and } X_1 + X_2 = \frac{R(AR + BX_2)}{(BR - AX_2)}$$

Hence substituting for X_1 and $(X_1 + X_2)$ in (1)

$$\text{we get } X_2 = \sqrt{\frac{R}{A}} (A^2 + B^2 - AR)$$

$$\text{and } X_1 = \frac{R (A^2 + B^2)}{(BR - AX_2)}$$

For X_2 to have a real answer

$$A^2 + B^2 > AR$$

$$\text{or } \frac{B}{A} > \sqrt{\left| \frac{R}{A} - 1 \right|}$$

Now $A = R_s$ and $B = QR_s - X_s$

$$\text{Hence } Q > \frac{X_s}{R_s} + \sqrt{\left| \frac{R}{R_s} - 1 \right|}$$

$$\text{or } Q > \frac{R_p}{X_p} + \sqrt{\left| \frac{R}{R_s} - 1 \right|}$$

$$Q > \frac{f}{f_o} + \sqrt{\left| \frac{R}{R_s} - 1 \right|}$$

where $f_o = \frac{1}{2 \pi R_p C_p}$, typically 100 MHz.

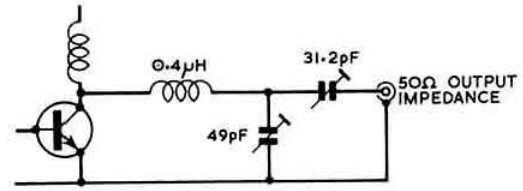


Fig. 6.

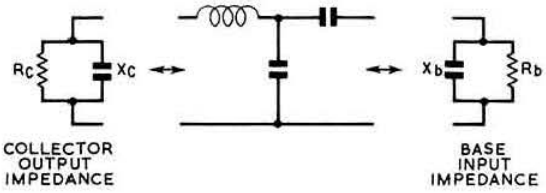


Fig. 7.

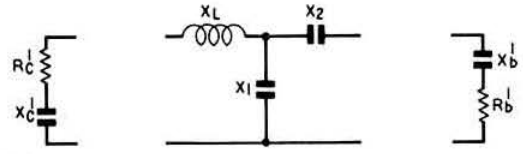


Fig. 8.

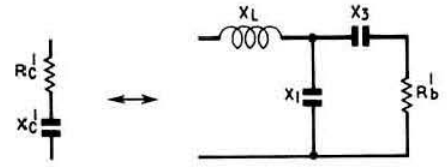


Fig. 9.

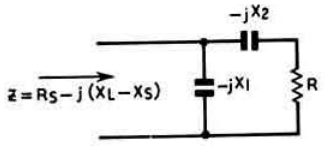


Fig. 10.

Now as the frequency increases f/f_o increases and R_s decreases making $\frac{R}{R_s}$ increase. Hence at values of $f > f_o$ Q values must be studied carefully.

As $BR \rightarrow AX_2 X_1$ will approach ∞ and when $BR < AX_2 X_1$ will become negative, i.e. the reactance will become inductive. This boundary condition is defined by

$BR = AX_2$

$B^2R^2 = A^2X_2^2 = AR(A^2 + B^2 - AR)$

$R^2(A^2 + B^2) = AR(A^2 + B^2)$

$R = A$.

Hence X_1 is capacitive for $R > A$

and X_1 is inductive for $R < A$

Normally however $R > A$ except when a high voltage/low current device is being used.

Reference

1. *Motorola Monitor* No. 4, Vol. 4, page 10.

REGULAR FEATURE

TECHNICAL TOPICS

By PAT HAWKER, G3VA

SURPRISINGLY enough, in certain respects, communications people are tending to become satisfied with lower rather than higher standards of equipment performance —although this fact is often buried under an impressive list of performance specifications that might appear superficially to prove how much better the current models are than anything that has gone before.

One well-known figure in the American Amateur Radio world—E. H. Conklin, K6KA—has been moved to write (*73 Magazine*, December 1967): "These are the days of widespread purchase of expensive amateur radio equipment . . . one wonders whether the receivers were designed in a screened room, or out on some isolated island with no DXpedition present. In the homes of amateurs, they experience a very different environment."

In writing thus of strong signal interference, K6KA has in mind the fantastic Californian conditions where some 10,000 amateurs can be within ground-wave blasting distances of one another. But one does not need to go West to realize that in terms of coping well with really strong signals the current ranges of receivers and transceivers leave a lot to be desired—and that some current trends could make the next batch of designs worse rather than better.

There are a number of reasons why front-end dynamic range and linearity of h.f. communications receivers have, if not actually degraded, then at least improved less than other aspects of receiver performance. There is the trend towards full transistorization with which the effective dynamic range, even with the improvement offered by field effect devices over bipolar transistors, is still significantly below that achieved in the best valved designs. With most amateurs still using valves, this point has perhaps not made the same impact as the trend towards multi-conversion and the use of the tunable i.f. technique with its added problems of direct signal breakthrough into the i.f. section; then there is the use of broad-band front-end circuits which catch all strong signals in a given band and deliver them with full r.f. amplification to the first mixer. One could also mention the use of higher i.f., for despite the vastly improved characteristics of some of the current h.f. crystal filters, it may prove difficult to prevent strong signals leaking around them.

Not included in this list is the problem of multi-conversion designs which do not achieve selectivity until late in the receiver (and yet do not restrict gain to extremely low levels in the earlier stages) since this problem is now widely appreciated, although often disregarded.

One interesting development, offering the possibility of both simple fixed i.f. with single or double conversion and yet giving constant tuning rate on all bands, is the pre-mixer (heterodyne-v.f.o. or partial synthesis) system which came in with some s.s.b. transceivers and is also used in the Hallicrafters SX146 and Drake R4A receivers. We hope to touch upon this approach next month.

And what appears in the test laboratory as being a satisfactory performance characteristic may not always seem quite so good in practice. Consider breakthrough into tunable i.f. strips. A figure of 60dB rejection would be reckoned as good in modern amateur equipment. Yet what precisely does this mean?

Accepting that really loud (yet *non-local*) signals in the h.f. band can certainly exceed 10 millivolts at the aerial terminal—a 60dB rejection means that one is left with a signal of the order of 10 microvolts—which could be many decibels above the strength of the weak DX signal.

In general, we accept attenuation, spurious and rejection figures of 50, 60 or (hopefully) 80dB, without always realizing that ideally one needs over 120dB (i.e. one million times down). Even this does not represent the absolutely ideal dynamic range for a receiver operating in a multi-station situation where the local transmitters may be putting ½ to 1 volt into the receiver, and a narrow-band c.w. filter might otherwise allow one to get down to say 0·1 microvolt signals. This would add up to a range of some 140dB.

Searching our memory, we can recall few receivers that have attempted this type of performance. Perhaps the nearest that comes to mind is the special receiver developed for the Navy by GEC which, in 1963, was reported to have image and i.f. rejection of —130dB with a single-conversion 1·6 MHz i.f. design, and claimed an overall response of 100dB attenuation at 30 kHz off tune. This receiver (which used a synthesizer) had two low-gain cascode B329 (12AU7, ECC82) r.f. stages followed by a third B329 as a balanced push-pull mixer, with no less than six high-Q signal frequency tuned circuits.

We do not think that any of the current semiconductor receivers, excellent though they undoubtedly are in many respects, could claim to equal such figures without additional protection units. It is always worth keeping an eye on trends in Naval receivers since they have to cope with the many transmitters carried on the ship and thus, in their stringent dynamic requirements, probably come nearest of any professional communications field to the amateur situation.

In his *73* article, K6KA describes some modifications to the a.g.c. arrangements on such receivers as the SB300 and Collins S-line and the Swan 350 transceiver. These include the short-circuiting of the grid capacitor in the r.f. stage so as to prevent large voltages on this grid from affecting the

STRONG SIGNAL PROBLEMS IN CURRENT COMMUNICATION RECEIVERS—PARAMP UP-CONVERTERS AGAIN—HOT-CARRIER MIXER DIODES—FET ACTIVE FILTER FOR TAILORING A.F. RESPONSE—100/10 KHZ SIC CRYSTAL CALIBRATOR—INSTABILITY PROBLEMS IN TRANSISTOR P.A. STAGES—BEARLEY RECEIVING STATION—HELICONE AERIAL.

remaining gain-controlled stages; he also points out the assistance that can be given by an r.f. attenuator (see *TT*, November 1967). Another technique which has been mentioned before in *TT* is the insertion of an efficient h.f. bandpass crystal filter in the input to a receiver, thus limiting coverage to a small section of the band: but little firm, new information has appeared on these h.f. filters since W2GHK's article in the 1965 edition of *Interadio—4U1ITU Calling*.

Now, as we indicated last month, there seems to be the promise of achieving an exceptionally good dynamic range with semiconductor equipment by adapting the microwave technique of parametric up-conversion, and we shall return to this subject in the next paragraphs; meanwhile it can be argued that we should be satisfied with what equipment is available. This is true enough—but it is important that we should have some concept of what the ultimate receiver should offer—and realize that there is still plenty of room for further improvement (if only to get back to the performance offered by some receivers of the late '50s.

More on Paramp Up-converters

Some further references to paramp up-converters for h.f. receivers (*TT*, January 1968) have been published in an article on "Programmable h.f. receivers," similarly stemming from an Avco Electronics writer, in *Signal*, (November, 1967).

After discussing the desirability of extremely low spurious output (to the order of 120dB down) in frequency synthesizers for professional receivers, the article continues:

"Another source of spurious responses is the receiver signal processing scheme which can produce various responses through mixer products and signal feed-through. Image rejection is the most common specification for this type of response and is usually 80 to 90dB. Other common responses are mixer cross-over products where combinations of mixer signal harmonics fall in the receiver passband. These are typically 70-100dB below the input signal level. As in the case of synthesizer responses, these should be attenuated 120dB.

"The upconverter approach offers the best method of achieving a simple, reliable, high performance tuner. With this scheme most of the required selectivity is fixed tuned, reducing complexity and cost. Mixer parameters can be better defined, making simpler the task of approaching the desired 120dB spurious signal rejection.

"The third source of spurious responses in a receiver is associated with the dynamic range of the receiver. Linearity of the r.f. processing determines the ability of the receiver to operate in the presence of strong adjacent undesired signals. Non-linearity in the r.f. processing can create such problems as cross-modulation, intermodulation (mixing of two undesired signals or harmonics due to r.f. non-linearities) and desensitization (saturation of r.f. stages by a large undesired signal).

"Recent developments in parametric amplifiers, field effect transistor amplifiers, and hot carrier diode mixers have shown great improvements in receiver dynamic range. FET stages can handle over 100 mV with linearity, hot-carrier diode mixers over 300 mV, and parametric up-converters can pass volts when pumped sufficiently. This allows the appropriate r.f. processing to be chosen for any application, with the paramp being best suited for a severe r.f. environment. A parametric tuner with a crystal filter in the first i.f. is capable of giving a receiver noise figure of 10dB, with the ability to handle a one-volt undesired signal without any saturation effects. Intermodulation products, from 100 mV signals within the r.f. passband, are attenuated greater than 50dB."

It will be appreciated that the Avco writer is concerned with advocating a particular approach adopted for receivers still under development by his firm. He is concerned with high-performance, and almost certainly high-cost, designs for military use. Nevertheless, these views have been quoted at length since they obviously represent a really interesting new design approach.

A late letter from Phil Morris of Granger Associates (Walton-on-Thames) brings to our notice their recent range of commercial, fixed-channel, h.f. transistorized receivers with FET-mixer, for up-conversion to 65 MHz, having dynamic range and image rejection both better than 100dB—and noise figure better than 10dB in spite of no r.f. stages—more next month.

Hot-carrier Diodes

Since hot-carrier diode mixers are mentioned in the *Signal* article as having high linearity, it may be advisable to put on record just what these devices are.

Current flow in a rectifying metal semiconductor is predominantly by majority carriers. When a diode of this general type is forward biased, majority carriers are injected into the metal and have considerably greater velocity than the thermal carriers; this type of diode is thus called a hot carrier diode, or alternatively a Schottky-barrier diode.

The basic idea is that since minority carrier storage is virtually eliminated, such diodes are capable of superior performance to more convention point-contact or *p-n* junction diodes at higher frequencies.

In practice, such diodes may take the form of a small diffused metal/silicon junction on a bilithic silicon/glass substrate. They are, in effect, planar versions of the point contact diode and have been made in both silicon and gallium arsenide.

Typical performance figures quoted for microwave applications are a low r.f. impedance of the order of 50 ohms with overall noise figure of 6 to 7·5dB from 500 to 10,000 MHz. It is sometimes claimed that such diodes permit the use of a wider dynamic range of local oscillator output (to about 100 mW) than the more usual point-contact mixer diodes, as well as having lower noise figures and lower insertion loss.

Here again this would seem to be an example of devices developed primarily for microwave applications being applied at h.f.

A.F. Active Filters

ZL2APC in his " Technical Notebook No 19 " (*Break-in*, October 1967) pays a handsome unsolicited compliment to *TTfiRA* in pointing out the usefulness of the active type of a.f. bandpass filter, without inductors and using a 12AT7 valve (*TTfiRA*, page 38, Fig. 50). He is using one in a phasing-type s.s.b. rig and finds " a very noticeable improvement in unwanted sideband suppression over the same rig with no audio filter."

But ZL2APC has taken this type of filter one step further. He has adapted the original circuit to use a couple of FETs (Fig. 1) with the measured performance shown in Table 1. Replacing the twin-triode produces a saving of space and heat, though ZL2APC admits that there is no saving in cost. He points out that incorporating a filter of this type in a receiver having only modest i.f. selectivity is an interesting exercise. It results in an apparent increase in signal-to-noise ratio and improved readability of signals, " high and low frequency heterodynes and audio chatter outside the filter passband are quite noticeably attenuated making receiver operation a more pleasant task."

He notes that a drawback of conventional passive i.f. filters using inductors is their insertion loss, which can sometimes be an embarrassment. One virtue of active filters of the type under discussion is that the insertion loss can be low, non-existent, or they can even provide gain. In this FET filter there is virtually no insertion loss.

ZL2APC reports that he has also substituted Fairchild 2N4360 *p*-channel FETs in place of the Motorola MPF103 *n*-channel types with no circuit alteration other than reversing the polarity of the supply.

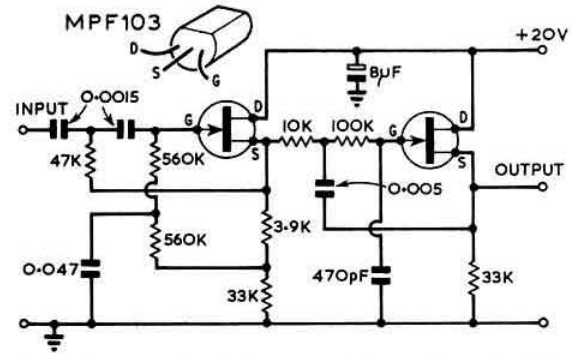


Fig. 1. The ZL2APC FET-version of the " active " bandpass audio filter.

Table 1—Filter response referred to 1 kHz level

—6dB at 3·2 kHz	—6dB at 380 Hz
—12dB at 4·6 kHz	—12dB at 240 Hz
—18dB at 6·0 kHz	—18dB at 160 Hz
—24dB at 7·8 kHz	—24dB at 110 Hz
—30dB at 10 kHz	

Input level 1-volt r.m.s.

SIC Crystal Calibrator

The usefulness of low-cost semiconductor integrated circuits (SICs) for crystal calibrators—producing strong markers up to high frequencies with only a 3-volt power source—has been underlined in earlier *TT*. One of the most interesting of a number of current suggestions appearing for such circuits is that in the " designer's casebook " section of *Electronics* (11 December, 1967) by John Althouse. This indicates how a single µL914 dual two-input gate SIC (for details see *TT*, January 1967) plus just a 100 kHz crystal, a switch, a 5k pot, three fixed resistors and two fixed capacitors can provide 100/10 kHz markers throughout the h.f. spectrum. About one-volt output pulses are obtained.

The principle is that the basic crystal oscillator, using a single 914 SIC, has a time constant approximating the period of the crystal's fundamental frequency, resulting in locked oscillation at 100 kHz. But if the time constant is further increased, stable oscillation can take place at sub-multiples of the crystal frequency.

In Fig. 2, if the switch S is turned to 100 kHz the circuit oscillates at 100 kHz. But when turned to 10 kHz, the circuit oscillates at 20 kHz, but the waveform at this frequency is asymmetrical and thus has a strong 10 kHz component, producing 10 kHz markers for fine calibration.

Attracted by the simplicity of this unit, we started out to put one in operation, but discovered that the junk-box 100 kHz crystal was no longer in working order. However by changing the time constant (by reducing the value of the fixed capacitors), we found that a 1 MHz crystal could be made to lock the unstable multivibrator-type oscillation. It was also clear that the regenerative divider effect could be achieved, though undoubtedly a 100 kHz unit would be a more useful piece of equipment. With such regenerative divider techniques it is important to ensure that the right count-down is being obtained, and when the oscillator is not properly in lock all sorts of noises turn up throughout the band, so some care in setting up is called for.

But this certainly seems an excellent way of getting SICs into the rig.

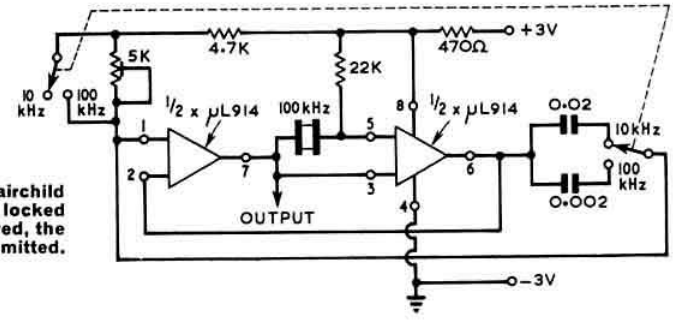
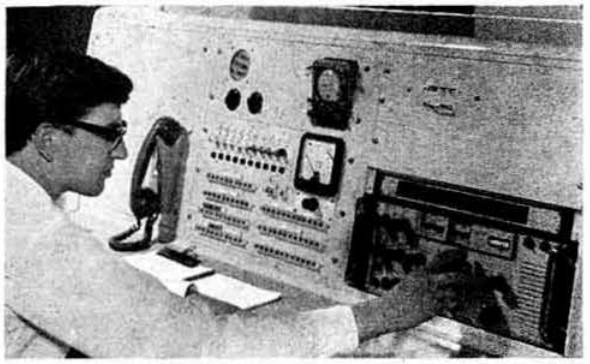
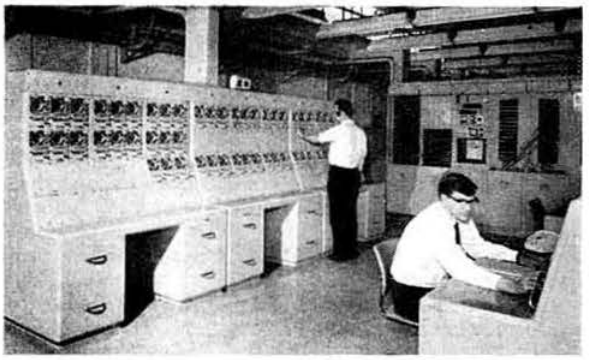


Fig. 2. 100/10 kHz crystal calibrator using single Fairchild µL914 SIC. The 5K potentiometer is adjusted for locked oscillation at 20 kHz. If the 10 kHz facility is not required, the switch, potentiometer and 0·02 µF capacitor can be omitted.





Left: **The Duty Officer's Console at the new Post Office h.f. receiving station at Bearley, Warwickshire. The receiver is the Plessey PR 1550.** *Right:* **Thirty-six Plessey PVR 800 automatically tuned receivers are operated from the console in the left-hand photo. This shows the two-hour signal recording charts.**

Transistor Transmitter Instabilities

In terms of pure cost, attempts to get really useful amounts of power out of h.f. transistors are still at a marked disadvantage to the hot cathode devices. And this cost differential can only too easily be increased to prohibitive levels by the burning out of a series of expensive transistors. This unhappy result is often induced by sudden instability in a transistor power amplifier stage. So that anything that can be learned about how to counter such effects seems well worth pursuing.

Those who wish to delve more fully into the stability problems in transistor p.a. stages are referred to an article by O. Mueller and W. G. Figel (*Proc. IEEE*, August 1967). This points out that with the increasing use of h.f. power transistors it is imperative to obtain better understanding of instabilities—defined as undesired frequencies present in the output load not harmonically related to the input frequency, including subharmonics. Such instabilities (or " parasitics " as amateurs would be inclined to call them) can range from some hundred kHz to some hundred MHz, and may or may not be self-sustaining.

The authors note that these effects seldom occur when an amplifier is precisely tuned, but rather when some change is made in normal operating conditions. The degree of detuning necessary for an instability to occur can vary over wide limits. One of the most serious cases occurs when there is a variation of the load impedance. Under these conditions the transistor may be destroyed almost instantaneously (it is for this reason that fast-acting protective circuits such as the Mullard design in *TT*, September 1967 are often recommended by the semiconductor manufacturers). Destruction of a device can also occur during amplifier tuning, it is pointed out.

Even if such parasitic oscillation does not damage or destroy the transistor, it should be controlled in order to eliminate spurious radiation.

Mueller and Figel consider that a class C p.a. can be regarded as consisting of a superimposed class A amplifier as soon as d.c. is flowing. Such an amplifier is thus prone to both linear instabilities as in any class A stage, and to various non-linear, parametric instabilities of the class C condition. They believe that it is advisable to eliminate the linear instabilities before paying attention to possible non-linear problems.

The major causes of class A linear instabilities are listed as: (*a*) low-frequency oscillations produced by thermal feedback effects; (*b*) oscillations due to internal feedback; (*c*) negative resistance and conductance instabilities due to transit-time effects, avalanche multiplication, etc; (*d*) oscillations due to external feedback (for example the common insufficient decoupling of the d.c. supply).

The tendency to burst into a destructive self-oscillation at low-frequencies is sometimes termed the " count-down effect " and has been described as being due to the transistor becoming " stuffed up " by carrier storage, causing violent saw-tooth oscillation at subharmonics of the amplifier frequency.

High Power Transistor P.A.s

It has been stated that the parallel operation of transistors is, if anything, more efficient than their use in push-pull; unlike valves, the transistor collector current is near sinusoidal, but voltage at the collector is heavily distorted, almost in pulse form. Large numbers of power transistors can be paralleled successfully provided that they share equally the total current. They should be mounted in the form of a perfectly symmetrical structure. This approach has been used by TRW in the form of circular rings of transistors to provide outputs up to 1 kW at 100 MHz, using ingenious independent three-step matching networks to combat the effect on input impedance of many paralleled devices. Westinghouse are also reported to have developed 1 kW amplifiers in the h.f. band by summing the outputs of 15 four-transistor modules while keeping the transistors electrically isolated so that they cannot interact and carry unequal shares of the current.

A recent survey of Japanese work on r.f. power transistors (*Electronics*, 11 December, 1967) indicates that Kobe are developing " mesh-emitter" devices as an alternative to interdigitated and overlay structures, while other Japanese firms working on the better known approaches are concentrating primarily on transistors for mobile radio units in the 300 to 470 MHz region; an important point for amateurs is that they are developing units specifically for 13·5-volt rather than 28-volt operation.

New Post Office Receiving Station

Not many amateurs could contemplate spending some £500,000 on modernizing their station, so it was with some interest that I looked round the new PO station at Bearley,

Warwickshire, one of the largest and most modern h.f. receiving stations in the world, officially opened at the end of November.

This now has some 60 large point-to-point receivers, including 36 of the fully-transistorized Plessey PVR800 series, using a quadruple superhet circuit, together with some 50 large rhombics at heights of 150 and 75 ft. Some idea of the frequency stability demanded in commercial operation these days can be gathered from the use of three 100 kHz master oscillators, sunk in 30 ft. boreholes and providing a stability of one part in 10-million for the synthesizers used in the receivers.

These buried oscillators (similar ones are also used at the modernized Leafield transmitting site) achieve a temperature stability of within 0·5° C about 10° C, month in, month out. Surprisingly enough there is an almost exact six-months " phase-lag " at this depth, the earth becoming just a little warmer in winter, a little cooler in summer. So if you want to keep that transmitter oscillator really stable, better start digging.

Looking around Bearley for ideas for *TT*, I was interested to note the use of coaxial reed relays in the aerial switching matrix. Also one noted that the wideband balun transformers which convert the 600 ohm open wire transmission lines from the rhombics down to 75 ohm coax within the station, include d.c. paths provided by r.f. chokes to facilitate quick d.c. continuity testing of the long transmission lines and aerials. This is a technique already advocated for aerials in *TT*. It can be realized very simply with folded dipole elements and rhombics where there is a continuous path right round; with normal dipole elements a useful dodge is to wire a 100 k ohms resistor across the aerial end of the co-ax or other transmission line, since this at least allows the line to be checked from the shack with an ohmmeter.

The Bearley aerial transformers also incorporate tiny spark gaps which when broken down by static weld together leaving the aerial permanently earthed until the spark gaps are replaced.

Helicone Aerial

A letter in *Proc IEEE* (April 1967) from K. R. Carver reports that much improved sidelobe performance with circularly polarized helical aerials of the type used by a number of amateurs for space experiments and for receiving satellite cloud cover pictures can be achieved by mounting the helix within a conical horn structure. The axial length of the helix is approximately equal to the altitude of the truncated horn: see Fig. 3. Half-power beamwidth of the " helicone " is given as about 17° compared with 33° for a 10-turn helix, and first sidelobe is almost 20dB lower (from −14dB to −33dB).

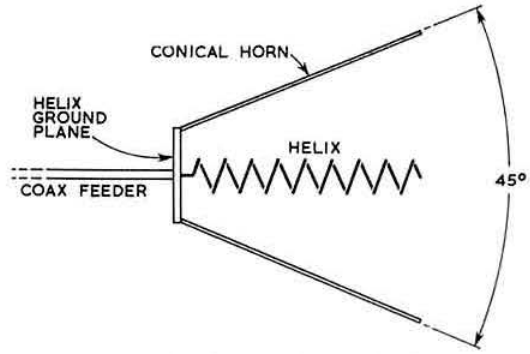


Fig. 3. Helicone aerial for reception of circularly polarized " space " signals. Typically cone mouth diameter is about 3 λ, the helix ground plane base plate 0·75 λ with a 10-turn helix, and cone angle of about 45°.

Here and There

It is regretted that an error crept into the circuit diagram of the transistor *Q*-multiplier described in *TT*, September 1967, involving the connections to the peak/null changeover switch. For clarity an amended circuit is shown in Fig. 4.

