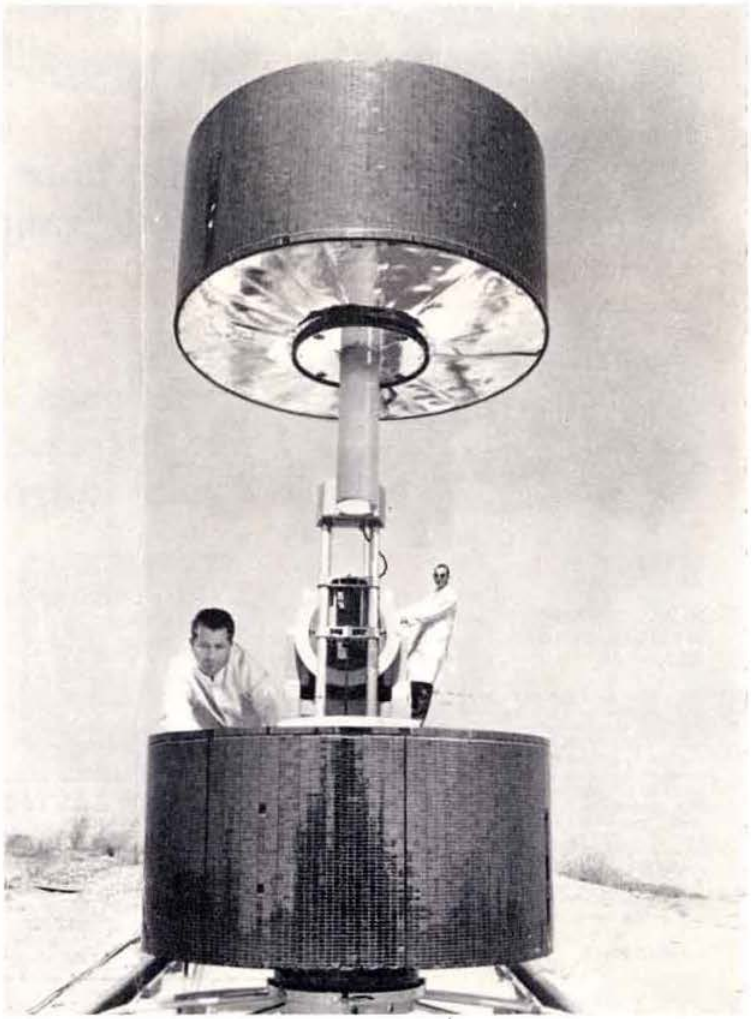
RSGB

BULLETIN

NOVEMBER 1967
VOL 43, No. 11



TWO INTELSAT COMMUNICATIONS SATELLITES ARE CHECKED OUT AT THE HUGHES AERIAL TEST RANGE, CALIFORNIA. ONE NAMED LANI BIRD-2 ACHIEVED SYNCHRONOUS ORBIT HIGH OVER THE PACIFIC OCEAN ON 11 JANUARY. THE SECOND WAS DUE FOR LAUNCH IN FEBRUARY.

FOR THE COMPLETE EXHIBITION STORY AND REVIEW TURN TO PAGE 722.

JOURNAL OF THE RADIO SOCIETY OF GREAT BRITAIN

RSGB BULLETIN

Incorporating RADIO COMMUNICATION

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4 Ludgate Circus,
London, EC4
FLE 4353

THE RSGB BULLETIN (INCORPORATING RADIO COMMUNICATION) IS PUBLISHED ON THE FIRST WEDNESDAY IN EACH MONTH BY THE RADIO SOCIETY OF GREAT BRITAIN AS ITS OFFICIAL JOURNAL AND SENT TO ALL MEMBERS.

CLOSING DATES

DECEMBER
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1 DECEMBER

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NOVEMBER 1967
VOLUME 43 No. 11

Selection of Amateur Radio Equipment

THE ULTIMATE IN VALUE AND PERFORMANCE

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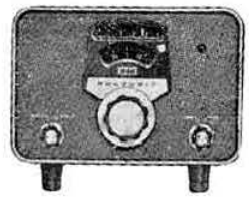
Kit GP-11 (Power Supply 6 or 12v. D.C.) **£9 . 10 . 0** Assembled **£12**

New !



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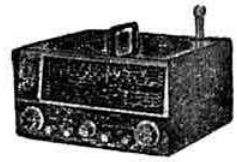
Kit HD-10, 6 lbs., **£21** Assembled **£28**



GR-64E Short Wave Receiver . . . Covers 1 Mc to 30 Mc/s., plus 550 Kc/s. to 1620 Kc/s. AM band. Many special features for such a modest price. For 115, 230v. 50/60 c/s. A.C. mains operation.

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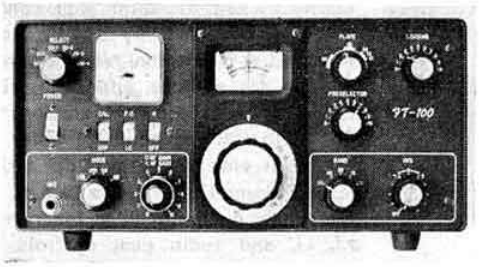

FT-100 Transceiver. 150W p.e.p. all transistor except driver and P.A. 13" × 6" × 10" deep. **£180.**

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National 200. Low price transceiver 80-10; 200W p.e.p. SSB, AM, CW. **£160** less p.s.u. (p.s.u. kit £25).

The dust of the Exhibition has finally settled and I have licked my wounds and got my breath back, well—almost. I'll be honest and say that four days on my two little flat feet just about creased me. However, made a lot of new friends, robbed a lot of people and drank a lot of ale. To say nothing of all the lovely goodies I saw. Didn't get much stuff whipped either—to the Gentlemen who whipped my favourite Teisco mike—" O.K. ole boy, but don't expect my normal guarantee as well! " To the other Gentleman who whipped my rather nice brass key—" Careful how you adjust the pivot pressure—otherwise the ball bearings splatter all over the floor. You should have whipped the instructions as well." One poor lad whipped a suitably weighted box for a dynamic mike. Inside was a lump of scrap iron and a note which said, " Tough luck, you can't win every time." Never mind, they're only £2.10.0. each, so you might as well buy one!

I had to chuckle at one guy—he asked what it would cost to service a Rx. " Well," I said, " It rather depends on how long it takes—service charges are £1.0.0. an hour." He looked horrified, " £1.0.0. an hour? That's awful." " Well, you know, the man who comes to fix your washing machine usually charges nearly twice this." " But " came back the K.O. punch, " there's a lot more in a washing machine." You should have seen John's face!! Mike nearly dropped his can of beer!! And normally, nothing short of an H bomb would do this. Anyway, I had to gently tell the guy that I didn't think we could bring his beat-up AR88 up to perfection for much less than 5/-, and maybe he should try the manufacturers. Seriously, though, £1.0.0. an hour is about standard, but the point is that John has had many years experience in communications and can diagnose faults very quickly. This is what counts. However, enough yacking, lets start selling.

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Rectifiers, IS1066, 1000piv 700mA, 7/6. SE05, 1000 piv 500mA, 4/-.
Postage: Allow plenty and the excess will be refunded.
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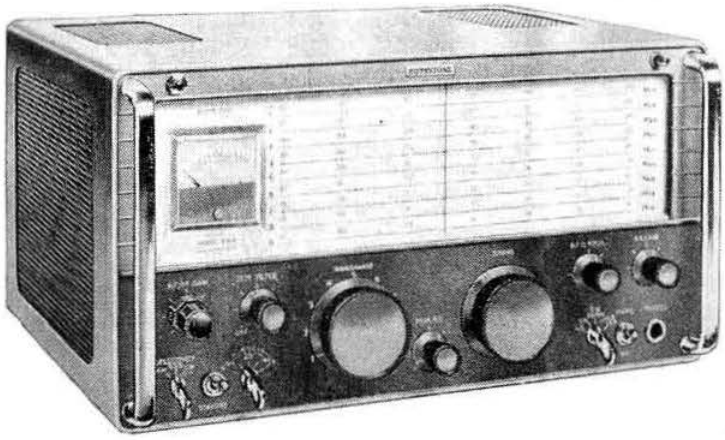
73 de The Bandit.
VE8DP/G3UBO

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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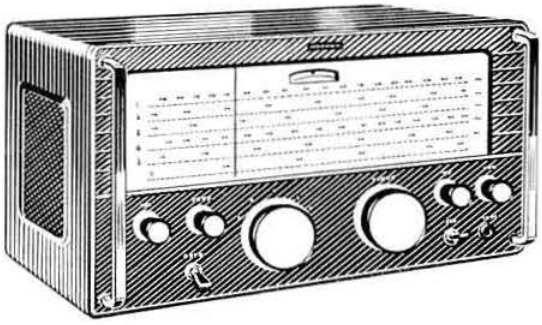

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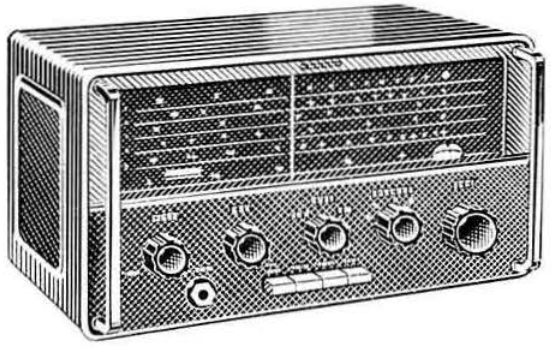
An 8-valve receiver with gap-free coverage from 500 kHz to 30 MHz metres providing excellent reception of broadcast programmes and all major s.w channels including marine and international distress frequencies. The famous Eddystone extended band spread and logging scale is an essential feature. Suitable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



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Converting the PYE RANGER for 2m

By E. CHICKEN, C.ENG., A.M.I.E.R.E., G3BIK*

THIS well designed and constructed commercially produced mobile transmitter/receiver has recently appeared on the Amateur market in considerable quantities and is very moderately priced. It is readily convertible to Amateur use, particularly for the 144 Mc/s band, and the purpose of this article is to explain in easy stages the necessary modifications.

The writer has had considerable success with such a unit, using the simplest of aerial systems, and had the good fortune to enjoy the recent big opening on v.h.f. during May/June this year when the Shetland Island beacon GB3LER and many Scandinavian stations were received at S9+.

Description

This is a completely self-contained unit requiring only the connection of a 12 volt supply and a coaxial cable-fed aerial to render it functional. It consists of an 8 valve 12 watt input crystal controlled transmitter, an 11 valve double superhet crystal controlled receiver, feeding into an internal loudspeaker, a vibrator power supply unit which provides an extremely well filtered h.t. supply for either the transmitter or receiver, all on separate sub-chassis. There is a hand unit which houses an e.m. microphone (in some cases single button carbon types were supplied) plus a press to transmit switch which controls the h.t. and aerial change-over relays.

The h.t. system is arranged to deliver about 260 volts on transmit, and 180 volts on receive. A stand-by switch allows the receiver to be used independently without the transmitter filaments unnecessarily loading the battery.

Whilst there are 24-volt units available, the majority seem to be wired for 12 volts which is quite independent of polarity. It is possible to readily convert the 12-volt type to operate from a 6-volt supply. The frequency ranges catered for come in two bands: Band A, 148–174 Mc/s, and Band B, 132–156 Mc/s.

Receivers offering various degrees of selectivity are available, according to commercial channel spacing requirements. Type V receivers are the most selective permitting channel spacings of 20, 25 or 30 kc/s, whilst Type N allows 40, 50, or 60 kc/s. The type of transmitter, receiver, voltage and frequencies are readily determined from the rear plate after removing the outer casing, and the channel spacing is given on the side of the chassis.

In the writer's case, the unit was marked:
Freqy Tx 171·4, Rx 166·6, Volts 12, P.T.C. 2002V, 25 kc/s, with two supply leads, green and brown, the green being connected to chassis, but the polarity is optional.

Provision is made on the front panel to monitor all transmitter stage drive currents, p.a. anode current, and the received signal strength.

Transmitter type 2002

Referring to Fig. 1, a 6BH6 pentode operates as a Colpitts crystal controlled oscillator with the crystal between grid and earth, and the anode tuned to the fundamental. The frequency of the crystal, F_x is given by the formula $F_x = \frac{F_c}{18}$ where F_c is the output carrier frequency which is derived by successive stages of multiplication from the crystal as follows:

F_x (xlx3x3x2xl)

In this particular unit, prior to modifications, $F_c = 171{\cdot}4$ Mc/s, hence $F_x = \frac{171{\cdot}4}{18} = 9{\cdot}522$ Mc/s, thus the anode tuned circuit of V1 was tuned to 9·522 Mc/s. This is capacitively coupled to the untuned grid of V2, another 6BH6, the anode circuit of which being tuned to select the third harmonic of 9·522 at about 28·6 Mc/s, which is again capacitively coupled to the untuned grid of the second tripler stage V3, using the first half of a type QQV03/10 double beam tetrode valve. As an aid to initial tuning up, the grid returns of V2 and V3A are commoned, producing a combined grid current of typically 0·2 mA.

A double tuned transformer in the anode circuit of V3A again multiplies by three to produce approximately 85·7 Mc/s, this being transformer coupled by the tuned secondary winding to the grid of V3B, the other half of the double pentode QQV03/10, the grid current of which is monitored, being typically 0·2mA.

This stage acts as the driver, and multiplies by two in the anode circuit to produce 171·4 Mc/s into a tuned circuit which is balanced to ground by means of a centre tapped plate coil, a split stator tuning capacitor, and a low value balancing capacitor, in order to give a balanced push-pull drive at carrier frequency to the grids of the p.a. valve V4, another QQV03/10.

Coupling to the grids is effected by an untuned centre-tapped link coil, and drive to the p.a. can be adjusted by physical movement of the link position relative to the driver anode tuned circuit, thus varying the coupling. P.a. grid current can be monitored, and is typically between 1·0 and 1·7 mA.

The push-pull p.a. anodes are tuned by a split stator capacitor to carrier frequency, with a preset adjustable link output feeding to a small parallel tuned circuit which acts as a filter for reducing harmonics and spurious responses. The link feed and aerial tapping points are preset to give maximum r.f. output of some 6 watts. This ATU can be adjusted from the front panel to resonate individual aerial installations.

The vertical quarter-wave aerial normally acts as a ground plane against the metalwork of the vehicle, has an input impedance of 30–50 ohms, and is fed by coaxial cable via an aerial changeover relay—the latter being operated by the press-to-talk switch. Indeed, this little aerial change-over relay is a real gem for mobileers and transistorised transmitters. P.a. anode current, typically 40 mA, can be monitored at the front panel.

Modulator

The single-button carbon microphone (when supplied) derives its energising current by feeding into the cathode of a grounded-grid triode V5A, one half of type 12AU7 double triode, the output of which is capacitively coupled to the second half of V5 to be amplified before being fed to V6, a 12AT7 double triode which acts as a phase splitter to drive a pair of 6AQ5 beam tetrodes V7 and V8 as a push-pull class A modulator, the output feeding via the

* 52 Marlborough Avenue, Grange Park, Gosforth, Newcastle-on-Tyne 3.

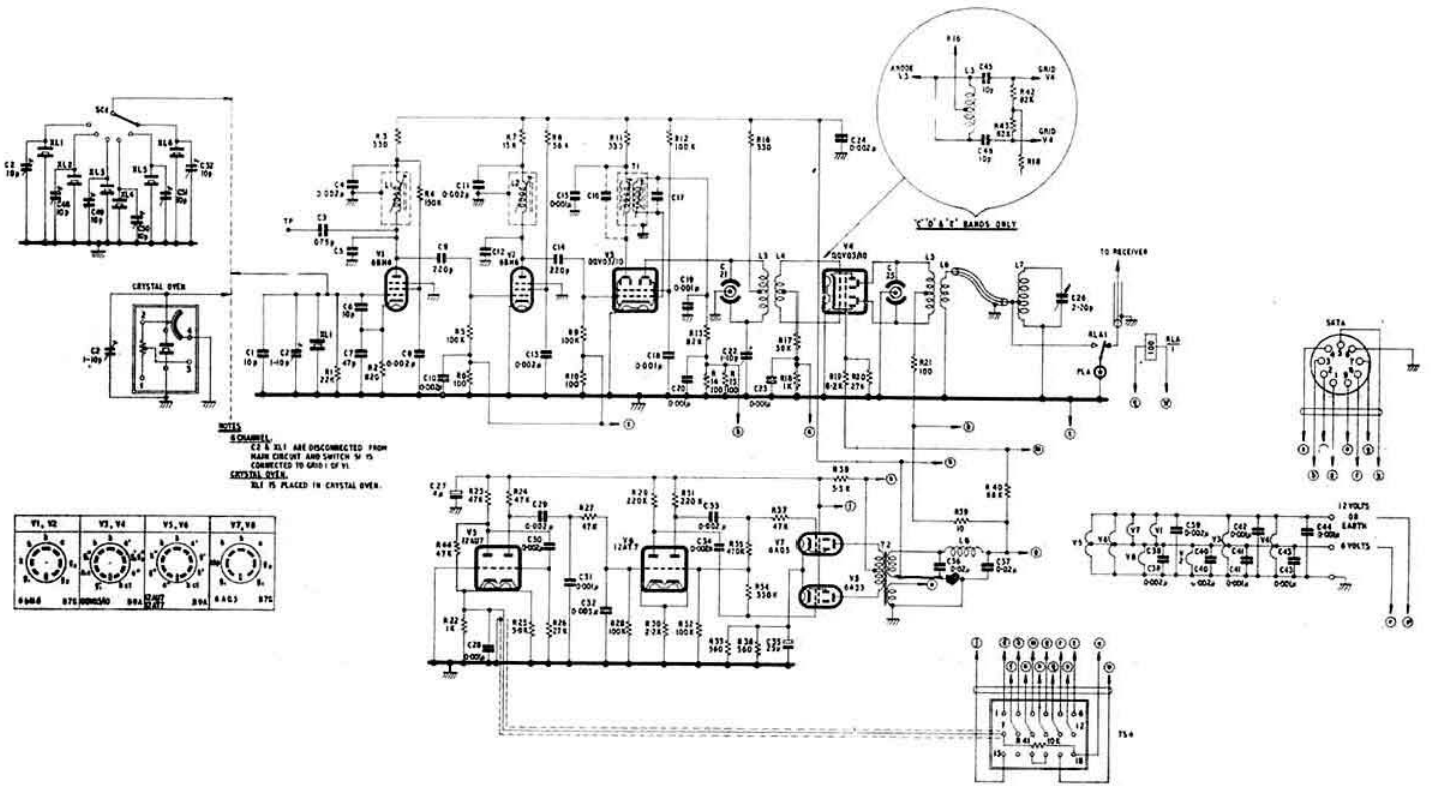


Fig. 1. The Pye Ranger transmitter circuit, type 2002. During course of production, various alterations were made to circuit details, and it is therefore quite possible that other units possessed by amateurs may be significantly different to this circuit

Reproduced by courtesy of Pye Telecommunications Ltd.

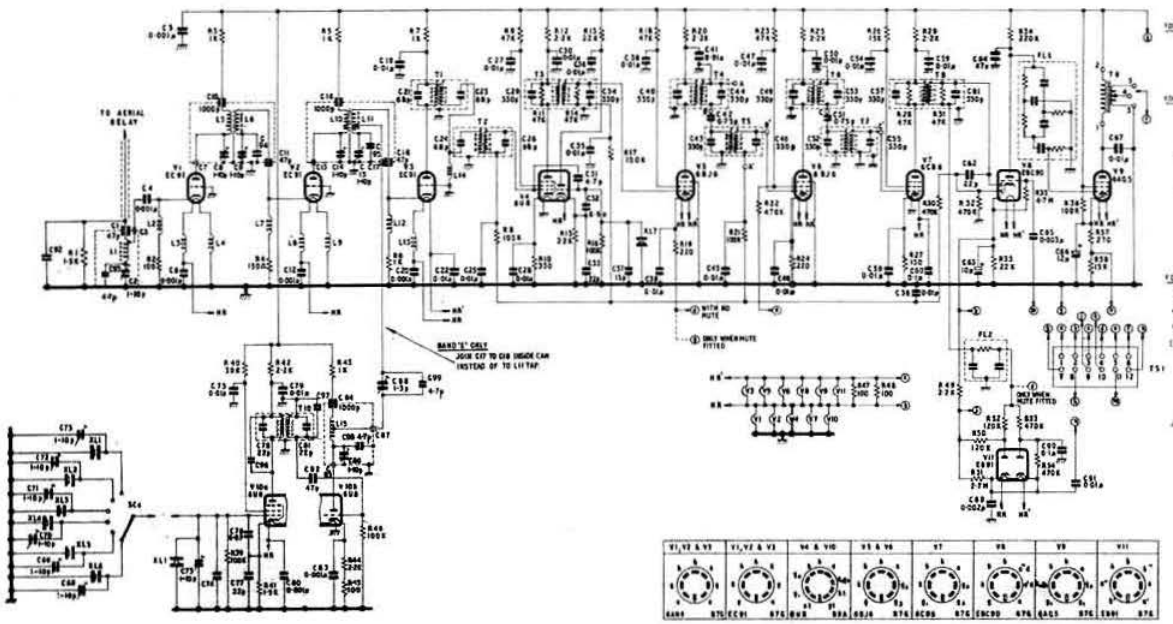


Fig. 2. The circuit for the type 2002 receiver, which applies to ranges A and B.