W5EHC of Oklahoma City solves the problem of the " els " used in the construction of the transmitting loop aerials (*TT*, November 1967). These are " elbows " or rigid angles, usually 90°, used in plumbing and in heavy electrical conduit. For the octagonal loops, the angle would need to be 135°.

G6NA has already demonstrated convincingly the value of transmitting loops for 1·8 MHz low-power operation and has prepared a most informative article on the subject —this is really one to watch for in *Radio Communication*.

Since writing these notes interesting letters have come in from G3COJ, G6LX, G3WW, G3HBW and G3KOX to be referred to next month.

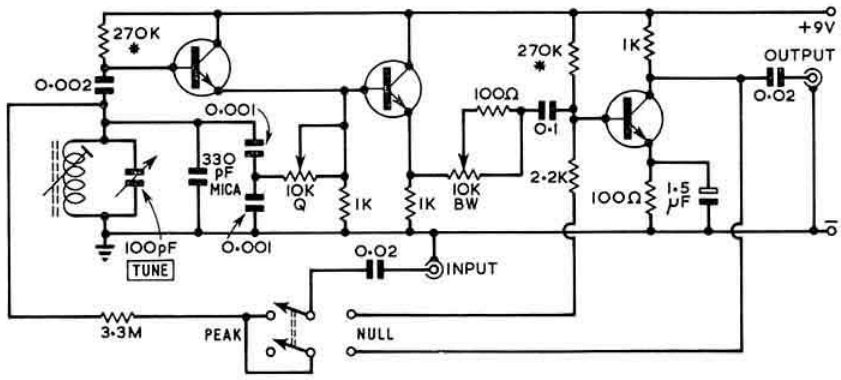


Fig. 4. Amended circuit diagram of the transistorized *Q*-multiplier described in the September 1967 *Technical Topics* and originally in *Radio-Electronics* of August 1967.

Quality Transmissions

By S. S. BEE

ONE wonders why, when listening to s.s.b. stations on amateur bands, the majority of signals emanating from Stateside sound so much better in quality than almost all UK signals. The problem can be brought down one more step. Why do some signals, say on 80m, sound so much better than others? These two problems are related but can be separated and answered differently. Several reasons can be given. Consider first the most perplexing part of the problem, when two stations in QSO are using identical equipment (microphone included) and are operating their equipment under exactly the same conditions. One of these stations may well sound vastly better than the other. It cannot be the equipment; it cannot be the microphone, therefore it must be the operator. Some operators' vocal tones are such that good quality will result, and having listened to Stateside operators and compared the type of voice with that of UK operators the difference is quite marked. The frequency response and the dynamic range of the American's voice suits the s.s.b. mode of transmission, but the tone of voice from our islands appears to have a wider frequency response and an even more marked larger dynamic range. In addition to this, the pitch of the voice is somewhat higher here than over there. Those UK signals which are of excellent quality fall into the category of lower pitch, lower dynamic range and narrower frequency response, compared with the rest of us. The general " smoothness " of the voice is also notable and the edges seem to have been " rounded off," rather than having the more usual sharpness. The majority of us are, therefore, limited as to what apparent " quality " we can achieve. Those with a pronounced high frequency response and reduced bass response have trouble with words having the letter " s " in them. If these letters are accentuated the sharp cut-off due to the filter in the rig causes these to sound like " f " or " th." This can be overcome to a certain extent by shaping the audio response or using a microphone to suit one's own voice. This can, however, mean that the individuality of the voice is changed, and stations worked who know what this voice is really like, will complain of the lack of " naturalness " in the voice quality. To put serious thought into this matter does leave us between two evils. We all like to think our transmissions are a good reproduction of our own voice, therefore one would suppose that the true reproduction should be aimed for. Of course on s.s.b. one cannot get a true reproduction unless a very wide filter is used. When using the more common bandwidth of about 2·5 kHz, in order to get the maximum performance out of this filter the best band of frequencies 2·5 kHz wide must be determined. The usual approach to the problem of frequency response is to select the lower frequency to be 300 Hz, so that the overall response then will be 300 Hz to 2·8 kHz, but this response will suit exactly only a small percentage of us. Those stations with lower pitched voices would be better suited using an audio response of 200 Hz to 2·7 kHz. Higher pitched voices call for a range of 400 Hz to 2·9 kHz. To produce a signal having excellent quality plenty of bass response must be present, for it is a fallacy to say, " Your signal is very toppy and will cut through the QRM!", particularly when referring to s.s.b. signals. If the bass response is missing the signal will not be as readable, but this only applies to operators whose voices do have plenty of bass. The opposite applies to those who have little bass and plenty of top in their voices. With these operators it is absolutely pointless having an audio response beginning at 200 Hz. If the voice is up an octave or so above average then a great deal of the " talk power " is being lost by the sharp high frequency cut off of the sideband filter. As an example just listen to a YL on s.s.b. In most cases one always wants to tune lower in frequency to make the signal more readable. If the carrier crystal in the exciter were moved further out of the passband a marked improvement would be found.

The correct position of the carrier can only be determined by trial and error methods. Very confusing reports on these tests can be received when trying it out on the air, as the problem here is that quite a few stations tend to receive s.s.b. too high (I know not why!). The most satisfactory way is in one's own shack and NOT by monitoring on headphones! A tape recorder is a most valuable piece of equipment for these tests, but DO NOT try to record using a microphone as the input to the tape recorder. A wide bandwidth receiver should be used with the tape recorder input directly connected to the receiver. The a.g.c. should be off and the receiver run at low gain and with only enough coupling between the exciter and receiver to produce a signal of reasonable level. Needless to say the loudspeaker should be removed and replaced by a suitable resistor. Several recordings can now be made using various carrier frequencies and ensuring that the receiver is tuned exactly to zero beat with the exciter each time the carrier is altered. It is admitted that this is not the ultimate way of setting up the carrier position due to the colouration of the voice by the receiver and tape recorder. The errors in this method however can still be considerably less than on the air reports, which have to take into account the receiving operator's personal choice of where your carrier should be and the frequency response of his receiver using a sharp cut off filter.

So much for carrier positioning, the next problem is to reduce the dynamic range of the transmitted signal. This, of course, is achieved with some form of compression, but the dynamic range of one's voice can be as much as 60dB. If the exciter gain is adjusted so that the output stage is being driven to maximum on voice peaks without overdriving, then the average level of voice will not be utilizing the full capabilities of the p.a. In other words the " talk power " will be down. Compression reduces the dynamic range of the voice and this means that the average level will be nearer the peak level which provides more " talk power." In fact, compression can provide an additional S point or two. One can, and some do, go too far, resulting in the sparrows at the bottom of the garden modulating as heavily as the XYL at the shack door shouting at the top of her voice " you're on the telly! " Compression in the audio stages is the best, but reasonable results can be obtained using an a.l.c. circuit in the transmitter, provided this is not pushed too hard.

So let's be fair to the manufacturers of the equipment that you buy. They can get a pretty bad reputation due to users of their equipment ill-treating it. The quality of a lot of signals can be vastly improved by running the rig *within* its capabilities rather than trying to get that meter to kick up as high as you can. A lot of friends are lost on the bands due to splattering signals. Next time you hear one, offer advice instead of abuse.

REGULAR FEATURE

THE MONTH ON THE AIR

By JOHN ALLAWAY, G3FKM*

AS readers will no doubt have noted the cycle per second has finally made its exit from Society publications. The precise reasoning behind the change to Hertz is lost on your scribe, who is a well-known reactionary! It is surely a retrograde step to replace an expression which was descriptive by one which merely commemorates a name. A paragraph in the February 1967 BULLETIN stated that the US Services Interdepartmental Committee and the Federal Communications Commission had declined to make the change. It is not known whether they have now given in to political pressure and conformed. It is interesting to note that the most recent literature received by the writer from the Soviet Union still refers to cycles, or should it be Mega-Popovs?

Sincere apologies are extended to the present holder of the ZC4FB call-sign. Further information has now been received from GM3LWS to the effect that it appears that the call-signs **ZC4FB** and **ZC4CZ** have in fact been reissued in spite of the fact that the issuing authorities intimated that they would not. Cards which find their way to GM3LWS will be re-routed to S/Sgt. Eric Milne unless obviously for contacts with Ted. There must surely be plenty of combinations still unissued in the ZC4 series which could have been given to more recent licensees.

Between 23 February and 1 March the Electronics Society of the University of Salford (G3VJU) will be putting on the air a special exhibition station with the call-sign GB3RAG. It is hoped to operate on all bands 160m through to 70cm and a Hallicrafters SR400 has been loaned for the occasion. The station hopes to be on the air 24 hours a day, and is running in conjunction with the Manchester and Salford Student Shrove Rag. Skeds with overseas stations are welcomed, preferably on phone as this is more easily understood by any members of the public who may be near the stand! QSLs should be sent via G3VJU (Electronics Society, University of Salford Union, Salford 5, Lancs.).

Manchester University ARS (G3VUM), is once again visiting St. Agnes in the Isles of Scilly, this time between 23 March and 1 April. They will be active on all bands 160 to 10m c.w. and s.s.b. They have applied for a special call-sign but have not yet been advised what this will be.

G3UML wishes it to be known that he is not the QSL Manager for **VP1PV**. A large number of cards are being received. According to the latest *Callbook* VP1PV is Dr George Collins, PO Box 643, Belize, British Honduras.

News from Overseas

G3RTU is at present in Israel and is looking for G contacts. He believes that he is the first G/4X4 licensee and is operating under his G3RTU/4X4 call-sign from a settlement near Haifa. A move to Tel-Aviv is anticipated in February, and a permanent 4X4 call is expected in April. Keith has been hearing a number of UK stations on Top Band, but no 160m licences are issued in Israel. He would be happy to arrange skeds for cross band contacts 160 to any other band (excluding 10m).

According to the Nigerian ARS News, Angus Murray-Stone, who will be remembered as 5N2AMS, HZ2AMS, HZ2AMS/8Z4, and various other rare DX call-signs, is shortly moving to Takoradi in Ghana where he will be a missionary at a club for seamen! The same newsletter also reports that Iris and Lloyd Colvin spent six days in Lagos but were not able to obtain operating permission. They said that they had completed 2½ years of travelling during which they had visited and operated from 21 different countries and made over 100,000 QSOs—their most important recollection was the enjoyment and pleasure of meeting so many amateurs in many parts of the world.

It is believed that amateur operation has been allowed to start up again in Indonesia. News has been received that 8F1SH is the secretary of the new Indonesian Amateur Radio Union, which gives its address as PO Box 2027, Djakarta. A number of stations have been reported using PK8 call-signs and an explanation is awaited with interest.

A new radio society is under the process of formation in Mauritius. At present the Mauritius Amateur Radio Society is using VQ8CC's address (Box 14, Curepipe, Mauritius), but they hope to have a PO Box number later. Readers will be interested to know that no fewer than 12 licensed VQ8s plus 14 other interested parties attended a meeting held on 21 October. Your scribe is certain that all RSGB members would wish to join him in wishing every success to the new club.

Participants in the RSGB 7 Mc/s DX Contest (1967) may wonder why there was such a lack of activity from Australia and other DX locations during the event. Some interesting observations from VK5KO may partly explain this phenomenon. It seems that John spent nearly 10 hours calling UK stations without a single reply, and he also heard a number of other VK and ZL stations experiencing similar lack of success. The writer has seen elswehere the suggestion that the points value of QSOs with semi-locals (e.g. other Europeans) should be reduced during this contest (which is, after all a DX event). It seems that the extra effort of really digging for weaker signals is not worthwhile under the

* 10 Knightlow Road, Birmingham 17. Please send contributions for the **March** issue to arrive by **14 February**, for the **April** issue by **13 March**, and for the **May** issue by **8 April**.

existing rules. This is a great pity as quite obviously there are a number of DX stations very kindly trying to take part but not getting anywhere!

Items of interest included in "Oceania DX News" (VK4SS) are that John Kaarsberg (ex-VS1JW, etc.) is now on the air from Wilkes Base, Antarctica. His call is VK0JW, and he may be found on 14,075, 14,150, and 14,220 kHz. QSLs from Europe and S. Africa only should go to VK3UO, Norm Foxcroft, 181 Victoria Road, Northcote 3070, Victoria, Australia. IRCs plus s.a.e. would be appreciated for direct replies. The most northerly VK4 is VK4SI, Thursday Is., he has been worked on 14,190 kHz s.s.b. at 09.00. Three 5W1 stations seem to be active—5W1AS, 5W1AZ, and 5W1AT who is ex-ZK1AR. Al wishes it to be known that he is a collector of stamps and covers and would be very pleased to hear from anyone with similar interests. He may be reached at: Al Shawsmith, 35 Whynot St., West End, Brisbane, Queensland, Australia.

The European 80m DX Net

Notification has been received from ON4UN, via GW3AX, that a special net meets at 21.00 on Mondays and Thursdays on 3795 for the specific purpose of working DX. Either ON4UN, GW3AX, or LA5KG will usually be found to be in charge. The routine procedure is that at 21.00 the net control station invites members to sign in and pass any 80m DX information they have, he then reads a DX bulletin, after which he takes a standby for any other stations who wish to join in and become members. It is understood that PA0FX, OH2CP, and DK1FW represent the Netherlands, Finland, and Germany, Austria and Switzerland respectively on the net. Your scribe would like to add one comment of his own concerning this very excellent scheme—when trying to work 80m DX please keep transmissions short and to the point!

Top Band News

Stew, W1BB/1, reports that he has managed to QSO VQ9JW. This was at 01.55 on 11 December, and was of course the first VQ9/W contact on 160m and also VQ9JW's first excursion on the band! Congratulations to both stations. W2RAA also managed a QSO at 03.03, his signals were RST 569 in Alabra (W1BB's had been 579).

John, VK5KO, informs us that he has managed to work G3LIQ for his second G contact on the band. This was at about 19.20 on 26 November, and G3LIQ's signals peaked at 569. He also managed to raise W1BB and JA8AA to give him a fine trio of DX contacts during the *CQ* WW Contest! A schedule was made with KL7FRY but nothing came of it. John says that there is too much loose talk about the l.f. bands going out during periods of sunspot maxima. He points out that the propagation mechanics of l.f. signals depend on the dispersion of the *E* layer whilst the h.f. bands depend on a high m.u.f. which depends on the *F* layer. The *F* layer should refract or reflect l.f. signals any time provided that they are not absorbed by the *E* layer.

A late flash from W1BB gives the news that PY2BJH managed to work K1PBW, W1WY and himself on 10 December. The PY was running only 25 watts input.

A report from G3SED, who acted as "helper" during the First Timer's test on 17 December says that conditions were apparently at their best for over a year. During the five

An important JA to watch for on 160m is JA1BHG. He has already done outstanding Transpacific and Oceanic DX work on this band.

(Photo from W1BB)

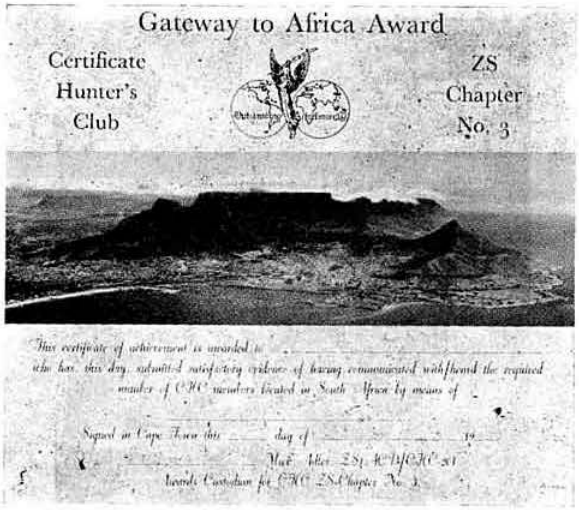
hours *before* the test began Mike worked 15 W stations. He suggests that UK stations should remember to use 1820-1827 kHz for calling DX stations and *never* call them on their own frequencies. As far as the newcomers are concerned it would be a help to an MC if they would choose a frequency and stay put on it so that the MC could advise the W's where to listen. A QSL has now been received for the PZ1AH/G3SED QSO on 8 December—this was the first QSO between the two countries on 160m. PZ1AH has an aerial only 36 ft. long, but will be active every weekend at 04.00 looking for Europe. Conditions during the "First Timer's" test on 7 January were extremely poor, and it is believed that no QSOs were made.

DXpeditions

A visit to **Gambia** by G3BID is due to take place about 7 February. Edgar's call-sign will once again be **ZD3F** and he hopes to operate /M for some of the time. Following this he hopes to move on to **Senegal** where his call-sign will be **G3BID/6W8** and G3BID/6W8/M. All QSLs will be dealt with by W2CTN.

Ed, K6CAA, is planning a trip to **Fanning Is.** (VR3). He should depart from KH6 about 1 February and hopes to be on from Fanning for about two weeks for some 12-18 hours daily. He will use c.w. and s.s.b. and frequencies given include 3505, 7005, 7090, 14,005, 14,190, 21,005, 21,290, 28,005 and 28590 kHz. Equipment will include a KWM2, an HW32A, and Hy Gain 18AVQ and/or a beam. His call-sign is not yet known but he may use VR3I. Most of the previous activity from VR3 has been from Christmas Is. QSLs are promised to all who contact Ed, and they will be sent direct if s.a.e. plus IRCs are sent to the address in *QTH Corner*.

The Royal Signals Amateur Radio Society is hoping to make an expedition to **Brunei** sometime between mid-March and mid-April. Their call-sign will be **VS5RCS,** and they will be active on all bands 80 to 10m with 160m operation a



possibility if permission is obtained. Operators taking part will include 9M2's BD, NF, and XX, together with HS3DR.

A visit by VQ9HB to **Desroches Is.** took place for a short spell in mid-January, when he appeared to use the call-sign **VQ9V/D.** It is believed that Harvey intends to leave the Seychelles soon for New Zealand.

Three further operations by W9WNV have taken place since the last *MOTA* went to press. The first was from **Nelson's Is.** in the Chagos group where Don used the call **VQ8CBN.** It is believed that this island remains a dependency of Mauritius although the surrounding group became incorporated in the British Indian Ocean Territory when this was formed. This preceded a short stint from the nearby **Blenheim Reef.** Here call-signs used were **VQ8CB/A/Blenheim Reef** (on s.s.b.) and W9WNV/Blenheim Reef on c.w. The reason for the use of the two call-signs is that had the W call been used on telephony it would have been necessary for transmissions to be made in the section of the 20m band to which US stations are restricted. It will be seen elsewhere that application for DXCC status for 1B9WNV, Blenheim Reef, was rejected on the grounds that proof of presence on the reef was not available. The last of the trio to take place was a short stop on **Geyser Reef, VQ8CB/A/Geyser Reef,** scene of previous 1G5A activity. The possibility of DXCC status for any of these places remains to be settled, but readers may be interested to read an extract from a US Naval Oceanographic Office document reproduced in the " DX'er." This says that Geyser Reef (12 21′ S. 46 26′ E) lies about 70 miles W.S.W. of the Glorioso Is. group and is a group of rocks and sandbanks about 11½ miles long and 7 miles wide. " A vessel that was wrecked on Geyser Reef in 1842 described it as a dangerous reef with numerous rocks, most of which dried, and of which many were visible at half ebb. At t hree-quarters ebb 17 rocks were counted in addition to some dry sandbanks. The largest rocks appeared to be about the size of boats under sail . . ." On his return trip to the US Don paid a short visit to the UK. He anticipated being back home on 20 January.

The much anticipated expedition to **St. Peter and Paul Rocks** finally materialized and **PY0DX** and **PY0SP** made about 2000 QSOs during a 30 hour stay. It is understood that the original landing took 7 hours, and it is also rumoured that a repeat visit may be made later in the year. Please note that the QTH given for this expedition's QSL cards in November *MOTA* was one allegedly supplied by PY1CK and subsequently found to be incorrect.

The current spate of activity from **Spanish Guinea** by **EA0CM** (who was HB9CM and who has now returned to Switzerland) and **EA0FP** (HB9FP) was increased by the appearance of EA0AH on 14 January. This is believed to be the operation long planned by Herman, TJ1QQ, although an operator named Jose has been heard! QSLs may be sent to Jose Ma. Manzano Perez, PO Box 92, Santa Isabel, Fernando Poo, or to the address in *QTH Corner.* It is *rumoured* that EA0CM and EA0FP are only licensed to handle Red Cross messages and therefore some of their contacts may not count for DXCC.

Fred, G3SVK, formerly well known as GM3SVK (Shetland Is.) is expecting to visit the **Orkney Is.** between 16 and 25 February. His call-sign will be **GM3SVK/A** and he will no doubt appear on 160m as well as other bands.

Awards

The " **Gateway to Africa** " Award (see illustration) is an attractive certificate issued by the ZS CHC Chapter No. 3, and is available to amateurs and listeners throughout the world for contacts with ZS members of CHC. There are no date limits and all post-war QSOs may be counted. Stations outside South Africa need to have 25 " points " for contacts with at least three different ZS call areas, for the purposes of the award contacts with ZS1AB and ZS3AB count for 10 points, with charter members 5 points, and with other members 3 points. Charter members are ZS1ACD, ZS1CY, ZS2MH, ZS3AH, ZS5OA, ZS5OB, ZS6ACD, ZS6IW, and ZS6YB. Other members are ZS1NQ, ZS1OU, ZS1RM, ZS2FA, ZS3D, ZS4IO, ZS4JB, ZS4MG, ZS5BP, ZS6ATA, ZS6BDU, ZS6BEJ, ZS6IX, and ZS6TD. A GCR list, showing call-signs, frequency, date, and mode of contact with points claimed should be sent together with a 5s. postal order to ZS1ACD, Max Adler, Box 1167, Cape Town, Republic of South Africa. This award is free to physically handicapped or blind applicants.

Apologies to readers for an error in this section of last month's *MOTA* concerning the **WAE Award.** The application forms should be obtained from Walter Geyrhalter, Box 262, 895 Kaufbeuren, West Germany. A small number are available from G3FKM or from G5GH, the Society's Certificates Manager to whom completed applications with appropriate QSLs and adequate return postage should be sent. G5GH also deals with applications for the Eu DX D Award.

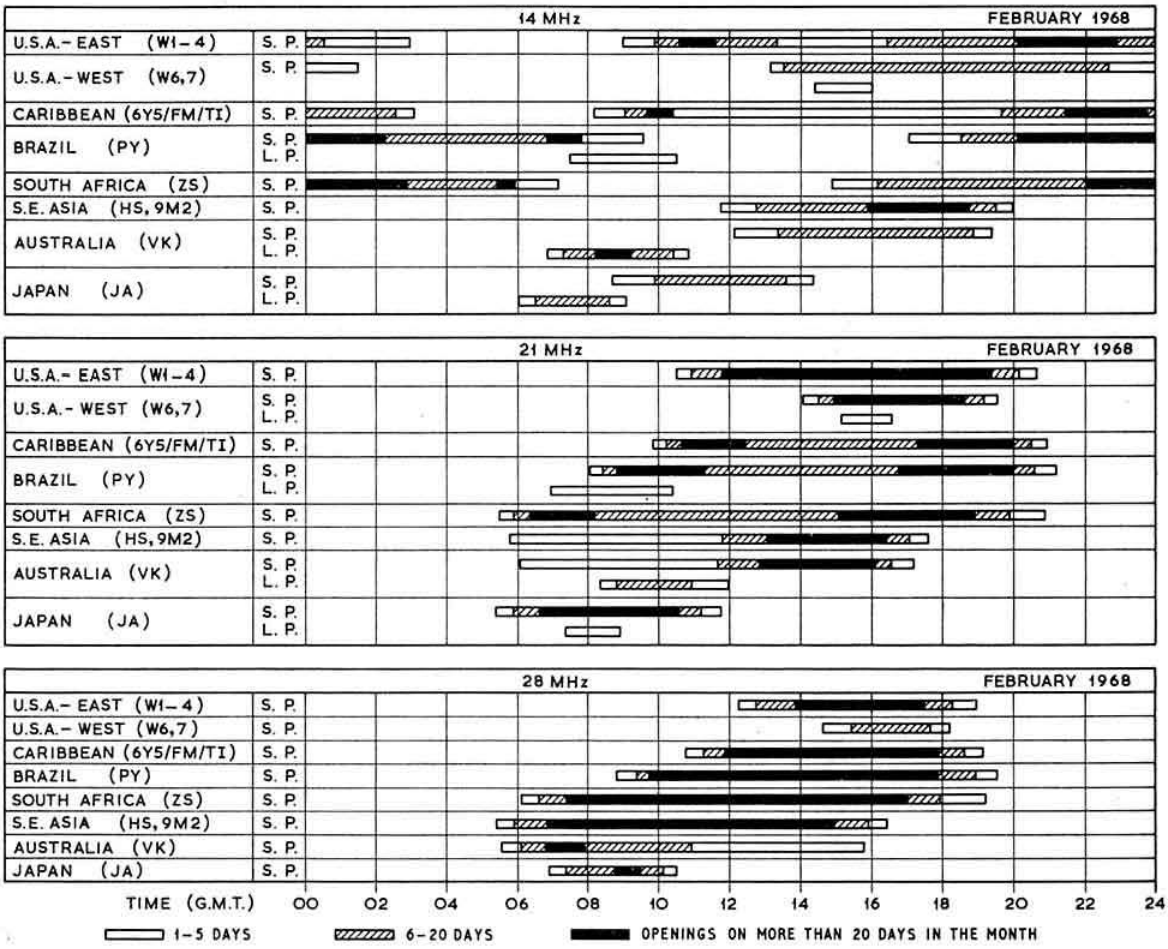
The Certificate Hunter's Club (Chapter 8) now has 76 members and holds two Sunday morning nets—one at 10.00 on 7030 kHz c.w. and the other at 11.00 on 7070 kHz for s.s.b. and a.m. stations. Those interested in CHC are invited to write to G5GH, and those interested in FHC to write to G3VNX, Ravenscourt, Grange over Sands, Lancs.

In order to help stations working towards the **London Town Award** a number of London stations (including G3s FPK, KZI, and MWG) will endeavour to be active at 11.00

Propagation Predictions

Relative to the position of the sun, winter gradually draws to a close during the month of February. In consequence the bands 14 to 28 MHz will remain open longer in the evening than during the previous two months, especially towards the end of the month. On 28 MHz Western North America will not be heard with certainty, otherwise all continents should be workable even if only during short periods. On 21 MHz all continents should be workable. The effects of the forthcoming springtime conditions will be most marked on 14 MHz, in that conditions during the latter half of the night will be much better than in the previous month. However, this band will probably not really open up again for night-time DX until some time in April. If in the coming ARRL DX Contest the F2 m.u.f.s are above the monthly mean, there will be some opportunities for working the USA on this band in the first two to four hours of the latter half of the night. In this respect conditions should be best in Southern Europe. It should be pointed out once again that in equal competition a Southern European station will always fare better in a USA Contest than stations further north. The propagation conditions on 7 and 3·5 MHz will differ little from those of last month. USA traffic on 7 MHz will probably be possible from a few hours before midnight onwards, and on 3·5 MHz most favourably from about three to four hours before sunrise until dawn.