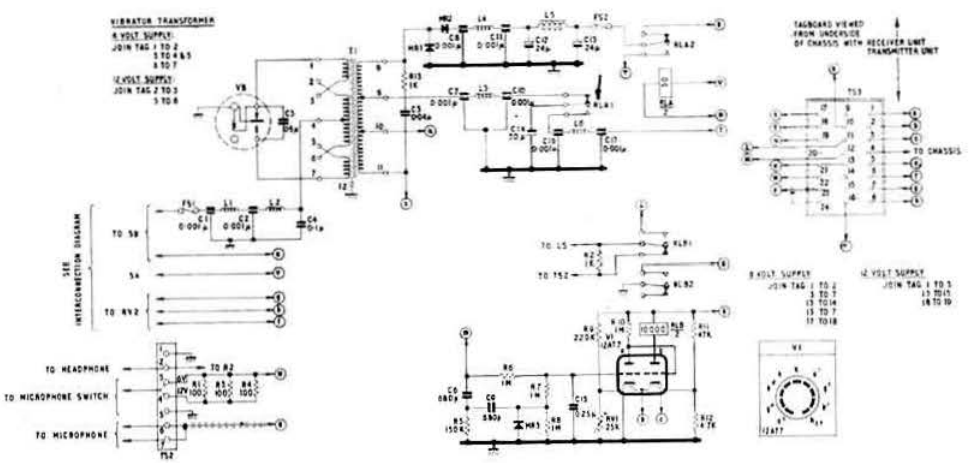


Fig. 3. The 6 or 12 volt vibrator power supply, with muting circuitry.

modulation transformer to plate and screen modulate the p.a. Speech frequencies are deliberately restricted to normal communication limits of about 300–3000 c/s, but even so, with the aid of overall negative feedback from the secondary of the modulation transformer to the input cathode via R41, the speech quality is very acceptable.

Receiver type 2002B

Although originally designed to operate on a fixed frequency by crystal control, it will be shown later how variable tuning over a reasonable range can be easily achieved.

It is basically a double superhet receiver, with a first i.f. of 10·7 Mc/s, and a second i.f. of 2 Mc/s. The circuit is shown in Fig. 2.

Signals from the aerial via the aerial change-over relay are fed into a series circuit tuned to signal frequency, hence to the cathode of V1, an EC91 triode operating as a low noise grounded grid amplifier. After amplification, the signal is passed via a double tuned r.f. transformer into the cathode of V2, another EC91 grounded grid amplifying stage, to be similarly amplified and passed to yet another EC91 grounded grid amplifier V3, which also acts as the first mixer. The first local oscillator valve V10 is a 6U8 (ECF80/82) triode-pentode, the pentode of which operates as a Colpitts type crystal oscillator, crystal between grid and earth, the third harmonic of which is selected by a double tuned r.f. transformer in the anode circuit. This is passed to the grid of the triode section, which multiplies by four in the anode circuit to produce the required final frequency, which when mixed with the signal frequency in V3 produces the first i.f. of 10·7 Mc/s.

Take for example the writer's receiver, originally tuned for 166·6 Mc/s. The first local oscillator crystal frequency F1 is obtained from the formula

$$F1 = \frac{F_s - 10{\cdot}7}{12} \text{ (for Band A frequencies 148—174 Mc/s)}$$

$$\text{or } F1 = \frac{F_s + 10{\cdot}7}{12} \text{ (for Band B frequencies 132–156 Mc/s)}$$

where F_s is the signal frequency.

$$\text{Therefore } F1 = \frac{166{\cdot}6 - 10{\cdot}7}{12} = \text{approx. 13 Mc/s.}$$

Hence the anode circuit of V10 was originally tuned to 13 × 3 = 39 Mc/s. and V10b triode anode to 39 × 4 = 156 Mc/s.

There is only one tuned stage at the first intermediate frequency, and that is a double-tuned transformer T1 in the anode circuit of V3. The signal is fed to the grid of the second mixer V4, another 6U8, for conversion to the second i.f. of 2 Mc/s by mixing with the output of the second local oscillator, which is the triode half of V4. Again, the crystal oscillator uses a Colpitts circuit with the crystal between grid and chassis.

This is a straight forward crystal oscillator with the anode circuit tuned to the fundamental crystal frequency, which may be either 12·7 or 8·7 Mc/s to produce the second i.f. of 2 Mc/s when mixed with the first i.f. of 10·7 Mc/s. The 2 Mc/s i.f. is selected by the double tuned i.f. transformer in the anode of the second mixer V4, to be further amplified by three stages of i.f. amplification at 2 Mc/s, using variable-mu pentode valves type 6BJ6 in positions V5 and V6, and a straight pentode type 6CB6 as V7, feeding into the detector, one diode section of the double diode triode valve V8, an EBC90.

The second diode section of V8 rectifies part of the i.f. signal to provide a negative a.g.c. voltage which controls valves V4, V5 and V6. Variations in screen voltage on V6 can be monitored at the front panel to give a received signal strength indication.

The different selectivities or channel spacings offered by receivers are achieved by using two 2 Mc/s i.f. transformers in cascade between valves V5/V6 and V6/V7, and by simply transferring the grid feed point to use the transformer either singly or in cascade—the latter affording the greatest selectivity.

A very effective noise limiter stage V11, an EB91 double diode valve, conditions the audio signal after it has been passed through a simple r.c. audio-filter FL2. It then feeds via the volume control to the grid of V8 triode section, to be amplified and passed via another audio-filter to the output pentode V9, a 6AQ5 (EL90) which drives the internal loudspeaker.

An i.f. gain control mounted at the front panel controls the cathode of i.f. amplifier V5. Some receivers may additionally have a squelch stage embodying an extra 12AT7 valve, the purpose of which is to automatically mute the background loudspeaker noise when no signal is being received, by adjusting the bias conditions on the i.f. amplifier V5 and the a.f. output valve V9. This circuitry is found on the power supply chassis.

Vibrator Power Supply Unit

This is a versatile unit which can cater for 12 or 6 volts input of either polarity. A circuit is shown in Fig. 3. There are 24 volt versions available, but these should of course be avoided for normal car use. Conversion from 12 volt to 6 volt operation is by replacing the vibrator and adjusting the links on the transformer primary. L.t. input and h.t. output circuits are fused.

The vibrator converts the low voltage d.c. input to a chopped waveform which is stepped up by the transformer and applied to a voltage doubler; 260 volts for transmission and 180 volts for receiving are obtained by switching transformer taps. H.t. change-over is via a 12 volt relay which, simultaneously with the aerial change-over relay, is operated by the press-to-talk switch.

All h.t. and l.t. circuits are particularly well smoothed and filtered. Total battery drain on 12 volts is about 8 A on transmit and 3 A on receive.

CONVERSION TO THE 144 Mc/s BAND

You would be well advised at the offset to make a tuning tool for adjustment of the tuned circuit slugs and capacitors. This is simply a short length of metal rod, for example a volume control spindle, with a saw-cut across the end face. A junior hacksaw blade gives the correct width of slot, taken to the depth of the blade.

Transmitter

If desired, replace the aerial socket by a standard coaxial type—a Belling-Lee flush mounting type exactly fits the holes, in fact. Solder a 6 volt 0·3 A bulb via short leads to a coaxial plug, and plug it into the aerial socket to act as a dummy r.f. load. The writer chose an output frequency of 145·8 Mc/s, to be derived from a × 12 multiplication of an 8100 kc/s FT243 crystal. Any active crystal will do, preferably one to fit the existing HC-6/U socket, but space beneath the chassis permits the crystal to be soldered into position if required.

The anode circuit of V1 should tune to 8100 kc/s by screwing *in* the slug adjuster on top of the L1 coil can, using the tool described earlier, after slackening the lock-nut. Resonance is easily detected by listening to the fundamental on the communications receiver with the b.f.o. on, or by connecting a multi-meter, set to the 1 mA range, between chassis and pin 2 of the B9A front panel monitoring socket, and adjusting L1 for maximum drive current to V2/V3 combined grids. If the coil L1 does not resonate fully when screwed right in, connect a 10 pF capacitor between V1 anode and chassis, which should then allow the coil to resonate with the slug at about mid position.

Leaving the meter in plug position 2, next adjust the coil L2 in the anode circuit of V2 to resonate at 24·3 Mc/s by

screwing IN the slug on the top of L2 can—as before, by either listening to the signal on the station receiver or adjusting for maximum drive current on the meter.

Now comes the only slightly tricky bit; tuning the upper and lower slugs of the r.f. transformer T1 in the anode circuit of V3a for resonance at 73 Mc/s. This definitely requires a small amount of padding capacitance across each winding—4·7 pF across each should suffice. Solder miniature capacitors keeping the leads short across the two pins nearest to the front panel and the two pins nearest to the rear respectively. Actually the writer used two 1½ in. pieces of thin insulated wire twisted tightly together to form each capacitor, thereby allowing the value to be adjusted by snipping the length to suit.

Next, transfer the meter to pin 3 of the monitor socket and adjust the top and bottom slugs of transformer T1 for maximum drive current to the p.a. grid, which will probably read between 0·7 and 1·5 mA. Switch the multi-meter to the 100 mA range and transfer *both* meter leads to pins 5 and 7 of the monitor socket to measure the p.a. anode current, and resonate the p.a. plate output circuit by adjusting the p.a. tuning capacitor C25 from above the chassis, as indicated by maximum dip (minimum current) on the meter.

Now adjust the aerial tuning circuit to resonance by means the of aerial tuning capacitor at the lower left of the front panel with a small screwdriver for maximum current on the meter, which should also coincide with maximum output to the dummy load bulb, which should now be glowing brightly.

Finally, readjust all the preceding stages for maximum bulb brightness. Whistling into the microphone should produce a marked increase in bulb brightness if the modulator is functioning correctly. A worthwhile increase in modulator sensitivity can be gained by replacing the valve V5 12AU7 by a type 12AT7 which is a direct plug-in replacement.

Increased r.f. output may be achieved by disconnecting the p.a. screen clamping resistor R20 27K from between screen and chassis. Its original function was to limit the modulation peaks. A further increase may be effected by replacing the two metal rectifiers by two BY100 silicon rectifiers. No need to disconnect the metal rectifiers; just solder the silicon replacements directly across the originals, being careful to observe polarities. It was found in practice that this raised the h.t. by some 15–20 volts.

Finally, seal all the adjustments with wax if you find this easier than using the lock-nuts.

Receiver

The first step is to check that the second oscillator and i.f. stages are operative, which could be most conveniently done if either a 12·7 Mc/s or an 8·7 Mc/s crystal were available. With this plugged into circuit and the i.f. gain control turned to maximum, the receiver should sound quite lively. If no such crystal is available then the second oscillator stage must be converted from crystal controlled to self excited, by simply replacing the crystal by a parallel tuned circuit resonating at 12·7 Mc/s with the existing 15 pF capacitor already across the crystal holder. A coil wound on a ⅜ in. diam. slug cored former with 25 turns of close-spaced 28 s.w.g. enamelled copper wire will resonate at 12·7 Mc/s without any extra capacitor. If it tunes too low in frequency try using a brass slug instead of the iron dust core. The coil can fit nicely into the space beneath the chassis adjacent to the crystal holder from which two wires are taken to the coil. Check the frequency of oscillation by listening on the station receiver and adjust the oscillator frequency to 12·7 Mc/s by means of the slug core. Now when the slug is tuned through the 12·7 Mc/s position, the noise output from the loudspeaker will be heard to increase and decrease. Set the slug to the position of maximum noise, and proceed with the next stage of the modifications, which is to set up the first oscillator chain to the required frequency.

This requires a crystal having a fundamental frequency which will multiply up to give the required output frequency for the local oscillator. The initial aim is to set up the receiver to receive on the same frequency as selected for your transmitter, then the receiver crystal must multiply up to the transmitter frequency, plus or minus 10·7 Mc/s—the first i.f. For example, 145·8 Mc/s ± 10·7 Mc/s = 156·5 or 135·1 Mc/s.

Bearing in mind that in the writer's receiver the oscillator anode circuit was originally tuned to 39 Mc/s, and that the tuned circuit would probably allow a tuning latitude of say ± 4 Mc/s, then a 9 Mc/s crystal could be used by selecting the third harmonic at 27 Mc/s in the oscillator anode circuit, and multiplying by five in the final anode circuit to give an output frequency of 135 Mc/s. Thus 135 + 10·7 = 145·7 Mc/s which is near enough to the chosen transmitter frequency of 145·8 Mc/s for normal working. In this event the tuned transformer T10 would have to be padded slightly to bring the resonant frequency down from the original 39 Mc/s to the required 27 Mc/s. A 6·8 pF capacitor across each winding should suffice. The second anode tuned circuit will also need some slight padding. A 3·3 pF capacitor connected between anode and chassis will allow 135 Mc/s to be tuned, at L15. Alternatively, a third overtone crystal type HC-6/U of say 33·77 Mc/s would tune without modification to T10, to also provide an output at 135 Mc/s.

The writer used an FT243 crystal of 7506·66 Mc/s, multiplying by four in T10 to 45 Mc/s then by three to 135·12 Mc/s to give a received frequency of 135·12 + 10·7 = 145·812 Mc/s.

This entails modifications to T10 and L15 as follows. T10 is now to tune 45 Mc/s instead of the original 39 Mc/s, which is not quite fully covered even with the slugs fully out. The original padding capacitors are inside the can, and comprise a total of 22 pF across each winding, made up of a separate 15 pF plus 6·8 pF in each case. By removing the 6·8 pF capacitors, the transformer resonates to the required 45 Mc/s. Remove the can complete by first unsoldering all the base connections—they slide off the can pins when the solder has melted—carefully note the coloured spot on the coil base and scratch an identification position on the outer can, then with a small screwdriver press the can retaining clips to one side thereby allowing the coil plus can to be removed complete. There is in fact a special tool provided clipped to the chassis for this purpose, but it is easier to use the screwdriver. The retaining clips will now unclip from the can to permit the coil to be extracted giving access to the capacitors. Remove the two 6·8 pF capacitors carefully, because they are to be used again. Re-install T10 in its original position.

Now connect the two retrieved 6·8 pF capacitors in series, and solder them between the L15 anode connection and chassis, thus completing this stage of the modifications.

Now feed into the aerial socket a strong modulated signal at 145·8 Mc/s (or whichever frequency suits your crystal). Listen carefully at the loudspeaker for the signal—it may be quite weak yet—and adjust the signal circuits in the following order; C2, C8, C9, C14, and C15—peaking for maximum signal in each case. Next peak up the first oscillator crystal chain for maximum signal, by adjusting the top and bottom cores of T10 and the tuning capacitor C86 associated with and on the underside of L15. Give the signal and oscillator circuits a final peaking and seal them with wax.

The receiver is now quite functional on the 2m band, and indeed can be tuned over a limited range by varying the slug core of the second oscillator tuning coil, but there is a better and very simple way of doing this, and that is by tuning it via a variable capacitance diode. This modification is simplicity itself, so do not throw up your hands in despair.

All it entails is a 1 megohm linear law carbon potentiometer, two fixed 1 megohm ¼ watt carbon resistors, a 47 pF silver mica capacitor, and a standard silicon rectifier or

diode. Almost any silicon rectifier or diode will do—a BY100 worked quite well in practise,—but a Radiospares silicon diode type 1SJ150 costing about three shillings is recommended. As the diode is to be connected across the h.t. line it must be rated at 150 volts minimum. The 1SJ150 does this. Connect the 47 pF capacitor and the silicon diode in series with the cathode or positive end of the diode to the capacitor, then solder them directly across the tuning coil. Remove the maker's name badge from the front panel to reveal a hole which will readily accommodate the 1 megohm potentiometer. Wire the components as shown in Fig. 4, and the modification to variable tuning is now completed. Listen on the main station receiver tuned to about 12·7 Mc/s and vary the 1 megohm potentiometer with the 2m receiver switched on. The oscillator should be heard to vary in frequency smoothly about the 12·7 Mc/s region. Set the potentiometer to its mid-travel, and adjust the slug core of the oscillator coil until it tunes exactly to 12·7 Mc/s, then seal the core with wax. Rotation of the tuning potentiometer in a clockwise direction should now cause a frequency swing upwards to about 13 Mc/s., and in an anti-clockwise direction a swing downwards to about 12·4 Mc/s. This corresponds to tuning the receiver through a frequency range of say 0·6 Mc/s about a centre frequency of 145·8 Mc/s. A convenient H.T. point will be found on the second tag from the rear of the tag-strip adjacent to V4 base.

Under no-signal conditions, the receiver background noise will be heard to peak to a maximum as the tuning potentiometer passes through the centre frequency position, indicating that it is tuning through the second i.f. selectivity curve with a resultant fall-off in sensitivity on either side of centre, but in practice, this has not proved to be a serious disadvantage. If desired, the band-pass could be flattened by adding a 20 k ohms resistor across each winding of the 10·7 Mc/s l.f. transformer T3. One could of course cover the whole 2m band by adding a selector switch plus two or three extra crystals.

As a final modification, for fixed or portable use, the general liveliness of the receiver may be enhanced by shorting out the very effective noise limiter. Take two connections to a switch, one from the junction of the audio-filter FL2 and R52/53, and the other from the volume control side of the a.f. coupling capacitor, C91. Both of these connection points are situated at the rear of the chassis beneath the noise limiter valve V11. Keep the leads short or use screened cable, to avoid introducing excess vibrator hash into the audio output.

Aerial

Excellent results, with signal reports of S9+, have been received from home-based stations using horizontally polarised receiving aerials, when feeding the transmitter output into the ordinary vertical car-radio aerial, adjusted to an overall length of about 19½ in., thereby acting as a quarter-wave ground plane, mounted on the front wing of the car.

Slightly better results were obtained from a simple piece of 14 s.w.g. wire mounted on a small insulator affixed to a 2 in. square thin aluminium plate jammed into the top of the car door to allow the aerial to protrude vertically above the roof level. This was fed at the base via a few feet of low loss 70 ohm coaxial cable with the centre connection to the base of the aerial wire and the outer screen to the aluminium plate. Although the plate did not actually make electrical connection with the car metalwork, due to the body paint and the door rubber seal, there was no loss of performance. Of course the coaxial cable was automatically connected to chassis at the transmitter end.

No doubt a slight increase in output would result from using a 30–50 ohm coaxial cable. The advantage of the car radio aerial was that by increasing the length a little past the normal quarter wavelength, the base impedance is raised to match that of the standard 70 ohm cable with which it was

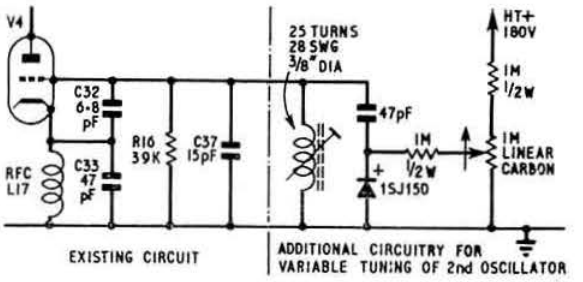


Fig. 4. The circuit used by G3BIK for tuning the receiver second oscillator using a variable capacitance diode.

supplied. It also worked very well as a three-quarter wave vertical by extending its length to about 58½ in. in which case the feed impedance is still around the 30–70 ohm region. Final trimming of the transmitter output circuits ensures maximum output from the aerial. This is best done in conjunction with a field strength meter—or otherwise by monitoring the p.a. anode current.

Conclusions

With the data provided here, the modifications can easily be carried out in an evening to provide a very functional portable or mobile 2m station.

* * *

This article is based on the early 2002 equipment, and although most of the conversions will probably still apply to later units, the circuitry shown cannot be used in conjunction with these. Headquarters can, however, supply reproductions of the circuitry applicable to the 2202 Ranger which uses a QQVO3-20A p.a., on receipt of 4s. to cover costs.

RSGB LONDON LECTURE MEETING

COLOUR TELEVISION

BY GRAHAM ROE, B.Sc.(Eng.), A.C.G.I., G3NGS, OF THE BBC

WEDNESDAY, 8 NOVEMBER, 1967

INSTITUTION OF ELECTRICAL ENGINEERS
Savoy Place, Victoria Embankment,
London, WC2.

BUFFET TEA	LECTURE
6 p.m.	6.30 p.m.

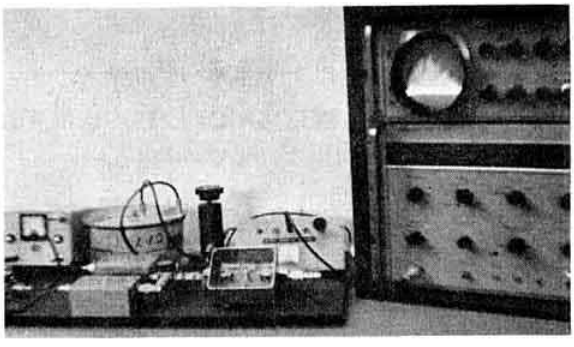
TICKETS ARE AVAILABLE FROM HEADQUARTERS ON REQUEST

Dr J. A. Saxton, Director of the Radio and Space Research Station, opens the 1967 exhibition at the New Horticultural Hall.
(Photo by C. Cooper)

1967 RSGB INTERNATIONAL RADIO ENGINEERING AND COMMUNICATIONS EXHIBITION

The KW2-20 2m transceiver and KW2-600 linear amplifier, which won the Manufacturer's Silver Plaque this year.

KW Electronics new 2m f.m. transistor transmitter. This can produce 15 watts output with a supply of 28 volts.



The Post Office exhibit with a spectrum analyser showing how not to line-up a varacter tripler. See page 729.

THE opening of the annual RSGB Exhibition has, from its inception in 1947, always attracted a good attendance of members as well as a distinguished gathering of people who have been closely associated with the Society. The opening of the 1967 Exhibition by Dr John A. Saxton, Director of the Radio and Space Research Station, Slough, at 12 noon on Wednesday, 27 September, proved to be no exception.

Introduced by the President of the RSGB (Mr A. D. Patterson, GI3KYP) Dr Saxton began his speech by referring to the honour accorded to the Society in 1966 when the annual Exhibition was opened by the Patron of the Society, His Royal Highness, The Duke of Edinburgh. After paying tribute to the organiser of the Exhibition (Mr P. A. Thorogood, G4KD) and the organizing Committee, led by Mr Eric Yeomanson, G3IIR, Dr Saxton commented that, although the Society is founded on the enthusiasm of amateurs, for what has been called "the greatest of scientific hobbies," there was much to be seen at the exhibition which had been produced by amateurs themselves, of which the professionals, also showing, would be proud. He suggested that while it may be true that perhaps half, or even more, of the membership are also professionally engaged in radio communication and electronic engineering it is also true that the non-professionals have contributed and continue to contribute much to the many achievements of the Society.

Although he had been a professional radio scientist for 30 years Dr Saxton said he had never ceased to be impressed by the way in which radio amateurs, generally, have kept up-to-date with advancing techniques and have been able to contribute in a valuable way to radio engineering and research. He reminded his audience of the important part

radio amateurs had played in the field of radio wave propagation and of the extensive investigations carried out by RSGB members during the International Quiet Sun Year programme. Dr Saxton referred to a paragraph Jack Hum, G5UM, contributed to the September 1967 RSGB BULLETIN in which he drew attention to the RSGB V.H.F. Beacon Service. These beacons can be relied upon to furnish signals at any time of the day or night, thereby offering facilities for aligning equipment and indicating band conditions. The fact that the Beacons are widely used also in continental countries not only by radio amateurs but also for propagation studies by professional organisations was, said Dr Saxton a further indication of inter-action between amateur and professional activities.

He spoke of the work being done by radio amateurs in space research and to the study by amateurs of space techniques, reference being made, in particular, to the *OSCAR*-type packages that have already been launched and to the IARU Region I *OSCAR* due shortly to be placed into orbit. Dr Saxton posed the question " Where is the British *OSCAR*? " Answering the question Dr Saxton remarked that, according to the President of the Society, the possibility of producing such a satellite designed by United Kingdom amateurs, is now being investigated. The necessary experience and expertise undoubtedly exists within the Society, all that is required being enthusiasm and hard work. (Dr Saxton then reminded his audience that a model of the successful *OSCAR III* was on display at the Exhibition). Dr Saxton expressed the view that amateurs everywhere should continue to foster and develop this kind of experimental, engineering and scientifically enquiring kind of activity especially because of the ever-increasing demands on the radio spectrum. Good as it may be as a personally stimulating, enlightening and pleasurable hobby and for the cause of international relations, Dr Saxton emphasised that Amateur Radio will greatly help to keep its claim for frequencies strong if it continues to make undoubtedly valuable contributions towards the progress of radio communication and science of the kind it has achieved up to the present time. After drawing attention to the need for vigilance and commenting on the fact that in Italy amateurs no longer have rights on certain v.h.f. bands Dr Saxton spoke of the good standing the Society enjoys and of the influence it is able to bring to bear in the appropriate quarters.

Dr Saxton referred to the continued growth of the Society with a turnover each year exceeding £50,000 and a considerable publishing activity. The facilities which it now provides centrally, should be greatly improved by the larger and better headquarters building it is hoped soon to occupy. It is the earnest wish of us all, said Dr Saxton, that Amateur Radio shall continue to contribute notably to the progress of radio engineering and science and that the influence of the Society shall become ever wider. Speaking as a member, Dr Saxton remarked " it is only we, acting together who can ensure that this comes about."

Dr Saxton concluded his speech by drawing attention to the exhibition itself which he believed to be unique in the world of Amateur Radio. He spoke enthusiastically of the outstanding display of equipment made by members of the Society and referred to the support which the Society had received from the radio industry, the three Services and from government departments.

On behalf of the Society Mr P. A. Thorogood thanked Dr Saxton for opening the exhibition and for his much-appreciated speech. The names of those whose exhibits had found favour with the panel of judges were then announced after which the President accompanied by Dr Saxton and other distinguished guests toured the Exhibition.

Among those present as guests of the Society at the opening of the Exhibition and at the luncheon afterwards were: Dr J. A. Saxton, Sir Albert Mumford, K.B.E. (formerly Engineer-in-Chief, GPO), Dr R. L. Smith-Rose, C.B.E. (Past President RSGB and Past Director of Radio Research, DSIR), Mr M. O. Robins, M.A. Head of the Astronomy Space and Radio Division of the Science Council, Mr H. G. Lillicrap, Senior Director, GPO, Mr W. J. Bray, Directo. Post Office Research, Mr H. Stanesby, Deputy Director of Engineering, GPO, Mr S. E. Allchurch, O.B.E. Director, British Radio Equipment Manufacturer's Association, Mr E. M. Lee, Director, Belling & Lee Ltd., Mr G. D. Wallace, MP Norwich (North), Mr John Gilbert, Northern Polytechnic, Lt.-Col. D. L. Pounds, Capt. J. Pegler, R.N. and Wing Commander C. R. Alexander (representing the Ministry of Defence). Mr R. M. Booth, General Counsel, ARRL and Mr John Clarricoats, O.B.E., G6CL (formerly General Secretary, RSGB) were also present together with representatives of the Technical Press. Mr R. Vaughan, G3FRV, was present as secretary of the Exhibition Committee, together with the President of the Society (Mr A. D. Patterson, GI3KYP), Immediate Past President (Mr R. F. Stevens, G2BVN), the Hon. Treasurer (Mr Norman Caws, G3BVG), the Chairman of the Exhibition Committee (Mr E. W. Yeomanson, G3IIR), the General Manager (Mr D. W. Robinson, G3FMT) and the Exhibition Organiser (Mr P. A. Thorogood, G4KD).

At the conclusion of the luncheon and on the invitation of the President, the author of " World at their Fingertips " presented, on behalf of the Society, a copy of the newly published book to Dr Saxton. Before making the presentation Mr Clarricoats mentioned that by a coincidence the first All-British Wireless Exhibition was held in the hall of the Horticultural Society at Westminster, from 30 September to 7 October, 1922—45 years ago.

Dr Saxton inspects a model of the American amateur satellite OSCAR III.
(Tella Photography)

The meat of the exhibition is of course the trade display, which this year seemed to have a much more " professional " approach, perhaps in keeping with the tone of the title, " RSGB *International* Radio *Engineering* and *Communications* Exhibition." Whether this is welcome is another story, open to question (and it has been questioned), but the fact remains that a general rise in standard is vital if the economics are not to become embarrassing. The catalyst may have been the title, it could have been the new hall, or possibly even the shop window approach of Electroniques' last year, but whatever it was it brought about the appearance of four elaborate stands gracing the foot of the stairs to the stage. It could have been these that provoked the odd comment about " impersonality " and " not the character of the old hall," but let's face it, there was far more room to manoeuvre, and the cafeteria etc downstairs was very good. We can only hope that you will get used to it, because next year's exhibition will be at the same place!

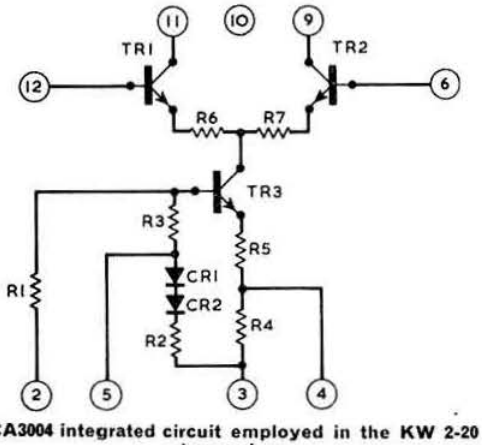
We found many trends and influence in the amateur industry evident, and the show could be analysed in this way, but to be fair to all exhibitors without showing bias, we will let you find your own way round by keeping basically to stand-by-stand reporting, in strictly random order, except for two new exhibitors, and

KW Electronics, who deserve special credit for winning the manufacturer's plaque. The equipment which earned G8KW and his team this plaque is a completely new field for the firm's Amateur Radio production line, for they have broken into v.h.f. with a complete 2m station. The heart of the equipment is an s.s.b., a.m., c.w. transceiver, the KW 2–20, which covers 144–148 Mc/s, running 20 watts p.e.p. input on s.s.b. to a QQV03–10 final amplifier, and incorporating a receiver using very up-to-date techniques. The performance figures provided by KW quote drift after warm-up at 50 c/s for 15 minutes, spurious suppression −60 dB unwanted sideband suppression better than 45 dB, and a carrier suppression of 50 dB. It is designed for a 52 ohm load. The receiver has a sensitivity of 0·5 μV for 10 dB s/n, selectivity 2·5 kc/s at −6 dB and 4·3kc/s at −50 dB, and image rejection is 50 dB. Considerable merit must be placed on the way in which this is done, for the circuitry is extensively transistorized, with considerable use of diode switching, and the receiver input stages consist of a cascode FET amplifier, followed by an FET mixer. Even more novel is the adoption of silicon epitaxial monolithic integrated circuit in the i.f. chain, the device in question being an RCA CA30004 housed in a 12 lead TO-5 package. Selectivity is shaped with a crystal lattice filter, prior to which is a complete noise blanker. Separate detectors are brought into operation for a.m. and s.s.b./c.w. The whole equipment is housed in a modern case 11 in. wide × 4¼ in. high × 7¼ in. deep, and sits neatly alongside its companion a.c. power supply 6¼ in. wide. If you should feel hampered by the KW 2–20's output, however, you can raise your punch with a linear having a startling power/size ratio: out of 11in. × 7¼ in. × 4¼ in. can emanate 600 watts p.e.p. s.s.b. and 150 watts a.m. The equipment which provides this is the KW 2–600, and comprises an RCA 8122 *and* its power supply. Forced air cooling is achieved with a blower bolted to the back of the cabinet. The only controls required on the panel are anode tune and load, with a meter to indicate anode current, and an on/off switch. The prices of the individual units are £105 for the 2–20, £25 for its power supply, £90 for the 2–600, and there is a d.c. inverter for the 2–20 costing £12 10s.

KW have not restricted themselves to development of the 2–20, for another neat piece of v.h.f. transmission equipment appeared. On a single printed circuit board measuring 8 in. × 3½ in. is an entirely solid-state 2m transmitter complete with n.b.f.m. modulator which can work straight off a 12 volt car battery. Under these conditions, 7 watts of r.f. can be obtained, although by increasing the supply to 28 volts, 15 watts into a matched 50/75 ohm load is quoted. The output stage is a BLY35 silicon planar epitaxial transistor, and the remainder of the circuitry employs seven more transistors, three Zener diodes and one Varicap diode. The price, without a cabinet, is £48. A new h.f. transceiver for the export market appeared too for the first time. This is named the Atlanta, and comprises a contemporary case containing facilities such as 485 watts p.e.p. s.s.b., 350 watts d.c. input c.w., and 125 watts d.c. input a.m., frequencies 3·5–4 Mc/s, 7–7·5 Mc/s, 14–14·35 Mc/s, 21–21·5 Mc/s and 28–29·7 Mc/s, dual speed tuning, automatic linearity control, crystal filter, built-in crystal calibrator and noise limiter. The anticipated UK price, complete with separate power supply, is £225.

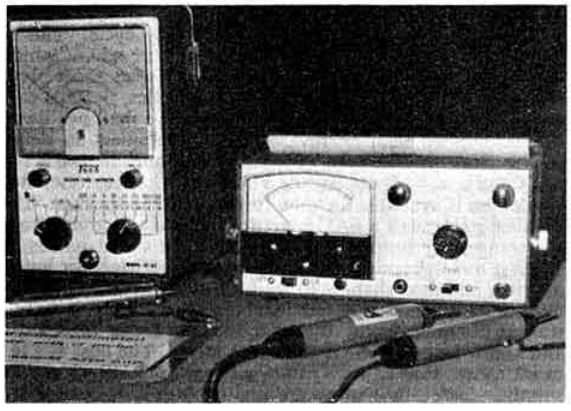
The remainder of the exhibition stand was well stocked with KW's other established products, such as the KW Vespa s.s.b. transmitter and its Mk. II version which can run to 220 watts p.e.p., the KW2000 and 2000A transceivers, the KW600 and 1000 linears, and numerous imported products from Sommerkamp, Drake, Star, Davco, Hustler, and SBE with the SBE-34 s.s.b. transceiver for 100 watts p.e.p, almost fully transistorized, and incorporating a d.c. inverter for 12 volts. The latter equipment costs £199, plus £134 if you require the SB2-LA 1000 watts p.e.p. linear to go with it.

Lowe Electronics. Bill Lowe made his debut, and impact, at this exhibition selling all forms of Japanese and American gear in no milder style than his advertisements! He does appear to have been very successful in building up a good reputation for service, aided, no doubt, by the support given by John Wilson, G3PCY, who runs the servicing dept. in Matlock. " Bandit Bill's " showpiece, at the beginning of the exhibition at any rate, was the low cost Paros 22-TR transceiver. Three bands, 80, 40 and 20m, 80 watts p.e.p. s.s.b. and c.w., 40 watts a.m., VOX, MOX and PTT, a 9 Mc/s six-pole crystal filter for a 1·7 : 1 shape factor, a transistor v.f.o. and 100 kc/s crystal calibrator, cost £125 with the separate supply/speaker unit. The semiconductor Sommerkamp FT100 was there, with the similar new FT150 which comes with built-in VOX. Prices for these are £180 and £190



The CA3004 integrated circuit employed in the KW 2-20 2m transceiver.
(By courtesy of RCA (Great Britain) Ltd.)

Bill Lowe's first appearance at the Communications Exhibition. The new Paros transceiver is just discernible at the far right of the display of equipment.
(Photo by C. Cooper)



Two new valve voltmeters which appeared on Lowe Electronics' stand. The prices are £14 10s. and £14 (left to right).

respectively. A fascinating little 5-watt transceiver was constantly being handled and mused over—the Sommerkamp TS600G, intended for C.B. but adapted for 10m with provision for eight channels. Three controls, one meter and proportions of 6 in. × 2 in. × 6½ in. make for an easily handled mobile rig costing £40. Amongst the remainder of the home-station equipments were the familiar FL200B, FR100B and FL100 Sommerkamp transmitter, receiver and linear, accompanied by the National NCX-5 and 200 transceivers (reviewed in the February and October BULLETINS), with Trio receivers 9R-59D (general coverage) and JR-500S (amateur band).

Two Japanese valve voltmeters are rather interesting in view of their prices; the cheaper of the two (£14) by Hansen exhibits a maximum sensitivity range of 6V, and will run up to 1200 volts, with resistance up to 1000 M ohms. Its companion was attributed to "Tech," and, like the Hansen, comes complete with an r.f. probe. A minimum range of 1·5 V, and resistance also up to 1000 M ohms costs £14 10s. There were also two similarly priced g.d.o.s.; a Hansen model with a 500 kc/s to 150 Mc/s for £10 and a Tech TE-18 covering 360 kc/s to 220 Mc/s for £10 10s.

The climax came on Saturday, however, when Customs at Victoria Station released an FTDX400 transceiver, imported from Sommerkamp in Germany. It is an 18-valve device, in a 16 in. × 6 in. × 14 in. case, and runs a pair of 6KD6s in the final. Bands 80, 40, 20 and 15m are covered with one range each, and the whole 10m band is fitted into four ranges. A crystal filter on 3180 kc/s tailors the response to 2·1 kc/s at 6 dB, two calibrators are provided, 25 kc/s and 100 kc/s, and there is a switch for selecting four crystal controlled channels at your choice. Metering is versatile, monitoring a.l.c., p.a. current and power output. Owing to the way it descended straight onto the exhibition, it was impossible to fix a price.

New to the show were also **Swanco Ltd.**, a Coventry retail business, and **Echelford Communications Equipment,** whose advertisements for 4m equipment have recently appeared in the BULLETIN, these firms combining forces to put on a joint stand. Swanco were proud of a recent tie-up with Contactor Switchgear Ltd., as they now have sole marketing rights for the famous 2A10 and 2AR receiver and transmitter for Top Band. These transistorized 10 watt devices have, incidentally, been modified to give a better receiver sensitivity (0·5 μV down to 0·2 μV for 10 dB s/n) and the modulator can now flex the carrier to 100 per cent. The prices of the transmitter and receiver are still £43 7s. and £44 respectively. On the Friday and Saturday, Swanco were also able to show the first model of the Trio JR500SE transmitter to arrive, but unfortunately literature failed to accompany it, and so the following specification had to be gleaned from a rapid superficial examination. It is for a.m. and c.w., and runs a 6146 in the p.a. on bands 3·5 to 28 Mc/s, and is also equipped for radiating on 50 Mc/s. A meter is provided for monitoring p.a. grid and anode current (150 mA f.s.d.), and s.w.r. There is also a small neon modulation indicator. An apparent disadvantage is the lack of an internal v.f.o. (crystal sockets are provided), but an outboard unit is expected to appear on the market before long. It can, however, apparently be run in conjunction with the JR500SE receiver, utilizing the v.f.o. in this equipment.

The rest of Swanco's section gave an insight into stocks held, including the Swan 500 transceiver, KW equipment, the Hallicrafters HT46, the Lafayette HA63A g.c. 24 gn. receiver, the Lafayette HA700 and HA500 receivers, and the Trio JR60U receiver which covers 142 to 148 Mc/s in addition to the s.w. bands 550 kc/s to 30 Mc/s.

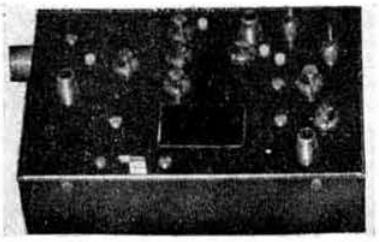
Echelford Communications has intrigued many readers, and its brief history is a development and combination of know-how from the Echelford Amateur Radio Society, Ashford, Middlesex. The equipment in production comprises a 4m transmitter complete with crystal, modulator and p.s.u., and a matching converter powered and controlled by the transmitter. Two versions of the transmitter can be supplied, one for running from mains only (£30) and battery or mains (£40) which includes a 12 V d.c. inverter. The modulator is, incidentally an ECL86, and the p.a. is an EL85 running 5 watts.

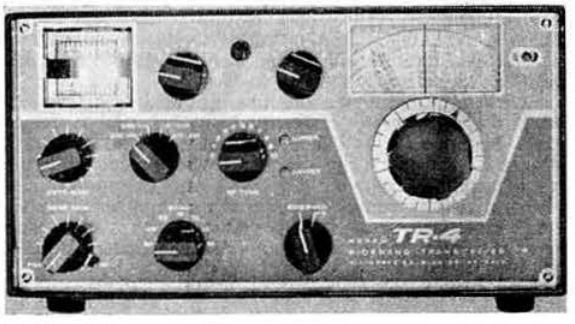
(Continued)

On display as London's only Radio Retailer dealing exclusively in the Amateur Radio market was Terry Edwards' **Radio Shack.** Opened a few weeks it should by now have established itself as a quality business dealing with equipments from the complete Drake line down. Starting at the bottom as it were (in price, that is) and working up, those co-axial switches at 67s. 6d. were a bargain by any standard. With four-way silver plated contacts, a power handling of 1000W mean and working frequencies to 160 Mc/s these switches could no doubt be used in most shacks. We will start by summarizing the Drake equipment: for v.h.f. enthusiasts there is the SC-2 FET 144 to 148 Mc/s converter, at a retail price of £33. The noise factor for this unit is *typically* 2·5dB and has an overall gain across its 4 Mc/s bandwidth of 15dB $\pm$ 0·5dB. Imported into the country for the first time was the TR-4 sideband transceiver at £270 plus £49 10s. for the a.c. power pack. Although priced a little above the average transceiver this unit covers a corresponding number of extra facilities. Two special features are a comfortable 300W p.e.p. input or 260W a.m. and c.w., and full coverage of amateur bands from 3·5 to 29·7 Mc/s in seven 600 kc/s segments. The i.f. selectivity is 2·1 kc/s at 6dB and 7·5 kc/s at 60dB down. For high stability in the v.f.o. solid state transistor technics are used.

For those who may prefer more flexible operation the combination of R-4A receiver and T-4X transmitter should provide the answer; both units are £185 each. To economize with use of the R-4A receiver the T-4 " reciter " has been introduced. The combination of both provide transceive facilities at a saving of £36. Radio Shack stock the extensive range of Drake equipments and in addition to the models mentioned there is the 2-C receiver at £99 and 2-NT transmitter at £70 plus a very wide range of accessories.

Imhof's split stand again contained products from the two spheres of this company's activities. The name Imhof is by now synonymous with Eddystone, as the New Oxford Street shop is the main London stockist of the well-known receivers. The amateur band EA12 (£185), well constructed with a very clear full-vision dial headed the team of receivers: the 830/7 general coverage set for £275, the 840C g.c. set for £66, the 940 for £133, and the newish EB35 broadcast receiver (£60 6s. 3d.) covering 150 kc/s to 22 Mc/s plus the f.m. band, housed in a case similar to the compact EC10 communications receiver (£53). But the new addition is the EB36, similar to the EB35 but costing about £6 less, and dispensing with the f.m. band. Another three units crept from the shop into the show: the Sony transistorized television (about £104), a companion TV camera (about £131) and a remarkably compact video recorder which retails at £264 12s. Its reproduction quality was excellent, and only demands ½ in. tape.