The provisional sunspot number for December 1967 issued by the Zurich Solar Observatory is 123·2 with intense solar activity during the second half of the month. The predicted smoothed sunspot numbers for April, May and June are: 117,117 and 116 respectively.



each Sunday on 14,250 kHz s.s.b. This certificate is issued by the Grafton Radio Society for contacting 65 of the 118 London postal districts (not by any means as easy as it would appear). QSOs must have been since 1 January, 1958 and only 6 mobiles may be counted. QSLs and list should be sent, together with 2s. 6d. to Grafton Radio Society, Montem School, Hornsey Road, Holloway, London, N7.

Due solely to devaluation the price of the *Directory of Certificates and Awards is now 21s. 3d.* One year's subscription to the *Extra News Letter* is now 17s. Both these publications are produced by Clif Evans, K6BX, founder of the Certificate Hunter's Club and allied organizations. The Directory is published quarterly from 1 January in each year and may be obtained through G2BVN. Stocks of the books are not held but orders are passed to K6BX for delivery direct to the subscriber.

QTH Corner

CN8FV	via DOTM, Box 7388, Newark, NJ, USA 07107.
EA0AH	via W4DQS, Dale Strieter, 928 Trinidad St., Cocoa Beach, Fla., USA.
EA0CM	via HB9CM, Neuveville, 37 Le Landeren, Ne., Switzerland.
EA0FP	via HB9FP, Walter Kratzer, Obere Hauptstr. 10, Thun 4, Be., Switzerland.
EA0TU	via HB9TU, Albi Wyrsch, Kirchbriete, Buchrain Nr. Luzern, Switzerland.
FL8JF	Jean France, ORTF, Djibouti, French Somali Coast.
HK0BKX	via WA6AHF, Rubin Hughes, 17494 Via Alamites, San Lorenzo, Calif., USA.
I4RUI **I6FRU**	via I1ZIZ, Umberto Rava, via Gustave Modena 13, Firenze, Italy.
KH6EDY	USCG Loran Station, USNS Box 36, FPO, San Francisco, USA 96614.
KP4 QSL Bureau.	KP4CL, Box 1061, San Juan, Puerto Rico.
MP4MAH	C. A. Thomas, Box 86, Muscat, Persian Gulf.
OY6FRA	via W2CTN, 159 Ketcham Avenue, Amityville, NY, USA, 11701.
PY0DX/SP	Box 842, Recife, Brazil.
PZ1CF	(since 1/1/68) W3HNK, 126 Henderson Avenue, Norwood, Pa., USA 19074.
VP8JD	(s.s.b. QSOs) via G3NMH, 24 Hook Street, Hook, Nr. Swindon, Wilts. (c.w. QSOs) via G2RF, 14 Whole House Road, Seascale, Cumberland.
VQ8CBN **VQ8CB/A**	(all calls) via K0TCF, 423 Marian Street, Kirkwood, Mo., USA 63122.
VR1L	via K6UJW, Joe Fischer, 4825 Regale Road, Woodland Hills, Calif., USA 91364.
VR2CC	via VE3DLC, 30 Zenith Drive, Scarborough, Ontario, Canada.
K6CAA/VR3	(or VR3I) Ed DeYoung, 1942-A Iwaho Place, Honolulu, Hawaii, USA 96819.
VS6DO	not via W2RDD.
XW8CAL	via VE6AO, 3211 Kenmare Crescent, Calgary, Alberta, Canada. **YV QSL Bureau RCV, Box 2285, Caracas, Venezuela.**
ZD3F	via W2CTN (see OY6FRA).
ZS2MI	via ZS2PX, PO Box 666, Port Elizabeth, Republic of S. Africa.
3A2MJC	via I1ALX, Box 33, Fiesole, Italy.
G3RTU/4X	via IRAC, Box 4099, Tel Aviv, Israel.
5U7AN	BP201, Niamey, Niger.

RSGB QSL Bureau: G2MI, Bromley, Kent.

Contests

Results of the **1967** *CQ* **Magazine S.S.B. Contest** have now been received from W1WY. UK scores were as follows:

Single Operator

G3NMH	All band	966,246 points.		**G4CP**	10 metres	88,364 points.	
G3IAR	,,	407,885	,,	G3PQF	,,	2,816	,,
G3ORK	,,	351,373	,,	**G3PEU**	15 metres	136,367	,,
G3CAZ	,,	119,382	,,	**GM3JDR**	20 metres	88,935	,,
G2AJB	,,	38,199	,,	GM3SSB	,,	4,160	,,
G3RUV	,,	31,850	,,	**G3NLY**	40 metres	32,376	,,
GM5ACE	,,	23,760	,,	**G3SZG**	80 metres	16,470	,,
G3MWZ	,,	6,811	,,	**GW3NNF**	,,	16,150	,,
G3RJB	,,	2,914	,,				

Multi-operator

G8FC	1,621,296 points	G3LNS	538,128 points	
GB2SM	1,064,812 ,,	G3LZQ	359,856	,,
G8KG	868,140 ,,	G3SKY	99,297	,,
G3RRJ	818,664 ,,	**GD3VBL**	87,374	,,

Congratulations to all certificate winners (in heavy type) and particularly to **G3NMH** whose score was world second highest, the only higher one being ZL1KG who scored 1,043,152 points. **G3NLY** was world top score on 40m, and in the multi-operator single transmitter section **G8FC**'s score was world sixth. The top station in this category was I9RB who had 3,030,335 points and beat their fellow countrymen at I4LCK whose total was 2,102,275 points. An interesting feature of these Italian scores is that although I4LCK made more QSOs than I9RB the latter worked 463 prefixes to I4LCK's 287!

The **1968 ARRL DX Competition** (Phone section) covers the two weekends 00.01 3 February to 23.59 4 February, and 00.01 2 March to 23.59 3 March. Similarly the c.w. section covers the periods 00.01 17 February to 23.59 18 February, and 00.01 16 March to 23.59 17 March. Stations exchange reports plus state or province (if they are in the continental USA or Canada), or report plus a figure representing their power input if located anywhere else. Two points are scored by receiving acknowledgement of a number sent, and a further one point on acknowledging a number received. Final scores are reached by multiplying QSO points by the number of continental states and VE/VO call areas worked on each band totalled together. Participants are advised to obtain official ARRL entry forms and log sheets from ARRL Communications Dept., 225 Main Street, Newington, Conn., USA 06111. Logs must be postmarked no later than 20 April.

The **Vermont QSO Party** will extend from 23.00 10 February to 03.00 12 February. Stations may be contacted on each band and mode for points. Each QSO counts 3 points, and the multiplier consists of the total number of Vermont band/counties (maximum of 14 on each band). Frequencies around which Vermont stations will be found include 3685, 7030, 14,040, 14,225, 14,290, 21,050, 21,300, 28,100 and 28,600 kHz. Those able to contact 13 counties may claim the " Worked Vermont " Award. Logs should be posted before 31 March to K1MPN, 3 Hillcrest Drive, Montpelier, Vt., USA 05602.

The **1967 IOTA Contest** ended at 24.00 31 December. A list of QSLs received before 30 April together with a list of islands they represent (with their IOTA reference numbers) must be sent to Geoff Watts, 62 Belmore Road, Norwich, NOR. 72.T no later than 30 April. The score is the number of island groups confirmed times the number of continents represented. The 1968 contest began on 1 January, and IOTA directories may be obtained from Geoff.

DXCC News

An announcement in December *QST* says that neither 1A6SBO nor 1B9WNV will be accepted for DXCC status. In the case of 1A6SBO it has not been shown that the operation came within Rule 8 of the DXCC rules (this says that all stations contacted must have been land based and that contacts with ships, anchored or otherwise, cannot be counted). The operation by Don Miller from Blenheim Reef under the 1B9WNV call-sign has been rejected " because of inability to establish actual presence on Blenheim Reef." Thus it would appear that W9WNV's second visit, if fully authenticated, should stand a good chance of receiving credit in due course.

Also in the same issue of *QST* the latest DXCC listings are of some interest. Over 100 UK stations are listed as members who have applied for endorsements within the last two years. The Honor Roll contains some 225 call-signs, amongst them being G3FKM (321/337), G4MJ (318/334), G8KS (318/335), G2PL (315/337), G2BVN (314/331), G3HCT (314/324), G2BOZ (312/329), G3AAM (312/335), and G3HDA (312/323). In the Phone Honor Roll are G3FKM (316/329), and G8KS (315/328). The first figure indicates the number of countries currently on the list confirmed, the second the number of " all time " countries confirmed, including those now deleted.

DX Briefs

Philo, HB9CM, who has been active from **Fernando Poo**

as EA0CM, is now back in Switzerland and his place has been taken by HB9FP who is using the call EA0FP. Walter is believed to be likely to stay for about four months.

The United States how has reciprocal licensing arrangements with 33 countries. The latest to be agreed are with Chile, Austria and Finland.

Rumours are around that an expedition to **Revilla Gigedo** (XE4) will be made by a group of Mexican amateurs sometime in April. They hope to put a station on the air for 24 hours a day during a week's stay. XE2YP is mentioned as one of the intending participants.

A volcanic eruption on **Deception Is.** on 5 December caused an immediate evacuation to be carried out. This means that there is now no current activity from the S. Shetland Is. (VP8). It will presumably be some time before the base is reoccupied.

Sid, ex-TL8SW, 3V8CA, etc., is now in the Congo and is using the call-sign 9Q5CD. His QSLs should be sent to his home address (see *QTH Corner*).

John, VQ9JW, is scheduled to leave Aldabra at the end of March. 3V8BZ should have left Tunisia on 31 January.

Barbados is now independent and has changed its prefix from VP6 to 8P6. All calls have been reissued and some new calls noted include 8P6AY (ex-VP6GC), 8P6AZ (ex-VP6AO), 8P6BH (ex-VP6KL), 8P6BU (ex-VP6PJ), and 8P6CC (ex-VP6WR).

PY7QBG, claiming to be on **Fernando de Noronha,** has been worked on 40m c.w. at around 22.00. A new operator has now arrived on **Macquarie Is.** and appears to be using the call-sign VK0IA. VK0CS is active from Mawson, in Antarctica, and VK0AA has also been reported (any further information would be welcome). WA6YMT/MM has been heard on 20m s.s.b. en route for Christchurch before leaving for KC4USG, McMurdo Sound.

UA0KIP, asking for QSLs via UW3FD, is said to be located on Wrangel Is. This remote spot off the NE tip of Siberia once counted for DXCC but no longer does so.

Andre, FH8CD, is expected to be back in France early in February.

Band Reports

Conditions appear to be improving already as we enter the year expected to be that of the sunspot cycle maximum. Many thanks to the following who provided information from which this section has been constructed: G2BOZ, G2HKZ, GW3AX, G3BDQ, GM3CSM, G3HCT, G3HDA, G3HDC, G3IGW, GW3NJW, G3NMH, G3PQF, G3RJH, G3SED, G3SML, G3TBK, G3UAA, G3URX, G3VRZ, G3WJN, G4MJ, G8JM, G8VG, SM2BYD, BRS25428, BRS 28198, A3942, A4886, A5032, A5126, A5135, A5224, A5273, A5437, A5610 and A5723.

As reported in an earlier paragraph conditions on **160m** have been patchy, in spite of this *OE2JZ* (23.32), *DL5YZ* (00.10), *PY2's BGH* and *BJ* (05.10), *PZ1AH* (04.30), *W1BB/1* (05.26 etc.), *VO1FB* (05.55), *ZC4RB* (22.00), *5Z4LE* (03.30) and *9H1AE* (21.00) have been heard or worked.

The **80m** band has produced some excellent signals from long distances. It is a great pity that deliberate interference is being caused to the dedicated DXers who surely cannot be accused of themselves causing excessive interference to others since they normally confine themeselves to the section between 3790 and 3800 kHz. Stations reported include *CT2DU* (22.58), *EA6DC* (23.00), EL3C (21.30), EP2GI (00.37), MP4TAH (22.03), *OY7ML* (19.50), TA2BK (22.55), VE7YY (06.50), VP1PV (23.00), VP5AA (23.42), VQ9JW (00.14), VS6DO (19.00), W1, 2, 3, 4, 5, 8, 9 (23.00-01.00, 06.00-08.00), XE1H (07.40), ZD8J (22.00), 4X4WN (22.20), 9J2BC (21.30), 9L1JJ (23.00), 9M2NF (22.30), and 9V1LK (22.40).

Hardy listeners on **40m** have braved the commercial QRM to log *CN2RU* (19.20), CT2BO (20.00), FP8BL (09.46), HK6AWX (08.38), *JA6BJT* (21.00), *KV4CI* (21.25), PJ2CU (23.28), *PY7QBG* (21.50), *PY0DW* (06.00, RST 599), *TA2BK* (20.00), VKs (L.P. 07.30-09.00, S.P. 19.00-20.30), VP2SM (21.00), *VQ8CC* (20.15), W6/7's (SP 06.30-08.00), *XE1DDM* (07.35), *ZL3OR* (L.P. 08.20), ZS1JA (20.05), 9J2BC (19.00), and *9V1OK* (19.30).

The **20m** band has already started to show occasional openings during the night hours with loud signals from the W. Coast US being heard at 01.00. CE0AC (07.10), CE3ZN/0 (08.16), CR4BC (09.05), CR5SP (18.10), EA9EJ (19.44), HS4HA (14.30), KG6IF (07.45), KP6AP/KH6 (18.00), TA1LY (18.09), VE8RH (King William Is. 17.16), VP1LL (19.22), VP5AA (Turks and Caicos. 23.08), VP8JB (Falkland Is. 20.16), VP8JD (19.34), *VQ8CBN* (17.58), VQ8CB/A Blenheim Reef and Geyser Reef (17.30), VR1L (06.37), YJ8BW (08.30), YK1AA (09.36), ZS2MI (On a.m., 17.34), ZS9L (20.46), 7P8AR (17.48), 9Y4VT (20.55).

15m is still only open for a limited time during the daylight hours. *CR3KD* (18.15), EA0CM (10.25), FG7TH (16.13). HR1WM (13.00), JAs (08.30-09.30), K0ILI/KG6 (09,30). MP4MBB (10.58), OA5SJ (12.30), PY0SP (08.49, 15.00), *TC2AJ* (10.02), VP2VM (11.30), ZL's (08.30), ZS2MI (On a.m., 13.35), 5VZAB (10.14) and 9X5AA (10.47) have been heard.

There have been quite a number of good openings on **10m,** and signals have been audible from the USA on most days. SM4DXL in *QUAX* thinks that it would be a good idea to carry out tests on the band during the hours of darkness in order to investigate the occurrence of unusual openings. He suggests that interested amateurs put out a CQ call on 28,500 at 21.30 and see what answers! Stations in evidence during daylight hours have included FH8CD (11.05), *FK8AU* (11.00), FY7YM (13.27), HC1PC (12.50), HR1DX (15.00), HS3DR (10.28), *HZ1AB* (10.29), K0ILI/KG6 (09.55), KR6TAB (10.40), *OA4KF* (13.52), OD5BZ (15.00), SV1AB (14.20, SV stations had their licences returned in late December), SV0WL (Crete, 13.34), *TJ1QQ* (15.35), *TU2BK* (11.45), VK8AU (11.47), VK9XI (13.12), VP1's DM, PV (15.30), VQ8CC (14.12), VS9MB (10.18), XW8CAL (12.32), ZD5R (10.38), 5U7AN (09.54) and 7Q7LZ (11.50).

Once again your scribe would like to express his thanks to all correspondents, and especially to the following for permission to reproduce the contents of their bulletins: *CQ DX* (ARI), *On The Air* (ON4AD), *DX'press* (PA0FX), *NARS News* (5N2AAF), the *L.I.DX.A. Bulletin* (W2GKZ), *The DX'er* (K6CQF), *DX News Sheet* (Geoff Watts), *The Ex-G Radio Club Bulletin* (W3HQO), *QUAX* (SM4DXL), the *DX'ers Magazine* (W4BPD), the *West Gulf DX Bulletin* (W5QK), and the *Florida DX Report* (W4BRB), Please send all items for the **March** issue to reach G3FKM no later than **14 February**, for the **April** issue by **13 March,** and for the **May** issue by **8 April.**

REGULAR FEATURE

FOUR METRES AND DOWN

By JACK HUM, G5UM*

The Price of Liberty—again

LAST year's little bit of kite flying from the professional camp, with its implied threat to our 70cm band, brought swift and sharp rejoinders from the amateur side. If it did nothing else the incident served to demonstrate once again the urgent need for vigilance to be sustained constantly by the Amateur Radio movement.

This vigilance can be—and is being—exercised in a number of ways. On the h.f. bands there is the Intruder Watch, effectively and ably conducted over many years by G3ADZ and his team. On v.h.f. nothing of this nature at present exists, and one of the things which operators on v.h.f. and u.h.f. could usefully do is to keep their own check on interlopers into these frequency areas. Because it is easy to distinguish *rightful* Service users (our sharers) on " Four " and the aeronautical people on " Two "—whose frequencies are written into our licence—any trespassers stand out a mile.

What needs to be done is to identify them. Sometimes they give themselves away by the content of their transmissions especially when deliberate piracy is involved (for a clue, note Amateur (Sound) Licence A: 8(3): Gramophone or tape recordings of the type intended for entertainment purposes may not be transmitted for any purposes). Even if they don't, there is always the chance of getting a fix on them when groups of amateur operators equipped with sharp beams apply direction finding tactics.

One word of warning that may seem so obvious as to be superfluous is: don't confuse image signals from out-of-band transmissions with intruders. Some amateur receiver front ends are sufficiently broad to admit them; which does emphasize the importance of organizing collective rather than lone-wolf identification of illegitimate transmissions so that double checks may always be made.

Substantiated reports of persistent and unauthorized intrusion into our bands from 4m and down should be sent to the V.H.F. Committee at Headquarters.

* * *

Still on the subject of " constant vigilance " (though it may not look like it at first sight): how many v.h.f. and u.h.f. operators could give, if asked, even an approximate idea of the pattern of their activities in any one year?

How many, for instance, keep a running monthly total of contacts made on each of the bands used? It is the easiest thing in the world when ruling off the log at the end of the month to write in *green* ink against the last 4m contact " 4/35," if you had 35 contacts on the band that month; and in *red* ink " 2/68 " assuming you had 68 QSOs on " Two"; or in *blue* ink " 70/21," or in *Royal Purple* (it deserves it) " 23/7 " to denote seven contacts on the 1296 MHz band. Month by month a colour-coded self-evident conspectus of the year's operations-on-the-air is built up.

This methodical yet easy-to-work system both complements the " Number of Different Stations Worked " register which most v.h.f. men keep, and yields instant information on band activity in a way which few card index systems do.

* * *

We quoted last month a significant statistic which log analysis was able to throw up: that G2JF had worked 3583 different stations on "Two " up to the end of November. We can now quote another: during 1967 ON4HN made 1850 contacts on the 70cm band of which 1150 were with the UK (" a large proportion from 'two rock stable skeds' "), the rest distributed over France, Belgium, Holland and Germany in that order. In reverse, this means that 1150 contacts were made on 70cm *from* the UK eastwards to ON4HN in the course of last year—and that represents an intense level of activity on the 432 MHz band within these islands.

By advantage of site, equipment and sheer operating experience, G2JF and ON4HN may not be representative of the generality of v.h.f. operators, but the argument for methodical log analysis holds, nevertheless. Indeed, in a sense it is *more* important for the generality (meaning you and me) to keep some account of our activities in addition to what is required by the licence, for what *we* do on the air, even though we may not be heard far afield, adds up to a whacking amount of v.h.f./u.h.f. occupancy in any one year. And because it's *occupancy* that justifies retention of our bands, it is well to have figures to show it.

Operators who have not yet initiated a running record of their contacts for 1968 are reminded that it's not too late to start *now*.

Contest News

Before the reminders about imminent contests, herewith some thoughts in the contest context for debate or generally mulling over.

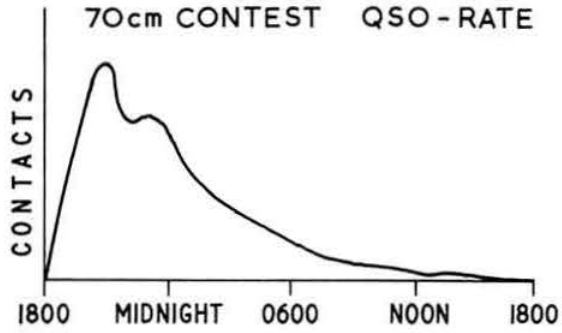
From Don Hayter, G3JHM, of Worthing in Sussex comes a word of sympathy for the BRS men who recently complained about being swamped by portable operations on the South Downs hard by their homes. He too has been forced to go QRT for the same reason, a situation which prompts him to proffer a forceful remedy: " . . . that portable contestants should be limited to 25 watts input and to their own county or within 30 miles of their own QTH."

The latter proposal, printed also in the commentary on

* Houghton on the Hill, Leicester LE7 9JJ. Send reports for the March issue to arrive not later than 12 February; for the April issue by 11 March.

V.H.F. NFD last month, came in for some off-the-cuff debate by members of the West Midlands V.H.F. Group when they met in December. The feeling was that it would penalize people in conurbations who had to travel a considerable distance to find anything like a decent site for field day operations.

Another thought which emerged at this same Coventry meeting was that some of the 70cm contests are too long. From G3OVA and G8AHE came the observation that almost everything on the band can be worked within the first eight hours, so why prolong the proceedings for a further 16? Sketching out a rough graph to prove the point—it looks something like this—



—they advocated limiting future 432 MHz contests to a period from 18.00 to 02.00 hours clock time.

* * *

Another piece of forceful comment on contests coming up, this time from G3COJ of High Wycombe, his subject the s.s.b. contest on " Two " at the beginning of January. Says Brian:

" The 2m sideband contest although quite interesting was not helped by poor conditions or the lunatic idea of permitting repeat QSOs during each half hour of the contest. This meant that just as the QRM caused by locals all working each other began to die away and the weak DX became audible, it was immediately drowned by the locals all working each other again! "

From the after-the-event inquests we heard on 145·41 MHz we believe there are many other sideband operators who share the G3COJ viewpoint. No doubt there are others who don't. It is hoped that all who turned in entries (the closing date was 23 January) will have accepted the V.H.F. Contests Committee's invitation to " . . . make all comments on rules of this contest on reverse side of this cover sheet declaration," as printed in bold capitals on page 59 last month. The next sideband contest is in June and a third in November, leaving a modicum of time for the rules to be changed if intending entrants so wish, and express their views in sufficient numbers to the Committee.

Something on which contest *aficionados* will agree is to congratulate the V.H.F. Contests Committee on the fairly massive job of work it must have had to do to prepare the " blanket " rules for this year's events as shown on pages 58/59 last time.

Coming up this month are the First 70 MHz (Open), a convenient ten-hour event on 11 February; and on 17 February the third leg of the 1968 Cumulatives, a ninety minute phone-only event on 2m followed by the same on 70cm.

We had also better remind contestants of the arrangements for the weekend of 2-3 March. Two contests are chalked up, one of them the always highly popular Open event on 2m and the other the Spring RTTY Contest run by the British Amateur Radio Teleprinter Group, apropos which (or perhaps whom). . . .

ARRL have supplied us with this photograph of G3LTF (centre) when he visited the East Coast V.H.F. Society, WA2WEB, on the occasion of their annual Christmas Dinner. Here Peter is shown receiving an award for pioneering moonbounce in the UK from Society President K2OJD/FP8CA (left) while WB2OHH/WA1IUO looks on. The Society used the occasion to announce plans for another International V.H.F. Convention to be held in May.

V.H.F. Teleprinting

. . . . We welcome a letter from Hon. Sec. D. J. Goacher of the BARTG—he is G3LLZ—on the subject of recommended frequencies for RTTY transmissions on the v.h.f. wavebands. He reports that at the last meeting of the Group's committee it was agreed to recommend to RTTY operators on v.h.f. that the following frequencies should be used:

On " Four ": 70·56 MHz; on " Two ": 145·3 MHz for the north of the British Isles and 144·6 MHz for the south, the northern portion to be taken as Zones 7, 8, and 9, and the southern portion as Zones 2, 3, 4, 5 and 6.

Also at the suggestion of the BARTG Committee it is intended to recommend the use of frequency shift keying at v.h.f., as opposed to a.f.s.k.

Please, more about teleprinter contacts and schedules on v.h.f. The level of activity in this *genre* is, we are sure, higher than references in " Four Metres and Down " have so far indicated.

Polarization at 13cm

From G3RPE has come the following comment on last month's proposal by G3GWL to standardize vertical polarization on 2304 MHz and thus allow the use of a common aerial dish for 13 and 23cm:

" A quick survey of interested members of G5FK [the Research-GEC Amateur Radio Society at Wembley where much pioneer 13cm work has been done] brought forth no objections to vertical polarization on 13cm, and all agree that it could make a common feed for 13 and 23cm more practical. One advantage with our design of 13cm aerial is

that it would allow rainwater to drain more easily from the slot!"

The subject was also discussed at the December meeting of the RSGB V.H.F. Committee, and the decision minuted that "vertical on 13" should be the recommended mode.

The 13cm scene in the States

Continuing in a 13 centimetric vein, we have a letter from Mervyn McKee of Acton in Massachusetts, who now signs G3PXB/W1, and was prompted to write after seeing in this journal an account of activity on "the next band up."

He reports that activity in his corner of New England can be considered good, especially during contest times ". . . with stations making contacts over distances usually associated with 144 MHz."

What is particularly interesting is that much of this activity is with pulse transmitters and with receivers designed to receive P-modes, inspired by a series of articles by Guba/Zimmer in *QST* from February to May of 1963. Mervyn regards these articles as recommended reading for anyone contemplating starting on "Thirteen." They give a good idea, he says, of some of "the trials and tribulations to be expected."

He heartily endorses the comments made in these columns by 13cm workers that the segment 2304 to 2306 MHz be adopted on an international basis for crystal controlled operation by reason of its harmonic relationship with the 2m band. It will, he says, "be apparent from the advances made on 1296 MHz that sooner or later serious minded amateurs will be looking to 2300 MHz for moonbounce communication, when an agreement on the precise frequencies to be used will be a must."

He generously offers to forward names and addresses of stations in his W1 area active on 2300 MHz to anyone in the UK who wishes to correspond with them. His own QTH is PO Box 344, Acton, Mass., 01720.

For some more, but rather different, news from America, now over to. . . .

TF on Two?

From 25 January to 15 April a station is in operation from Keflavik in Iceland on four h.f. bands—*and on "Two."* Call-sign not known, but we would guess K2LME/TF in view of the fact that D. B. Collins, K2LME, is the prime mover behind the project (his QTH: c/o FEC-DYE5, Keflavik USNS, Iceland).

He reports that the full legal 150 watts input is in use on "Two," and there is sufficient system gain, "as almost to guarantee contact with the UK on 144 MHz."

H'm, yes . . . it's not a path noted for temperature inversions, and the QRB to London is of the order of a thousand miles. So let's put it in the "you never can tell" category in the hope that aurora (it's constantly visible in TF, and overhead for much of the time), may help.

Mobile calling frequency on "Two"?

In taking to the v.h.f.s, G3NBU was impressed with the use made of the mobile calling frequency on the 4m band, 70·26 MHz, and puts the case for allocating a similar spot frequency on the 2m band.

"Last Sunday, we went for a short trip and at various times during the day were in Zones 2, 4, 5 and 6 . . . I stayed on 144·24 MHz. And I am likely in the course of my job to wander all over G, GW, GM and even further afield. As things stand at present, one would need a separate crystal for each zone one visited. This can be especially inconvenient where the crystal in the mobile transmitter is internal and the case has to come off when changing it, as it does with my Heathkit HW30, which is small enough to fit in a corner of the vehicle . . . my receiver is ticking over on the frequency of a local operator, but he's not on. Several local mobiles could all be calling CQ for all I know . . ."

On several different frequencies across the 2m band, of course. So why not allocate them a *spot* frequency, just as on "Four," but preferably at one of the zone junctions? This suggestion by G3NBU seems to us to be worth talking over by the 2m mobileers.

More Video News

Last month's extended piece about amateur television activity in the south west has brought news from the West Midlands of a high level of activity there, too, from Birmingham through Wolverhampton up to Stoke-on-Trent.

To remind us all that the 70cm band doesn't start at 432 MHz but that there are several useful MHz below it, G6KQJ/T of Wolverhampton reports that he is regularly active on 430·66 MHz video with sound going out at 434·16. He would particularly welcome tests after 21.30 GMT any evening with other members equipped to receive video on the 70cm band.

Wearing his other hat—it is labelled G8ACB—he has been active on 70cm mobile. Appropriately, one of his recent contacts was with another well known television worker, Ian Waters of Ely, G8ADE at the time but perhaps more familiar as G6KKD/T. The G8ACB/M vehicle has a clip-on cloverleaf aerial fed by a varactor driven by a TW2, which represents a commendably economical way to generate r.f. at 432 MHz. The contact with G8ADE was held as far as Desborough on the A6, about 50 miles.

From G6KKD/T himself comes a reminisce about That Opening of last November and how it profited some of the television men as well as the u.h.f. phone operators at the time; hearing a video QSO in progress between G6NOX/T of Essex and G6ILD/T of Durham, Ian popped his TV transmitter on for a second as G6NOX/T went over, eliciting an amazed comment from G6ILD/T to whom one picture had suddenly become another. A three-way television QSO followed over path distances well in excess of 150 miles.

Some days later, after a committee meeting of the British Amateur Television Club had drawn to a conclusion, it was decided to relax and enjoy a little television laid on by the Fenland TV Net. First of all, G6KKD/T engaged G6RIZ/T about a dozen miles to the north of Ely in a video two-way, the latter putting on what almost amounted to a studio production, with simultaneous sound and on the vision side the benefit of a 3in. image orthicon camera and two vidicons.

Then Ian locked in with G6PGF/T about a dozen miles to the south, from whom via a home built 8mm teleciné a number of films of amateur radio activity were received, including shots taken at the Hunstanton Bucket and Spade meeting at the nearest bit of seaside to the Fenlanders.

None of those concerned would claim anything special about all this; but it is well worth recording as showing the

highly developed state of the amateur television art which has been achieved in this corner of East Anglia.

Beaconry

What is believed to be the first DX reception of the Malta beacon—and it occurred as far back as 28 August—has been reported by a Rhineland listener, Heinz Stelberg, of Konigswinter. He copied (and taped) its 70·1 MHz signals at good strength from 17.35 to 19.38 GMT, observing them to peak as high as S9 plus 30 at 18.36 GMT. A 3-element beam was used. The path distance was something like 1100 miles.

Heinz was kind enough to send along this information to " Four Metres and Down " after reading last month's comment that so far 9H1MB had not been heard in the UK. It's that last 400 miles from DL to here that seems to be the difficult bit.

Another long haul reception feat on 4m—which, like the above, demonstrates the value of having a beacon service—is reported from the South Coast, where G3JVL logged GB3GM during the meteor-shower phenomena at the end of the year. The presence of the Dounreay beacon on 70·305 MHz should encourage 4m operators to search for it as an indicator of band openings, either tropo, sporadic-*E* or, who knows, by auroral manifestations which, as far as " Four " is concerned, have been infrequently reported. Or, of course, in season by M-S, *vide* G3JVL.

The QRB G3JVL to GB3GM is of the order of 600 miles.

Beyond Dounreay there are almost 300 miles of wild North Atlantic water to the next beacon northabout, which is OY7VHF at Thorshavn. We make its QRB to London about 780 miles, which puts it in the super-DX class on " Two " by anybody's reckoning. According to the magazine of the Faeroes Society, FRA, the transmitter on 145·26 MHz radiates continuously and has already been heard in Holland and Denmark. The special value of OY7VHF is its siting well within the auroral belt and its consequent ability to give early warning when Aurora is developing. From most parts of the UK beams will need to be turned north west to hit the Faeroes.

* * *

More about G3JVL (Mike Walters, one of the intensely active group of professional-amateurs associated with the Plessey organization at Havant in south Hampshire); as will be known by those who saw it at the last Communications Exhibition, the mechanical keyer for ZB2VHF was designed by Mike and has stood up to gruelling wear keeping Gibraltar's 4m beacon constantly on the air. Now Mike, aided by G8AIX, is hard at work designing a new automatic keyer using only semiconductor logic circuits, having no moving parts and costing little. It should be operational at ZB2VHF soon.

Further to expand the activities on The Rock, the Havant members have a 2m beacon transmitter under construction for ZB2VHF and are hoping to acquire a 6m one from The States. This last would be used for Transequatorial tests with South African and Rhodesian Amateur Radio groups.

As for the good old original ZB2VHF beacon on " Four," there is almost daily reception by meteor ping at the Havant members' clubroom, G3WLE.

* * *

Great news for 70cm men broke last month: GB3GEC was back. Its " f.s.k.-ish " note was not exactly T9, but how welcome, nevertheless.

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

Call-sign	Location	Nominal Frequency	Emission	Aerial Direction
GB3ANG	Craigowl Hill, Dundee*	145·985 MHz	A1	
GB3CTC	Redruth, Cornwall*	144·10 MHz	A1	North-East
GB3GI	Strabane, N.I.	145·990 MHz	A1	N/SE
GB3GW	Swansea	144·250 MHz	A1	E.N.E.
GB3GM	Thurso*	145·995 MHz	A1	S
GB3GM	Thurso*	70·305 MHz	A1	N/S
GB3GM	Thurso*	29·005 MHz	A1	N/S
GB3GEC	W.London	434·00 MHz		
GB3VHF	Wrotham, Kent	144·50 MHz	F1	North-West

* Not operational.

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 MHz):

Date	Time	Error
3 January	16.00 **GMT**	100 Hz low
10 January	11.00 **GMT**	300 Hz high
16 January	10.37 **GMT**	100 Hz high
23 January	10.26 **GMT**	230 Hz high

Ratifications

70 MHz Band: first contact Gibraltar to UK was on 2 June, 1967, at 17.08 GMT between ZB2VHF and G3RIK, Rochdale. (Information from G3JHM and G3RIK).

70 MHz Band: world distance record for the 70/72 MHz bands was established between ZB2VHF and GM3EGW on 11 June, 1967, at 19.20 GMT. Path distance approximately 1400 miles.

70 MHz Band: first Gibraltar to Northern Ireland contact was on 11 June, 1967, at 19.15 GMT between ZB2VHF and GI3RXV.

70 MHz Band: first Gibraltar to Irish Republic contact was on 16 June, 1967, at 18.26 GMT between ZB2VHF and EI6AK.

70 MHz Band: first Gibraltar to Wales contact was made on 18 June, 1967, at 11.02 GMT between ZB2VHF and GW4CG.

(Information on these last four also from G3JHM).

2300 MHz Band: first UK contact was on 6 June, 1948, between G3CBN and G8IH of West London. (Information: G3JHM).

2300 MHz Band: current UK distance record 35½ miles between G3CBN and G8IH/P at the end of 1949. (Information: G2WS, quoting " World at their Fingertips ").

Skeds Wanted

By ON4HN, Henri Van Gastel, 16 Bauwerwaan, Zomergem, Belgium, on 70cm daily " with stations with good equipment and sufficient power " in the Liverpool area, and in Cornwall and Northern England. Preferred times: 18.15 to 20.00 and 20.30 to 21.00 GMT.

By G8ANQ, Bill Burton, 14 Westbourne Road, Castle Park, Whitby, with any stations at or near the east Scottish coast for across-sea tests on 70cm.

(Continued)

Skeds Operative

By G8ANQ, 433·35 MHz, from Whitby to G3NWU, 433·047 MHz, Hartlepool, at 22.30 GMT nightly.

Tech Corner

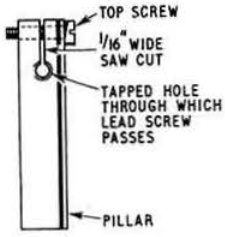
From G8ANQ (Bill Burton of Whitby):

May I add a thought or two to the useful contribution by G3COJ in "Tech Corner" on the subject of air cooling of the 4CX250B valve at 70cm? In using this valve in the course of the daily job I have observed that a typical air flow rate of 3·8 cubic feet per minute at 250 watts dissipation is satisfactory. If when running up equipment on dummy load a blower rated at 10 cubic feet per minute is used, this proves to be more than adequate, and means that one does not need to worry about sealing up corners in the chassis. Incidentally, polystyrene cement is just the job for this.

The air flow for the 4CX250B at maximum dissipation (250 watts) is: sea level: 6·4 cubic feet per minute (0·82 in. of water); 10,000 feet: 9·3 cubic feet per minute (1·2 in. of water).

One rather interesting blower which has been used at G8ANQ comes from Airflow Developments Ltd., Lancaster Road, High Wycombe, Bucks, and is their type 26BTM for 230 volts a.c., and priced at 49s. 6d. complete, ex works.

The 4CX250B p.a. at G8ANQ uses a half-wave grid line tuned by a 10pF capacitor. The anode line is also half wave, tuned by a disc on a lead screw. One point to which special attention had to be paid at G8ANQ was the grounding of this lead screw. Good contact between this screw and its brass supporting pillar with a tapped hole was assured by the simple means shown in the accompanying sketch. The top screw can be tightened up to increase the pressure on the lead screw and thus obtain a good contact.



From G6KKD/T (Ian Waters of Ely):

Arrangements have now been made at G6KKD/T to permit the use of duplex sending and receiving on 70cm through the same aerial and feeder. This is brought about through the vision/sound r.f. combiner in which both transmitters feed a common aerial but with a high loss path transmitter-to-transmitter.

When television is not in use a co-ax relay enables the receiver to be connected to the vision transmitter feed point. With 25 watts of outgoing r.f. on 433·5 MHz signals above 434·5 or below 432·5 MHz can be received quite well.

From G3ENY (Geoff Roberts of Bridgnorth):

The v.f.o. exciter unit described by G8AEX must be one of the very few for the 70cm band which are at present in existence, and points the way to future developments.

I note that it is stated that the choice of the two input frequencies to feed to the mixer is at the discretion of the constructor. In the mixer sum and difference frequencies are present, and if a v.f.o. frequency as low as 3 MHz is chosen the mixer will offer up 144, 141 and other nearby frequencies at large amplitude which will be hard to select.

At G3ENY the v.f.o. is on 3 MHz but mixes with a crystal controlled signal at 13 MHz to give 16 MHz. A number of tuned circuits are used to eliminate all but the wanted 16 MHz. This is then multiplied by three to 48 MHz and by three again to 144 MHz. With this configuration the v.f.o. itself needs to cover quite a small frequency range.

Here and There

"... one of the OE stations I worked on 2m had a transistorized handy-talkie. By profession an operator in a cinema, he worked me from the projection room while projecting the movie"—OK1DE.

* * *

Just because most East German stations are DM2, do not write off any DM4 as pirates. This is the prefix allocated to radio schools in the DDR.

* * *

"It's worth looking for OE2OML at his mountain retreat 4000 ft. up. He is on 145·41 MHz sideband, and though he is normally there at weekends he does know about our Monday Night Activity Night on 2m and often prolongs his stay"—G3DAH. (Later.—G3COJ worked the OE on 2 December: "... he was audible the whole of the evening up to S8".)

* * *

Oscar-info when any occurs is put into the ARRL broadcasts from their headquarters station W1AW. These go out at 00.00 GMT daily.

* * *

No Cambridge University expedition to the Isle of Man this Easter after all, the team having been denied the use of the summit of Snaefell as originally intended. Hard luck on G3SKT and his confreres who had done so much prearranging ... but the 2m sideband and 70cm gear may yet get an airing later in the year.

* * *

"I would very much like to hear GB3CTC going again. It is greatly missed as a pointer to conditions on 2m. A beacon on 70cm would also be interesting."—G3COJ.

* * *

"The ambition of every G8 plus three man is to get his full G3 plus 3 ticket." True or false? False—very. All the same, enough do to make the provision of Morse exercises for them on 70cm well worth while. Morse men on 70cm who would like to help are invited to write to G3KGU, the RSGB Slow Morse organizer, at 25 Purlieu Way, Theydon Bois, Essex.

* * *

LATE NEWS—and good news: just formed is The South Coast V.H.F./U.H.F. Group. The decision was taken at a meeting in Worthing on 5 January ..."to foster and encourage v.h.f. activity and the adoption of advanced techniques." For details contact Don Hayter, G3JHM, 4 Newling Way, Worthing, Sussex.

* * *

Final final: when you got that new 1968 diary did you remember to insert the date of this year's Fourteenth International V.H.F./U.H.F. Convention? If not, it would be a good idea to put it in now: Saturday 27 April—yes, once more at Whitton.

Project Oscar

By W. BROWNING, G2AOX*
UK Co-ordinator for Project Oscar

DETAILS of the *Australis* satellite, which may be launched before *Euro-Oscar*, are given below so that operators will have an opportunity to familiarize themselves with the satellite transmissions before the launch date, which, at the time of writing, is not known.

Australis is not a translator type package like the last two *Oscars* but will emit identical signals on the 144 and 28 MHz bands, with eight telemetric channels which include the usual HI HI identification in Morse. The latter will be on a.f.s.k. with two tones and not m.c.w. The satellite is powered by two 20 volt alkaline-manganese batteries with an expected life of about two months. The 28 MHz transmitter will be "command" switched on and off from ground stations in order to conserve the battery drain.

The v.h.f. transmitter will emit a continuous a.m. signal and also telemetric emissions on 144·050 MHz with a power of 50 milliwatts in the following sequence:

Channel 0	HI HI
Channel 1	Battery current drain in mA.
Channel 2	X Axis sensor
Channel 3	Battery voltage
Channel 4	Y Axis sensor
Channel 5	Internal temperature
Channel 6	Z Axis Sensor
Channel 7	Skin temperature of package

In all cases, the parameter is specified by the audio frequency of the signal, and not by a time count as previously. Each channel will operate for approximately 6½ seconds, giving a total of 52 seconds for the complete cycle. The frequencies will vary from about 500 Hz to 1500 Hz and the graphs relate the frequency received to the actual battery and temperature values.

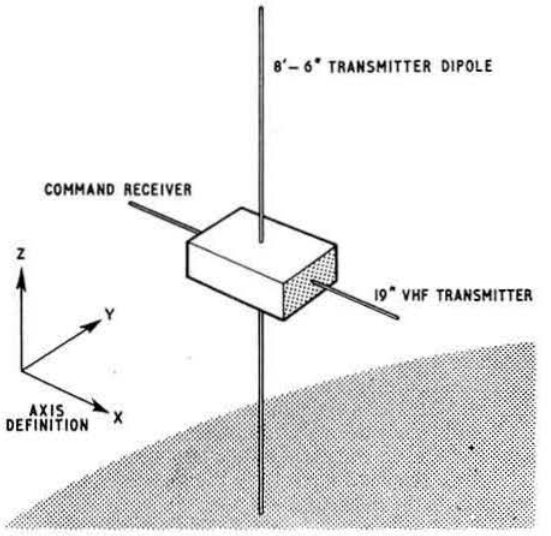
In order to decode the telemetry channels, it is necessary to use an oscilloscope and a calibrated audio oscillator. The received audio signal should be fed into the vertical axis and the audio oscillator into the horizontal axis; this, when correctly adjusted, with as little "sync" as possible, will give a Lissajous figure of an ellipse. If an oscilloscope is not available, a reasonably accurate measurement can be made by matching the audio signal note with the note of the signal generator by ear. The best method is to use a direct reading digital read out frequency meter.

A stop watch is essential to ensure that the correct channel is being measured, as if two adjacent channels are on the same, or very near frequency, there will be no break to identify the change.

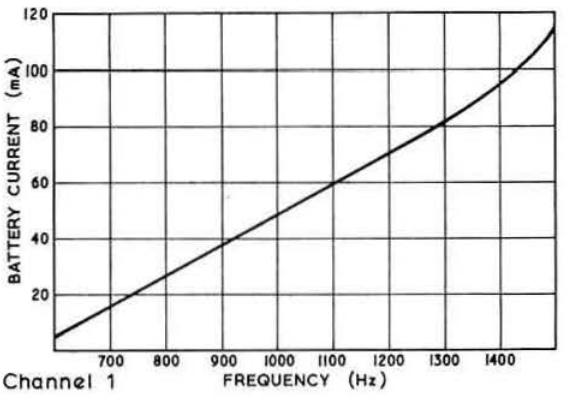
For the first time in an amateur-built satellite, an attempt has been made to stabilize the package, in order to ensure reliable reception free from fading due to "spin, roll or tumble," and this is being achieved by associating the energy generated by the spin being removed by an array of Permalloy wires and by eddy current losses in the aluminium casing. A powerful bar magnet is also built in which should bring the X Axis in line with the Earth's magnetic field.

It should be noted that as the signals are all amplitude

*47 Brampton Grove, Hendon, London, NW4.



The functions of the aerials on Australis.



Telemetry interpretation graph for battery current.

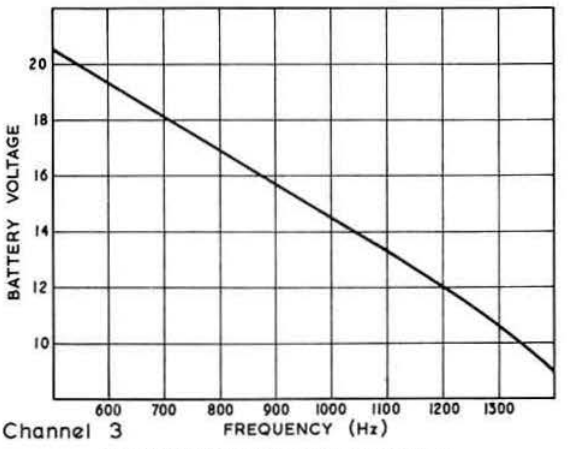


Chart for determining battery voltage.

modulated, it will *not* be necessary to use a b.f.o. to receive them.

The same telemetry sequence will be transmitted on 29·450 MHz, when the h.f. transmitter has been switched on, with a power of 250 milliwatts, and this signal will serve as a useful indication of the propagation conditions on the 28 MHz band.

Special report forms are being prepared and their use is absolutely essential, as they are a type of computer card, and will be fed direct into the master computer. Any reports that are not on one of these forms will be ignored. Report forms will be obtainable from G2AOX by sending a stamped self-addressed envelope. All completed report forms should be sent to G2AOX at the address given on page 117 where they will be tabulated and then sent to Melbourne University.

Full details of the orbit figures will be announced on the Sunday RSGB News Bulletin as soon as possible after the launch with predictions to cover seven days orbit. Orbit details will also be discussed on the SSC net on 3,780 kHz.

The three graphs for resolving the telemetric details are calculated on the following formulae:

Channel 1. $I \text{ (in mA)} = \left(\frac{\text{Freq. (in Hz)}}{9}\right) - 63$

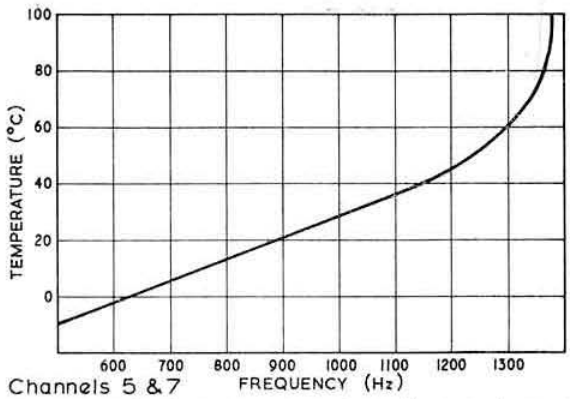
Linear up to 1400 Hz

Channel 3. $V \text{ (in Volts)} = 26{\cdot}4 - \left(\frac{\text{Freq.}}{84}\right)$

Linear up to 1300 Hz

Channel 5. & 7. $\text{Temp. (in °C)} = (0{\cdot}078 \times \text{Freq.}) - 50$

Linear up to 1200 Hz



The relationship between case or internal temperature and audio frequency.

A tape recording of the actual telemetric signals that will be emitted by the satellite has been received from Melbourne University. The complete cycle is about 52 seconds and the tape runs for some 12 minutes, sufficient for those who have the necessary frequency measuring equipment and an oscilloscope to carry out preliminary tests and familiarize themselves with the procedure before launch date. Copies of the tape recording are available and requests to G2AOX should be accompanied by a postal order for 4s. According to the demand there may be some delay in the despatch of the tapes but all requests will be dealt with in rotation.

Eddystone Essay Competition

The presentation of an Eddystone EA12 communications receiver was made to the Eddystone Competition winner, Mr B. G. Taylor, aged 25, who is engaged on Ph.D. research on Information Theory sponsored by Ferranti at the University of Edinburgh. This took place on 27 November at the company's works in Birmingham, at which several representatives of the technical press were present. The Society was represented by Mr A. E. Dowdeswell, G4AR, General Manager.

A radio enthusiast from an early age, Mr Taylor is a member of the Radio Society of Great Britain and was licensed as GM3NZI in 1960. Bruce has contributed to microwave and ionospheric research programmes and graduated B.Sc. with First Class honours in Electrical Engineering. He has also participated in the OSCAR series of amateur communication satellite experiments.

What could otherwise have been a routine affair turned out in the event to be of singular interest. Professor Roger Jennison, Director of the Electronics Laboratory at the University of Kent, who made the presentation, was himself the winner of an Eddystone 640 receiver in a similar competition some 20 years ago. In spite of severe pressure on his pocket in his early days he had resisted all temptations to dispose of the 640 and, to prove his story, produced a photograph of the set taken the previous day!

The Managing Director of Eddystone Radio Ltd., Mr A. C. Edwards, G6XJ, organised an excellent buffet lunch for all the visitors and followed this by a most interesting conducted tour of the works.

Bruce Taylor receiving the EA12 from Prof. R. Jennison.
(Photo by courtesy of Eddystone Radio Ltd.)

THE ANNUAL PRESENTATION OF TROPHIES AT THE SOCIETY'S AGM

Held on Friday, 8 December, 1967, at the Royal Society of Arts, London. Following the business meeting, Mr A. D. Patterson, GI3KYP, President 1967, made the presentations, some of which are shown below.

The trophy winners, and in some cases their "deputies", lined up after the presentation.

Two quite new members of the Society's staff, Mr A. E. Dowdeswell, G4AR, General Manager (right) and Mr C. P. Pope, Secretary (left), with the trophies.

Sven Weber, G8ACC, receiving the Courtenay Price Trophy in recognition of the merit of his article "Overlay Transistors" published in the June 1967 *RSGB Bulletin*

C. Penna, G3POI, accepting the Surrey Trophy on behalf of the GB2GC Expedition Group, winners of V.H.F. NFD.

The Bevan Swift Memorial Prize being presented to G. F. Gearing, G3JJG, for his articles describing the G3JJG s.s.b. exciter.

The Raynet Trophy was awarded to the Cornish RAEN Group and is seen being handed to F. E. Bowden, G2AYQ.

H. E. Perkins, G3NMH, received the Whitworth Trophy as winner of the Telephony Section of the 21/28 MHz Contest.

(Photos by G3NMR)

For his article entitled "A Multi-Band Parametric Amplifier," published in the *RSGB Bulletin*, A. J. Hodgkinson, G3LLJ, receives the Wortley Talbot Trophy.

The ROTAB Trophy was received by H. P. Wiggins, G2CP, for outstanding and consistent DX work.

Radio Amateur Emergency Network

ADDRESSES:

Honorary Registrations Secretary:
Mr R. A. Ledgerton, G2ABC
1 Latchingdon Gardens,
Woodford Bridge, Essex.

Honorary Secretary, RAEN Committee:
Mr E. R. L. Bassett, BRS16075
57 Upper St. Helens Road,
Hedge End, Southampton, SO3 4LG.

By S. W. LAW, G3PAZ *

AT the turn of the year it is a pleasant custom to indulge in a little visiting to renew old acquaintances. We had a few visits in our neck of the woods very early in January, and none more welcome than that of G3IKL (Bob) AC for the Rugby area of Warwickshire. Bob turned up in South London /M and was joyfully pounced upon by the Surrey Group despite his 70·375 MHz signal as against the Surrey frequency of 70·365 MHz. Obviously one of the hidden advantages of utilizing wide-band ex-commercial equipment for RAEN on v.h.f. Needless to say, G3IKL/M was speedily " talked-in " to G3VK (CC for Surrey) and spent a most enjoyable and profitable evening comparing notes. In this connection it occurs to us that it might well be a useful exercise to publish a list of the normal " stand-by " frequencies of various Groups in order that a RAEN mobile visiting another county could be reasonably sure of exchanging compliments with other members. It goes without saying that such a list would also be of the greatest use should the need arise for inter-county calling, either for the dissemination of ideas or for a county-border emergency. If Controllers would care to send in information of their Group " stand-by " frequencies in whatever band is normally used in their area, we will see if we can find room for a list of the nature suggested.