The new Drake 2m FET converter and Drake TR-4 300 watt s.s.b.transceiver. Both units were seen on Radio Shack's stand.

Imhof's Uxbridge business is instrument cabinets, and a superb array of samples and finishes had been arranged. Miniboxes are probably of interest to the majority of experimentally-minded amateurs, but modular construction, particularly the new system J for racking printed circuits, can give a useful measure of versatility and appearance when a piece of transistorized equipment is to remain in an almost indefinite state of design flux.

Daystrom are very pleased with the popularity of the American Heathkit transceiver SB101. This was launched on the British market a few months ago, and since that time they " go as fast as they come." The 101 operates on 80 to 10m at 180 watts p.e.p. s.s.b., and can be pushed comfortably to 170 watts on c.w. with a 50 per cent duty cycle. This it delivers into 55–80 ohms with less than 2 : 1 s.w.r., which can be monitored on the panel meter. The spec. sheet plays with figures in the order of −45dB harmonics, −50dB carrier, and 10dB r.f. compression, but these we shall not dwell on because we shall be reviewing the equipment in detail in the BULLETIN shortly. Facilities on transmit are PTT, VOX and c.w. by operating the VOX with a keying tone, thus a sidetone is available for monitoring with the speaker. The receiver starts with a 6AU6, getting its grid selectivity from the transmitter output tuned circuit. The signal passes to the first mixer, coming out at nominally 8·5 Mc/s for initial filtering, and then shaping to 2 : 1 s.f. at 3·4 Mc/s. The s.s.b. filter is 2·1 kc/s across at 6dB, and the filter for c.w. is 400 c/s wide at the same depth. Image and i.f. are better than 50dB, and spurii below 1 μV at the aerial input. The cost is £165 in kit form. For 12 volts input you need the HP-13 mobile supply, which is fully transistorized, takes 25 amps maximum on full load, and costs £33. The price lists state negative earth only, but Daystrom (Gloucester) will readily adapt this for positive earth if required at no extra charge. The other new amateur-application unit is the SB-620 Scanalyzer, a panoramic spectrum analyser for checking channels determined by a receiver's tuning frequency (the Scanalyzer input is connected to the anode of the receiver mixer, which usually gives an adequate response to cover 500 kc/s each side). The maximum width which you can, in fact, display on the scope's X-axis is governed by the nominal i.f. For 455 kc/s, 10 kc/s to 100 kc/s is the available range, but if you can take off your signals at 6 Mc/s, then 100 kc/s to 500 kc/s is possible. Signals popping up on the display can, of course, be adjusted for maximum amplitude, but there is a further facility of switching to a logarithmic Y-trace read in dB, which gives a greater dynamic range. The price is £57 10s.

We are principally restricting ourselves to reviewing new items to meet space requirements, but it would not be fair to omit the " individual " range of amateur equipment, the SB301E s.s.b. receiver (£125), with an SB600 speaker (£9), the SB401E s.s.b. transmitter (£140), the SB200 1kW linear (£107 10s.) and its miniature cousin, the HA-14 (£49 10s.) with the HP-24 a.c. supply (£27 10s.). Easier credit terms were given due publicity.

J-Beam Engineering Ltd. were unable to bring production of a new aerial forward in time for the exhibition, but had to content themselves with giving warning of the arrival of a 14 element 2m Parabeam; a sizeable addition to a large family of popular durable v.h.f./u.h.f. aerial systems, not forgetting the 4 element 10m beam new to last year's show. The stand

was adorned with 10 beams, of which four were Parabeams and thus shows the firm's inclination to this pattern of array.

Tom Withers' stand quite sprouted with his new Phase II 2m transverters. This device appeared in prototype form last year, and a few months ago reached quantity production. S.s.b. drive at 28–30 Mc/s is required at between 10 and 200 watts, a complete oil-immersed dummy load being incorporated in the transverter. Signal injection is to a QQV03–10 mixer, which drives the QQV06–40A amplifier to 180 watts p.e.p. input, or a.m. with 100 per cent modulation to 100 watts d.c. input. A receiving converter, of a similar pattern to the separate range of converters using a 6CW4, derives its

Tom Withers holds up a production model of the new Phase II 2m transverter. This is a complete transverter/converter, with a QQV06-40A amplifier to handle 100 watts d.c. input. In the background, on the BATC stand, can be seen Bob Tebbutt adjusting his home-built colour television receiver.

(Photo by C. Cooper)

oscillator signal from the same source as the transmitter chain. There is an internal transmit-receive relay operated by a d.c. line from the s.s.b. transmitter. The Phase II is neatly finished in two-tone grey, and a power supply to match is available for £30. The cost of the transceiver is £69. For the record, one of the units on the stand was connected to a KW2000 transceiver and a TW Halo, resulting in several medium-range contacts even with the indoor aerial. Up to now, T. Withers has only employed transistors in the converters built into the range of Communicators and Two-mobiles, but there is a hint of separate transistor converters, including a 70cm, appearing before very long.

Enthoven Solders Ltd. claimed no new products, but were freely demonstrating their established Superspeed and Miniscope irons, which are operated in a similar fashion to soldering guns, by virtue of the rapid heating time in the order of seconds. Lesser known products are their flux Superspeed, the " hard stuff " Tricene which provides a good key for soldering, and a protective lacquer for preserving a clean surface without impeding the flow of solder. A solder paint is also produced, which consists of solder and alloy in fine particles of about 60 microns in suspension in flux. This can be brushed on a sizeable surface and the whole area heated and tinned instantly.

Just below the stage was a repeat performance of an elaborate stand occupied by **Electroniques**, the retail business under the wing of STC. With such a diversity of products held in stock, the four sides of the stand were quite insufficient to carry but a bare selection, although there was no holding back with the introduction of a new line in kits: Knight-Kits.

Electroniques now have exclusive marketing rights for this American line of kits, which widely covers test equipment, hi-fi, education in electronics, photography and even motoring. Examples from the line of test equipment are an r.f. signal generator covering 160 kc/s to 112 Mc/s at up to 400 mV, with modulation, costing £21 4s. 11d.; a 5 in. oscilloscope with a direct coupled amplifier operating at up to 5·2 Mc/s for £80 8s. 4d.; a " laboratory quality " signal generator featuring a built-in crystal calibrator and a comprehensive attenuator system costing £51 16s. 8d.; a valve voltmeter with d.c. ranges of 0·5 μV to 1500 V and a.c. ranges starting at 1·5 V for £28 19s. 6d., and a testmeter kit featuring a taut-band meter with an f.s.d. of 50 μA, price £24 10s. A receiver is on the market for £28 6s. 2d., named the Star Roamer, covering broadcast long and medium wave bands, and 1·8 to 30 Mc/s. At present, the kits are being imported complete, and essential modifications such as replacing power transformers and altering the spec. accordingly are carried out in this country. Gradually, however, Electroniques plan to assemble the kits from British parts, and thus possibly lower the retail prices. The manuals are lucid, and " tested " by true novices in the USA and UK.

The Hallicrafters range was also given due priority. One of the most interesting equipments was the SR400 Cyclone transceiver, a new import, capable of running 400 watts p.e.p. on 80 to 10m, and costing £395. Judicious use of twin concentric controls allows many functions to be brought out to the panel without undue overcrowding, and switching indexing is very light (even we have not yet overcome the basic " knob twiddling " instinct!). Features include a six pole crystal filter giving a 3 to 50dB response of 2·1 to 4·2 kc/s, automatic amplified level control which can be monitored on the anode current and S-meter, VOX and PTT built-in, a notch filter, product detector, and an attractive addition of a full noise blanker with signal take-off prior to the i.f. filter. Deliveries can be expected to begin in December. An a.c. power supply is available (P500), which incorporates a loudspeaker and features safety electrical interlock systems, and costs £59. The SR-400 can be interconnected with an HA20 v.f.o./s.w.r. console to provide split frequency working beyond the inherent 3 kc/s receiver incremental tuning, and provides an output monitoring facility. The HA20 costs £95. The SR-400's big brother, the Hurricane SR-2000 transceiver with power supply was found nearby; this version is capable of running 2kW p.e.p. under favourable licence conditions, and costs £495 plus £195 for the power supply. Extending the Hallicrafters range were receivers SX130, general coverage, at £79, the SX122 g.c. at £135 and the SX146 amateur band type at £125 which can be mated with the HT46 s.s.b. transmitter (£175) to provide a transceive set-up. This combination would give you a 175 watt potential on 80 to 10m, in 500 kc/s tuning bands, crystal filters in both units, and automatic level control during transmit. Supplies are built-in.

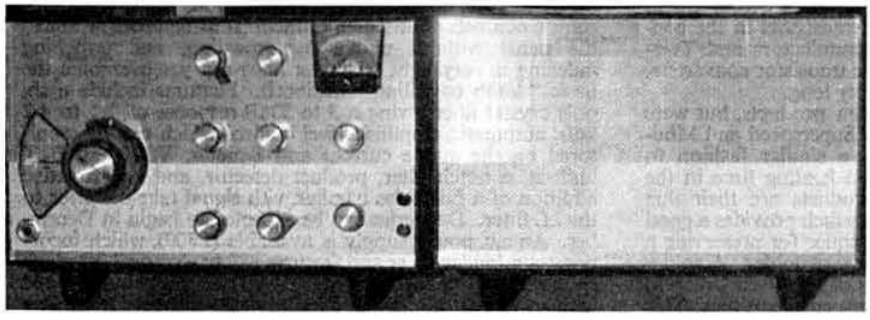
(Continued)

The 9502 aerial rotator by Channel Master had apparently undergone a ruggedising process, with a heavier gear train fitted, and another modification is a new control unit for the automatic combination, which makes it easier to achieve rotation in 1° increments. An important point in connection with the erection of these rotator systems is achieving correct dynamic balance under windy conditions in addition to static balancing. Without such precautions, you can immediately put an unnecessary and unfair load on the rotator gears and bearings. The cost of the automatic rotator is £18 18s., and an alignment bearing (£3 7s. 6d.) and ball bearing rotatable guy ring (£1 17s. 6d.) are available as extras. TW and Eagle equipment were on sale, together with, of course, Electroniques' own products, which now include printed circuit modules for audio amplifiers, power supplies, and transistor Quoilpax tuner units. The i.f. strips are now available in a Mk II 1·6 Mc/s version, which boasts an improved built-in collector coupled product detector to eliminate b.f.o. leakage into the a.g.c. system, and a more convenient take-off for an S-meter. The price of the new model is £11 11s.

As visitors to the stand may remember, Electroniques held a raffle for a Hallicrafters S210 receiver. The lucky winner of this unit was K. C. Brown of Aldburgh, Suffolk.

Peter Seymour Ltd., the Hull equipment retail business, is very enthusiastic about the sale of Swan transceivers, which have now reached the figure of about 300 in the UK. This includes the Swan 500, which has only recently appeared, costing £285 complete, and with a 480 watt power capacity. Another new Trio equipment was found on this stand, the TS500 transceiver with a separate power supply and remote v.f.o. It can run to 200 watts p.e.p. on the 3·5 to 28 Mc/s bands. The family of Drake equipment had some new offspring too; the W4 direct reading in-circuit r.f. wattmeter with ranges of 200 and 2000 watts, wideband within the limits 2 and 30 Mc/s, although frequencies beyond can be checked using a correction factor. If desired, the r.f. assembly can be divorced from the meter case and fitted close to the aerial system with remote indication. The price is £25. The Drake MN4 is a matching network, s.w.r. and power meter designed as an auxiliary unit for the TR4 s.s.b. transceiver. The Galaxy V Mk II was a neat transceiver also found on this stand; it covers 3·5 through to 29 Mc/s, with VOX, PTT and c.w. facilities, and costs £255.

Len Crane, G3PED, tapping at the keys of a Creed 54 teleprinter on the BARTG stand.
(Photo by C. Cooper)



A new import by Peter Seymour: the Galaxy V Mk. II s.s.b. transceiver.

Depending on recommendations for sale of the famous Joystick aerial, **Partridge Electronics** had arranged an intriguing form of competition by seeking confirmation of a series of contacts made by ZL1TB, using this aerial. Several testimonials and reviews also adorned the stand. Apart from the three versions of Joystick, a de-luxe model (£5 19s. 6d.), the standard model (£4 15s.) and a junior version (£3 7s. 6d.) there was also a complete range of tuners. These are, incidentally, slightly different from the original Mk. I patterns in that they are designed to work with the current un-tapped Joystick, and it should be mentioned that good results cannot be expected if Mk. I tuners are used with Mk II Joysticks and vice versa. There are receiving only, receiving and low power transmitting (switched and unswitched), receiving and 300 watt transmitting (with and without built-in indicators) and Top Band only versions. To overcome loss of *Q* on higher bands when transmitting, a special version is made for 10, 15 and 20m bands only. Prices vary within the limits £2 15s. and £6 6s. Partridge are also looking harder at exports now, and to this end there is news of a forthcoming 1kW tuner.

A new soldering iron was announced by **Weller**; this is an offshoot from the TCP-1 temperature controlled low voltage iron, but has the advantage of being mains-operated. By adopting the phenomenon discovered by and named after Mmme Curie, where iron or nickel-iron loses its magnetic properties when a critical temperature is reached, predetermined control of the tip temperature is possible. The industrial price list for the 230 volt range quotes £5 10s. to £8 for powers 60 watts to 200 watts. A range of 16 tips 'pretty well covers every application from light transistor work (safely) to 16 s.w.g. copper chassis working. These irons could be regarded as expensive for some applications, and so for those who are content with conventional irons, their needs are covered by the Marksman soldering pencils (£1 9s. to £4 15s. in powers 25 watts to 175 watts). Soldering guns complete the range, although it must be mentioned that most of the products can be purchased in the form of complete soldering kits.

World Communications Receivers was a new idea, a joint effort by exhibitors to pool the latest receivers so that visitors could make side-by-side comparisons. The collection was grandly headed by a Redifon R408 ("a few hundred pounds"), featuring more or less everything, including a film-strip dial 90 in. long.

THE "OFFICIAL" AND SOCIETY STANDS

Dr Saxton's opening speech contained several references to the part amateurs are playing in research into ionospheric propagation and associated fields, and it was encouraging to note how highly he rated this work, especially considering his capacity of Director of the Radio and Space Research Station. To help support the theme of his speech, a stage display had been arranged by RSRS, and this gave an insight into the related aspects of research which are being investigated professionally.

The principle function of the exhibit was to demonstrate three types of research being carried out to find out more about the effects of the lower and higher atmosphere on radio waves—in particular on frequencies down to 3cm. **Studies of the structure of the lower atmosphere** are important because variations in the refractive index affect many aspects of radio wave transmission. Refractometers, flown in aircraft, balloons and helicopters show that the lower atmosphere sometimes contains remarkable differences in humidity and temperature over distances of a few feet. These differences are associated with radar echoes from clear air (" angel " echoes) and with abnormal propagation of very high frequency waves over distances of several hundred miles over the Earth's surface.

Studies of the outer atmosphere by topside sounder satellites were also featured. The behaviour of the ionosphere has an important influence on the propagation of radio waves used in long-distance h.f. radio communications. Predictions of radiowave conditions are worked out from information supplied by a world network of ground-based ionospheric-sounder stations. These stations, however, are not evenly distributed over the Earth and cannot supply information about the major portions of the ionosphere above the maximum ionization height, but the launch of Alouette, in 1962, first of a long series of " topside sounders " started a new era of ionospheric studies.

The steerable aerial at Chilbolton, commissioned recently, is a versatile research instrument which can be used for both lower and outer atmosphere studies and a model was displayed at the exhibition. The 25m (82 ft.) dish-type aerial is a reflector of radio waves large enough to provide a highly directional instrument able to distinguish very small variations in directions of arrival of radio waves, and this enables scientists to investigate microwave ray structure on tropospheric paths and the causes of fading and scintillation on microwave communication links. Ground transmitters and satellites will be used as signal sources in these experiments; radar methods will also be used in measurements of the refractive index. Present experiments at Chilbolton concern studies of fluctuations in radio signals along a path between the aerial and a transmitter at Hannington.

The **GPO** concentrated on three very diverse aspects of work, falling into categories of research, education and operational equipment. A very topical subject for the amateur was instituted by members of the Post Office research team at Dollis Hill, and really formed part two of last year's display of a Varactor tripler for 70cm. This aroused some enthusiasm amongst visitors, but discussion revealed that many amateurs were likely to make use of these devices without knowledge of difficulties likely to be encountered during alignment. A warning was subsequently published in the BULLETIN, but to clarify the situation, an enlightening demonstration of how and how not to align them was assembled with the valuable aid of a spectrum analyser. Two 70cm triplers could be connected for display, one which had been aligned, conventionally, for maximum output power, and the other for minimum spurii on the spectrum analyser. The myriad of vertical response lines resulting from the first unit would almost mean TVI on every channel in existence! Even the good unit developed a couple of spurii close to the wanted output when drive was reduced, which is a warning if you intend to use a tripler for a.m. This display was not meant to deter amateurs from employing these devices, but rather to press home the need to be careful to avoid developing spurii in unexpected places when alignment is undertaken.

With the increased infiltration of digital techniques into the Post Office for automatic sorting of mail, appropriate logic teaching equipment has been constructed (partly by the students themselves), and three such devices were at the mercy of show visitors. The forms of visual presentation were very clear, and must obviously assist considerably in promoting a rapid understanding of gates, counters, shift registers, etc.

The third exhibit was a recorded demonstration of Lincompex, a communications system developed to improve path reliability by combating fading. In brief, it employs two compressors to tailor the speech waveform, and information regarding the degree of compression is also obtained. The resulting a.m. signal is transmitted conventionally, with an upper frequency limit of 2700 kc/s, and above this in the band 2700 to 3000 kc/s is added an f.m. compression information signal. Conversely, in the receiver the decoded f.m. signal is used to control expanders, with appropriate automatic level control. The result of this process is a greater signal to noise ratio and the general absence of severe distortion.

The centrepiece of the **RAF Amateur Radio Society's** Stand was the equipment taken to Australia for the Western Australia Expedition, and the station which was used at RAF Locking to provide the British end of the communication link. A KW2000, with an E-Zee Match was taken on the expedition, while the base station lined up a Collins 75S-3, 32S-3 and, 30L-1. An adjunct to the stand was an exhibit of special equipment aids which are used for instructing trainees in the art of fault finding.

The **Royal Naval Amateur Radio Society's** stand attracted a worthy number of visitors who were determined not to let the Morse code beat them at up to 35 words per minute. Several candidates will be receiving certificates in due course. On the Saturday, the Society took the opportunity to hold its Annual General Meeting, when those attending were able to hear Captain McKaig give an account of the year's activities.

Overshadowing the Army stand was a large 6 ft. dish intended for satellite communication from a mobile installation. The system is entitled IDEX (Initial Defence Satellite Equipment) and is under the auspices of the **Ministry of Technology.** The station is in two parts, simply a Land-Rover and trailer on which is carried the dish with its transmitting and receiving equipment. The terminal equipment, including teleprinter, is installed in the back of the Land Rover, and a p.e. generator is carried for supplying the whole installation. The transmitter operates on 8 Gc/s, at a power of 1 kW derived from a Varacter diode multiplier chain culminating in a klystron amplifier. Receiving is on 7 Gc/s, using an uncooled parametric amplifier. One interesting feature is the means of aiming the aerial at the satellite—tracking is achieved by " stepping instructions " from a pre-computed perforated tape.

G3LUB, with his wife, who won the Organizer's Silver Plaque for his home-constructed 50 watt p.e.p. 80m transistor transceiver.
(Photo by courtesy of UK Atomic Energy Authority)

THE "HOME CONSTRUCTED" EXHIBITION

The Society's home constructed equipment this year brought forth very encouraging support, and virtually all of the contributions gave the appearance of considerable effort having been spent in both design and construction, with complete regard for appearance. The judges endured a difficult task in selecting the winners, but finally agreed on the names listed alongside.

The photograph below shows the equipments entered for the awards. Each unit is identified, in descending order, from left to right. (1) 160m a.m./c.w. transmitter using FETs, valves and bi-polar transistors, by G3VJN. (2) 80m transistor c.w. transceiver with an output of 1W, by G3AM. (3) 70 Mc/s transistor tunable i.f., by G3SAK. (4) 70 Mc/s transistor 1-4W a.m./c.w. transmitter, also by G3SAK. (5) 160m mobile whip, by G3OOQ. (6) V.h.f. receiver tunable i.f. covering 2-4 Mc/s by G3HBW. (7) A complete mobile or portable station for 2m in four modules, by G3HRH. (8) 20W p.e.p. input 1·5 Mc/s to 31 Mc/s transceiver using three synthesizers, by G3HBW. (9) H.F. transistor transceiver, by G3MVZ. (10) 70 Mc/s transistor transceiver, linear amplifier and s.s.b. exciter, by G3WBQ. (11) 70 Mc/s transistor converter costing less than £5, by G2UJ. (12) 80m transistor transceiver, by G3LUB. (13) Keying monitor and a.t.u., by G3AM. (14) Power supply for the G3MVZ transceiver. (15) 80-10m 400W linear using TT21s, by G6JP. (16) 70 Mc/s 50W a.m./c.w./s.s.b. transmitter, by G3SAK. (17) 70 Mc/s linar amplifier, by G2AIH. (18) 70 Mc/s and 432 Mc/s linear s.s.b. transmitter, also by G2AIH. A complete range of Novisets was displayed by the Education Committee.