Many a Slip

The season for snow and ice is not yet gone, and it is as well to bear in mind the commonsense routines for car driving in such conditions. Those who are fortunate enough to have a car which is still fitted with a starting handle will know that by its use a car can be " wound out " of places that would completely immobilize a modern " automatic ". If you do have to go out in snow, however, it is as well to remember to put a few old sacks (or that old overcoat which " she " has been trying to throw away for so long!) in the boot, together with an old spade or shovel to dig for grit. Few people carry wheel-chains these days, but an old piece of rope lashed round the tyres will get you out of a lot of trouble. *Don't* try to roar your way out of a jam in low gear —it doesn't work! Use the highest gear that your engine will stand for (they don't make those long-stroke engines any more!).

RAEN Committee

The last meeting of the RAEN Committee was rather overshadowed by the resignation of " Geoff " Allcock G3ION, from the ranks. As a long-standing member of the Committee and an ex-Chairman to boot, Geoff has done sterling service for RAEN, and his excellent work with the Southampton Group has been both an inspiration and a spur to us in years gone by. Now pressures of work and certain other matters have caused Geoff to regretfully step down, leaving a gap which will be difficult to fill.

Ideas Have Legs

Those who have been following with interest the concept of an overall Emergency Service, to correlate all expertise in this sphere under one controlling body, will be interested to hear of the Convention to be held in Geneva this year on the subject of Civil Disaster. We must admit to a slight feeling of disappointment at the apparent lack of emphasis on communications in the literature which has so far come our way—but after all, we are prejudiced! One thing we *have* noted—those who attend will need to have pretty strong stomachs, as some of the demonstrations are *very* realistic. An interesting point arises here—what constitutes a " disaster "? If an earthquake or a cloudburst should occur in the middle of a vast uninhabited area—who cares? Provided that no danger to life or limb or animal is present, the occurrence merely constitutes a fearsome demonstration of the unleashing of the forces of Nature; but the same happening in a densely populated urban district can be a disaster of the first magnitude. Put thus, the matter may appear painfully obvious, but it is surprising the amount of muddled thinking that comes our way at times about the job that we try to do to the best of our ability within the framework of the licensing regulations. It is good to know that we are not alone in our awareness of some of the problems involved.

It Happens Anywhere

We have often mentioned floods in various parts of the world, but a recent occurrence was so amazing that we might well consider it worthy of some thought in our own assessment of possible local hazards. Last month two goods trains loaded with petrol, oil and ammonia collided in a village in America. A nearby fertilizer plant erupted in flames and the whole village became a blazing inferno. Could it happen in your town?

* 11 Chisholm Road, Croydon, Surrey, CR0 6UQ.

IARU

Region 1 calling

INTERNATIONAL AMATEUR RADIO UNION

Reciprocal Licensing

The GPO has announced the signing of a reciprocal licensing agreement with **Denmark.** Correspondence concerning permission to operate in Denmark should be addressed to the General Directorate of Posts and Telegraphs, Trietgensgate 37, Copenhagen 5.

At the time of writing the fee payable for a Danish Licence is not known but a figure of 20 kroner (1 kroner = 1s. 1d.) has been mentioned.

Holders of Danish amateur licences categories A and B may obtain a reciprocal licence in the United Kingdom, but not holders of Danish C licences.

A reciprocal agreement with **Sweden** has also been announced and details will follow as soon as they are available.

Maritime World Administrative Conference

This Conference which was convened by the ITU, and of which Mr R. M. Billington, Head of the United Kingdom Delegation, was elected Chairman, ended on 3 November. Amongst the main decisions of the Conference was the following:

"The gradual introduction up to 1 January 1978 of single sideband radio telephone technique in the high frequency bands between 4000 and 23,000 kHz allocated to the maritime mobile service. The Conference also recommended that a world administrative radio conference should be convened in 1973 to establish a new frequency allotment plan for sharing out the new single sideband channels to the coast stations."

This is the first recommendation that has been made for the holding of a World Administrative Conference but the recommendation is not automatically accepted by the ITU. However, the amateur service should note the situation and preparations should be made to meet the possibility of a Conference in 1973.

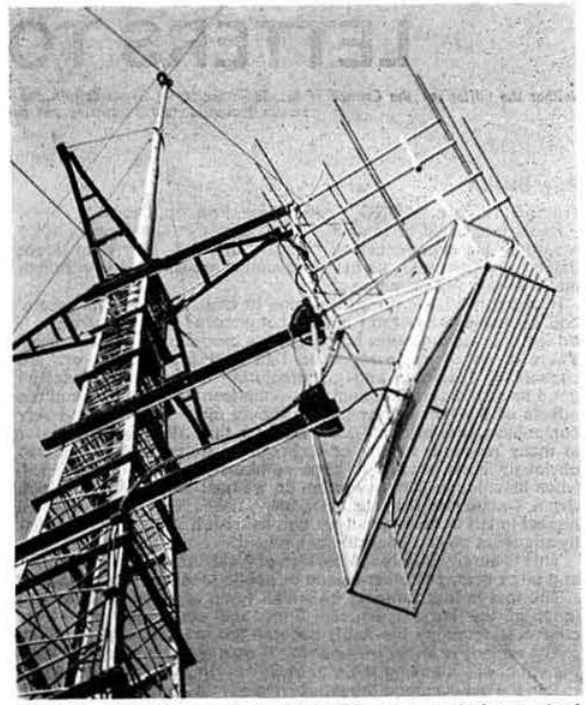
Region 1 Bulletin

In accordance with a recommendation accepted by the 1966 IARU Conference at Opatija, copies of the *Region 1 Bulletin*, which is published quarterly, may be obtained by subscription. The yearly fee has been fixed at six Swiss francs, the equivalent of which is now 11s. 6d. sterling. Subscriptions should be sent to the Secretary of Region 1, G6CL.

Beacon Stations

During the recent openings on 2m a station signing OZ7IGY was heard on a number of occasions. The normal frequency of this station is 145·975 MHz and the location is near Copenhagen.

The Radio Society of Rhodesia have initiated the construction and erection of a beacon station, **ZE1JZA**, at a site 50 miles NW of Salisbury which is 5600 ft. above sea level. The purpose of this station is to provide transmissions for a propagation survey and also to provide constructors with a signal source for setting up equipment. Details of the beacon operation are as follows:



The 144 and 432 MHz aerials of ZE1JZA are mounted on a steel tower 65 ft. high. The skeleton slots are fed in phase and stacked approximately one wavelength apart.

Frequencies:	144·016 MHz 432·048 MHz
Modulation:	f.s.k. 300 Hz on 144 MHz 900 Hz on 432 MHz
Power Input:	100 watts on both frequencies
Power Output:	70 watts on 144 MHz 55 watts on 432 MHz
Aerials:	For 144 MHz Double skeleton slot. Gain 15dB above reference dipole For 432 MHz Reflex—single unit. Gain 15dB above reference dipole.
Keying sequence:	This comprises a carrier break for 18 seconds, an unmodulated carrier for 54 seconds, five call-signs every 18 seconds and an unmodulated carrier for 270 seconds. The entire sequence takes 432 seconds to complete.

It is unlikely that this beacon will be heard in Europe, except through a satellite repeater but reception could be possible under unusual conditions. Any reports of reception of ZE1JZA should be sent to—The Secretary, Radio Society of Rhodesia, PO Box 2377, Salisbury, Rhodesia.

(continued on page 123

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.

Buy British

From: G. N. Fare G3OGQ, Penwortham, Preston, Lancs.

I was interested to read the letter from G3SEL (January 1968) regarding his experiences of " buying British." I have no doubt that many other members have had similar experiences with British manufacturers in the same way.

However, whilst in no way wishing to excuse the manufacturers' bad business sense (and indeed common or garden manners) I do feel that we amateurs have possibly brought this on ourselves. There is no doubt in my mind that British manufacturers are capable of designing and manufacturing equipment at least as good as any imported equipment—American or Japanese, and the effects of the recent devaluation should make our products very competitive. For example, Collins apart, the KW2000A is superior in many respects to any other imported transceiver and it has obviously been bought in large numbers by UK amateurs. But, when listening to 80m how often do we hear imported equipment, Swan, Drake, Heathkit, etc., etc., being used. The Amateur Radio market in UK is quite small enough without it being made smaller by amateurs buying imported equipment.

This is surely reflected in the lack of " Customer Service Depts " and other such customer liaison or public relations departments.

The fact is that turnover in British firms is much smaller than most of the large American firms and such appendages as customer relations inevitably become too expensive to maintain.

The remedy is in our own hands. If we buy British, this will have the effect of increasing the size of British firms, encourage others to join the bandwaggon or restart Amateur Radio production which they have dropped (remember Labgear, Tiger etc?) and eventually by sheer weight of competition give us the gear we want at a price we can afford with decent spares and advice services.

Apart from that, think of the effect on our balance of payments position.

Needless to say, except as a customer, I have no connection with any radio manufacturer.

From: J. J. Maling, G5JL, Hayes, Middlesex.

Mr Powell's experience when he sought help with his faulty equipment suggested that foreign firms might be more efficient than British. I don't think that nationality has anything to do with it; some firms are well organized, others not.

I wrote to a well-known firm for advice recently. A reply, by return of post, asked me to send in the faulty component. I did so, and it was returned, repaired, within two days. A total time of six days elapsed between the date of my original letter and my receipt of the repaired item. The firm, Cosmocord Ltd., made no charge, but even if they had done so, I should have been happy to pay it.

Another firm, also British, engaged me in a game of electronic tennis, with a power unit being sent back and forth at 6s. 6d. a time; plus about three letters and four phone calls. Eventually I solved this problem by going to visit them, when I got immediate satisfaction.

I got the impression that they had a good service department but poor liaison with their office!

From: R. G. Shears, G8KW, Managing Director, KW Electronics Ltd., Dartford, Kent.

The publication of Mr F. Powell's letter in your January 1968 edition of *Radio Communication* could not have come at a more inappropriate time with the considerable publicity being given to the " Back Britain Campaign." Whilst not excusing the British manufacturer concerned, it would, in my opinion, have been more correct for the RSGB to investigate the member's grievance. My experience of dealing with American companies is that in correspondence they can be less efficient than most British companies and I have adopted a practise (and I know this has been done by others in various industries) of sending TWO letters when I wish to ask TWO questions, otherwise by asking two questions in one letter, invariably only one is answered.

The Amateur Radio market in this country is very limited from the manufacturing viewpoint and the results of this can be judged from the number of manufacturers who have " fallen by the wayside " recently and in the past ten years. I only wish we had a home market potential of over 300,000 radio amateurs like in USA—I could then afford to include a " Customer Relations Department " in my organization. Nevertheless, my company has equipment now, in over 60 countries throughout the world including USA and Canada but the competition is tough and getting tougher. During the past year we have improved our production efficiency by 23 per cent and in spite of rising cost, must maintain our present price level and strive to make our exports even more competitive. This situation can be considerably enhanced by increasing our home market sales—the greater our turnover, the cheaper we can manufacture equipment. We certainly have the facilities for increasing our output.

The " customer relations " given by my company and advice given freely (even given on TVI problems with Japanese and USA equipment which we have not supplied) is a service second to none. Members who intend buying new equipment and wishing to " Back Britain " would do well to remember to BUY BRITISH and then give it all possible publicity abroad—the pleasure British equipment can give your members can also bring this country more export business.

Operating from Royal Ground

From: Lt. Col. W. D. Horniman, G2WH

I have read with interest your article on page 50 of the current " Bull," and the remark that GB2CC was the first Amateur station operated from Royal property. With respect, I beg to differ.

In 1925 my late father, having retired from the Royal Navy, was given a " grace and favour " residence in Windsor Great Park. As I was then unmarried, it was also my home.

In 1926, while serving in Royal Signals in Aldershot, I was issued with an Amateur Licence and allotted the call sign G5WH. Normally I operated from Aldershot, but the GPO allowed me to operate from both QRAs. See the enclosed QSL card of the time.

I had to give up the licence in 1928 when I was posted overseas, but when I returned in 1932 I was issued with the call G6UR at the same address (Virginia Water) but did no operating there. I only held that call for a couple of years. I do not know what address was in the call books of that period as I have none between 1924 and about 1953, after I became G2WH.

I think therefore that I am justified in claiming that I was the first holder of an Amateur licence on Royal property.

PS. I suppose the fare to USA didn't come out of " Petty Cash " —or did you swim the Atlantic! May I add my congratulations on your publicity work.

PPS. The King was very interested, especially in my aerial from home to a tall fir tree with a counterweight to allow for wind.

From The Public Relations Officer, Mrs Sylvia Margolis.

Well, it was worth a try! All I can claim now is that GB2CC was the first ever s.s.b. station on Royal property! I hope your letter will be published in " Radio Communication," to correct my error. It happens that the Sandringham story will appear in a couple of months as one of my series in CQ Magazine. *I shall try to add a bit about you if there is time. If not, you might like to write to the Editor. I'm sure he'll be glad to publish a letter from a G-reader.*

As to my fare to the USA—didn't you guess, as most people have done, that I travelled by broomstick*? But you can be sure that, whoever paid my fare, the RSGB did not!*

Our New Look

From: I. R. Cutler, BRS 27983, Shirley, Solihull, Warks.

May I congratulate you on your new presentation and format with the Radio Communication.

This and the new title for the " bulletin " represents a modern outlook, which is in keeping with the advanced state of the technology.

Babs v. RAEN?

From: E. M.Wagner, G3BID, London, NW3.

Although not a member of the Radio Amateur Emergency Network, I read the article on page 55 of the January issue and was particularly interested in the paragraph on the *Torrey Canyon*. I note that G2AYQ received an official letter of thanks for the willing assistance which was forthcoming *at a moment's notice*.

This was, of course, before the Breathalyser became law. To-day the story might well be different. I observe this law fairly strictly.

So long as some driving is expected *in my normal activity*, I refrain from drinking or drink only very little. Once the day's driving is over, either because I have returned home, or because I am using public transport, then the drinking begins in earnest, the Volnay and the Pommard flows. In these circumstances, I would be quite unwilling to undertake any operation involving driving *at a moment's notice*. I understand it takes about 4 to 6 hours for the alcohol in the blood to return to normal—perhaps longer.

It would seem that members of the Radio Amateurs Emergency Network have four courses open to them.

(a) To take the pledge and become strictly teetotal (which doubtless many will do. It might even be made a condition of membership).
(b) To inform the CC that they can no longer be relied upon for any service at a moment's notice.
(c) To arrange a rota system whereby certain members avoid all drinking on certain days.
(d) Obtain official exemption from Breathalyser test for Members of the Radio Amateur Emergency Network (which could well boost recruiting).

In any case it is clear that the organization must give the new situation most careful consideration.

In reply to G3BID:

One must obviously sympathize with the views of an Ernest Bacchant, a disciple of Dionysus. It requires little imagination to envisage Mr Wagner retiring from his board like a good Trencherman replete with the Volnay or Pommard from his no doubt excellent cellars.

Seriously though, whilst at least one of his four alternatives may seem to have attractive possibilities, I feel that the members of the Radio Amateur Emergency Network are in no more difficulty than the member of any other "Emergency or duty service."

The Police, Fire Brigade, Ambulance—my own duty engineering staff are all liable to call out. These gentlemen all managed to live and work within the pre-Breathalyser laws and I am sure that good sense prevailing, they will manage to live and perform their duty within the present drinking laws without signing the pledge, or reducing the efficiency of their service.

Of course Mr Wagner you have a point, no organization would wish its members to risk their licence—driving, radio or what have you. Pardon me whilst I open the Gevrey Chambertin.

P. Balestrini, G3BPT.
(Chairman, RAEN Committee)

Panda Cubs

From W. E. Nutton, G6NU, Gillingham, Kent.

As most owners of Panda Cubs find out, these devices produce a T7 or T8 note on c.w. on 20m and above. I could not find a cure, but as the note on low power was T9, I thought I would use the Cub as a driver to a separate p.a. I built a push-pull p.a. for 50 watts and used the Cub as stated. Every report is now T9 and as I use a separate modulator with its own power supply, I get good modulation. The Panda Cub mod can be used and gives good results, but, of course, the mod in the Panda is more or less grid mod to the new p.a. Now when I get a S8 or S7 report on c.w. I can also get S8 or S7 on phone.

I hope that this is of some help to someone.

Antique Wireless Gear

From: D. Byrne, G3KPO, Jersey House, Eye, Peterborough.

The Peterborough and District Amateur Radio Society, of which I am Honorary Secretary, will exhibit a stand of ancient wireless equipment at their Mobile Rally on August Bank Holiday, and later form a Radio Museum.

If any reader has a very old set, or radio books and periodicals dating back to the 1920s, would he be so very kind as to send a card to the above address?

IARU Region 1 Calling **(Continued from page 121)**

News Bulletin

At 17.00 on each Wednesday the Club Station of the VFDB at Darmstadt transmit a news bulletin on RTTY under the call **DL0DA.** This transmission is on a frequency of 3585 kHz, the speed being 45 bauds and an 850 Hz shift.

Zaragoza Convention

The Spanish National Society, URE, have given advance notice of an International Amateur Convention to be held in Zaragoza between 22 and 26 May. Applications for detailed information should be addressed to Delegaction URE, Apartado 86, Zaragoza, Spain. Enrolments will be accepted up to the 15 April.

Operation in Italy

Whilst there is yet no reciprocal licensing agreement with Italy it is understood that permission for overseas amateurs to operate an existing Italian Station may now be obtained. This facility has been obtained by Anacleto Realini, I1RCD, and the documents required are as follows:

1. A photocopy of own National licence,
2. Copy of Birth Certificate,
3. Two passport type photos, one of which is authenticated
4. Application fee of 30s.,
5. A self-addressed envelope with IRC,
6. Address to where licence should be sent.

This material should be sent at least one month before the date on which operation is desired to commence of I1RCD, via Rimini 13, Milan.

Incentive Licensing in the USA

The FCC have recently approved new regulations which reserve certain sections of the 3·5, 7, 14, 21 and 28 MHz bands for operators who have passed the Advanced and Extra Class examinations. The first of these alterations will come into effect on 22 November 1968. This is a purely domestic US affair but no doubt the altered distribution of activity will be noted overseas.

International Amateur Radio Club

At a meeting on 15 January in Geneva Jack Herbstreit, HB9AJI/W0IIN was elected President of the IARC succeeding Dr. M. Joachim, OK1WI. Mr. Herbstreit is the Director of CCIR and his experience and knowledge will be of great value to the amateur service in the hub of the telecommunications world. G2BVN

News from Headquarters

Wireless Telegraphy Act 1967

Order under Section 7

The text of a memorandum issued by the GPO is as follows:

" In agreement with the Board of Trade the Postmaster General has made an Order under Section 7 of the Wireless Telegraphy Act 1967 ' specifying ' certain radio apparatus for the purposes of that Section. The Order is due to come into force on 1 April, 1968.

It means that the authority of the Postmaster General will be required by anyone who wants to manufacture or import radiotelephonic transmitters capable of transmitting on any frequency between 26·1 and 29·7 MHz or between 88 and 108 MHz.

For some time past the public have been offered small imported transmitters—e.g. the 27 MHz walkie-talkies—which operate on the wrong frequencies for this country. The Post Office has warned that use of these sets cannot be licensed here because they are liable to interfere with authorized services and has prosecuted a number of people for using them without a licence. The purpose of the Order is to deal with the matter at source and protect the public from being offered sets which they cannot legally use.

This does not mean that there will be a complete ban on manufacture or import of all types of apparatus using the frequencies in question. Exemptions will be made for those which can legally be used. Applications and enquiries should be addressed to the GPO Radio & Broadcasting Department, Radio Branch, Armour House, St. Martin's-le-Grand, London, EC1. Some of the frequencies covered by the Order are used by licensed radio amateurs and they will be authorized to build their own apparatus for use within the terms of their licence. This will be done by a general authority published in the London, Edinburgh and Belfast Gazettes.

The Order effects only two frequency bands and does not disturb the present arrangements for other frequencies. For example the Post Office has approved some walkie-talkies (which meet its technical conditions and use the correct frequency bands for this country) and will continue to license their use. It is important to remember that any use of radio in this country requires a licence from the Postmaster General."

* * *

In accordance with the fourth paragraph of the GPO announcement an authority will be published which will exempt licensed radio amateurs from the restrictions to be imposed by the Order. Amateurs will therefore continue to be able to construct or purchase transmitting and receiving equipment for use in the band 28·0 to 29·7 MHz and the Order will assist in preventing encroachment on these frequencies by " citizens band " type operation.

The Society has been consulted by the GPO Radio Branch regarding the terms and effect of the Order and there will be continued liaison in connection with the method of exempting equipment designed for amateur use.

Headquarters Building Fund

I am taking this opportunity to say " thank you " to all who have contributed so generously to the Headquarters Building Fund and who have purchased Debentures in response to my letter. The fact that £1 from each member would provide adequate funds for our needs seems to have put the matter in perspective for most of you.

Please make every effort to maintain the present contribution rate and the future of our Society is assured.

A. D. Patterson,
Immediate Past President

Stuart F. Meyer, W2GHK

At the annual meeting of the US organization of Aerotron Inc. W2GHK was elected a Director of the Company. Mr. Meyer has been an active amateur since 1933 and is the Founder-Director of *DXpedition of the Month* a programme well known to DX'ers. Aerotron Inc. is a leading producer of a large number of communication products including sideband equipment.

Subscriptions rates for CQ Magazine

Effective *1 March, 1968* the subscription rates for *CQ Magazine* will be increased to the following figures: one year, 7$; two years, 13$, and three years 18$. At the present rate of exchange the US dollar is equivalent to 8/4d. Subscription orders can be placed with Headquarters and before 1 March the existing rate of 6$ for one year's subscription will continue to apply.

Subscriptions to *73 Magazine*

A number of members who have placed orders through the Society for *73 Magazine* have advised Headquarters of the non-arrival of recent issues. These complaints have been referred to the publisher of *73* who has stated that a new system of handling subscriptions has recently been introduced. This has suffered from initial troubles but it is hoped that all overseas subscribers will in future have no reason to complain of non-delivery. Members will appreciate that the Society has no control over delivery of US magazines as they are posted from the USA direct to the subscriber.

Amateur Radio Licences

The following are the total number of Amateur Radio Transmitting Licences in force on 31 December 1967.

Amateur (Sound) Licence " A "	12,627
Amateur (Sound) Licence " B "	700
Amateur (Sound Mobile) " A "	2,407
Amateur (Sound Mobile) " B "	22
Amateur (Television) Licence	177

There were also 12,658 Model Radio Control Licences in force.

THE HARROW CHALLENGE

We, the Radio Society of Harrow, hereby challenge you to a fund raising competition in aid of the Headquarters Fund. The contest shall run until 31 December, 1968 and results will be measured in terms of *Free Donations* to the fund per paid up club member (not only RSGB Members). A table of results will be published each month in *Radio Communication* together with appropriate publicity. The object of this challenge is to give more widespread publicity to the campaign and to stimulate a sustained effort at fund raising throughout the year.

Tape/Slide Lecture

A recent addition to the Tape/Slide Library is a newly produced lecture by C. Newton, G2FKZ, entitled *Radio Aurora*. This extremely popular presentation may be obtained on loan by Club Secretaries from the Tape/Slide Curator, Mr. G. S. Milne, G3UMI, 23 Linacre Road, Eccleshall, Stafford.

QSL Bureau

All QSL cards for Aden are being held at present at the RSGB Bureau. Holders of VS9 calls, who have returned to the UK, are requested to send envelopes to G2MI, Bromley, Kent.

Special Event Station

During the period 23 February to 1 March 1968, the Electronics Society (G3VJU) of the University of Salford is putting on the air GB3RAG in connection with the Annual Manchester and Salford Students Shrove Rag. Rag day is Tuesday, 27 February. It is hoped to operate on all bands 160m to 70cm, a.m., c.w. and s.s.b. All QSLs and requests for skeds should be addressed via G3VJU.

Corrections to the 1968 Amateur Radio Call Book

The following are corrections to the 1968 Edition of the RSGB *Amateur Radio Call Book*.

EI5BG, F. Fletcher, " Carragoona," Bray Road, Foxrock, Co. Dublin.

G2FLK, T. L. Delvin, 165 Central Park Road, London, E6. Mr Delvin is also erroneously credited with the call-sign G2FIK.

G3CCX, Peter Craw—via RSGB QSL Bureau (station located in West Sussex).

G3NDO, P. Sorab, c/o The President, United Bank Ltd., McLeod Road, Karachi, West Pakistan.

G3NXM, W. G. Borland, 10 Ashfield Drive, Baildon, Shipley, Yorks.

G3PQE, John Thorn, Jessamine House, Chapel Allerton, Axbridge, Somerset.

GM3OFT, P. G. Bower, Pentegrew, 22 Blackwood Road, Milngavie, Dunbartonshire.

GW3PUR, Robert J. Tarr, 43 Castle Park, Ruthin, Denbighshire, N. Wales.

Silent Keys

We record with sorrow the passing of the following:

Andre Leroy, F8MW, of Vire, France.

Jim Roe, G2VV, of Sunbury-on-Thames, Middx.

W. Child, G3RFV, of Hebden Bridge, Yorks.

A. Auld, GM3SLW, of Halkirk, Caithness.

A. N. Wales, G3SVM, of High Wycombe, Bucks.

T. S. Barclay, ZS1LC, of Rondebosch, C.P., South Africa.

S. E. Knowles, 9Y4TI, of Port-of-Spain, Trinidad.

R. W. T Keating, BRS24630, of March, Cambs.

Obituary

Howard Littley, G2NV

It is with feelings of great sorrow that we have to record the passing of that great old timer Howard Littley, G2NV. To those of us who had known him well for over 40 years he seemed ageless and by those 80m and top band enthusiasts he will be greatly missed.

As recorded in " World at their Finger Tips " Howard was perhaps one of the oldest active amateurs amongst us, but at 75 years of age his interest in all things electrical and in Amateur Radio was insatiable. To those who visited his QTH at Ventnor, whether old friends or new, his hospitality was boundless, and a visit to his shack was something not to be missed and there must exist very few like it.

Howard for many years was Chairman and Managing Director of the family business of Iron Founders in West Bromwich and it was from there in 1909 under the call sign LSX that some of his early experiments were carried out. He was a skilled Electrician and Engineer and his workshop at Ventnor was the model of efficiency, a precision lathe, shaping machine, drilling machines were all in their correct place and always kept clean and tidy after use. His set building both electrically and mechanically was an example to many.

On the air he was always a gentleman, no " breaker " was left unanswered and invitations to take part in a test were readily accepted and a special welcome was given to all newcomers to Radio.

His two 70 ft. lattice steel towers and aerial arrays at his previous QTH at Stourton in the Midlands were a well known landmark, and when he retired to Ventnor some seven years ago he was soon on the air again, but confining most of his activities to Top Band and 80m although he frequently showed up on 40m and 2m.