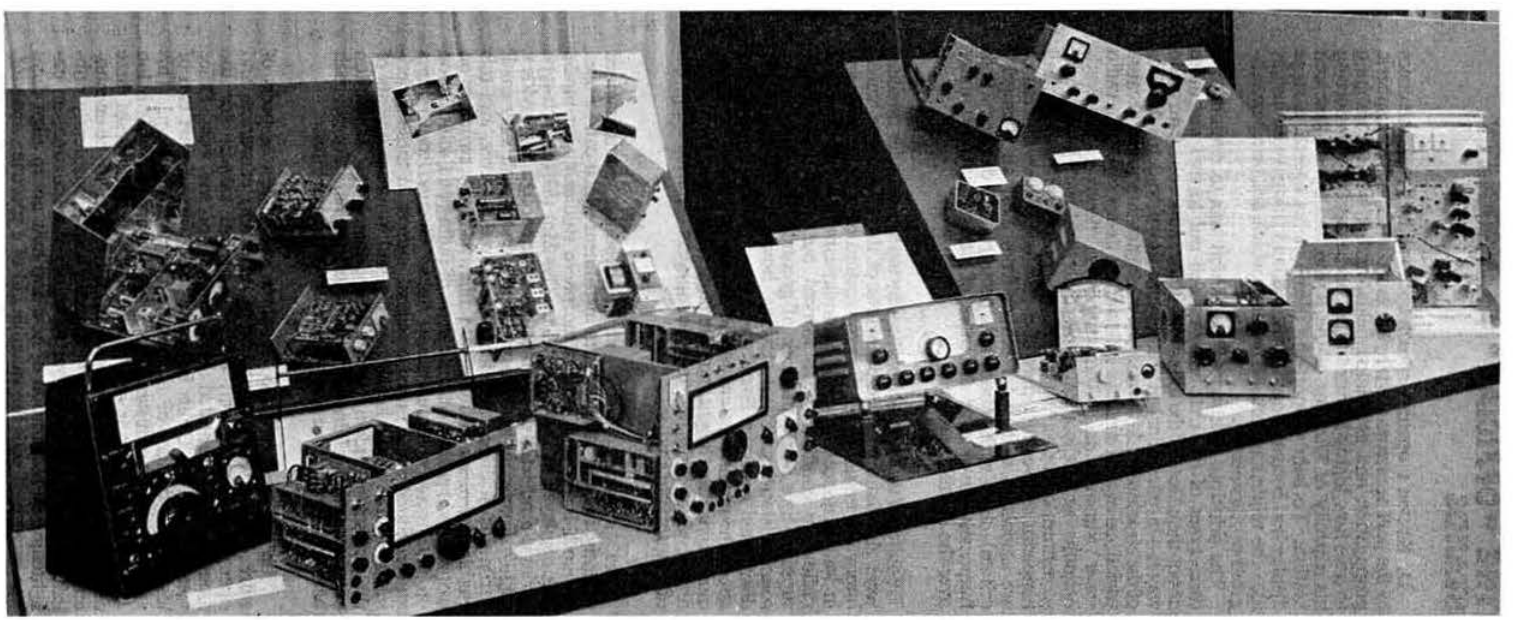
AWARDS

ORGANIZER'S SILVER PLAQUE
D. L. Bowman, G3LUB

HORACE FREEMAN TROPHY
A. L. Mynett, G3HBW
(V.H.F. Tunable I.F.)

PRIZE VOUCHERS
R. C. Hills, G3HRH
T. Brook, G3WBQ
N. G. Hyde, G2AIH
P. T. Beer, G3AM

AWARD OF MERIT
G. P. Golunski, for his Noviset oscilloscope



A lesson could be learnt from the **Army's** technical display, if you suffer from TVI on one of the lower TV bands. A Marconi TF801-A signal generator was tuned to 28 Mc/s, modulated at 100 c/s, and fed through the notch filter illustrated in Fig. 1 to an Eddystone 880-2 receiver tuned to the second harmonic at 56 Mc/s, with another receiver monitoring the fundametal output. The audio outputs were then displayed on a twin channel oscilloscope, and the filter tuned through the harmonic frequency. The attenuation observed was at least 55dB, the noise rising significantly as the bottom of the notch was reached. A Polyscop panoramic display unit verified the curve.

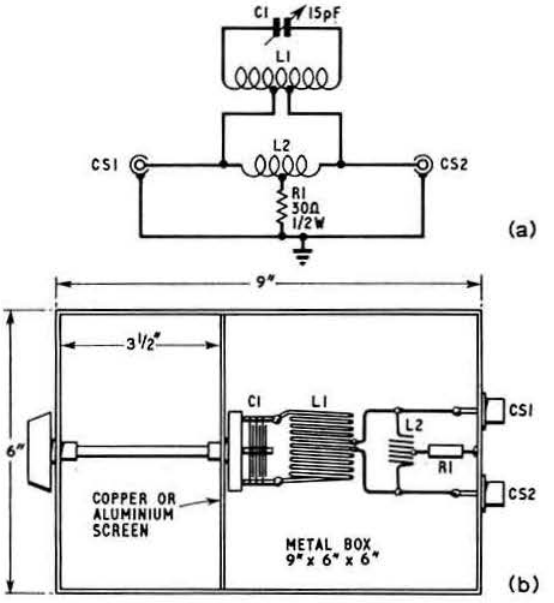
On the other side of the Army stand terminated a direct line from the Royal Signals Amateur Radio Society's station GB3RCS at Blandford Camp, Dorset. Thus it was possible to partially remote control the station at Blandford and make demonstration contacts without mutual interference with the exhibition station. An average of 30 contacts a day was made. The equipment at Blandford consisted of a KW2000A transceiver and a Thunderbird TH3 beam. Close to the station was a demonstration model of the Plessey PR 155 MF/HF communications receiver which is under trial by the Army. A considerable time could be spent thumbing through the manual's circuit diagrams.

The **British Amateur Television Club** encountered several problems in setting up the stand to their rather stringent requirements of lighting, or rather lack of it, but were able to show some excellent colour television pictures from a monitor constructed by Bob Tebbutt, BATC Committtee Member, entirely in his spare time. It took a year, but only cost about £45 in parts. One particularly infuriating alignment problem, incidentally, was that owing to his normal location being distant from the BBC-2 transmitter, the set had to be almost completely detuned to prevent overloading of the final signal circuits! A knob-twiddler's joy was a remote controlled camera, including a zoom facility, constructed by John Tanner, G6NDT/T. The worrying part of this exhibit was the exceptionally expensive lens which had been borrowed and fitted for the occasion. The club had hoped to have a complete colour telecine unit available to be used in conjunction with the monitor, but regrettably, problems prevented this from being ready in time. The BATC subscription is, incidentally, 10s. and subscriptions are handled by the Honorary Secretary, White Orchard, 64 Showell Lane, Penn, Wolverhampton, Staffs.

The **British Amateur Radio Teleprinter Group** staged a working v.h.f. station and succeeded in covering fair distances, working stations such as G3NTT (Tunbridge Wells, Kent), G3BPT (Gravesend, Kent), G3LOX (Rickmansworth, Herts.) and G3WGM (Watford, Herts.). Recruitment of members was quite satisfactory, and G2FUD expected to find a large quantity of completed application forms waiting to greet him when he returned home on the Sunday! As last year, the picture tapes were in much demand by RTTY'ers with tape readers, especially a rather delicious shape in half a bikini. . . .

One of the **Amateur Radio Mobile Society's** principal objectives is to encourage safety whilst mobile, and therefore installed a demonstration set-up of a VOX operated transmitting receiving station. VOX is obviously not particularly convenient on long runs, but when negotiating traffic and roundabouts, it reduces the demands on the driver if a hand does not have to be found to operate yet another control.

An interesting feature of the equipment was the use of a Sinclair 12 watt audio amplifier as a modulator, using a readily available heater transformer to match this to a valve p.a. stage.



The 25 to 60 Mc/s notch filter demonstrated on the Army stand. It is built into a metal box 9 in. × 6 in. × 6 in.; R, 30 ohm, ½ watt; C, 15 pF variable; L1, 10 turns, 12 s.w.g., 1⅜ in. mean diam., 1¾ in. long, tapped at 4½ and 5½ turns; L2, 6 turns, 18 s.w.g., ½ in. diam., ¾ in. long.

Exhibition Stations

This year's exhibition station operated as GB2VHF in the 4m, 2m and 70cm bands. 270 contacts were made during the exhibition period, although v.h.f. conditions were rather flat. A large number of schedules were successfully kept, but it is regretted that many of the 70cm schedules were not completed. The usual problem of reflections from buildings made 70cm operation extremely difficult, some stations " peaking " on headings totally different from the expected! The best 70cm contact from the Show was G3DAH in Herne Bay, with whom c.w. was worked at 559 both ways.

Many enquiries were received about the absence of GB3RS from the h.f. bands. The reason was the presence of a live receiver exhibit in the Show, and it was decided to allow a clear field for this exhibit. The hoped-for u.h.f. link to a good site did not materialize due to unexpected circumstances, but tests made indicate a good chance of such a link for the 1968 Exhibition, when GB3RS should again be active.

Equipment for the station was loaned by G3FRV, G3PHG, and G3SGA; acknowledgement must also be made to Redifon Ltd., who kindly loaned an R408 receiver for the station, and SVS masts. Operators during the Show were G2DP, G3FRV, G3IIR, G3LHZ, G3PHG, G3SGA, G3SGN and G3VEU. Thanks are also due to the aerial erection party for hard work " fore and aft " of the exhibition.

TECHNICAL TOPICS

By PAT HAWKER, G3VA

TRANSMITTING LOOP AERIALS FOR 3·5 MC/S?—DUAL-GATE MOS FET FRONT END FETS AND SICS—COMMON-GATE APPROACH TO H.F. FRONT END GATE DIP OSCILLATOR—HOMODYNE RECEIVER SHOWS PROMISE NEW OUTLOOK ON " ROUND-THE-WORLD-ECHOES " AND EXTREME LOW ANGLE RADIATION—OSCILLATOR KEYING—TWO R.F. ATTENUATORS—NEW 6JE6B

DURING those now distant days before the coming of the Radio Amateurs' Examination, old timers may recall that it was necessary when applying for the British " experimental " licence to include in the application an outline of the proposed experiments for which (officially) the licence was required. Fortunately perhaps, this was never taken too seriously and, at least during the 'thirties, developed almost into a polite game of wits between the would-be amateur and the Post Office.

For instance, if one were unwise enough to say that the licence was needed to develop new techniques in transmitter design, this could be countered by the Post Office pointing out that such work could be carried out satisfactorily under the terms of an " artificial aerial " licence; it was even more foolhardy to indicate an interest in receiver design. Amateur radio operating, of course, was not then considered as any purpose of the licence.

The usual procedure was to concoct (often in collusion with someone who had succeeded in obtaining a licence) an impressive account of how a licence was essential in order to carry out experiments involving either aerials or propagation. I imagine that tucked away somewhere in the PO vaults must be some weird and wonderful experimental projects, few of which were really intended to be carried out. For, luckily, once the coveted licence was issued, the Post Office was discreet enough not to ask the embarrassing question of how the experiments were getting along.

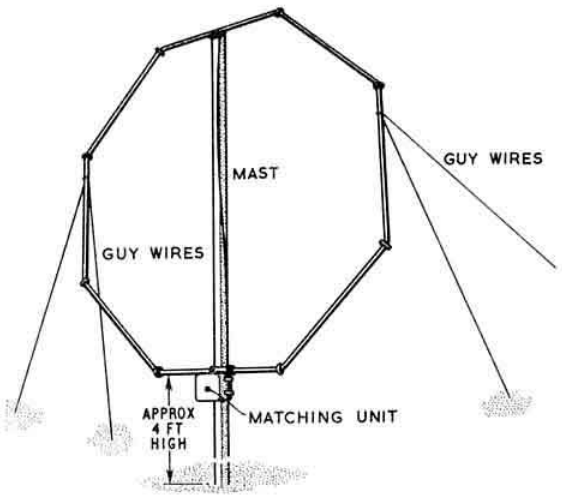


Fig. 1. Sketch of the octagon loop aerial with 5 ft. sides developed for the US Army. It is claimed that the performance matches that of half-wave dipoles up to 40 ft. high, but is easy to transport and to set up. In the balanced version it appears that an earth wire is taken up to the centre of the top horizontal bar from the matching unit.

There is a reason for recounting this fragment of pre-war lore. For if my memory serves me correctly one of the purposes for which " G3VA " was issued was to carry out experiments with compact transmitting loop aerials. Largely by coincidence, some 15 years later I did in fact get round to trying loop aerials in order to put out a 3·5 Mc/s signal from a Central London flat. To judge by the reports received, the loops could not be considered a shattering success.

Nevertheless, it has always seemed that eventually someone might come up with improved techniques for transmitting with loop aerials. And from an excellent account in *Electronics* (21 August 1967) of work by the US Army Limited War Laboratory, it seems that the required push in this direction has come from the tricky problem of operating portable military h.f. radios in the jungles of Vietnam. The article describes a compact octagonal loop (Fig. 1) having 5 ft. sides; this is seriously claimed as " usually doing as good a job as a full-length dipole (from 94 ft. long at 5 Mc/s to 234 ft. at 2 Mc/s) 40 ft. above the ground."

Recalling those 339 reports, this claim—in a journal not usually given to wildly extravagant claims—was enough to set us looking for some magic new approach. In fact, the article makes it clear that no really new principles are involved, but rather that very careful consideration has been given to means of simultaneously raising radiation resistance, and reducing to a minimum the inherent ohmic resistances in the loop and its aerial matching network.

The article points out that in the case of low horizontal dipoles (of a height less than about 0·12λ, or say 30 ft. at 3·5 Mc/s) the reflected wave from the surface of the earth tends to have a cancelling effect on the incident wave (i.e. a dipole at zero height above a *perfectly conducting* earth would have zero radiation). This is because of the phase inversion on reflection.

Conversely, signals from vertically polarised systems (in this case loops but the argument applies to other vertical aerials) are reflected predominantly in phase with the incident wave so that there is no decrease of total radiation with decreasing height. For this reason, it is suggested that wherever an aerial must be severely limited in height, vertical polarization should give improved results. The loop approach was adopted in preference to vertical grounded whips, since the overall height can be much less, and there is no overhead null in its radiation pattern.

Furthermore, the loop does not depend on any artificial ground plane for its efficient operation. While its operation over a good earth would presumably be more efficient than over an extremely poor earth, this is a far less critical factor than with whips or vertical rods tuned against earth.

The author admits frankly that a compact loop is not being put forward " as the best design for every application." It will not, he stresses, " outperform the large rhombic in specific low angle unidirectional tasks. But the loop can do

the job at installations where real estate is limited and a complex of high aerial masts is impracticable " (a situation possibly even more common among amateurs than in military communications). This viewpoint has been confirmed during extensive trials in the USA and in Vietnam, using frequencies between 2 and 5 Mc/s.

Fig. 2 shows the aerial matching network used to feed the loop from 50 or 70 ohm coaxial line throughout this frequency range: for use only on one or two amateur bands, the number of " coarse " impedance settings could be much reduced. This type of matching, it is claimed, keeps resistive power losses to a practical minimum, with no inductive taps or links, and using only air-dielectric and fixed mica-dielectric capacitors. The network shown is approximately balanced about earth (this reduces the peak voltages in the network) but it is said that for low power this is an unnecessary refinement. This matching unit is mounted immediately below the lower horizontal member of the octagonal loop.

The other major reduction in ohmic losses is achieved by using large surface tubing to form the single turn loop (which is shown to be generally preferable to using a smaller multi turn loop). Apparently the earlier models used $\frac{3}{4}$-in. tubing, but a change has been made to $1\frac{1}{2}$ in., and it is thought that in some cases it would be advantageous to increase this even to 3, 4 or 6 in. tubing!

The octagonal loop has its eight sides each 5 ft. long (chosen to allow dismantling and easy transport); this shape increases the area enclosed by 20 per cent beyond a square: even better in terms of area (and hence radiation resistance) would be a circle, but it is suggested that the straight tubes, with what are termed " els " (electricians?) corners, are more readily available.

Altogether, this type of approach to loops seems to offer the promise of efficient aerials for the lower frequency bands in sites where this would otherwise be almost impossible: their value for 1·8, 3·5 and possibly for 7 Mc/s would certainly seem to be well worth investigating if some large diameter alloy tubing is available! One further possibility is also hinted at: that of using the loop as the final output tank circuit of a low power transmitter mounted in the position of the matching unit, so that in effect it forms an active aerial of the " antennafier " type mentioned in *TT* (July, 1967).

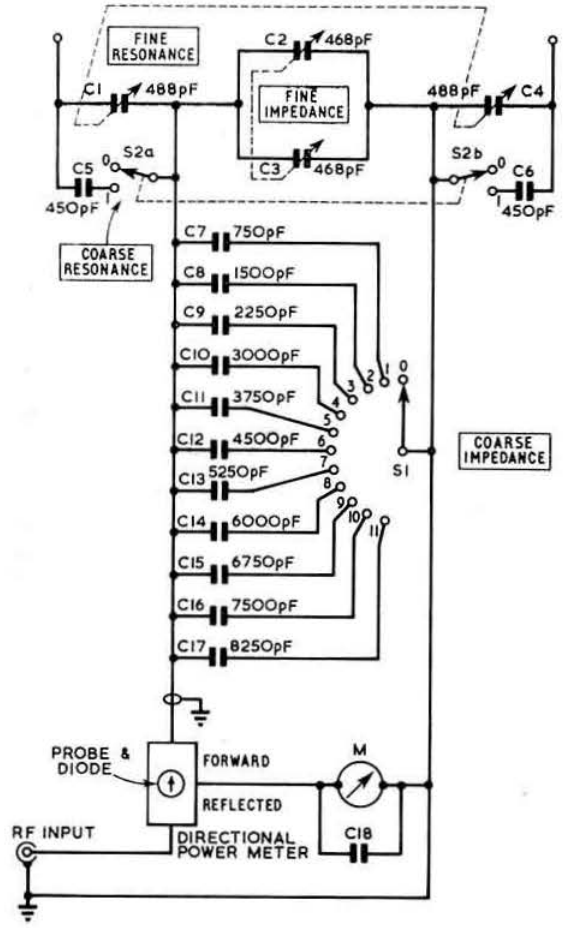


Fig. 2. The low-loss matching unit intended for use throughout the range 2 to 5 Mc/s, incorporating directional power meter to facilitate matching.

Dual-Gate MOS FET Front-ends

In *TT* (January, 1967) attention was drawn to the introduction in the States of development type dual-gate MOS FETs specifically intended for the front-ends of h.f. and v.h.f. communication receivers. These have the important advantage of providing, in effect, a single device cascode-type stage, and facilitate good automatic gain control by allowing the control voltage to be connected to the second gate. At that time, however, as we warned, prices still seemed high for amateur applications.

RCA Great Britain have, however, just announced a whole series of single-gate and dual-gate devices intended for use in communications and television receiver front-ends, and all (in 100-up quantities) at under £1 each. Some of these are rated for 400 Mc/s, others for 200 Mc/s and 100 Mc/s, and one—intended for i.f. stages in television receivers—for use up to 45 Mc/s.

I understand that this batch includes both the 3N140 and 3N141 for use up to a maximum of 200 Mc/s at UK prices for *single units* of 13s. 9d. and 13s. 6d. respectively. The 100-up prices for these units are around the 11s. mark while the 400 Mc/s units (TA7153 r.f. amplifier, TA7308 mixer) have 100-up prices of roughly 18s.

At this sort of price, these dual gate MOS FET units would certainly seem to merit immediate consideration for h.f., v.h.f. and u.h.f. front ends!

The cascode arrangement has the important advantage of reducing feedback capacitance (see the section on the BRS16468 front end) and the 3N140, for example, can give a typical gain of 18dB at 200 Mc/s in an unneutralized circuit, and has a maximum feedback capacitance of 0·03 pF.

The RCA advertisement included a circuit diagram of a typical application for a 200 Mc/s front-end using a 3N140 and 3N141, illustrating how these devices could be used on 144 Mc/s: see Fig. 3.

FETs and SICs

It is illuminating to note just how quickly the field effect family of devices is establishing its importance—a fair proportion of all circuits now appearing in amateur journals now include junction or insulated-gate FETs; yet it is only just over two years ago that *TT* was first hinting at the big developments likely in this field.

Meanwhile also coming along quickly is the linear SIC (see *TT*, January, 1967), with the rapidly growing use of the differential amplifier configuration (basically our old friend the cathode-coupled amplifier in a new guise).