He explored almost every branch of Radio, Hi-Fi, Stereo reproduction Tape recording and even electronic organs, in fact a modern electronic organ graces his home.

He was a Past Master of the Sandwell Lodge of Free Masons and a Past Provincial Officer in Staffordshire. He was also the President of the Isle of Wight Radio Society and a Past President of the Stourbridge ARS. At his funeral on Thursday, 4 January, were many floral tributes from amateurs all over the country.

To his widow Eileen, to his sons Donald and Brian and their families we are sure everyone will join in expressing our sincere sympathy.

Supplementary Report of the Council

THE Council has pleasure in submitting a brief supplementary report to that published in the December issue of the RSGB BULLETIN, covering the period since 30 June, 1967.

New Headquarters

Since the completion of the purchase of No. 35 Doughty Street, the Finance and Staff Committee has been responsible for the planning of the accommodation in the new building and making arrangements for re-decoration and internal alterations. The Council hopes that the Headquarters offices can be moved to the new accommodation in the Spring of 1968, but it is considered essential that all the necessary work shall have been completed before the move is made. It is the wish of Council that the new Headquarters shall offer excellent accommodation, both for visiting members and members of the Headquarters staff.

The work in connection with the building has been supervised by an independent Surveyor, Mr P. J. Buckle of Cuthbert, Lake and Company.

The RSGB International Radio, Engineering and Communications Exhibition

The Society's Exhibition was opened this year by Dr J. A. Saxton, Director of the Radio and Space Research Station, and again attracted an excellent attendance. The new venue provided superior facilities for both the Exhibitors and the Members. A feature of this year's Exhibition was the excellent display of equipment constructed by members.

The Council places on record its grateful thanks to the Society's Exhibition Organizer, Mr P. A. Thorogood, G4KD, who was again responsible for the management of the Exhibition. The Council is also most grateful to all Members of the Exhibition Committee under the chairmanship of Mr E. W. Yeomanson, G3IIR.

Regional Meetings

Two successful Regional Meetings have been held since the end of the Society's year. These took place in Region 10 at Cardiff on 16 September and in Region 14 at Culzean Castle on 23/24 September. The Council was pleased to note the cordial atmosphere at these meetings and offers its thanks to the organizers.

IEE Lecture

There was a large attendance at the Lecture on 8 November given by Mr Graham Roe, G3NGS on the subject of Colour Television.

Visits to Affiliated Societies and Clubs

Following a letter sent out by the Membership and Representation Committee requests were received for Members of Council to visit Societies and Clubs and give talks on current Society matters. Council is grateful for the welcome extended to its representatives during visits to widely separated parts of the country.

Aerials and Planning Permission

There has been a steady flow of enquiries to Society Headquarters from Members seeking advice regarding Planning Permission and increase in rating due to the existence of aerials and masts.

Members will be glad to know that in both the rating cases that have so far been concluded the District Valuers concerned have withdrawn their applications for an increased valuation of the properties. The Council wishes to place on record its thanks to Mr A. H. Yallop, G3SVQ, for his invaluable assistance and advice.

Radio Amateurs Examination

The Society again arranged a centre for candidates unable to make local arrangements and 140 persons sat the examination at the RSGB Centre on 5 December, 1967.

Radio Communications Handbook

After the setback to production, caused by the death of John Rouse, work is proceeding on the Fourth Edition and the Society records its grateful thanks to Mr J. Tebbit and Mr D. Wiles for assuming the heavy task of production. It is hoped that the new Edition will be available in the late Spring 1968.

Publications

New editions of the Radio Data Reference Book and the Call Book were available at the RSGB Exhibition, together with a completely new publication " World At Their Fingertips " written by John Clarricoats, G6CL. These volumes have been in considerable demand since their appearance. Work has been commenced on a series of specialized manuals which are scheduled to appear in 1968 and 1969. The Council records its thanks to the Members who have assisted in the production of Society publications.

QSL Bureau Sub-Managers

The last list of sub-managers contained an error in the address of P. R. Cox, G3RYV, who handles cards for the series G3U - - - and G3V - - -. His correct address is Half Timbers, 20 Allenby Road, Maidenhead, Berks.

Tapespondent Sought

R. Mannion, 43 Elgar Road, Sholing, Southampton, Hants, is anxious to get in touch with any other SWLs who are disabled through loss of an arm or arms. He can correspond by writing or by tape (3¾ i.p.s.), and is keen to exchange views on methods of constructing equipment.

Wildlife

Edward M. Noll, W3FQJ, is anxious to establish schedules on 10m with English amateurs interested in the conservation of wildlife. He can be contacted by writing to 3510 Limekiln Pike, Chalfont, Pa. 18914, USA.

Society Affairs

A Brief Report on the December 1967 Meeting of the Council

THE meeting was held on Thursday, 7 December, 1967 and was attended by The President (Mr A. D. Patterson in the Chair), Messrs B. Armstrong, N. Caws, J. Etherington, J. C. Graham, E. G. Ingram, H. E. McNally, L. E. Newnham, J. F. Shepherd, R. F. Stevens, G. M. C. Stone, J. W. Swinnerton, G. Twist, E. W. Yeomanson (Members of the Council), C. P. Pope (Secretary), A. E. Dowdeswell (General Manager), and T. R. Preece (Assistant Editor).

An apology for Absence was submitted on behalf of Mr F. Parker.

Membership and Affiliation

The Council approved the election of 184 members (147 Corporate and 37 Associate) and accepted 17 transfers from Associate to Corporate Membership.

The subscriptions of eight Members were waived on the grounds of blindness or disability.

The application of Mr M. S. Box, G3RZG, for Life Membership was accepted.

Affiliation was granted to the following:

Racal Amateur Radio Club
Trinidad and Tobago Amateur Radio Society
Cheltenham Amateur Radio Society
Southdown Amateur Radio Society

New Headquarters

The Honorary Treasurer reported on the position of the debenture issue. In view of the fact that there was some stock still available it was decided to send a letter to all Members and to follow this with publicity in the Society's Journal. The Council accepted, with thanks, an offer by Mr R. Broadbent, G3AAJ, to prepare the letters for distribution. Mr Stevens reported on the tenders that had so far been received for the renovation work to be carried out at No. 35 Doughty Street.

Radio Communication Handbook

A report on the progress of the new edition was received and it was agreed that a dedication to the late John A. Rouse would appear in the Handbook.

Overseas Members

The Council considered a request from Mr J. Pershouse, 9M2DQ, that a regular feature containing news of overseas members should appear in *Radio Communication*. It was agreed that the General Manager would pursue the matter.

General Purposes Committee CCIR

The Council approved the nomination of Mr R. F. Stevens to serve as the Society's representative on this Committee.

A Guide to Amateur Radio

The Council approved the preparation and printing of a further edition of 5000 copies of this publication.

Faroese Amateur Radio Society

The Council voted a sum of £10 to be sent to the Faroese Society as a donation to their Headquarters Building Fund.

Beacon Station on 29 MHz

Council approved the action necessary to raise the power of the GB3GM beacon station to at least 100 watts input. This is to make this beacon more satisfactory for the Society in a propagation research project initiated by the German Post Office.

Honoraria

The Council approved the payment of honoraria to a number of Members who have held honorary offices and carried out work for the Society during the past year.

Mr J. F. Shepherd, GM3EGW

Mr Shepherd had not sought re-election and was retiring from Council. The President thanked him for his services to the Society during his term of office.

Committee Meetings

Minutes of the following Committee Meetings were accepted as reports: **V.H.F. Committee** (11.10.67) which was mainly concerned with matters relating to the use of the 70cm band. Georef and QRA Locator were discussed and a review of beacon stations was made.

Exhibition Committee (20.10.67), when the results of the 1967 Exhibition were considered and comments from members reviewed. The display of Home Constructed Equipment had been the best for a number of years and the lack of operation of GB3RS on the h.f. bands had not caused adverse comment.

RAEN (21.10.67), which considered publicity and the requests from clubs for speakers to give talks on RAEN. A report on the caravan brought to Woburn Abbey by the Manchester Group was received and there was further discussion on the possible extension of the activities of RAEN.

V.H.F. Contests Committee (31.10.67). The General Rules for 1968 Contests were approved and correspondence from Members considered.

Technical Committee (1.11.67), when progress of the new series of Manuals was reported. Reviews of commercial equipment were considered and consideration was given to the *Radio Communication Handbook* and to articles submitted for publication in *Radio Communication*.

IARU Working Group (7.11.67), which heard reports on the Region 1 Executive Committee meeting and the preparations for the 1969 IARU Conference. Matters concerning space communication and liaison with amateurs in developing countries were discussed.

Mobile Committee (8.11.67), when a review of the past year's work was made and matters for action during 1968 were agreed.

Scientific Studies Committee (20.11.67), which received reports of the various transmitting and receiving stations engaged in Society projects, and considered experiments which might be carried out in connection with a Transarctic expedition. Evaluation of received data and future work were discussed.

* * *

In closing the meeting the President thanked members of Council for their co-operation during the past year. A unanimous vote of thanks was passed for the work that Mr Patterson had carried out during his year of office.

* * *

The council was in session for 4½ hours.

National Field Day, 8-9 June 1968

THE complete rules for NFD 1968 are as follows (RSGB General Rules do *not* apply):

1. Duration. The contest will commence at 17.00 GMT on **Saturday, 8 June** and end at 17.00 GMT on **Sunday, 9 June, 1968.**

2. Eligible Entrants. Any group of members within the British Isles which for the purpose of the contest comprise 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. The use of the GB prefix will not be permitted.

3. Operators. Operators of portable stations competing in the contest must each hold a current British (GPO) Amateur (Sound) Licence A or a valid GPO 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 put 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 MHz; 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 Representative. 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, bands to be allocated between the two stations as detailed above.

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

6. Applications. Each group intending to compete must send in an Application Form (obtainable from RSGB Headquarters) properly completed to the RSGB H.F. Contests Committee, 28 Little Russell Street, London, WC1, not later than **Wednesday, 1 May, 1968.** *Entries not made on the Official Entry Form or posted late will not be accepted.*

The information required on the Official Entry Form includes the following:

Call-signs of stations, the exact location in National Grid Reference of each station, the bands to be used by these stations, the full name and address of the RSGB member responsible for each entry.

A change of site may be permitted in cases of urgency provided that full details of the new site is made known to the H.F. Contests Committee at RSGB Headquarters in time for their inspectors to be advised of such a new site prior to the day of the commencement of the Contest.

Failure to notify such a change may cause the entry to be disallowed.

7. Tents. Stations must be operated from tents.

8. Apparatus. No apparatus may be erected on the site prior to 12.00 GMT on **8 June, 1968.** 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 a total cross section area not greater than 14 s.w.g. with the exception, however, that vertical radiators of any construction may be used.

The use of tubular metal elements as well as metal foil wrapping for aerials is not permitted.

(*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. The total in 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.

The valve or valves energizing the aerial shall have total maximum rated anode dissipation not exceeding 13·5 watts.

Where semiconductor devices are used, the total maximum rated dissipation (at an ambient temperature of 25°C) of the device or devices energizing the aerial shall not exceed 20 watts for the purpose of this rule. Manufacturers' published ratings only will be accepted.

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 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, mobile or portable.

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 points
(*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

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. Names and Call-Signs. 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. *Failure to comply with this rule will result in automatic disqualification.*

20. Entries. The entry from each station shall consist of extracts of the station log on the printed log 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 these purposes will be supplied by Headquarters. Entries must be addressed to the RSGB H.F. Contests Committee, 28-30 Little Russell Street, London, WC1, postmarked not later than **24 June, 1968.** 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. Awards.

(*a*) National Field Day Trophy and Miniature Replica to the group obtaining the highest combined score.
(*b*) Gravesend Trophy to the group obtaining the second highest combined score.
(*c*) The Frank Hoosen Memorial Trophy to the group with the highest score on the 14 MHz band in addition to the miniature replica and certificate awarded under (*f*).
(*d*) The Scottish NFD Trophy to the Scottish group scoring the highest number of points.
(*e*) The Bristol Trophy 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.
(*f*) Miniatures and certificates will be awarded to the groups with the highest score on each frequency band.
(*g*) A certificate to the chief operator of the overseas station whose checking log shows that he contributed the most points to competitors.

22. Station Inspections. All stations are subject to inspection by nominated representatives of the H.F. Contests Committee.

(These representatives will make every endeavour to interfere as little as possible with the stations' operations, and to assist in this, entrants should make it easy for the inspector to see the final stage(s) of the transmitters.)

"This NFD Business"

It is certainly fair to say that no one subject has generated so much controversy in British Amateur Radio Circles as National Field Day. The tremendous enthusiasm for NFD can be readily seen from even a casual examination of most Club broadsheets or Activity reports; the plans (and inquests) go forward with an enthusiasm befitting military operations!

Every year, following NFD (and for that matter, all other Contests), the H.F. Contests Committee considers the comments which come in either with logs or by way of separate letters. With a large Contest such as NFD, it is impracticable to individually acknowledge, or answer, each comment; but we do our best to assess each one against the background of other comments, and experience. NFD 1967 was no exception, and following our analysis of the comments received, it was obvious that a number of questions required answers from a rather larger sample of opinion than was available to us by way of direct comments.

Accordingly the H.F. Contests Committee formulated a circular which was sent to 137 groups who originally *entered* for the event. The questions in the circular were based on the points raised in the comments received.

A total of 94 replies was received, giving a return percentage of 68·6 per cent. The letter accompanying the circular mentioned that, if no reply was received, it would be assumed that the groups concerned were in favour of the existing rules. This move was made in the hope that a positive response would be obtained, the unusually high return percentage seems to indicate that this plan worked!

Question 1 asked:

" Do you wish to retain the present 10 watt power limit for all entrants? "

57 groups (60·6 per cent) said " yes "
37 groups (39·4 per cent) said " no "

If we assume the 43 non-returns imply the " status quo ", then 73 per cent wish to retain the 10 watt limit.

Question 2 asked:

" Notwithstanding your answer to Question 1, would you support, (using the 10 watt limit yourselves) a contest with any form of high power participation? "

50 groups (53·2 per cent) said " yes "
44 groups (46·8 per cent) said " no "

We cannot fairly infer any opinions so far as the " non-returns " are concerned.

Question 3a asked:

"Would you enter a separate high power section of the contest if this was run coincidentally with the main event? "

32 groups (34 per cent) said " yes "
62 groups (66 per cent) said " no "

If we assume the 43 non-returns favour the 10 watt limit, then only 23·4 per cent would enter any High Power section.

Question 3b asked:

" If so, would you favour a power input of:

(i) 50 watts (10 watts on 1·8 MHz)
(ii) Maximum licensed power."

26 of the 32 groups answering " yes " to question 3a said they favoured alternative (ii)

Question 4 asked:

" If higher power operation was permitted under a points handicapping system, would you enter the High Power classification on this basis? "

28 groups (29·8 per cent) said " yes "
66 groups (70·2 per cent) said " no "

Question 5 asked:

" Do you wish to retain the present aerial restrictions? "

55 groups (68·5 per cent) said " yes "
39 groups (41·5 per cent) said " no "

If we assume the 43 non-returns support the " yes " faction then 71·5 per cent wish to retain the present rule.

Question 6 asked:

" Do you wish to retain the rule concerning operation from tents only? "

72 groups (76·6 per cent) said " yes "
22 groups (23·4 per cent) said " no "

If we assume the 43 non-returns support the " yes " faction then 84 per cent wish to retain the present rule.

Question 7 asked:

" Do you wish to retain the present rule concerning time limits for erection of stations? "

76 groups (80·8 per cent) said " yes "
18 groups (19·2 per cent) said " no "

If we assume the 43 non-returns support the " yes " faction then 86·9 per cent wish to retain the present rule.

At this point it might be as well to consider the objects of NFD.

National Field Day is:

(i) A Club or Group contest, intended to provide the means for participation in Group activity for all members.
(ii) A unique low power telegraphy portable contest, intended to enable *any* group to compete, on equal terms, with any other group; leaving the result dependent on station efficiency and operator ability.

National Field Day is *not*, neither is it intended to be:

(i) An emergency exercise in any form.
(ii) A high power multi-operator contest. There are many of these in the contest calendar.

The Solution

Examination of the results will show that, even if the non-returns are completely disregarded, a clear majority exists for the maintenance of the present rules. At the same time, it is apparent that a significant minority would prefer a high power no-restrictions event. After careful consideration the H.F. Contests Committee feels that, with these completely conflicting factions, only one satisfactory solution is possible. For the 1968 event, the NFD rules will be the same as for 1967; but we propose to organize a separate High Power Field Day, probably during July 1968. Further details will be published in an early edition of the *Radio Communication*, but it is anticipated that the new contest will be experimental in nature; with very few " restrictions". We hope that this event will attract a large entry.

Contest News

RSGB 28 MHz Telephony Contest 12-13 October 1968

The H.F. Contests Committee has considered the advisability of restricting this contest to 28 MHz Telephony only. With the increasing availability of both 21 and 28 MHz for world-wide communication due to the sunspot cycle it is felt that the original purpose of the contest, which was to increase activity on these two bands, is perhaps no longer completely valid.

The 21 MHz band is now heavily used for normal DX traffic and is always well occupied. Therefore, in order to reduce the QRM caused to normal users by a contest it has been decided to restrict this contest to 28 MHz only.

The contest for 1968 will therefore be called the RSGB 28 MHz Telephony Contest and will be held on 12-13 October, 1968. Full rules will be published in an early edition of *Radio Communication*.

Second 70 MHz (Open) Contest

1. Date and Time. 17.00 GMT on 20 April to 17.00 GMT on 21 April.

2. All **Logs** should be sent to the adjudicator at the following address: V.H.F. Contests Committee, 80 Argyle Road, Ealing, London,W13.

In addition the following General Rules will apply: 3a, 4, 5a, 6a, 7a, 8a, 9b, 10a, 11 to 28.

Third 144 MHz (Open) Contest

1. Date and Time. 17.00 GMT on 2 March to 17.00 GMT on 3 March.

2. All **Logs** should be sent to the adjudicator at the following address: V.H.F. Contests Committee, 20 Pembury Road, Bexleyheath, Kent.

In addition the following General Rules will apply: 3a, 4, 5a, 6a, 7a, 8a, 9b, 10a and 11 to 28.

CLUB NEWS

REGULAR FEATURE

Clubroom and Forthcoming Events have been combined in this new feature " Club News " to provide members with a more convenient single source of information about a particular club's activities. We ask club secretaries and/or publicity officers to send all information direct to Regional Representatives, giving full details of future meetings, and any snippets of activities which would be interesting in print. When listing meetings, please be sure to include the date and time, the meeting place, the lecturer's full name and the call-sign to whom prospective members can refer. The last day on which Regional Representatives can accept letters for inclusion is the first of the previous month.

REGION 1

Ainsdale (ARS).—7, 21 February, 6 March, 8 p.m., 77 Clifton Road, Southport.

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

Ashton under Lyne (AUL & DARS).—Fridays, 7.30 p.m., 6 Stamford Street, Stalybridge.

Blackburn (ELARC).—7 March, YMCA, Limbrick, Blackburn.

Blackpool (B & FARS).—Mondays, 8 p.m., Pontins Holiday Camp, Squires Gate. Morse tuition from 7.30 p.m.

Bury (B & RRS).—Club Nets Tuesdays, 8 p.m., Sundays, 11 a.m., 13 February, 8 p.m. (" Budget Stereo " by Mr Ernie Wigzel), George Hotel (Private Room), Market Street, Bury. The AGM was held on 12 December and the resulting " new blood " will it is hoped put " new blood " into the Committee. Although G3VVQ still commands the pen as Hon. Secretary and G3SUI will be once again reminding members that subs are due, G3TFN has now taken over the whip, as Chairman, to keep tight reins on G3ETU, G3IVG, G3RSM, G3SRI and G3TVT, who go to make up the rest of the committee.

Chester (C & DARS).—Tuesdays, 8 p.m., YMCA.

Crewe & District.—4 March, 8 p.m., 80 Albert Street.

Eccles (E & DRC).—Tuesdays, 8 p.m., Patricroft Congregational Schools, Shakespeare Crescent, Patricroft. Every Thursday Club Top Band net 20.30 hours.

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

(NLRC).—16 February, 1 March, 8 p.m., Landsbury House, 13 Crosby Road South, Liverpool 22.

Macclesfield (M & DRS).—13, 27 February, 12 March, 8 p.m., The George Hotel, Jordangate.

Manchester (M & DARS).—Wednesdays, 7.30 p.m., 203 Droylsden Road, Newton Heath, Manchester 10. Representative of the wide variety of lectures the Society manages to present, is the line-up planned for the next couple of months. February will include talks on Computers including a film show given by D. F. Shaw, G3JIB and a talk later in the month on Mountain Rescue. March will see G. Tillson, G3TJX talk on Radar technique, followed in April by L. Toke, G3ETU lecturing on power supplies. On 20 December Bill Mackie talked on f.m. broadcast reception.

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

North West V.H.F. Group.—Monday and Tuesdays 8 p.m., Club Headquarters, Chapeltown Street, Manchester 4.

Preston (PARS).—8, 22 February, 7 March, 7.30 p.m., "Windsor Castle," (Private Room), St. Paul's Square.

St. Helens (SES).—20 February, 5 March, 7.30 p.m., IVS Centre, 55 College Street.

Southport (SRS).—Wednesdays, 8 p.m. and Sundays, 2.30 p.m., The Esplanade.

(73 S.S.B. Society).—Tuesdays, 8 p.m. (All commencing with a talk on part of the RAE Syllabus), 73 Avondale Road North, Southport.

Stockport.—7, 21 February, 6 March, Royal Oak Hotel, Castle Street, Edgeley.

Warrington-Culcheth (CARC).—Fridays, 7.30 p.m., The Harrow Inn, Culcheth.

Westmorland.—16 February, 1 March 7 p.m., The Allen Technical College, Sandes Avenue, Kendal.

Wirral (WARS).—8 p.m., Scout HQ, 76 Park Road South, Birkenhead, Cheshire. February's meetings commence with a Junk Sale on the 7th and a Commercial Equipment demonstration on the 21st. *G3PXX.*

REGION 2

Barnsley (B & DARC).—9 February (Short talks on member's equipment), 23 February (" Top Band S.S.B.," by G6LZ), 7.30 p.m., King George Hotel, Peel Street, Barnsley.

Bradford (BRS).—13 February (Visit to Richard Allen Radio Ltd., Gomersal, Cleckheaton), 20 February (" Fire Prevention " by Bradford Fire Brigade Officer), 5 March (Display of Members' Gear), 7.30 p.m., Bradford Technical College, Great Horton Road, Bradford.

Northern Heights.—14 February (TVI and BCI Prov.), 28 February (Sale of Surplus Equipment conducted by G8CB), 7.45 p.m., Sportsman Inn Ogden, Halifax. In July or early August two club members, M. J. Fisher, G3UBI and R. J. Constantine, G3UGF, are once again paying a visit to Northern Ireland on Top Band signing GB2NI. In the more immediate future on 13 March D. Millard, G3OGV will be lecturing on Going Mobile. *G3MDW.*

Halifax and District ARS, 8 p.m., Sun Inn, Rastrick. On 16 February the Society will be visiting the Control Centre of the Bradford Fire Brigade. This event will be followed on 1 March by a talk by A. Petts entitled Superhet Receivers. *G3WLW.*

Scarborough (SARS).—Thursdays, 7.30 p.m., rear of 3 Trinity Road, Scarborough.

South Shields (SS & DARC).—Fridays, 7.30 p.m., Trinity House Social Centre, Laygate, South Shields.

REGION 3

Birmingham (Bourneville).—Fridays, 8 p.m.

(MARS).—No meeting 17 February-2 March. Operating station at Birmingham Boat Show, Bingley Hall.

Bromsgrove (B & DARC).—Second Friday in the month, 8 p.m., Co-op Hall. 1967 was concluded with a lecture by J. A. Braby, G3GVA, describing his Top Band self-tracking transceiver. One side of radio as yet unexplored by the club is Model Radio Control. A very interesting talk and demonstration by Ray Harris of the Kidderminster Aero Model Club set up serious new line of thought. The shack has been out of bounds for the past few weeks owing to the Foot and Mouth epidemic but it is hoped that restrictions will be lifted shortly. *G3VGG.*

Coventry ARS.—Fridays, 8 p.m., CD HQ Canal House, Drapers Fields, Coventry.

Dudley (DARC).—9 February, 23 February, 8 p.m., Art Gallery, Dudley.

Mid-Warwickshire (MWARS).—12 February (" Electronics in Medicine," by Dr L. G. MacLachlan), 26 February (" V.H.F. Equipment," by Glen Ross), 28 Hamilton Terrace, Leamington Spa.

Salop (SARS).—8 February (MEB, Visit to Control Room), 7.30 p.m., Spring Gardens, Ditherton, 13 February (Club Project), 22 February (Members Colour Slides and G3GDA with a Cine film), Old Post Office, Hotel Street, Shrewsbury.

Stourbridge (STARS).—6 February, 7.45 p.m., The Library, Longlands School.

Sutton Coldfield (SCRS).—Second Monday and fourth Wednesday of the month, 8 February (Eddystone receivers), 8 p.m., Fox Inn, Walmley, Sutton Coldfield. Static, its causes and cures, was discussed during a lecture by G. D. Hubbard on 11 December. The month concluded on the 27th with a Natter Nite. *G8AVH.*

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

Hereford ARS.—First Friday in the month, 7.30 p.m., Mortimer Hall, Mortimer Road. The Society were surprised by a visit at its Decem-

ber meeting from D. J. Miles, G3PRJ who has just returned from a visit to Oklahoma en route the Republic of South Africa where he hopes to operate using a ZS call. Others present included GW3-MPB and members of the Worcester ARC. *G3RJB.*

REGION 4

Burton on Trent (B-o-T ARS).—14 February (Visit to a local Brewery), 13 March (Ladies night—Films etc.), 7.30 p.m., Club Room, Stapenhill Institute, Stapenhill, Burton-on-Trent.

Derby (D & DARS).—7 February (AGM), 14 February (Open Forum—Quiz and any questions), 17 February (Annual Dinner and Dance at Derbyshire Yeoman), 21 February (Activities of Derby Tape Recording Club), 28 February (Visit to GPO Sorting Office, Ascot Drive—Limited to 20), 6 March (Surplus Sale by Auction), 15 March (" My World Journey " by W. A. Roberts, C.Eng., F.I.E.E., M.B.I.M., G2RO—Ladies invited), 7.30 p.m., Room No 4, 119 Green Lane, Derby. There will be some delay in the issue of the current programme, but it is hoped to bring out a duplicated newsheet to keep Members up to date with current events. The group project has had a very slow start but it is hoped that more interest will be shown in the new year. Members interested are asked to contact G. P. Miles, G3TOV or J. Smith, G3SMV. *G2CVV.*

Grimsby (GARS).—8 February (Tape lecture on V.H.F. Propagation), 22 February (Your Films and slides), 7.30 p.m., Model Engineer's Club Rooms, Fletchers Yard, Wellowgate, Grimsby.