Some recent work reported by Plessey on miniature domestic radio receivers using a single SIC to replace virtually all the conventional circuitry apart from tuned

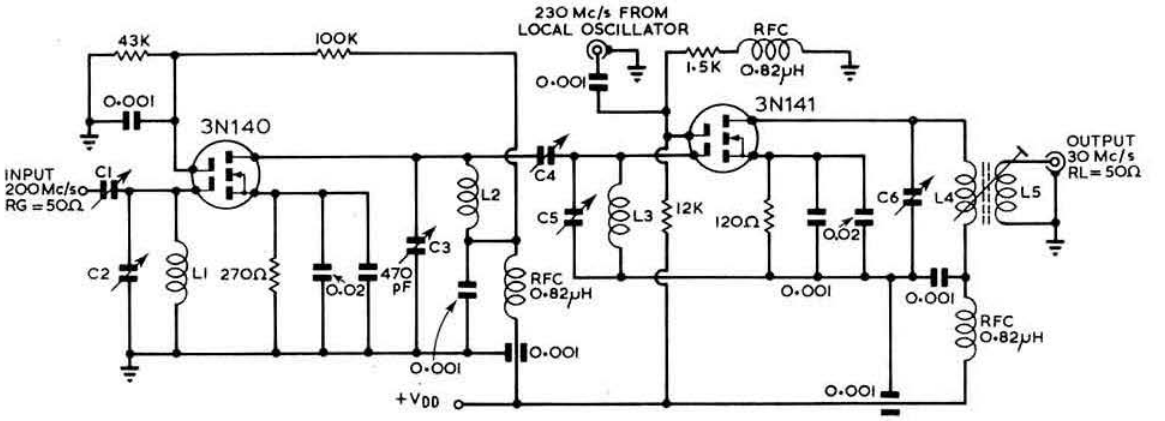


Fig. 3. A typical 200 Mc/s receiver front-end using 3N140 and 3N141 dual-gate MOS FETs.

circuits stressed that " performance matches in general the best conventional transistor designs and in several ways, including crossmodulation and a.g.c., surpasses them." But while the set is basically a conventional 470 kc/s i.f. superhet it notes that " the design bears little resemblance to the conventional transistor (or valve) designs." This reflects the point we have tried to make several times—that SIC circuit approaches are not just a translation of familiar circuits into miniature form but involve a radically different approach to circuitry.

Experimental FET Front-end

In *TT* (September, 1967) a brief reference was made to an interesting letter from C. F. Dorey, BRS16468 of Yeovil on problems of using 2N3819 FETs in the front-end of an h.f. converter, and advocating the use of common-gate rather than the more usual common-source configuration.

He points out that, judged by valve standards, the junction FET is only a humble 6C4-like device, with a drain-gate capacitance of more than 1 pF (up to 4 pF) and a g_m roughly 2·0 to 6·5 mA/V. Thus it could be expected that connections to output or input tuned circuits may have to be effectively tapped down so far to ensure stability that the stage gain becomes too low to be really useful. He admits that one way of coping with this difficulty is to adopt the cascode configuration using two devices or one dual-gate FET, though

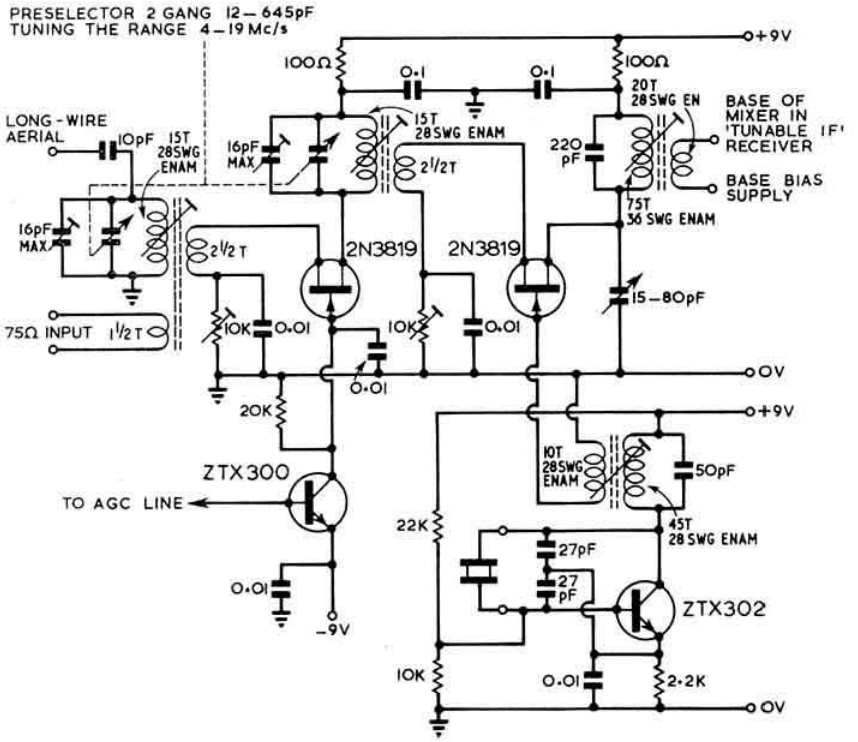


Fig. 4. BRS16468 experimental M.F. front-end using 2N3819 FETs in the common-gate configuration.

The pre-set bias resistors are set for 5mA drain current for r.f. amplifier and 1 mA for mixer. Preselector tuning gang is 12 to 645 pF tuning about 4 to 10 Mc/s. All coils close wound on Neosid 351 formers (0.276 inch o.d.) with Grade 500 dust coils. Coupling windings at signal earthy end, overwound or adjacent. The a.g.c. line is connected to the a.g.c. line of the main receiver which uses p-n-p transistors (earth line of the receiver is connected to the —9 volt rail of converter).

he points out that even dual-gate FETs (particularly the junction type rather than MOS FETs) have feedback capacitances high in comparison with say a 6BA6 (0·0035 pF): he quotes the Motorola 2N126 (dual gate JUGFET) with gate 2 to source as having a C_{rss} of about 0·5 pF.

He therefore believes it to be wishful thinking to expect an FET used as an h.f. amplifier in other than the common-gate or cascode configuration to give both good gain and good stability without involving a load of trouble in attempting neutralization.

To test his views, BRS16468 has been working on an experimental front-end which feeds into a six-transistor trawler-band (2300 to 2600 kc/s) receiver as the tunable i.f. The converter comprises a 2N3819 r.f. amplifier (common-gate); 2N3819 mixer (common-gate to signal, gate injection); ZTX302 h.f. crystal oscillator; ZTX300 a.g.c. amplifier: see Fig. 4. The two ZTX n-p-n bipolar transistors are Ferranti plastic-encapsulated devices.

BRS16468 comments: "The mixer output of the converter was fed into the trawler band receiver with the 20-turn coupling winding substituted for the ferrite rod aerial coupling winding; hence the existing (flatly-tuned) output tuned circuit. This would, of course, better have been made part of the tunable receiver had that part not been a ferrite rod; I did not wish to modify the receiver at this stage. Similarly the a.g.c. arrangement is not very satisfactory, as it needs quite a high level in the germanium detector diode which develops the a.g.c. voltage to turn on the silicon ZTX300 used as a.g.c. "amplifier." These points must be put right when the front-end is incorporated in a complete receiver."

The available pre-selector tuning is about 4 to 19 Mc/s, and BRS16468 has tried the arrangement using a 7506 kc/s crystal (thus tuning 9806 to 10106 kc/s) and with some other crystals, giving about 1½ volts peak-to-peak injection at the mixer. No stability problems have been experienced in the r.f. stage using normal lay-out precautions and screen between r.f. input and output coils. BRS16468 points out that much remains to be investigated, including noise (he gets about 20dB signal-to-noise ratio with an input of a few microvolts at the 75 ohm input), cross-modulation, etc. but he believes that this is a start along the right lines. Some additional notes on common-gate operation were given in *TT* (January, 1967).

Gate Dip Oscillator

In *QST* (September, 1967), W7ZOI suggests that although the transistorized forms of "G.D.O.s" have the extremely useful feature that they work off a small battery, the performance is not really comparable to that of the original valve grid dip oscillators. Instead, he advocates the use of an FET for this application, in effect a gate dip oscillator with a circuit almost parallel to that of the valve arrangement: see Fig. 5.

One difference is the requirement for a rather more sensitive meter, and he in fact uses an external valve voltmeter for this purpose: both arrangements are indicated in the diagram. He also points out that the "split-stator" capacitor can conveniently be formed from one of the miniature ganged-capacitors used in transistor radios. Many of these have unequal capacitances to simplify oscillator tracking, in which case the higher value capacitance section should be connected to the "gate" side of the tuned circuit. Alternatively, a conventional dual 365 pF or similar can be used.

Synchrodyne (Homodyne) Reception

When in *TT* (March, 1967) the circuit of a homodyne receiver using transistors by PA0KSB was included together with the suggestion that a further improvement might come from the use of a balanced FET demodulator, it was with the hope of stirring up some active interest in this "ancient" type of reception, which has been sadly neglected in the era

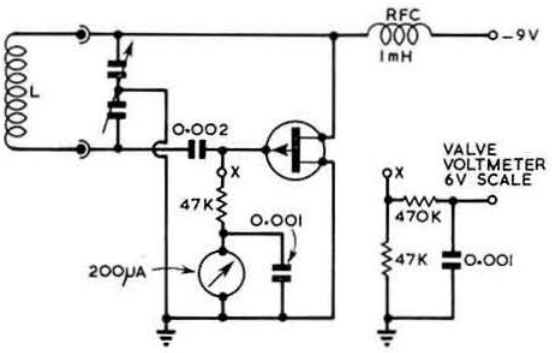


Fig. 5. Gate dip oscillator suggested by W7ZOI. Note that this uses *p*-channel junction FET (e.g. 2N4342, 2N4360) and polarities should be reversed for *n*-channel devices. A slight modification has been made to the original circuit which appears to have an error.

of amplitude modulation. Although this item brought in some correspondence and clearly evoked some memories, the hoped-for positive reaction from readers actually trying out the proposals remained lacking.

But at the recent International Broadcasting Convention our hopes were fulfilled. For we met John Rollason, G3WCO who described some of the work he has been doing on a breadboard 3·5 to 3·8 Mc/s homodyne receiver, roughly of the PA0KSB type but using two junction FETs in the balanced demodulator, and a more stable two-transistor v.f.o., as well as some novel ideas in the high gain a.f. section.

He more than confirmed that the technique is beginning to look extremely promising, and his prototype now gives results on s.s.b. stations "fully comparable" with his usual station receiver, which is a well-known British receiver with crystal-controlled first mixer. The little set is already attracting considerable interest in the Chelmsford area, and he is hoping to rebuild it in a more permanent and reproduceable form (and, it is much to be hoped, may eventually write-up the design). Meanwhile he points out that the extremely high gain required in the a.f. section can involve some screening and stability problems, and makes it essential to use low-noise devices in the early stages of the a.f. amplifier (one gathers that he has adopted some circuit techniques from a well-known colour television camera with which he is professionally concerned). Nevertheless the basic simplicity of the homodyne, with no i.f. section, and yet high selectivity, definitely opens up interesting possibilities for high-performance, low-cost receivers, at least for s.s.b. and c.w. reception.

Interestingly enough in recent weeks we have also come across evidence that some of the professional communications research people are showing renewed interest in this form of receiver.

For those who are really brave and want to try full synchronous detection on a.m. and d.s.b. signals (and on narrow band f.m. or phase modulation), full details of a complete synchronous detector including phase locking and a couple of 7360 demodulators operating in phase quadrature are given by W3DUQ in *73 Magazine* (September, 1967). With one of these at each end of the circuit d.s.b. (suppressed carrier) can be every bit as efficient as s.s.b. plus some additional advantages as well—but one word of warning, the circuit diagram occupies almost two pages and there are some 16 valves and a goodly number of semiconductor

diodes, which you may feel is a bit much just for the detector and a.f. section of a receiver.

Extreme Low Angle Radiation

As one who tries to keep an eye open for new developments in radio communications, but who has no access to classified information (fortunately, since this might inhibit one unduly), it is quite an exercise to note how some new development is freely discussed for a time, and then just when things begin to look really interesting, detailed descriptions cease to appear in the open literature.

One wonders whether this might be the case with current work on " round the world echoes " and the various forms of layer entrapped propagation. These are sometimes known as the " whispering gallery mode," and at one time were usually ascribed to freak ionospheric conditions and tilts; but now seem to be recognized as feasible under almost any conditions. These echoes have been known for many years. During World War 2 a technique was developed by German engineers to use them in order to determine with considerable accuracy (to about one part in 1000) just how far away a distant h.f. transmitter was from the receiver (*Radio Wave Propagation and the Ionosphere* by Ya. L. Al'pert, pages 322 to 325, or *Proc IRE*, 1948 page 581).

They came back prominently into notice when, just over ten years ago, reports on the 20 and 40 Mc/s signals from Sputnik 1 started turning up in unexpected places. The interesting point to note is that echoes which have travelled several times round the world show remarkably little additional attenuation. In the early 'sixties, work on this mode of propagation was carried out at Stanford Electronics Laboratories by R. B. Fenwick and O. G. Villard (a familiar name to readers of *QST*), and in 1958 some observations on this type of propagation were published in the UK in *Marconi Review*.

Then again in the early 'sixties, another factor (which may or may not be connected with such propagation modes) turned up. Careful tests by the Americans showed clearly that the h.f. broadcasting stations controlled by the USSR and China were consistently out-performing their own, the British, and the Japanese stations. The Moscow and Peking signals seemed to be getting through on higher frequencies, for longer periods and at greater strength than those from other transmitters of comparable power. Equally interesting was the observed ability of these particular transmissions, a few minutes after coming on the air, or changing frequency, to peak up suddenly in strength in the particular areas to which the programmes were being beamed; this did not seem to be due to power increase since the signals in non-target areas showed no corresponding increase.

To account for these observations, it was suggested that the Russian and Chinese stations were in fact located at very high sites, and that this might make possible extremely low-angle radiation. Furthermore it was thought that a technique must have been developed whereby the vertical angle of radiation could be carefully controlled and changed to make optimum use of this ability; possibly using some form of back scatter to allow the transmitter engineers to determine just when the optimum conditions had been achieved. All these theories suggested that the Russians had developed ways of utilizing propagation modes other than those described in the classic textbooks.

Meanwhile, and quite disconnected from the broadcasting observations, some interesting experimental work was being carried out in the development of receiving aerials suitable for picking up signals coming in at vertical angles of about 1° or less (compared with say 7 to 15° of good commercial rhombic arrays). For example, two elaborate arrays were put up in Australia: one using the sea to provide a very good ground plane (E. O. Willoughby, *Proc IRE (Australia)*, September, 1960); and the other with an extended wire net ground plane extending out to some 1800 ft. in the beam direction and using some 25 miles of wire (J. F. Ward, *Nature*, Vol. 205, 13 March, 1965).

Now, even with classical propagation theory, good low-angle operation is a desirable characteristic for consistent DX working, as every amateur knows. But, or so one may deduce, all these various ideas seem to be coming together in theories which suggest that extremely low-angle working may give the ability to make use of the " round-the-world " entrapment modes (signals trapped between ionospheric layers which form in effect a waveguide).

This could open the way for far more consistent long-distance working on h.f., with much less disturbance due to disturbed ionospheric conditions, and with relatively low power: it might also in effect increase the top end of " h.f." out to about 60 Mc/s in so far as DX working is concerned. Al'pert, a Russian propagation expert, in the book already mentioned, includes the observation: " It is very interesting that the delay time of the round-the-world echo is very constant. This suggests that the properties of the ionosphere as a whole, as an envelope surrounding the entire world, are on the average quite stable, so that a stable path is continuously provided for radio waves on all the possible propagation paths."

There seems reason to believe that professional communications engineers are becoming alive to the possibilities, and that practical trials are going on. Some of these have used satellites on opposite sides of the globe, and there have been reports that trials last year were " highly successful " in showing that signals trapped between D and F layers suffer relatively little attenuation in travelling half-way round the world. Now, one may guess, work is likely to be concentrated on seeing whether signals can be launched into this mode for point-to-point working, by using ultra low radiation angles.

All this is potentially of considerable interest to amateurs, particularly if some simple ways could be developed (for those of us who do not live on the seashore or on a 6000 ft. mountain) of launching low-angle signals. The idea of 21 Mc/s, 28 Mc/s and conceivably 70 Mc/s being almost continuously " open " may seem far-fetched at the moment: but, if my reading of what has already been openly revealed is correct, by no means out of the question.

Most amateurs will be able to recall many occasions when, out of an apparently dead band, DX signals can be heard steadily and at strengths not readily accounted for by the usual multi-hop propagation theories. It may be that by careful control of vertical as well as horizontal directivity, we may before too long be able to summon up these conditions, almost at will.

Keying an Oscillator

How best to key a valve oscillator without the note being marred by excessive chirp, clicks and thermal heat-cycling is a problem of long standing? Most texts solve it simply by saying " never key the oscillator stage " but, as *TT* has suggested on several occasions, this is rather a defeatist attitude to what can be a most useful facility.

Hints and Kinks (*QST*, September, 1967), WB2ZNT puts forward a system which he uses to improve the keying characteristics of a conventional series-tuned Colpitts (Clapp Gouriet) but which could also be applied to some other forms of oscillator. When correctly adjusted, the system allows the anode and screen currents of the valve to remain substantially unchanged under key up and key down conditions.

Fig. 6 shows the arrangement, with the 1N34A diode " switch " as the heart of the idea. With the key up the diode is biased in its conductive state, and this puts C4 in parallel with C3, reducing the feedback below the value

needed to sustain oscillation. With the key depressed, the 1N34A is in the " off " condition, restoring feedback to its normal value, causing the grid leak bias to increase but the cathode bias to fall. The adjustable cathode bias control (R2) enables the conditions to be adjusted so that there is no overall change in bias conditions. When this is the case, the stage current remains virtually the same whether the valve is oscillating or not.

Interestingly enough, we recall an article some years ago in *Electronic Engineering* showing how keying transients could be eliminated by arranging that the transistor drew the same current whether or not it was oscillating, so that it would seem that there really is an advantage to be gained in this way. In this case it was an audio oscillator.

R.F. Attenuators

Recently we had an opportunity of twirling the knobs and talking to the design team of a new high stability transistorized h.f. communications receiver which has a large number of interesting features (not to mention a price tag quite a bit over £1200). For the moment, the only point we wish to make on this fully synthesized receiver is that we were impressed by the usefulness of the r.f. attenuator with steps of 10, 20, 30 and 40dB attenuation placed immediately between the aerial input and the tuned circuit of the first cascode FET r.f. amplifier. Such attenuators are useful in coping with strong signals even with the dynamic range given by FETs.

Two ways in which this facility could easily be duplicated were noted in *QST* and *CQ*. In *QST* (August, 1967) W1DX provides a very simple switched attenuator for 50 ohm input lines, giving ten different degrees of attenuation (plus straight through) in 3dB steps up to 33dB: see Fig. 7. This unit, built as a compact external shielded unit, needs just 12 ½ watt composition resistors, four double pole double throw switches, input and output sockets and the box.

The *CQ* unit (also August, 1967) by W2EEY/1 is rather more complex, using three diodes to form a continuously variable T-pad r.f. attenuator going from less than 1dB up to some 40dB attenuation: Fig. 8. An additional complication in this case is the requirement of control and reference voltages but the reference voltage can be obtained by a voltage divider across the control voltage.

Improved Line-output Valve

In *TT* (November, 1965) the characteristics of a number of American line output (horizontal sweep) valves were given in respect of their use in transmitter p.a. stages. The valves developed for colour television sets were shown to be particularly attractive, including the now popular 6HF5. Another valve of comparable performance was the 6JE6. A recent announcement by the UK office of International General Electric of New York (296 High Holborn, London WC1) reports the introduction of a modified form of this valve, designated the 6JE6B. It is claimed that this provides increased reliability at no extra cost, cooler operation and very low primary beam plate emission. Other improvements include a new copper cored anode material and a lower temperature cathode. It would seem to be a type number worth bearing in mind.

Here and There

A note from Doug De Maw, W1CER of ARRL HQ, points out that the two diode product detector (*TT*, September, 1967) was originally described by Byron Goodman, W1DX of ARRL in *QST* for May 1965, and derives from a 6H6 valve circuit devised by Don Norgaad, W2KUJ, way back in 1948. The circuit is in recent editions of the *ARRL Handbook*. We are glad to put this on record, particularly since another of W1DX's circuits (" The Miser's Dream " front-end) from his 1965 article was used in *TT*. But it is difficult to remember just where every circuit first appeared!

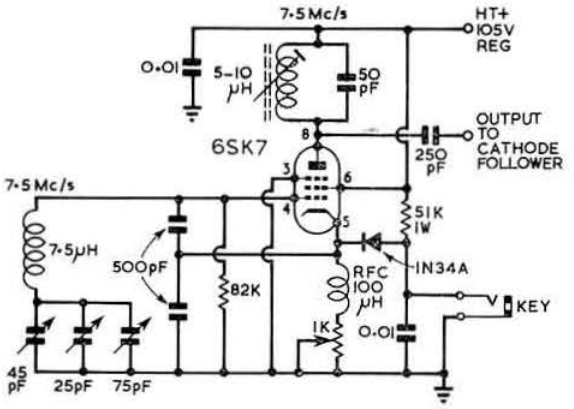


Fig. 6. The WB2ZNT oscillator keying arrangement providing substantially similar anode and screen currents in key up and down positions.

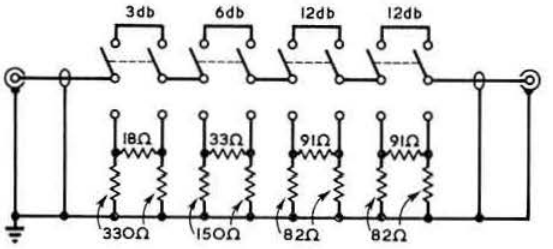


Fig. 7. Simple step attenuator for 50-ohm input line.

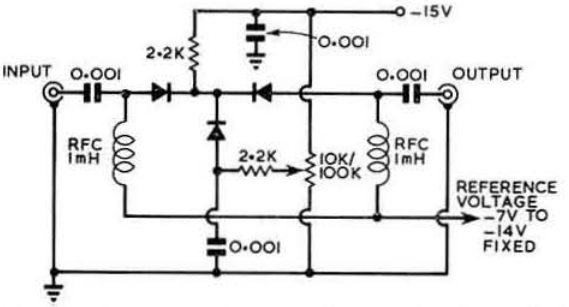


Fig. 8. Diode r.f. attenuator to provide continuously variable attenuation up to about 40dB. Diodes typically 1N527 or 1N840.