Hunstanton.—Bucket and Spade party organized by G3JEC, G3SAW, and G3ANM will be held on 16 June at Brookes Refreshment Rooms Car Park near the pier. The talk in Station will operate on 160m by G3ANM/P from whom further particulars can be obtained.

Heanor (H & DARS).—13 February (Sale of Surplus), 20 February (" The state of the Art", by B. M. Sandall, G3LGK), 27 February (Constructors' Exhibition and competition for The President's Trophy), 5 March (20 per cent off—B. M. Sandall, G3LGK), 7.30 p.m., Club Room, South East Derbys. College of Further Education (Heanor Branch), Ilkeston Road, Heanor.

Leicester (LRS).—Mondays, 7.30 p.m., Sundays, 10.30 a.m., Club Room, Gilroes Estate Cottage, Groby Road, Leicester.

Loughborough (LARC).—Fridays, 7.30 p.m., Club Rooms, Bleach Yard, Wards End, Loughborough.

Mansfield (MARS).—First Friday in the month, 7.45 p.m., New Inn, Westgate, Mansfield. Members are asked to note the AGM coming up on 1 March.

Melton Mowbray (MMARS).—7.30 p.m., St John Ambulance Centre, Asfordby Hill, Melton Mowbray.

Newark (NSWC).—Mondays, Thursdays, 7.30 p.m., Room No 3, Sherwood Community Centre, Woodthorpe House, Mansfield Road, Sherwood, Nottingham.

Peterborough (P & DARS).—Friday, 5 April (Film Show), 7.15 p.m., Peterborough Technical College, Eastfield Road, Peterborough. Further details from G3KPO.

Worksop (NNARS).—Tuesdays (RAE Class), Thursdays (Lecture night), 7.30 p.m., Club Room, 13 Gateford Road, Worksop.

Arthur Milne, G2MI cutting a cake during the 21st Anniversary celebrations of the Cray Valley Radio Society.
(Photo by Kenneth G. Jones)

REGION 5

Bedford (B & DARC).—Headquarters, " The Dolphin Inn," The Broadway, Bedford. Particulars of Meetings from G3VBA.

Bishop's Stortford (BS & DARC).—Details of meetings from Andrew Marriott, G3VWS, 21 Thorley Hill, Bishop's Stortford, Herts.

Cambridge (C & DARC).—Fridays, 9 February (Informal), 16 February (" Beginner's Approach to S.S.B.," Richard Baker, G3USB), 23 February (Informal), 7.30 p.m., Club Headquarters, Corporation Yard, Victoria Road, Cambridge.

Cambridge University (CUWS).—Meetings on Tuesdays at 8.15 p.m., Department of Psychology, Downing Site, Cambridge.

Luton (L & DARC).—Details of meetings from G3VES, 1b Cade's Lane, Farley Hill Estate, Luton, Beds.

March (M & DRAS).—Tuesdays, 7.30 p.m., at Old Police Headquarters, High Street, March, Cambridgeshire.

Royston (R & DARC).—Wednesdays, 8 p.m., Manor House Social Club, Melbourn Street, Royston, Herts.

Shefford (S & DARC).—8 February (" Elementary Transistor Theory," by G3VMI), 15 February (Any Questions), 22 February (" Aerials and A.T.U.'s," by G2DPQ), 29 February (" Working on the 70cm Band," by G8AKT), Thursday Evenings. Morse Classes at 7.45 p.m., Meetings 8 p.m., Church Hall, High Street, Shefford, Beds.

Stevenage (S & DARS).—15 February (Use of Oscilloscopes—Graham Henderson, G3RTJ). Meetings on first and third Thursdays of the month at Hawker-Siddeley Dynamics Ltd., Gunnels Wood Road, Stevenage, Hertfordshire.

REGION 6

Cheltenham RSGB Group.—First Thursday in the month, 8 p.m., Great Western Hotel, Clarence Street, Cheltenham. The January meeting was well attended when G8KG gave his excellent talk entitled Propagation and the Radio Amateur.

Gloucester (GRC).—Second and fourth Thursdays in the month (Morse practice included each evening), 7.30 p.m., Lamb Inn, Market Parade, Gloucester. 8 February (Talk and Demonstration by Daystrom Ltd.). Several interesting lectures in the near future, dates to be announced.

REGION 7

Acton, Brentford and Chiswick (ABCRC).—20 February, 7.30 p.m., Chiswick Trades and Social Club, 66 High Road, Chiswick.

Addiscombe (AARC).—20 February, 7.30 p.m., 158 Addiscombe Road (Toch H Hall).

Ashford (Middlesex) Echelford (ARS).—8, 22 February, 7.30 p.m., St Martin's Court, Kingston Crescent, Ashford.

Bexleyheath (NKRS).—8, 25 February, 7.30 p.m., Church Hall Chapel Hall, Chapel Road, Bexleyheath.

Chingford RSGB Group.—16 February, Royal Forest Hotel, Chingford.

Chingford (SRC).—Fridays except first in month, 8 p.m., Friday Hill House, Simmons Lane, Chingford, E4.

Croydon (SRCC).—20 February, 7.30 p.m., Blue Anchor, South End.

Dorking (D & DARS).—13 February, 8 p.m., Wheatsheaf, 27 February (Film Show—The Radio Sky and Electron Emission), 8 p.m., Star and Garter, Dorking.

Ealing (E & DARS).—Tuesdays, 7.30 p.m., Northfields Community Centre, Northcroft Road, Ealing, W13.

East Ham.—First and third Tuesdays, 7.30 p.m., 12 Leigh High Road, East Ham.

East London.—18 February, " Police Radio Equipment," by Bruce Hackney, G6YF, 2.30 p.m., Wanstead House, The Green, Wanstead, London, E11.

Edgware & Hendon (EADRS).—12 February (Film Show), 26 February (Lecture by G3SJE), 8 p.m., John Keble Hall, Church Close, Deans Lane, Edgware.

Gravesend (GRS).—Third Wednesday, 8 p.m., RAFTA Club, Overcliff Road.

Guildford (G & DRS).—9, 23 February (Talks by G2YL), 8 p.m. Guildford Engineering Society in Stoke Park.

Hampton Court (TVARTS).—First Wednesday, 7.30 p.m., Cardinal Wolsey, Hampton Court.

Harlow (DRS).—Tuesdays, Thursdays, 7.30 p.m., Mark Hall Barn, First Avenue.

Farnborough (F & DRS).—13 February (" Aerial lecture and demonstration using 10cm equipment," by G3OLN), 27 February (Informal), 7.30 p.m., 310 Farnborough Road, Farnborough, Hants. Members can look forward next month to a talk on the RSGB by its President, J. C. Graham, G3TR. This meeting takes place on 12 March, followed on 26 March by a further informal evening. G3NVM.

Harrow (RSH).—Fridays, 8 p.m., Roxeth Manor School, Eastcote Lane. During one of the most successful years since its inception

21 years ago the Radio Society of Harrow report a total membership of 128. The most notable event during 1967 was the 21st Anniversary Supper held in October, which was attended by over 80 members and friends. The highlight of the Supper was a mammoth raffle and the first prize, a Heathkit OS1 Oscilloscope was won by Stan Fryer, G3ERO. *G3JVM.*

Havering (H & DARC).—14, 28 February, Romford.

Holloway (GRS).—Mondays RAE), 7 p.m., Wednesdays (Morse), 7.30 p.m., Fridays (Club), 7.30 p.m., Monten School, Hornsey Road.

Hounslow (HADRS).—19 February, 7.30 p.m., Canteen, Mogden Main Drainage Department, Mogden Works, Isleworth.

Ilford.—Thursdays, 8 p.m., 103 Heath Road, Chadwell Heath.

King's Langley (HH & DARS).—First and third Friday in the month, 8 p.m., Rucklers Lane Hall, King's Langley, Herts. Secretary is now A. Lex Arnold, 13 Little Road, Adeyfield, Hemel Hempstead.

Kingston (K & DARS).—Second Wednesday, 8 p.m., YMCA, Eden Street.

Leyton and Walthamstow.—Tuesdays, 7.30 p.m., Leyton Senior Institute, Essex Road, London, E10.

London U.H.F. Group.—7 March (70cm and TV, R.F. Sections), 8 p.m., White Hall Hotel, Bloomsbury Square, Holborn.

Loughton.—9, 23 February, 7.30 p.m., Loughton Hall (nr. Debden Station).

Maidenhead (N & DARC).—20 February, 7.30 p.m., Victoria Hall, Cox Green, Maidenhead.

New Cross.—Wednesday, Fridays, 8 p.m., 225 New Cross Road, London, SE14.

Norwood and South London (CP & DRS).—17 February (AGM), 8 p.m., CD Centre, Council Depot, Woodyates Road, SE12.

Paddington (P & DARS).—Wednesdays, 7.30 p.m., Beauchamp Lodge, 2a Warwick Crescent, W2.

Purley (P & DRC).—First and third Fridays, 8 p.m., Railwaymen's Hall, Side Entrance, 58 Whytecliffe Road, Purley. During the month of December the club passed another milestone in its history by enrolling its 100th member, all subscriptions paid and up to date. In the relatively short space of 2½ years from June 1965 to date the club has had a net increase in membership of 70.

Reigate (RATS).—7 February, 7.30 p.m., George & Dragon, Cromwell Road, Redhill.

Romford (R & DRS).—Tuesdays, 8.15 p.m., RAFTA House, 18 Carlton Road.

Scouts ARS.—15 February, 7.30 p.m., Baden Powell House, Queensgate, South Kensington, SW7.

Sidcup (CVRS).—15 February (Natter Night), 8 p.m., All Saints Church Hall, Bereta Road, New Eltham. 7 March, Church Hall, Court Road, Eltham.

Cray Valley Radio Society celebrated its 21st year during last December. During the course of the evening G3VLX talk on his first 12 months of being licensed and G3ANK outlined the earlier days of the Society. The highlight of the evening was the cutting by the Society's President, G2MI, a special home baked cake, sporting a replica of his h.f. beam (see photo).

St. Albans (Verulam ARC).—7 February (Informal Meeting), 21 February (TVI by G3HVA from Luton), 7.30 p.m., Watford Road, St. Albans. Verulam Amateur Radio Club found a recent visit by Ray Hills, G3HRH, a great success. Organized as a return lecture following Ray's earlier visit to Verulam, the subject was " Aerials and Feeders." Treated as a question-and-answer session, the 50 or more members and guests present soon gave G3HRH ample material to work on and he was quickly busy describing the capacitive and resistive impedances which appear at each end of a feeder with standing waves. In answer to a question about reflectometers, Ray intrigued his audience with a practical explanation of exactly how these devices operate including that very hard-to-understand business of being sensitive to currents going in one direction but not registering currents going the other way! The meeting was also a chance for members to trot out some of those thorny aerial questions guaranteed to keep most amateurs in heated argument throughout any club meeting. Such as, ". . . should you prune an aerial designed to be used on 80m at 40ft. so as to give you a low s.w.r. when centre-fed with coax, or so as to achieve optimum resonance in the antenna at the required frequency? " The operation of different types of balun was also a subject raised in a series of questions from members of Ray's audience.

G3HRH has promised to make a third visit to Verulam during 1968 and this occasion is eagerly looked forward to.

Slough (SDR Group).—First Wednesday. United Services Club, Wellington Street.

South London Mobile Club.—10, 24 February, 7.30 p.m., Clapham Manor Baths, SW4.

Southgate & District.—8 February, 7.30 p.m., Parkwood Girls' School (behind Wood Green Town Hall), During the AGM held in December last, R Wilkinson, G3TXA of 23 Ashridge Gardens, Palmers Green, London, N13, was elected Secretary.

Sutton & Cheam (SCRS).—20 February, 8 p.m., 9 March (20th Annual Dinner and Dance), Woodstock Hotel, Sutton, Surrey. Tickets 30s. each from G3DCZ. The Harrow Inn, High Street, Cheam.

Westminster (CSRS).—7 February (" SSB Working," by E. P. Essery, G3KFE), 6 p.m., Room 66. 20 February, Informal. 5 March (Amateur Moonbounce Work, by Peter Blair, G3LTF). Civil Service Recreation Centre, Monck Street, Westminster, SW1.

Welwyn (Mid-Herts. ARS).—8 February (Radio Frequency Transformers by Mr L. Baker, of Neosid Ltd.), 8 p.m., Welwyn Civic Centre, Welwyn.

Wimbledon (W & DRS).—9 and 23 February, 7.30 p.m., 124 London Road, Merton, SW19.

Wembley (GECARS).—Thursday, 7 p.m., This club is now open to non-GEC Employees by invitation. Please Telephone ARNold 1252 first. Sports Club, St Augustin Avenue, North Wembley.

REGION 8

Crawley (CARC).—Wednesday, 14 February (Informal Meeting). For details contact G3FRV. Friday, 23 February (Annual Dinner), New Airport Hotel, Crawley. Wednesday, 28 February (Film Show), 8 p.m., Trinity Congregational Church Hall, Ifield, Crawley.

Mid-Sussex (M-SARS).—14, 28 February, 8 p.m., Lindfield Primary School, Nr Haywards Heath.

Worthing (W & DARC).—13 February (" The Amateur Radio Licence, History, Facts and Figures," by G3IWL), 27 February (" Receiver alignment "), 8 p.m., Rose Wilmot Youth Centre, Littlehampton Road.

Canterbury (EKRS).—Details of future meetings available from D. N. T. Williams, G3MDO.

Medway (MARTS).—Details of future meetings available from P. Carey, G3UXH.

Thanet Radio Society.—At its 21st Annual Dinner to be held on 6 April 1968 the G2AIW Trophy will be awarded to the Club member who contacts the most Commonwealth Radio Amateurs during February. The co-operation of Commonwealth readers will be greatly appreciated.

REGION 9

Bristol RSGB Group.—19 February (" U.H.F. Working," by Bill Scarr, G2WS), 7.30 p.m., Becket Hall, St. Thomas Street, Bristol 1. The AGM was held in December, and Ted Halliday, G3JMY was appointed the Chairman for 1968, ably assisted by Ron Vowles, G3PFD as the Secretary again. G3JMY then gave a talk on " Aerials," the Swindle table is in full swing again. *G3PFD.*

Bristol (BARC).—Monday and Thursday, 7.30 p.m., University Settlement, 43 Ducie Road, Barton Hill, Bristol 5. A new Chairman has been installed by the Club, Brian Croker, G3ULJ and the new Secretary is now Pete Furzeman, G3WLZ.

Burnham-on-Sea (B-o-S ARS).—Second Tuesday in the month, 8 p.m., Crown Hotel, Oxford Street, Burnham-on-Sea.

Cornwall (CRAC).—First Thursday in each month, 7.30 p.m., Staff Recreation Hall, SWEB Headquarters, Pool, near Camborne. G3NKE.

Cornwall (V.H.F. Group).—Third Thursday in each month, 7.30 p.m., The Coach and Horses, Pydor Street, Truro. *G3OCB.*

Exeter.—First Tuesday in each month, 7.30 p.m., George and Dragon Inn, Blackboy Road, Exeter.

Plymouth (PRC).—Every Tuesday, 7.30 p.m., Virginia House, Bretonside, Plymouth.

Saltash (S & DARC).—Alternative 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 Walk, Dorchester.

Taunton.—Alternative Thursdays, 7.30 p.m., Lecture Theatre, Taunton Technical College. *G3LCJ.*

Torquay (TARS).—Every Tuesday and Friday from 7.30 p.m., 24 February (" TVI, its causes and cures," by B. E. Symons, G3LKJ), 7.30 p.m., Club Headquarters, Bath Lane, Rear 94 Belgrave Road, Torquay. *G3VNG.*

Wells (WARS).—Mondays, 8 p.m., EMIE (Wells) Sports and Social Club, Chamberlain Street, Wells, Somerset. *G3OTK.*

Wessex Amateur Radio Group.—First Friday in the month and the Monday 17 days later. Cricketers Arms Hotel, Windham Road, Bournemouth. Not much has been heard from this club recently, but it appears much effort has been put into Fox Hunts during the past Summer months. Plans for this year include a Mobile Picnic at Stoney Cross. *G3MKN.*

Weston-super-Mare (W-S-M ARS).—A new venue for Meetings and a Club Station is being arranged; the February meeting will be notified by circular from G3GNS.

Yeovil (YARC).—Wednesdays, 7.30 p.m., Park Lodge, The Park, Yeovil. On 1 December a member of the BBC Engineering staff talked on the Construction and working of aerials. *G3NOF*.
Yeovil Summerleaze Park ARC.—Tuesdays at 4 p.m. and Fridays at 1 p.m. *G3SEL*.

REGION 10
Blackwood (ARC).—Fridays, 7.30 p.m., Lectures and practical programmes. Section devoted to RAE Examination, Blanche Cottage, off High Street, Blackwood, Mon.
Cardiff (RSGB Group).—Monday, 12 February, 7.30 p.m., TA Centre, Park Street, Cardiff.
Pembroke (ARC).—Last Friday of month, 7.30 p.m., Defensible Barracks, Pembroke Dock.
Pontypool (ARC).—Tuesdays, 7 p.m., Educational Settlement, Rockhill Road, Pontypool, Mon.

REGION 11
Bangor (UCNWARS).—8 February (to be arranged), 22 February (" Overlay Transistors," by S. F. Weber, B.Mus., G8ACC), 5.30 p.m., Small Lecture Theatre, Department of Physics, University College of North Wales.
Llandudno (CVARC).—15 February (Talk by Dr J. D. Last, GW3MZY), 7.30 p.m., Parade Hotel, Church Walks, Llandudno.

REGION 13
Edinburgh (LRS).—8 February (Film Show), 22 February (" Amateur Radio in Norway," by R. Koksvik, LA6VH), 7.30 p.m., YMCA, 14 South St. Andrew Street, Edinburgh.

REGION 14
Ayrshire (AARG).—7 February (TVI, GM3OYH), 21 February (Film Show), 7.30 p.m., Peter Boyle Bowling Club, Craigie Road, Ayr.
Auchenharvie (A & DARS).—8, 13, 15, 20, 22, 27, 29 February, 7.30 p.m., Auchenharvie Community Centre, Stevenston.
Glasgow University (GURC).—9 February, 7.30 p.m., Engineering North Building, University of Glasgow.
Lowland Royal Signals (LRSARC).—13, 20, 27 February, 7.30 p.m., 21 Jardine Street, Glasgow.
Greenock (G & DARC).—9 February (" Radio Fault Finding," by N. McAnearnie), 23 February (" NFD," by GM3LYI), 7.30 p.m., Art's Guild, Campbell Street, Greenock.
Mid-Lanark RSGB Group.—16 February, 7.30 p.m., YMCA, Brandon Street, Motherwell.

REGION 15
Belfast and District RSGB Group.—Third Wednesday in the month, 8 p.m., War Memorial Building, Waring Street, Belfast.

REGION 16
Ipswich (IRS).—Last Wednesday of the month, 7.30 p.m., Red Cross HQ, Gippeswyk Avenue, Ipswich.
Norwich (NARC).—Mondays, 19 February (Heard But Not Seen —Tape Recording), 4 March (" Electronic Organs," by D. E. Johnson, G3MPN), 7.30 p.m., Old Lakenham Hall, Lakenham, Norwich.

Bob Holt, ZB1BBZ/GM3VCD being presented a pair of Tartan towels by Alan Murray, GM3DOD on behalf of Greenock and District Amateur Radio Club. Seated is GM3UWX Bob arrived back in New Zealand at the beginning of December operating Maritime Mobile on the way.

REGION 17
Basingstoke (BARC).—Third Saturday in the month, 7 p.m., Immanuel Hall, Wote Street.
Harwell AERE (ARC).—Third Tuesday in the month, 7.30 p.m., Social Club, AERE Harwell.
Maidenhead (MDARC).—First Monday in the month (Formal) Third Tuesday in the month (Informal), 20 February (" Frequency Synthesisers," G3CAZ) 19 March (" Aerials " by G6CJ). 7.30 p.m., Victory Hall, Con Green.
Portsmouth (P & DRS).—Wednesday, 7.30 p.m., Room 5, Twyford Avenue Community Centre, Portsmouth.
Reading (RARC).—13 February (" The Complete G3BNU "), 27 February (" Progress to date "), St Paul's Hall, Whitley Wood, Reading. The meeting on 12 March will be a talk by G8AAG entitled " The use of unusual tools " and promises to be of special interest to those members who are engaged on constructional projects. The second meeting will consist of a general discussion on contests with particular emphasis on the preliminary arrangements for NFD followed by details of the constructional competition to be held later in the year.
Southampton (RSGB Group).—Second Saturday in the month 7 p.m., Engineering Lecture Theatre, Lanchester Building, The University, Southampton.

CONTESTS DIARY

3-4 February	—ARRL DX Contest (Phone)
11 February	—First 70 MHz (Open) Contest
17-18 February	—ARRL DX Contest (C.W.)
17-18 February	—First 1·8 MHz Contest
24-25 February	—(REF & UBA), 3·5-28 MHz, Phone
2-3 March	—ARRL DX Contest (Phone)
2-3 March	—BARTG Spring RTTY Contest
2-3 March	—Third 144 MHz (Open) Contest
9-10 March	—BERU
16-17 March	—ARRL DX Contest (C.W.)
30-31 March	—(REF), 3·5-28 MHz, Phone*
31 March	—Low Power Contest (3·5 MHz)
6-7 April	—(PZK), 3·5-28 MHz, C.W.
20-21 April	—Second 70 MHz (Open) Contest
27-28 April	—(VERON), 1·8-432 MHz
4-5 May	—First 1296/432 MHz (Open) Contest
4-5 May	—(RSF), 3·5-28 MHz, C.W.
19 May	—Fourth 144 MHz (Portable) Contest
1-2 June	—(DARC), 3·5-28 MHz, C.W.
8-9 June	—(UBA), 1·8-28 MHz, C.W.*
8-9 June	—National Field Day
23 June	—Second 432 MHz (Portable) Contest
24 June	—Fifth 144 MHz (S.S.B.) Contest
6-7 July	—Summer Top Band Contest
21 July	—Third 70 MHz (Portable) Contest
3-4 August	—Sixth 144 MHz (Open) Contest
10-11 August	—(DARC), 3·5-28 MHz, C.W.
1 September	—(DARC), 3·5-28 MHz, C.W.*
7-8 September	—(DARC), 3·5-28 MHz, Phone
7-8 September	—V.H.F. National Field Day (provisional date)
15 September	—30m Field Day
21-22 September	—(SSA), 3·5-28 MHz, C.W.
28-29 September	—(SSA), 3·5-28 MHz, Phone
5-6 October	—Third 432 MHz (Open) Contest
12-13 October	—28 MHz Telephone Contest
12-13 October	—Second 1296 MHz (Open) Contest
26-27 October	—7 MHz Phone Contest
7-10 November	—7 MHz C.W. Contest
11 November	—Seventh 144 MHz (S.S.B.) Contest
16-17 November	—Second 1·8 MHz Contest
1 December	—Fourth 70 MHz (C.W.) Contest

* Restricted to Members only

MEMBERS' ADS

These advertisements are published free of charge for the benefit of the Society's Members. The number of words is limited to 30 (not including the address). It is essential that we receive the advertisement at RSGB Headquarters by the first of the month for the following issue, typed or written on a standard post card and posted in an envelope with your last Radio Communication wrapper. The address on the wrapper must, of course, agree with that in the advertisement. We cannot accept any responsibility for mistakes.

No trade announcements can be included here, but these can be submitted in the usual way for Classified Advertisements.

FOR SALE

B40 Admiralty RX, fitted S meter, £19. Exchange HRO or similar smaller RX. Many high voltage xfmr's, chokes, capacitors, cheap. s.a.e. E. D. Dunn, G2RP, Meadow Cottage, Holloway Road, Duffield, Derbys.

Nombrex Signal generator model 27, 220 kHz to 220 MHz, £5. D.c. p.s.u. model 61, 0·5 to 15V, 100 mA with protection device, £3, both as new. G. N. Glover, G3AAV, 30 St Chad's Avenue, Leeds 6.

G2DAF RX—no filter XTALS but works OK on 20m, £15. G2DAF TX Mk 1—works on 160, 80, 20m, £15. Two Eddystone 898 dials, 50s. each. Eight bamboo canes for Quad, £5. M. Cox, G3RWR, 3 Regina Drive, Walsall, Staffs.—27083.

M359 Coaxial Elbow adaptors for SO 239, 4s. Wolf Cub drill stand, 10s. 2-726A klystons, sockets, fittings, 30s. Hand crank genny, 300V/6·3V, 15s. Many spares—components, Command, TCS, TV units. J. Cassoh, G2ACT, 14 Station Road, Upper Poppleton, York.

Philco RX, 22 valves, 150 kHz to 18 MHz in five bands, variable selectivity, £9 10s. Heavy duty accumulator charger, separate metered switchboard, OK for light welding, £19 10s. Mint 52 set with d.c. p.s.u. £9 10s., plus carriage. D. Byrne, G3KPO, Jersey House, Hodney Road, Eye, Peterborough.

Prospective G3 must sacrifice Hi Fi gear in exchange for proven all band c.w./phone TX. Offered immaculate Heathkit a.m./f.m. tuner, 12 Wamp with pre-amp, gram supplies, 3/15 ohm output, cost £50. P. B. Bates, G8BBJ, 88 Penhill Road, Lancing, Sussex.

KW2000 with 12V d.c. p.s.u. £150. A.c. p.s.u. £5. EC10 £35. 5ft rack with 150W mod. and numerous p.s.u. £15. 2 and 4m TX, 10-15W input £10. 2 and 4m converters, 6CW4, 1·8-3·8 MHz i.f., £6 each. Carriage extra. F. J. Armstrong, G3JRL, 36 Hallamshire Road, Fulwood, Sheffield 10.

F.s.k. teleprinter TX, AT&E FSK 2, 2 to 6 MHz, XTALs, shift metering, fully stabilized p.s.u., complete, working with data, £15. Eddystone 898 dial, £3. 598 £1. 100 + 100 pF, 0·15 in spacing, 30s. T. R. Preece, G3TRP, 28 Stoneyfield Road, Old Coulsdon, Surrey. CR3 2HG.—71 52138.

Table Top 100W 10m TX, f.m./a.m. in grey louvred case with lift up lid, pair 6146 in final, gives splendid results, space needed, no reasonable offer refused. G. A. Jeapes, G2XV, 165 Cambridge Road, Great Shelford, Cambridge.