It is now possible to buy a transistor (TRW 2N5178) capable of providing no less than 100 watts output at 500 Mc/s—but it does *not* come cheaply. Actually it consists of 16 separate transistor cells on two chips mounted in the same package.

A recent *QST* design for a low-noise cascode FET 144 Mc/s converter uses a 2N3390 transistor in lieu of a 9-volt Zener. The emitter is connected to the h.t. line, collector/base strapped to chassis.

For those interested in the DDRR (directional-discontinuity " hula-hoop " aerial, I1MK gives details of a ½λ version for v.h.f. in *CQ* (September, 1967), including full dimensions for 145 Mc/s.

MOBILE COLUMN

Woburn Abbey Mobile Rally, 10 September, 1967

The second of the annual RSGB Mobile Rallies took place at Woburn Abbey on Sunday, 10 September, 1967, and though not able to match the numbers of flower people at their "love-in" the attendance of power people at their "talk-in" was excellent. Perhaps our broad hint in connection with the Gilwell Rally had its effect because the roped-off car park proved to be pitifully inadequate and there was a great overspill on to the surrounding parkland. Your scribe set out to count the cars and gave up at 400.

A spell on duty at the signing-in table was an education in itself because amongst the four hundred odd signatures, most of them accompanied by a call-sign, are some of the household names of Amateur Radio.

Trade exhibitors included Imhof Ltd, KW Electronics Ltd., and J-Beams together with a number of smaller traders all of whom displayed a wide variety of excellent products and components. The Mobile Committee has tried to ensure that only bona fide dealers are granted sales space at mobile rallies and the range and quality of equipment and components on sale at Woburn proves the soundness of this policy.

Of particular interest was the welcome appearance of the Manchester RAEN Group under their Area Controller, John Scarborough, G3MBQ, who brought their mobile communications centre to show what can be done when good leadership combines with keenness and ingenuity. Fitted for 2, 4 and 160m a.m. operation and a teleprinter link the existence of this self-contained caravan gives the lie to the oft-repeated comment that RAEN is unnecessary. Those members of this Group who took part in the rescue operations at the Stockport air crash know otherwise.

Once again the Lea Valley Model Aero Club gave an excellent display of radio-controlled flying, Uncles Joe and Harold did the honours at the Children's sports and the weatherman did his best to provide a fine day, though there were times during the afternoon when he almost lost control.

Much has been said and written about the spirit of Amateur Radio and the good fellowship of those whose hobby is communication was evident amongst the groups of old and new friends dotted about the Rally site. It is therefore particularly distressing to have to warn members that not all of our licensed colleagues feel this way. There were those at Woburn who apparently thought they had as much right to property as the owner and we would be failing in our duty if we did not take this opportunity to warn members attending mobile rallies not to leave equipment in reach of hands which might be tempted and to make sure that car doors are locked when their occupants are away. To be forewarned is to be forearmed.

Our thanks to all those who helped to organize and run this very successful rally. To His Grace, The Duke of Bedford for his permission to use the grounds and other facilities of Woburn Abbey and to his Controller, Mr P. W. Amphlet for his assistance. To J-Beam Aerials for providing the 2m talk-in station and for loaning and erecting the omni V aerial, the Manchester RAEN Group for providing talk-in on 4m and to Swanco for providing solid state CSE equipment for use on 160m.

We hope all who attended had a pleasant day, including our long suffering YLs and XYLs, and look forward to our next season of mobile rallies.

A good crowd milling around the stands at the Woburn Rally.

Woburn: obvious signs of a good turnover with some 400 potential customers!

Swindon Mobile Rally 1967

The second Mobile Rally organized by the Swindon and District Amateur Radio Club took place on Sunday, 3 September 1967 at Lydiard Park, about three miles west of Swindon. The accommodation consisted of a large marquee to house the trade exhibitors, the bring and buy stall, the quiz-competitions and the raffle-stall, and three smaller tents for the tea-stall, the talk-in stations and the reception. In the event, the day began in pouring rain but we were able to find enough room for everybody under cover, and did not need to use the additional accommodation which had been arranged in Lydiard Mansion itself.

About 150 cars arrived, with 54 of them fitted for mobile working. Talk-in stations were working on 1920 kc/s a.m., 3720 kc/s s.s.b. and 144 Mc/s, with the Top Band Station by far the busiest. A guess at the attendance figures would make it about 450 people. A 9M1 and a WB4 signed in as the best DX present, and G3HCL from Beuman's, Anglesey won the prize for the longest distance travelled on the day. Other prize-winners were: Mobile Safety Award, G3NXV/M;

(Continued)

Headquarters Staff Vacancy

A vacancy exists on the Headquarters staff for a technical assistant. His duties will consist mainly of dealing with correspondence and enquiries on technical matters and liaison with manufacturers and dealers. Possession of an amateur licence is desirable but not essential.

If you would like to be considered for this position please write, giving brief personal particulars and salary required to N. Caws, Honorary Treasurer, 20 Hamilton Road, London, W5.

Best home-brew mobile rig, G2HFG/M; Best commercial rig, G3NAC/M; runner-up, G8FU/M; Longest talk-in contact, G3NXV/M; runner-up, G3JTK/M.

To cater for the XYL's, a special ladies' raffle was run for a tea-service, a stole, a table-lamp and other things guaranteed not to appeal to the OM. For the children, the North Wilts Model Engineering Society gave rides on their model railway, and the boys joined in a twenty-a-side football match.

Owing to the generosity of the trade exhibitors, there were plenty of prizes for the big raffle and for the side-shows, and each programme contained a small assortment of components.

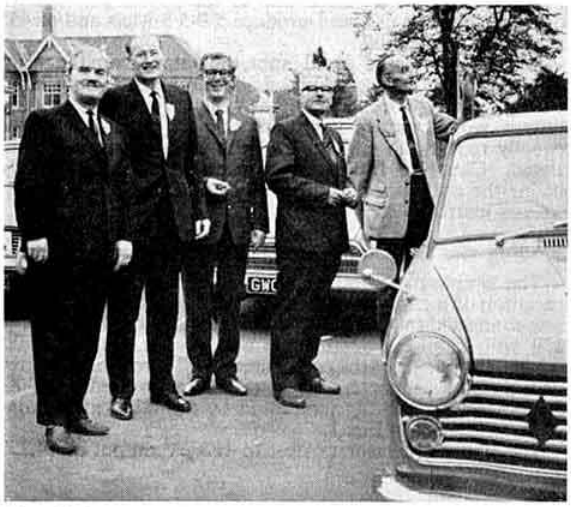
A shot across the trade stands at the Swindon rally.

The Region 10 ORM

BY noon on Saturday, 16 September, a number of visitors had arrived at the University College of South Wales and Monmouthshire in Park Place, Cardiff, where the ORM was to be held. An excellent trade show, members' equipment and the facilities for personal QSOs occupied the time until 2.30 p.m. when the Business Meeting commenced in one of the Lecture Theatres of the University.

After an introduction by Cyril Parsons, GW8NP, the Regional Representative, Council Representatives, Jack Etherington, G5UG and Roy Stevens, G2BVN, provided news on Society matters. Mr G. C. Price, GW2OP, paid tribute to the excellence of the facilities provided for the meeting. The Business Meeting embraced a lively discussion on many points affecting the amateur service and the Society and a number of members raised points in connection with television interference. It seemed that in some cases the actions of GPO Engineers were not in accordance with the established procedure. Members were reminded that at present there is no Council Member representing Zone E, comprising Regions 10 and 11.

At 4.30 p.m. an excellent meal was provided by a group of ladies led by Mrs Jean Parsons, and thus fortified, members assembled to hear the results of the draw and the competitions for home constructed and mobile equipment. First prizes in these were awarded respectively to GW2BFD for a G2DAF type s.s.b. transmitter and to GW8UH. The highlight of the Meeting was due at 6 p.m. when Professor C. A. Taylor, Professor of Physics at the University commenced a lecture under the title of "Images". This was at the same time instructive and entertaining, and many physical phenomena connected with mirrors, lenses and prisms were illustrated by demonstrations visible to the audience, both directly and on closed circuit television. One most interesting demonstration involved the use of a gas laser and three dimensional photography, and a further application of laser technique showed the heat radiated from the lecturer's hand! Professor Taylor, who at one period had been engaged in research on aerial techniques, drew attention to the link-up between physical and radio phenomena.



Five Welshmen who attended the Region 10 ORM: GW5BI, GW3LAD, GW3RWX, GW8UH and GW3HJR.

Single Sideband

By G. R. B. THORNLEY, G2DAF*

Alignment of a G2DAF-Type Receiver

Part 6

IT has already been stated that with the injection to the second mixer V4 taken from the anode of the v.f.o. valve the white noise output was excessive, and that this was reduced by taking the injection to the mixer from the v.f.o. *cathode* circuit (see page 184, " Single Sideband," March 1967).

In this position the available heterodyning input to the mixer V4, measured with a Salford Valve Voltmeter Type BW211B at pin 7 of V4, was 0·75 volts r.m.s. (tuning dial at mid-band position).

The receiver was then checked for spurious responses as follows:

1. 75 ohm dummy load into aerial input socket.
2. R.F. and AUDIO gain controls at maximum.
3. Mode switch in L.S.B. position.
4. PRESELECTOR tuning control kept in resonance while the main tuning control is slowly traversed across the complete 500 kc/s range on each of the eight amateur bands in turn.

It was found that there were a number of birdies (about four) on the 15m band, and one on each of the 10m bands. The 15m birdies were the strongest—not sufficient in amplitude to move the " S " meter at all—but with the AUDIO GAIN at MAX, audible from the speaker.

As the r.f. by-passing and the mechanical construction of the receiver was beyond reproach, it was reasonable to conclude that the v.f.o. might be running at too high a level and that higher order harmonics had sufficient amplitude to beat with the second harmonic of the 26,500 kc/s heterodyning crystal in use, and produce 5·0-5·5 Mc/s and/or 455 kc/s spurious signals.

For a given wanted signal input, the output from the mixer is proportional to the amplitude of the heterodyning input voltage. It therefore follows that while a reduction of v.f.o. output would reduce the amplitude of birdies, it might equally reduce the amplitude of the wanted amateur band signal. Clearly a little further investigation to accurately define the optimum injection voltage into the second mixer V4 was worthwhile.

Finding the Optimum Level of V.F.O. Drive Voltage

The simplest method of controlling v.f.o. output is by variation of h.t. supply voltage. A 100 K ohm potentiometer was connected to a length of twin flex and wired between the 150 volt stabilized supply line and chassis, on the audio compartment side of the cross-screen feed-through capacitor, with the slider connected to the existing v.f.o. feed line—the available voltage being monitored by the AVO meter connected as shown in Fig. 1.

The signal generator was set to 100 μV output at 14,250 kc/s—the 75 ohm dummy load removed—and the signal generator output lead connected to the receiver aerial input socket. The main dial and preselector being adjusted for maximum S meter deflection. A graph was then plotted showing signal strength indication as a function of v.f.o. h.t. supply voltage. After these readings had been taken the valve voltmeter was connected to the v.f.o. valve cathode pin, and a second graph was plotted showing the r.m.s. output voltage as a function of h.t. supply voltage. The two curves obtained are shown in Fig. 2

It will be noted that maximum signal output occurs at an injection amplitude of 0·75 volts r.m.s. and that increasing the injection beyond this point actually results in a *reduction* of wanted mixer output. Having found that the maximum wanted signal occurred at an injection voltage of 0·75 volts r.m.s. taken from the cathode of the v.f.o. valve, it was clearly of interest to know what happened when the same injection level was taken from the *anode* of the v.f.o. valve and in addition whether the white noise component of the v.f.o. output followed the same law.

The first need was to measure the total receiver white noise output under the existing " cathode coupled " conditions. Accordingly the signal generator was disconnected from the receiver aerial input socket and the socket loaded with the 75 ohm dummy load (Belling-Lee L734/PAL plug with a 75 ohm carbon resistor wired across it) and the Model 8 AVO meter was set to the 100-volt a.c. range and connected across the output transformer primary winding. With the A.G.C. switch set to OFF, the AUDIO GAIN control advanced to MAX and the MODE switch in the L.S.B. position (receiver still tuned to 14,250 kc/s) the white noise output was found to be as follows:

PRESELECTOR off tune . . . 6 volts r.m.s.
PRESELECTOR at resonance . . . 13 volts r.m.s.

The mixer injection grid feed capacitor was then removed from the v.f.o. cathode and connected to the anode pin (as shown in the original circuit, Fig. 2 page 105, " Single Sideband," February 1967 BULLETIN; and in the circuit of Fig. 46, page 36, " Communication Receivers " Edition Two, by G. R. B. Thornley, G2DAF). The 100 k ohm h.t. feed

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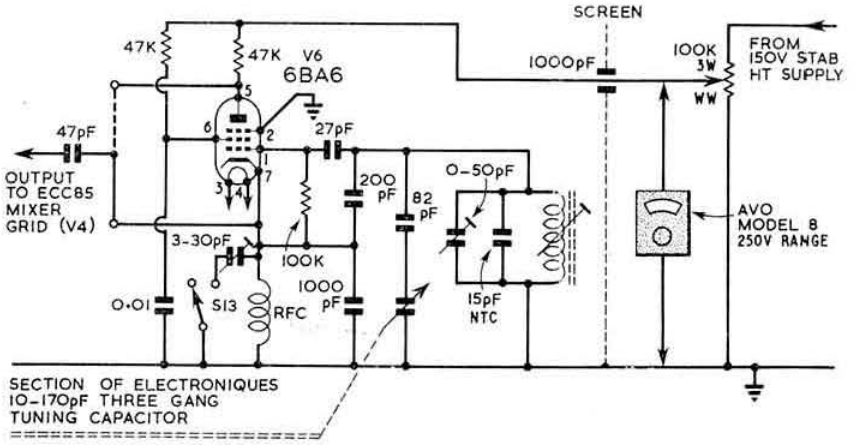

Fig. 1. V.f.o. circuit showing the temporary test set-up enabling the r.f. output to be varied as required. Note: The tuning and padding capacitor values shown are suitable only for the Electroniques 10-170 pF tuning gang. S13 is ganged to the sideband switch.

potentiometer was then set so that the valve voltmeter (connected to pin 5 of V6) showed the optimum injection of 0·75 volts r.m.s. White noise output was again measured as follows:

PRESELECTOR off tune . . . 49 volts r.m.s.
PRESELECTOR at resonance . . . 49 volts r.m.s.

Replacing the 47 k anode feed resistor with an r.f.c. and setting the v.f.o. to the same 0·75-volt injection voltage gave the following noise figures:

PRESELECTOR off tune . . . 16 volts r.m.s.
PRESELECTOR at resonance . . . 20 volts r.m.s.

Comparison of these two groups of figures clearly shows that r.f. current flowing through the 47 k resistor is contributing excessive noise and that this noise was reduced by almost 10dB by feeding the anode potential through an r.f. choke.*

Inspection of the three sets of noise figures shows that partition noise caused by the action of the internal screen grid on the electron stream is adversely affecting the overall receiver signal-to-noise ratio, and that a material improvement is possible when the cathode connection is used.

As the output side of the v.f.o. valve is no longer going to be used, there is no point in continuing with the pentode connections. Accordingly the screen and anode (pins 6 and 5) were strapped together and by-passed to ground; the revised circuit being shown in Fig. 3. A check with the valve voltmeter showed that the new circuit arrangement gave 0·7 volts r.m.s. at the cathode of V4 with the full 150 volt stabilized supply to the combined anode and screen feed resistor. The white noise output was checked and found to be as follows:

PRESELECTOR off tune . . . 5 volts r.m.s.
PRESELECTOR at resonance . . . 14 volts r.m.s.

Final Spurious Output Check

Having reached the stage where the optimum v.f.o. output and mixer injection level had been finalized it now remained to ascertain the effect of these alterations on the level of birdies on each band in turn (the term " birdie " is amateur parlance for the whistle produced when the sum or difference frequency of two of the internal oscillators falls either within the range of the tunable i.f. (5·0-5·5 Mc/s) or the second 455 kc/s i.f. passband). Birdies are self generated whistles and are invariably very sharply tuned because they are caused by higher order harmonics of the v.f.o. beating with a fixed oscillator—usually the first conversion crystal fundamental or second harmonic.

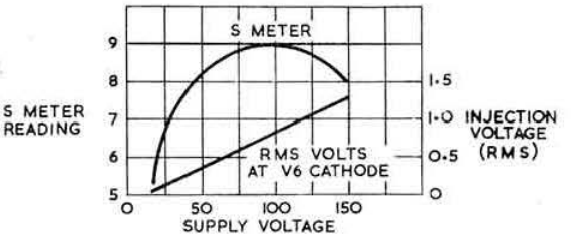

Fig. 2. Graph showing the relation between the S meter reading obtained and the v.f.o. supply voltage. The resulting v.f.o. r.f. output for the different supply potential is also shown. It will be noted that maximum receiver sensitivity occurs with a mixer injection voltage of 0·75 V r.m.s. (the S meter readings were obtained with a 100 microvolt signal input at 14,250 kc/s into the receiver aerial input socket.)

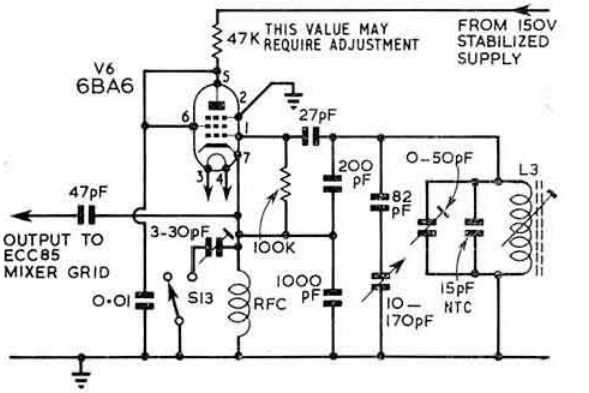

Fig. 3. Recommended v.f.o. circuit showing the GBA6 valve wired as a triode and the mixer injection taken from the cathode pin. The optimum r.f. output voltage (measured at V6 cathode) is 0·7 to 0·75 volts r.m.s. As the v.f.o. output will be affected by the chassis lay-out and the quality of coil former used for L3, no two receivers will be the same. The drive voltage can be finally adjusted to the required level of 0·7-0·75 V. by changing the value of the combined anode and screen feed resistor.

* It is possible that the particular make 47 k ohm resistor used by G3OCX was a "noisy" specimen. However the general conclusion remains the same that the ECC85 mixer—under the operating conditions given in the circuit—works best with an oscillator grid injection voltage of 0·7 to 0·75 and that self generated white noise is materially reduced when the v.f.o. output voltage is fed from the oscillator cathode circuit.

Normally a pure c.w. signal will appear to have a bandwidth on the tuning scale of 3 kc/s—the same as the mechanical filter bandwidth. Check this on your own receiver by switching on the calibration oscillator and traversing the the tuning dial while watching the S meter. It will be seen that the heterodyne appears to be 3 kc/s wide and falls off rapidly in amplitude as it drops down the slope of the 455 kc/s i.f. response curve.

If a birdie is caused by the second harmonic of the v.f.o. it will appear to be only 1·5 kc/s wide (the harmonic is moving twice as fast relative to the normal tuning rate). If the birdie is caused by the third harmonic of the v.f.o. it will appear to be 1·0 kc/s wide; the fourth harmonic 0·75 kc/s wide; the fifth harmonic 0·6 kc/s wide; the sixth harmonic 0·5 kc/s wide . . . and so on. Careful inspection of the tuning dial traverse will usually indicate the v.f.o. harmonic order that is causing difficulty. Birdies caused by low v.f.o. harmonic orders beating with the strong wanted output of the conversion oscillator indicate bad design—these should have been eliminated by a better choice of tunable i.f. and v.f.o. fundamental range—and this is of course the responsibility of the circuit designer. Of further note is the fact that it is quite impossible to find any frequency combinations at all where higher order harmonics (from the fifth up to the fifteenth) will not beat with the first conversion oscillator to produce either the first or second i.f. frequencies. As an example the fourteenth harmonic of the v.f.o. tuning 500 kc/s will sweep across 7·0 Mc/s—this is the whole of the frequency spectrum from one amateur band to the next one. Fortunately the higher order harmonics above the fifth have little power and if the v.f.o. is run at the lowest possible level and has a " clean " output producing a pure sine wave with a low level of harmonic distortion and the receiver construction and r.f. by-passing on common supply leads is as it should be, there should not be any birdies on any of the amateur bands at a level that could interfere with a wanted weak signal.

With the 75 ohm dummy load in the aerial input socket, all gain controls were turned to Maximum. The main tuning was then traversed right across the 500 kc/s range on each of the amateur bands in turn to finally check the receiver performance in regard to self-generated birdies. The results are given in Table 1.

TABLE 1

Band (Mc/s)	Dial setting at which birdie appears (kc/s)	Remarks
29–29·5	Nil	
28·5–29	Nil	
28–28·5	28,288	Does not move S meter at all. Audible from l.s. with audio gain at max.
21–21·5	Nil	
14–14·5	Nil	
7–7·5	Nil	
3·5–4	3607	Does not move S meter at all. Weak audio signal from l.s. with audio gain at max.
1·5–2	Nil	

Conclusion

This series of articles covering the alignment of a G2DAF-type receiver has been written specifically with the object of helping constructors to get the maximum performance and operating pleasure from their own G2DAF receivers.