TW 4m Nuvistor converter, i.f. 28-30 MHz with p.s.u., £8. 70cm G6JP cavity converter, i.f. 28 to 30 Mhz, £4. 70cm Pre-amp, A2521 £1. Leak Point one Stereo Pre-amp and Stereo 20 Amp, £25. Decca ffss pick up £7. M. A. Pawley, G8AWV, 52 Sumatra Road, West Hampstead, London, NW6.

XTALs, 100 kHz, 3505 kHz, 7810 kHz (4m) 7s. 6d. each, Muirhead s.m. dial 10s. 6d., Eddystone Dial 12s. 6d. 4m converter, 28 to 30 MHz i.f., 50s. 2m TX (832), 50s. Panels, brackets, p.s.u.'s free list. E. Line, G2ASL, 7 Dinmore Avenue, Northfield, Birmingham 31, Warks.

TS-45 APM3 Microwave Signal Generator, £5. Ericsson four tube dekatron counter, £8. CT 53 Signal generator £10. Advance, 9 to 300 MHz, Signal Generator £12. Geiger counter with batteries, £4. R. J. Tarr, GW3PUR, 43 Castle Park, Ruthin, Denbighshire, Wales.

Exchange Rolleiflex "T" with 3·5 Tessar for Radio equipment. D. A. Wood, G3HKO, 28 Hillcrest Avenue, Scarborough, Yorks.

Getting started on 2m? XTAL controlled TX, QQV03/10 p.a. complete with mod, built on standard 19in. rack cabinet, plus valve converter built on chassis, plus material for aerial construction, £8. C. F. Ford, G3FDS, 57 Crows Road, Epping, Essex.

Rebuilt 19 set, 25W transceiver, Top Band, 80m, 40m, int mains p.s.u., n.l., a.v.c., b.f.o., Pi tank tuning, complete with microphone, key etc., £10. P. Wilding, Duncars, Billingshurst, Sussex.

Alternator, Ex Admiralty in new condition, 240 & 120/1/50, 4 pole, 1500 r.p.m. 750 W, £18 carriage paid o.n.o. J. R. Wordsworth, G3JGJ, Rose Cottage, Pepperdon, Moreton Hampstead, Newton Abbot, Devon.

Eddystone 840A g.c. with phones, unmodified, unmarked, nearest to £20; deliver 50 miles or exchange AVO 8 mint. Wanted AVO 8 Mk II mint only, any information on the LM13 Frequency meter. Circuit diagram and p.s.u. All letters answered, B. D. Crook, "Alder," Holt End, Brentworth, Nr Alton, Hants.

Homelight generator, 24V, 60A, £15. RX 52 Set £5. 348Q £10, P58 £5, 206 £10. APQ9 TX £4. Contax III good £18. Surplus valves and motor generators etc. All delivered 30 miles of Shrewsbury. W. C. Brown, Pendref, Caersws, Montg.

Beckman 10 turn Helipot, 0·25 per cent linearity, ganged, 50K-100K-100K ohms, for parallel "T" tunable filter, £2. 1 per cent resolution dial for above 10s. Both £2 5s. post free. M. Mann, G8ABR, Flat 71, Queens Road, Tewkesbury, Glos.

AR88D, £35. Minimitter Mercury, 150W, TX £35, BC221 with built in p.s.u. and charts, £18. All in excellent order, offers invited. E. C. Gray, 111 Ravenor Park Road, Greenford, Middx. 01-578 6186.

Electroniques IFA/1·6/SSB in makers sealed pack with data, £8 5s. New Hi Fi audio Amp modules f.m. i.f. strips, p.s.u. all silicon transistor types. M. C. Osment, G8AIP, 116 Parsonage Leys, Harlow, Essex.

G2DAF RX built with new components, partly aligned, £25. C. Toogood, G3TND, Felacre, Felton, Somerset.—Lulsgate 241.

NCX-5 with NCX-A p.s.u. as brand new. No mods, £200 o.n.o. J. C. H. Pearce, G3IGP, 73 Deerswood Avenue, Hatfield, Herts.—Hatfield 65098.

LG300 TX with rack mounted mod. and p.s.u.'s £35. Would accept Heathkit Mohican RX in part exchange. F. L. Parsons, G3MIX, 96 Blackamoor Lane, Maidenhead, Berks.—Maidenhead 26723.

Collaro Tape Deck, HF/TR3 Amp, cabinet and 10in. × 7in. speaker with circuit details, £20. Buyer collects, C. G. Powell, 1 Wenwell Close, Aston Clinton, Aylesbury, Bucks.—Aston Clinton 600.

TF390G signal generator 16 to 160 MHz, working, buyer collects, £4. 11HC 2m collinear £2. EMI tunable converter 600/33 MHz with A2521 and p.s.u. £2. Both carriage extra. Exchange BCC base station control unit/speech amp. R. F. Stevens, G2BVN, 51 Pettits Lane, Romford, Essex.

Electroniques transistorized tuner HB166T, new in makers packing, at less than cost, £12. Advance constant voltage xfmr, 6·3 V, 8 W, input 190-260V, £1. Post free. G. Elliot, G3FMO, "Oatlands," Southend Road, Sandon, Nr Chelmsford, Essex.

Codar AT5 TX with Codar p.s.u., both unused, all gen £16. R. H. Bland, G3JOM, 1A Princess Terrace, North Road, Ripon, Yorks.

Flush moving coil meters, 3½in. dia., 200mA & 500mA, 10s. 6d. including postage. National type N dial. Offer? S.a.e. H. Beadle, 12 Cartmel Road, Keighley, Yorks.

B44 MkII 4m TX/RX with mic and dipole. Variable tuning on RX. TX XTAL controlled. Ideal for mobile, with circuit and in good working condition. Offers to R. Chamberlain, G3VYU, 40 Elmfield Road, Peterborough.

RX. Home made, Electroniques front end, Eddystone 898 dial, " S " meter, Calibrator, 2nd i.f. 85 kHz. Not beautiful! Yours for £20. Buyer inspects and collects. C. L. K. Ledger, G3UBL, 1 Conholt Road, Andover, Hants.—Andover 2766.

Hammarlund HQ 180 triple conversion communications RX in excellent cond., complete with manual, £80 o.n.o. A. Oglesby, 99 Stockton Lane, York.

Hallicrafters S36A 27 to 145 MHz, v.g.c. £25.Wanted UM2 and Ferrograph. C. C. Redshaw, G2YT, Manor Cottage, Buckland Ripers, Weymouth, Dorset.

36 Set TX, complete with p.s.u. harmonic filters, dummy load, key and hand mic. £10. Buyer collects. E. Wilders, 28 Highbury Street, Peterborough.

Codar AT5 TX and 12V mobile p.s.u., £20. Heathkit RA1 RX, £28. G. Cameron, GM3UUJ, 58 Fountainhall Road, Aberdeen, AB2 4EH. —Aberdeen 28660.

Linear, Green LA600, 4 hrs. use only, £55. Buyer collects. F. A. Long, G3TUF, 37 St Catherine's Road, Bitterne Park, Southampton.—Southampton 57539.

Eddystone 840 g.c. RX. 210 kHz to 610 kHz, 1·4 MHz to 30·6 MHz. Also Eddystone 640 g.c. RX with " S " meter, 1·4 to 31 MHz (requires attention). Both RX's £20 o.n.o. M. Collins, 77 Townend Road, Tiddington, Stratford on Avon, Warks.—66174.

Class C wavemeter, 1360 to 7400 kHz with p.s.u. and spare valve, £3. Multi vibrator with mod. Mk 1, 1000, 100, 10 kHz less XTAL, £2. Buyer collects. A. J. Solomons, G3ICT, 70 Fairholt Road, Stoke Newington, London, N16.

Eddystone EC10 RX v.g.c., £30. AVO 7 Mk II little used, new condition, with instruction book in original packing, £12. Buyers collect. G. Marshall, 49 St Mary's Grove, London, W4. (ring lower bell please).

Entire contents of laboratory for sale including frequency meters, TS174, TS175, TS175AU, TS186D. Signal Generators TS762/C/2, Lavoie Lab. LA6, LAE. Oscilloscopes and meters. C. Goldman, Apt. 6, 36 West Heath Road, London, NW3.—01-435 2663.

Meters, 100 μA 3½ in. dia., 15s., 100 μA 2½in. dia., 15s., 400 μA, 4in. dia., marked in Decibels, 15s. 70 + 70 μA, 3in. dia. marked, Left, Right. 15s. 105 Unit 70cm oscillator, silver plated case, spare valve, 15s. All post free. W. F. Neal, G3FUL, 18 Newark Road, Luton, Beds.

Eddystone 888A, immaculate condition, with blocks and " S " meter. No modification, £60. Prefer buyer to inspect and collect, or arrange transport. Also three new boxed TT21, £2 10s. F. G. H. Jones, GW3CF, 15 Gronant Road, Prestatyn, Flintshire.—3627.

Linear. 1kW peak—half power position for UK use—integral solid state h.t. screen and grid bias p.s.u. Three 3in. meters, £45. For demonstration contact C. D. Abbott, G6TA, 13 Belltrees Grove, Streatham, London, SW16.—01-769 1038.

P.s.u. AWRE Type T700, regulated, stabilized, relay, thermal delays, 450V, 100mA, 300V, 140mA, 200V 50mA, 6·3V, five times, all duplicated, £5 plus carriage. A. G. Thorburn, 27 Banklands, Workington, Cumberland.

AR88D re-aligned, no mods, manual, speaker, £35. Elizabethan TX, 3·5 MHz to 28 MHz with p.p. 807 Mod., spare valves, p.s.u. (for c.w. only) £20. R. J. Stellig, G4CK, 35 Resthaven Road,Wootton, Northampton.—Northampton 61553.

W1191A Het frequency meter. Air Force equivalent to BC221. Beautiful instrument. Brand new with spare valves. Complete with wooden case and details for mod to mains. £6 10s. Buyer collects. H. C. Pryse, G3GXT, 36 Hart Road, Byfleet,Weybridge, Surrey.

R1132A, 90 to 150 MHz RX £4. TU5B a.t.u.s. in cases, have six way ceramic changeover switches, 2in formers, TXmitting variables e.t.c. £2 each. Telegraph pole 40ft £4. Wanted, cheap 80m and or 160m transceiver working or not. F. Powell, G3SEL, " Wits End," Don Lane, Lower Odcombe, Yeovil, Somerset.

Creed 7B p.s.u., DL6EQ unit with all facilities. All in excellent order, demonstration can be given. Keyboard perfect, CR150, 2 to 60 MHz, diversity switch, Type 455, offers to G. Ellison, The Bell House, Rowington,Warwick.

Hallicrafter SX-16 RX, 550 kHz to 60 MHz one owner, £10. Also. Q5er. D. B. Drage, G2BNI, 30 Ashcombe Avenue, Surbiton, Surrey. —01-399 2548.

Top Band s.s.b. TX with XTALs and valves, p.a., 5B/254M, No p.s.u., easily converted to Cornishman all band s.s.b. TX. £10, prefer buyer inspects and collects. D. Alimundo, G4HK, 6 Devonshire Road, Heaton Moor, Stockport, Cheshire.

R1155/A RX in working order all bands, but needs slight peaking up, no b.f.o., Prefer buyer collects, but deliver up to 30 miles, £4 o.n.o. S.a.e. for details. J. Wresdell, Out Gate Farm, Lowthorpe, Driffield, Yorks.

Tape Recorder 4 speed Brenell Deck, little used, £25 o.n.o. Will deliver 25 miles. Also Astrasonis wire recorder built in radio £5. Recording wire, 5s. a mile. Bloomfield, G2WR, 22 Elmwood,Welwyn Garden City, Herts.

Mixture used/unused ECF82, ECC81, EI80F all 2s. each 15s. for ten. FT243, FT241A XTALS 3s. 6d. New boxed U281, IOP31 and others at 10s. each, all post paid, s.a.e. for lists. R. P. Norris, 19 Bluebridge Avenue, Brookman's Park, Hatfield, Herts.

Home brew, general coverage, six valve plus 2 × BY100 superhet less front panel and dial (takes Eddystone 893) £3 10s. New Görler f.m. tuner head less valves 12s. J. S. Roberts, 18 Buckley Street West, Wigan, Lancs.

Textbooks, Computer H/B, immaculate, £4. Transistor Logic Circuits, £1. Electron Tube Circuits (Seely), 10s. Radio Engineering (Sandeman) Vol. 1, 2, 15s. Radio Communication (Reyer), 10s. Following 5s. each, Vol. 1, Vol. 3, intermediate set. G. Bell, 55 Belvedere Road, Hessle, E. Yorks.—048 645724.

Eddystone S640, 1·7 to 30 MHz, excellent condition, desirable modification S meter, dia cast speaker, headphones, H/B £20. S659, " Overseas " RX, 6 to 32 MHz, 0·55 to 2·75 MHz, l.w. & a.n.l. added, 10 in. plinth loudspeaker, £15. R. Rew, 73 Pamela Road, Northfield, Birmingham 31.—021-475 3519.

Lafayette HE30 RX unmodified and in excellent condition. Coverage 550 kHz to 30 MHz, £25 or offer. Edwards, G3WCE, 18 St Johns Avenue, Friern Barnet, London, N11.

SB10U as advertised in November *RSGB Bulletin*, still no buyers, must get rid of, no use to me! Any offers around £25? J. V. Hoban, G3EGC, 96 Ashworth Lane, Astley Bridge, Bolton, Lancs.—Bolton 51502.

Components, 1200V p.s.u. less rectifiers, £3 10s. Top Band c.w. TX self contained £4. Buyers collect. SCR 522 Mod. xfmr, 6s. 807, 5U4, 3s. each. Vintage valves, Osram Catkin, TDD4, VMS4. Offers. R. Edginton, G3AGF, 8 Springfield, Ashby Gardens, Kegworth, Derby.

FT243 XTALs, 8175, 8325, 8500, 8650 kHz, 3s. each. Wanted, cheap 4m equipment! A. R.Williams, 35 Howard Place, Edinburgh 3.

Radio & TV servicing (Newnes), all 17 volumes, very clean, mostly mint, £30 carriage paid o.n.o. TR1987 Radio telephone 2m, £4 10s. plus 10s. carriage. J. E. Berry, G8BOB, " Highfield," Kirkhead Road, Grange over Sands, Lancs.

National NCX 5 Mk 2 with matching p.s.u. £220, as new. NC300. The " Ham's Dream " RX £50. Eddystone EC10, hardly used, £45. R. Moreton, G3EMY, 23 Thackeray Road, Kings Norton, Birmingham 30.—Kin 3020.

RX BC342J, as new £15. Speech clipper as page 280. RSGB H/B £2. Buyer collects. A. J.Wilkes, Schiehallion, Hookley Lane, Elstead, Godalming, Surrey.

Marconi 50 W4m base station, TX & RX in separate cases. Both units self powered 6-40A p.a. RX tunable and XTAL as new in perfect working order £30 o.n.o. Woden UM3 new unused £2 plus p.p. P. Lindsley, G3UDV, 47A St Mary's Road, Ealing London W5.

Three HRO bandspread coils 28 MHz original adapted 21 MHz; R.T. & I 21; another 21, £4. Electroniques i.f.ts, one SIF/1/46X, three SIF/2/46X used but perfect, £1. All post free. J. MacIntosh, GM3IAA Cradle Hall, Broom Park, Inverness.

WANTED

FT243 or FT241: 5873, 5875, 7200, 12,000 kHz. Any between 8100–9111 kHz. Have HC-6/U: four each 6525, 6200, 6408, 6317 kHz, one 6440 kHz, nine each 440·74, 438·888 kHz. A. G. Thorburn, G3WBT, 27 Banklands, Workington, Cumberland.

19 Set, R1155, HRO or any ex-surplus receiver for 1·8 - 30 Mc/s. Must be working with p.s.u. B. Urquhart, Jasmoir, Pavilion Court, Dingwall, Ross-shire.

RSGB H/B. Price please or will exchange 1960 ARRL H/B. J. H. Stacey, 3 West Park, South Molton, Devon.

Heathkit "Two-er" 2m transceiver. Will exchange Garrard A70 record changer—brand new, tested only—or Pye Reporter. 70·385 MHz TX or will haggle. P. Bendall, G3NBU, 3 Alexandra Terrace, Sherfield on Loddon, Basingstoke, Hants.—0256 84 408.

Front panel for Minimitter MR 44/11 RX, Your price paid. Would consider scrap RX, if price reasonable. E. Waddington, 18 Barnwood Road, Earby, Colne, Lancs.

Handbook or Circuit diagram, purchase or loan for Hammarlund Super Pro, type with separate p.s.u. with rectifiers 80 and 5Z3 or information on mains xfmr. Urgent! T. W. Langham, MBE, 1 Chatsworth Avenue, Radcliffe on Trent, Nottingham.

Class D or similar wavemeter. Any others. J. Wilkinson, 32 Comrie Street, Sandyhills, Glasgow, E2.

Commercial Z Match. G. N. Dale, G3PZF, 18 Lezayre Road, Green Street Green, Orpington, Kent.

CR100 RX case, price to P. Daniels, GM3NRP, 10 Stonecraig Road, Wishaw, Lanarkshire.

XTAL Calibrator, prep. 1000/100/10 kHz. Also suggestions for R1933A a.m./f.m. RX conversion to 80 to 100 MHz. J. G. Shaefer, 431 MU, SRAF, RAF Bruggen, BFPO 42.

UM3 mod. xfmr, plugs for rear of 52 Set, 52 Set a.t.u., mains xfmr 250V prim. 650-550-375-0-375-550-650 Sec. at 250mA. B44 TX/RX. Will collect 30 miles A. N. Chantler, "Clareke House," Smithy Lane, Rainow, Nr. Macclesfield, Ches.

Circuit, alignment details or H/B for R209. Large kite and wire. P. Simpkins, G3MCL, 3 West End Terrace, Winchester, Hants.—61334.

Millers Falls Drill Bench Stand No 8806, no longer obtainable from makers. Also Cubical Quad Antenna H/B. A. E. J. Cooper, G5VT, Half Acres, Bishops Stortford, Herts.

Early wireless books, magazines or catalogues before 1930. Will buy or swop for early valves, parts or small sets, preferably before 1925. H. Wenden, K8IKO, Box 327, Worthington, Ohio, USA, 43085.

Type 10X XTALs required, 9160, 7720, 7540, 7665 kHz or near. Also FT243, 7790 & 7915 kHz. F. Barrett, G8CO, 2 Whitehall Road, Grays, Essex.

Urgently required. REF 10H/13677 flying helmet. Minimitter Mobile aerial MW/1/160 coil only but will consider top section and coil. R. Williamson, GI3RNY, Avonmore, Antrim Road, Ballymena, Co Antrim, N. Ireland 2.

Class C Wavemeter information. Preferably circuit diagram. All replies gratefully received. M. A. Higgins, 80 Elphinstone Road, Hastings, Sussex.

40m resonator for Newtronics Hustler Mobile Vertical, also base and resonator springs. G. C. Badger, G3OHC, 23 Aulton Road, Four Oaks, Sutton Coldfield, Warks.

ANTENNA HANDBOOK

By Ken "Judge" Glanzer, K7GCO

Theory through to practice is covered in 37 sections under the three subjects Transmission Lines, Antenna Fundamentals and Matching Devices.

VOLUME 1
COWAN

33s. 6d. INC. POST.
RSGB, 28 LITTLE RUSSELL STREET, LONDON, WC1

BC221/LM frequency meter. Details and price including carriage to V. Hartshorn, G3VZO, 1 Mount Park Drive, Lanchester, Durham.

FT243 XTALs between 5000 kHz and 5400 kHz. Other pressure types in same range are also required. Number and price to G. A. Day, G3GAD, 18 Bushey Avenue, Petts Wood, Orpington, Kent.

Electroniques QP166 or HB166T in cabinet with Eddystone 898 dial (or similar type with horizontal scale and reduction drive) required for approximately £10. All letters answered. M. W. Cartwright, 23 Hargate Lane, West Bromwich, Staffs.

FT243 XTAL at 7000 kHz. Buy or swop for similar 1950 kHz. L. M. Airey, G3GEJ, 14 Brandles Road, Letchworth, Herts.

Manual, circuit diagram or any other information on the Collins TCS TX 1·5 to 12 MHz. G. B. Horsfall, G3GKG, 183 Chester Road, Macclesfield, Cheshire.

Panda aerial tuning unit designed for use with 150W TX. Must be in reasonable condition. Alternatively, circuit and details of same. E. O. Wright, G3ICX, "Ponda Rosa," 2 Goodley Hill, Pensham, Pershore, Worcs.

S.S.B. equipment. Immaculate condition, Collins, Heathkit, Sommerkamp KW or similar. Also rotator and beam. CSE 2A10 TX & CSE 2AR RX or S.S.B. Cannonball TX 1·8 to 2 MHz equipment. Price and details. J. E. Baylis, Holt Farm, Fair Oak Road, Bishopstoke, Hants. —Fair Oak 470.

LM freq meter, 1132 v.h.f. RX, both with p.s.u. Detail and condition to B. J. Payne, 159 Micklefield Road, High Wycombe, Bucks.

National VX501 v.f.o. console, NCX5 Mk II and Webster bandspanner. D. R. H. Jolly, Little Russel, Lytchett Minster, Nr. Poole, Dorset.—Lyt Min 142.

TA32 jnr or TA33 jnr beam. Will collect 75 miles. Offers to R. E. Rogers, 21 Trueman Close, Blean, Canterbury, Kent.

Mobile gear. TW Communicator or similar. Also 20/15/10m beam and rotator. C. W. Nicholls, G3NXF, 542 Chester Road South, Kidderminster, Worcs.

KW1000 Linear in exchange for Bolex P3 8mm cine camera, reflex zoom lens, little used including case. G. S. Rose, G3WGF, 353 London Road, St Leonards on Sea, Sussex.

Components for X band. Aerials, Klystrons (Not 723A/B), waveguide components (size WG16). Details to M. S. Box, G3RZG, 9 Connaught Road, Weymouth, Dorset. All replies answered.

Z Match, El-Bug, Hallicrafters S20R RX. Cash or exchange superb 200W mod. c.w. p.s.u. P. Gowen, G3IOR, 17 Heath Crescent, Hellesdon, Norwich, Norfolk. NOR 58N.—Norwich 52651 ex 2253 business hours.

RSGB Annual Log Book, 1928 & supplements, *Bulletins*, Aug '29, Jan '30, July '33 (with covers), Indices, Vols. 1-6, 8-14, 17-20. *Helping Hand to Amateur Radio* 1938 booklet. F. A. Herridge, G3IDG, 96 George Street, Basingstoke, Hampshire.

Hy-Gain Antennas

18 HT	Hy-Tower 10/80 metres	£91	0	0
18AVQ	10-80m Vertical	£27	10	0
18 V	10-80m (oneband) Vertical	£9	15	0
14 AVQ	10-40m Vertical	£16	0	0
14 RMQ	Roof Mount Kit	£5	5	0
LC-80Q	80m Loading Coil for 14 AVQ	£4	5	0
12 AVQ	10-15-20m Vertical	£14	0	0
12 AMQ	Roof Mount Kit	£4	10	0
TH6DX	6 Element Triband Beam	£78	0	0
*TH3JR	Fabulous 3 Element Thunderbird Junior. 8dB forward gain, 25dB front to back ratio	£35	0	0
*TH3MK2	Rugged 3 Element Thunderbird Senior	£58	0	0
TH2 Mk 2	2 Element Thunderbird Senior	£35	0	0
DB-24A	4 Element 20+40 Duoband	£96	0	0
DB 10-15	3 Element 10+15 Duoband	£35	0	0
402 BA	2 Element 40m Beam	£59	0	0
204 BA	4 Element 20m Beam	£59	0	0
203 BA	3 Element 20m Beam	£42	0	0
153 BA	3 Element 15m Beam	£24	10	0
103 BA	3 Element 10m Beam	£21	0	0
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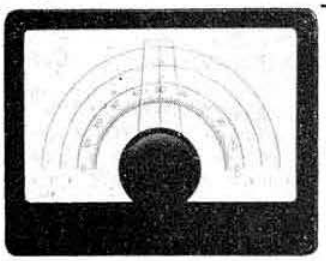

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For Sale advertisements continued on Page 140

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R.Q.10X	8	8	0	**12/RC** control	2	7	6
CC.40	6	10	0	**T28** receiver	15	10	0
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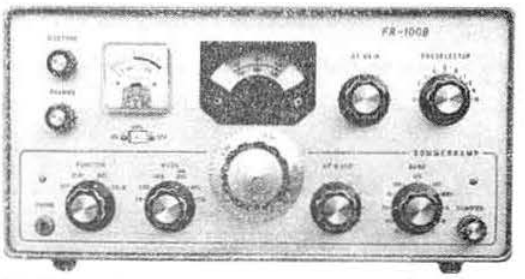

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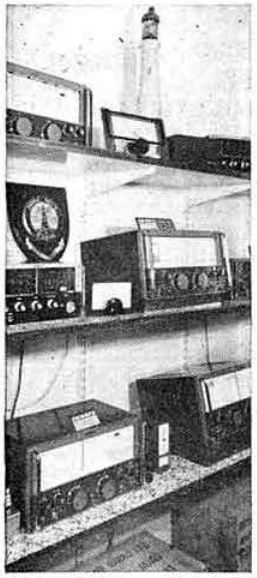

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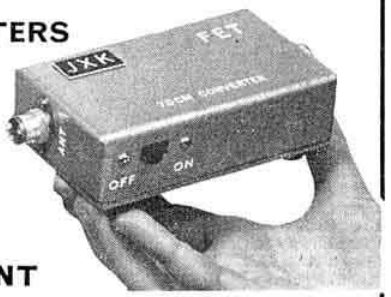

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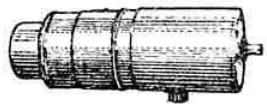

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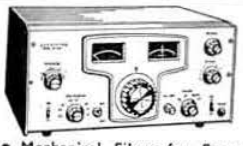

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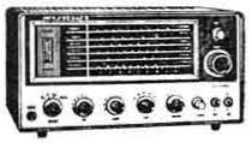

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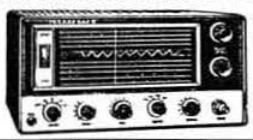

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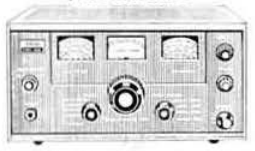

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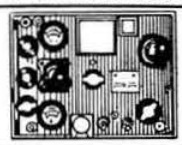

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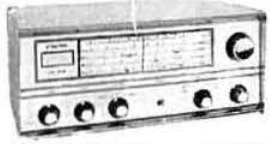

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