For the information to be of value under all situations it has obviously been necessary to cover every possible fault condition, and then deal with this in a step-by-step detailed manner. Most certainly this does not imply that every owner of a G2DAF receiver will automatically have all of these troubles. In fact, a great many owners report straightforward alignment without any difficulty. They all emphasize the fact that although the construction of a dual conversion high performance receiver involves a considerable amount of hard work, the satisfaction when the work is completed and the receiver in use on the present crowded amateur bands makes it all very well worth while!

Every constructional project undertaken by the writer has been concluded by measuring and recording final performance figures. These figures are invaluable for future reference or for future comparison. The G3OCX version was the first (complete in one unit) G2DAF-type receiver the writer had handled using the 6BZ6 r.f. valve and the ECC85 low noise double triode mixers. Before the receiver was returned to its owner, the opportunity was taken to determine the final performance figures. These are given in Table 2.

TABLE 2

G2DAF Mk. 2 Receiver Final Performance Data

Band (Mc/s)	Input for 10dB S/N Ratio (μV)	Input for 20dB S/N Ratio (μV)	Noise factor (dB)	Image rejection (dB)	White Noise Output Preselector (volts r.m.s.) off res.	on res.
1·5–2·0	0·26	0·6	6·5	92	5	16
3·5–4·0	0·27	0·64	9	92	5	10
7·0–7·5	0·3	0·76	9	92	5	10
14–14·5	0·28	0·68	8	78	5	12
21–21·5	0·28	0·7	9	77	5	10
28–28·5	0·3	0·75	9	67	5	11
28·5–29	0·3	0·75	9	70	5	11·5
29–29·5	0·3	0·75	9	66	5	12

I.F. Break-through Rejection
Receiver tuned to 3·8 Mc/s = 62dB (Signal generator input into aerial terminal)

Image Rejection—Second mixing process
Tunable i.f. at 5·25 Mc/s = 68dB (Signal generator input into V2, first mixer, grid. Conversion oscillator disabled by removing valve.)
(Input frequency 6·16 Mc/s)
Tunable i.f. at 5·25 Mc/s = 96dB (Signal generator input into aerial terminal. V2 replaced.
(Input frequency 2·84 Mc/s) Preselector resonated at the normal receiver input frequency of 3·75 Mc/s.)

Stability
After initial warm-up period of 10 to 15 minutes, v.f.o. was to all intents and purposes " rock stable." It was always possible to tune in a crystal controlled transmission, switch the receiver off, switch it on again several hours later, and find that the transmission would come into tune during the warm up period.

Radio Society of Great Britain

NEW RUSKIN HOUSE, 28 LITTLE RUSSELL STREET, LONDON, WC1

Patron:

H.R.H. THE PRINCE PHILIP,

DUKE OF EDINBURGH, K.G.

COUNCIL 1967

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Immediate Past President
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† Ceased to be a member of Council 10th July 1967
‡ Ceased to be a member of Council 7th July 1967

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D. W. ROBINSON, M. Inst. P. S., G3FMT

Secretary
C. P. POPE

Auditors
EDWARD MOORE & SONS
Chartered Accountants

Bankers
BARCLAYS BANK LTD.

REPORT OF THE HONORARY TREASURER

I have pleasure in submitting to the Members the Balance Sheet of the Society at 30th June, 1967 and the Income and Expenditure Account for the year to the same date.

I am pleased to report that the Income and Expenditure Account shows a reduced excess of Expenditure over Income—*£501* compared with an amount of *£1,198* for the previous year.

At the Annual General Meeting I shall deal with the Balance Sheet and Income and Expenditure Account in detail, but I want to call attention in this Report to some general items.

It is satisfactory to note that the receipts from Advertising in the BULLETIN still show an increase over the previous year although only by a small amount. I think there can be no doubt that the response that the Advertisers are receiving from their advertisements must be the reason for this. Our thanks must go accordingly to all the Members who are taking the trouble to notify Advertisers that their purchases are made as a result of the advertisement in the BULLETIN. I do ask that members will be good enough to continue to do this.

I am also pleased to report that the cost of the BULLETIN has been kept in hand and does show a small reduction in spite of continued increases in expenses of production.

The annual Exhibition is a further source of contact with our Advertisers and our thanks must be given to all those whose sterling efforts contribute to the continued success of this function.

The Receipts from Subscriptions reflect the new increased rates and represents a full year's income. The Society has accordingly been enabled to deal with the salaries and wages of the staff in an adequate manner.

The increase in the cost of travelling, etc., is due mainly to the meeting of the Regional Representatives held in 1966 and to the expenses of bringing Council and Committee members to meetings. It is felt that this expenditure is well justified in the benefit accruing from the discussion of regional problems.

It will be seen from the Balance Sheet that a substantial amount has been carried forward for the advance expenditure of future publications. I am glad to report that as a result of current sales both from Headquarters and at the recent Exhibition (1967), a large proportion of this amount has already been recouped.

I would be very glad if any member has questions to be asked at the Annual General Meeting, he would kindly put these to me in writing beforehand so that there will be no doubt about the information required being available at the meeting.

In closing this brief report I would like to thank the Staff at Headquarters for the continued assistance that has been given in connection with the Accounts and in particular to both them and Council and Committee members for their assistance during my prolonged stay in hospital.

NORMAN CAWS, *Honorary Treasurer*

RADIO SOCIETY OF GREAT BRITAIN

(COMPANY LIMITED BY GUARANTEE)

New Ruskin House, 28 Little Russell Street, London, WC1

INCOME AND EXPENDITURE ACCOUNT
for the year ended 30th June, 1967

1966 £	1966 £			1967 £	1967 £	
			INCOME			
	26,320		Subscriptions (including proportion of Life Members' Subscriptions)			32,411
	6,360		Profit on Sales of Publications, etc.			4,123
	17		*Profit on Sale of Furniture*			—
	1,226		Interest on Investments (Gross Amount before deduction of Income Tax)			1,022
	132		Deposit Interest			135
	34,055		**Total Income**			37,691
			EXPENDITURE			
2,034			Rent, General and Water Rates, Cleaning, Lighting and Heating		2,193	
7,894			Salaries, Staff Pension Premiums, National Insurance and Selective Employment Tax		10,224	
226			Payments to Past Employees		226	
276			Telephone		371	
1,336			General Postages		1,272	
1,158			Printing and Stationery (including Articles of Association and Publicity Leaflets)		1,510	
383			Staff Luncheon Vouchers		401	
236			Insurances		229	
100			Bank Charges		100	
262			Repairs and Maintenance		95	
68			Legal Expenses		90	
131			Audit Fee and Sundry Accountancy		215	
459			Sundry Expenses		551	
—			Contribution to Edward Appleton Memorial Appeal		25	
25			*Contribution to EuOscar Fund*		—	
453			Depreciation of Furniture and Equipment		482	
143			Membership Certificates and Badges		81	
178			Awards, Trophies and Contests		186	
12			Tape Recorded Lectures		33	
716			Cost of QSL Bureau		804	
243			Contribution to IARU Region I Division		336	
162			General Meetings (Cost of Printing and Hire of Hall)		128	
441			Net Cost of Exhibition (Note 1)		589	
275			*Cost of Daily Mail Exhibition*		—	
8			*IQSY Newsletter*		—	
108			Cost of Beacons		8	
405			IARU Region 1 Conference, Opatija (Note 2)		55	
			Bulletin distributed free to Members—			
20,164			Printing, Postages, etc.	20,111		
4,884			*Less* Receipts from Advertising	4,968		
	15,280				15,143	
	—		Presentation to Mr F. G. Lambeth, G2AIW		102	
			Travelling, Entertaining and Meetings—			
347			Council and Committee Meetings	361		
1,104			Council and Committee Members	1,373		
335			Regional, Club, Overseas and Foreign Meetings less surplus on various rallies and conventions	196		
75			RAEN Committee Meetings and Expenses	79		
46			Representatives' Expenses	69		
—			Regional Representatives' Conference	290		
21			London Lectures	49		
313			Sundries	326		
	2,241				2,743	
		35,253	**Total Expenditure**			38,192
		£1,198	**EXCESS OF EXPENDITURE OVER INCOME FOR YEAR ENDED 30th JUNE, 1967**			£501

BALANCE SHEET 30th June, 1967

1966 £	1966 £	1966 £	1966 £		1967 £	1967 £	1967 £	1967 £
				CURRENT ASSETS				
				Cash at Bank and in Hand				
	2,922			On Current Account and in Hand		762		
	4,500			On Deposit Account		1,250		
		7,422					2,012	
		1,720		Debtors, *less* Provision for Doubtful Debts			1,698	
		454		Payments in advance			379	
		1,354		Advance expenditure for future Publications			5,062	
		3,856		Stock of Publications, etc. (as certified by the General Manager)			3,284	
			14,806					12,435
				FIXED ASSETS				
				INVESTMENTS AT COST				
	10,774			Quoted at Stock Exchange (Note 3) Middle Market Value £7,170 (1966 = £8,439)		9,274		
	3,000			5 per cent Defence Bonds (Note 4)		1,000		
	9,000			*Luton Corporation—Loan on Mortgage*		—		
		22,774					10,274	
				INVESTMENTS IN SUBSIDIARY COMPANY				
	75			100 Shares of £1 each fully paid (Note 5)		100		
	5,225			Loan		19,711		
		5,300					19,811	
				FURNITURE AND EQUIPMENT				
	3,381			At Cost		3,700		
	1,622			*Less* Depreciation		2,104		
		1,759					1,596	
			29,833					31,681
			£44,639	**Total Assets**				£44,116
				BEVAN SWIFT MEMORIAL LECTURE FUND				
		70		Balance at 1st July, 1966		65		
		5		*Less* Prize Awarded		5		
			65				60	
			364	**LIFE MEMBERS' SUBSCRIPTIONS RESERVE ACCOUNT**				388
				CURRENT LIABILITIES				
		2,225		Headquarters Trust Fund—Loan		2,461		
		5,805		Sundry Creditors and Accrued Expenses		4,899		
		17,538		Subscriptions in advance		18,295		
		73		*Taxation*		—		
			25,641				25,655	
			26,070	**Total Liabilities**				26,103
				ACCUMULATED FUND				
		20,231		Balance at 1st July, 1966		18,569		
		21 (loss)		Add Net Profit on Realisation of Investments		248		
		20,210				18,817		
	1,198			*Less* Excess of Expenditure over Income for the year ended 30th June, 1967	501			
443				Income Tax on Investment Income	380			
—				*Deduct* Provision for Taxation in previous years no longer required	77			
	443					303		
		1,641					804	
			18,569					18,013
			£44,639					£44,116

A. D. PATTERSON, *President*

NORMAN CAWS, *Honorary Treasurer*

D. W. ROBINSON, *General Manager*

REPORT OF THE AUDITORS TO THE MEMBERS OF RADIO SOCIETY OF GREAT BRITAIN

We have obtained all the information and explanations which to the best of our knowledge and belief were necessary for the purposes of our audit. In our opinion proper Books of Account have been kept by the Society so far as appears from our examination of those Books. We have examined the above Balance Sheet and Income and Expenditure Account, which are in agreement with the Books of Account. In our opinion, and to the best of our information and according to the explanations given us, the said Accounts in conjunction with the notes annexed thereto give the information required by the Companies Act, 1948, in the manner so required, and the Balance Sheet gives a true and fair view of the state of the Society's affairs as at 30th June, 1967, and the Income and Expenditure Account gives a true and fair view of the excess of Expenditure over Income for the year ended on that date.

Thames House, Queen Street Place, London, EC4
23rd October, 1967

EDWARD MOORE & SONS
Chartered Accountants

NOTES

(1) **International Radio Communications Exhibition**

Held in 1965 £		*Held in 1966* £
848	Profit on Sales of Publications, etc.	560
330	Subscriptions of New Members enrolled	254
£1,178		£814

(2) **IARU Region 1 Conference, Opatija**

Expenditure not provided for in the 1966 Accounts

(3) **Investments**

Middle Market Value at 1st July, 1966 £		Middle Market Value at 30th June, 1967 £	Cost Price £
3,675	£*5,000* 3 per cent Savings Bonds 1965/75	3,875	5,219
3,161	£*4,145 1s. 6d.* British Transport 4 per cent Guaranteed Stock, 1972/77 ..	3,295	4,055
1,603	£*1,751 9s. 6d.* 3½ per cent Conversion Loan 1969	— (a)	—
£8,439		£7,170	£9,274

(*a*) *Sold June 1967*

(4) **5 per cent Defence Bonds**

£2,000 redeemed August 1966.

(5) **Subsidiary Company—Lambda Investment Co. Ltd.**

The Subsidiary Company made a profit for the year ended 30th June, 1967 amounting to £112 no part of which is included in these accounts.

(6) **Capital Commitments**

There are no outstanding commitments for capital expenditure (1966—*NIL*).

THE PILOT OFFICER NORMAN KEITH ADAMS PRIZE TRUST FUND

BALANCE SHEET 30th JUNE, 1967

	£ s. d.		£ s. d.
TRUST FUND	165 0 0	**INVESTMENT**	
Creditor:		£165 5 per cent National Development Bonds	165 0 0
Prize to be awarded under the terms of the Trust Deed for year ended 30th June, 1967	8 5 0	**CASH AT BANK**	13 10 5
ACCUMULATED FUND			
Balance as at 30th June, 1967	5 5 5		
	£178 10 5		£178 10 5

INCOME AND EXPENDITURE ACCOUNT for the year ended 30th June, 1967

	£ s. d.		£ s. d.
Provision for prize for the year ended 30th June, 1967	8 5 0	Interest on Investment for the year ..	8 5 0
	£8 5 0		£8 5 0

NORMAN CAWS, *Honorary Treasurer*

D. W. ROBINSON, *General Manager*

REPORT OF THE AUDITORS

We have audited the Balance Sheet and Income and Expenditure Account as set forth above and have obtained all the information and explanations we have required. In our opinion such Balance Sheet and Income and Expenditure Account are properly drawn up so as to exhibit a true and correct view of the state of affairs of the Prize Trust Fund as at 30th June, 1967, according to the best of the information and explanations given to us.

Thames House, Queen Street Place, London, EC4
23rd October, 1967

EDWARD MOORE & SONS
Chartered Accountants

HEADQUARTERS' TRUST FUND AT 30th JUNE, 1967

	£ s. d.		£ s. d.
ACCUMULATED FUND		**LOAN**	
Balance at 1st July, 1966	2,252 3 7	Radio Society of Great Britain	2,461 0 0
Contributions received during the year ..	219 11 7	**CASH AT BANK**	10 15 2
	£2,471 15 2		£2,471 15 2

NORMAN CAWS, *Honorary Treasurer*

REPORT OF THE AUDITORS

We have examined the above Statement including Contributions to the Headquarters Trust Fund and report that it is in accordance with the records.

Thames House, Queen Street Place, London, EC4
23rd October, 1967

EDWARD MOORE & SONS
Chartered Accountants

Lambda Investment Company Limited

New Ruskin House, 28 Little Russell Street, London, WC1

Directors: L. E. Newnham (*Chairman*) N. Caws (*Secretary*)
R. C. Hills, J. F. Shepherd and R. F. Stevens

Report of Directors

The Directors submit their Report and Statement of Accounts for the year ended 30th June, 1967. The profit for the year after deduction of Income Tax amounts to £*112* and together with the balance brought forward from the previous accounts of £*17* amounts in total to £*129* which the Directors propose should be carried forward.

On behalf of the Board
N. Caws, *Secretary*

LAMBDA INVESTMENT COMPANY LIMITED

PROFIT AND LOSS ACCOUNT for the year ended 30th June, 1967

1966 (15 months) £		£	*1966* (15 months) £		£
16	Sundry Expenses	4	*18*	Interest Received (Gross Amount)	434
2	Audit Fee	21	*28*	Deposit Interest	4
—	Loss on realisation of Investments	114			
11	Provision for Corporation Tax at 40%	—			
17	Net Profit carried down	299			
£46		£438	*£46*		£438
			17	Net Profit brought down	299
—	Income Tax deducted from Interest	187	—	Balance brought forward from previous accounts	17
17	Balance carried to Balance Sheet	129			
£17		£316	*£17*		£316

Balance Sheet—30th June, 1967

£		£	£	£		£
	Share Capital				**Fixed Assets**	
	Authorised				Moneys paid out to Solicitors and Agents' in respect of the purchase of the Freehold Property No. 35	
100	100 Shares of £1 each	100		—	Doughty Street, WC1 (see note)	32,574
	Issued				**Preliminary and Formation**	
	100 Shares of £1 each fully			*241*	**Expenses**	241
87	paid		100		**Investment at Cost**	
	Profit and Loss Account				County Borough of Luton	
17	Balance		129	*5,000*	Mortgage Loan	—
104			229		**Current Assets**	
	Liabilities			*19*	Accrued Interest	—
	Radio Society of Great			*82*	Cash at Bankers	—
5,225	Britain—Loan Account	19,711				
2	Audit Fee	21				
11	Corporation Tax	11				
—	Sundries	772				
—	Westminster Bank Ltd. (see note)	12,071			L. E. NEWNHAM, N. CAWS } *Directors*	
			32,586			
£5,342			£32,815	*£5,342*		£32,815

NOTE:—The loan from the Company's Bankers is now secured by a charge on the Freehold Property, No 35 Doughty Street, WC1, the purchase of which property was completed on 7th August, 1967.

AUDITORS' REPORT TO THE MEMBERS OF LAMBDA INVESTMENT COMPANY LIMITED

We have obtained all the information and explanations which to the best of our knowledge and belief were necessary for the purposes of our audit. In our opinion proper Books of Account have been kept by the Company so far as appears from our examination of those Books. We have examined the above Balance Sheet and Profit and Loss Account, which are in agreement with the Books of Account. In our opinion and to the best of our information and according to the explanations given us, the said Accounts give the information required by the Companies Act 1948, in the manner so required, and the Balance Sheet gives a true and fair view of the state of the Company's affairs as at 30th June, 1967 and the Profit and Loss Account gives a true and fair view of the profit for the year to 30th June, 1967.

Thames House, Queen Street Place, London, EC4
23rd October, 1967

EDWARD MOORE & SONS
Chartered Accountants

THE MONTH ON THE AIR

By JOHN ALLAWAY G3FKM

FURTHER to your scribe's remarks in the opening paragraph of August *MOTA* concerning third party message handling two interesting letters have been received. The first came from GM3LWS, who was formerly VP8CZ, and has personal experience of the situation in the VP8 area. He points out that things are not quite as difficult as it may seem, and that in fact special concessions are made to men in the Antarctic. These include telegrams either free or at a very low charge which are radioed to Montevideo and then delivered by air mail. The second communication, which was printed in the *Letters to the Editor* feature in October *MOTA*, was from the Radio Services Dept. of the GPO and set out the official reasoning whereby the decision not to allow third party privileges to VP8 amateurs was taken. The writer would like to point out that the intention of his remarks was to point out that apparently one set of rules was applied to Britons in a British territory whilst another set of rules was applied to an alien operator on Pitcairn Island. Surely there should be uniformity in the application of the rules, and it should not be too much to ask that if there be any leniency it should be extended to our own licensees!

A new radio association has recently been formed in Venezuela. This is the Association of Radio Amateurs of Venezuela, Quinta Alere, Calle Esmeralda, Lomas de San Rafael de la Florida, Caracas, which may also be reached via PO Box 3636, Caracas. The association was formed on 19 April, and already has 15 branches throughout the country. The official station has the call-sign YV5RV.

Official notice of the return of operating privileges to Pakistan amateurs has been received from the Lahore Amateur Radio Society. Operating permission is now being extended to Pakistan nationals only. All QSL's should be sent to the LARS at PO Box 65, Lahore, West Pakistan.

Apologies to Flt.-Lt. G. C. Moore, whose call-sign was inadvertently printed as ZC4CM in last month's *QTH Corner*. This should have been given as ZC4GM, and should be on the air anytime after 28 October.

Jamborees-on-the-Air

An advance notice of the results of the 10th Jamboree-on-the-Air suggests that the number of stations taking part was less than in the previous event, largely due to the earlier date. The 1968 JOTA will take place on the weekend of 19-20 October. As there is quite a long gap until this date a "Scout QSO Party" is being organized by WB6IZF and G3BHK for the weekend of 9 and 10 December. This will be a purely informal activity largely to encourage relaxed conversations rather than contest type contacts! Suggested frequencies to look around for interested stations are given as 3696, 3950, 7145, 7290, 14095, 14290, 21095, 21290, 28495 and 28990 kc/s. G3BHK points out that this is a "no effort" weekend, and that participants operate from their own homes and do not necessarily invite Scouts to join them.

* 10 Knightlow Road, Birmingham 17. Please send reports to arrive not later than **15 November** for the **December** issue, **1 December** for the **January** issue and **17 January** for the **February** issue.

Top Band News

Apologies to the group of JA3 160m enthusiasts whose picture last month turned them into *boasters* instead of *boosters*!

Undoubtedly the most interesting news of the month concerns the success which rewarded VQ8CBR's attempt at 160m operation. A special bulletin from W1BB reports that Don contacted one W station from Rodriguez Is.; this was with W2RAA at 23.30 on 12 September. At times Don's signal was 569 in the US. It is also believed that a contact was made with VK5KO, although details are not available. No reports of contacts with Europe have been received. At the time of the VQ8/W contact favourable sunrise/sunset conditions at either end of the signals path existed.

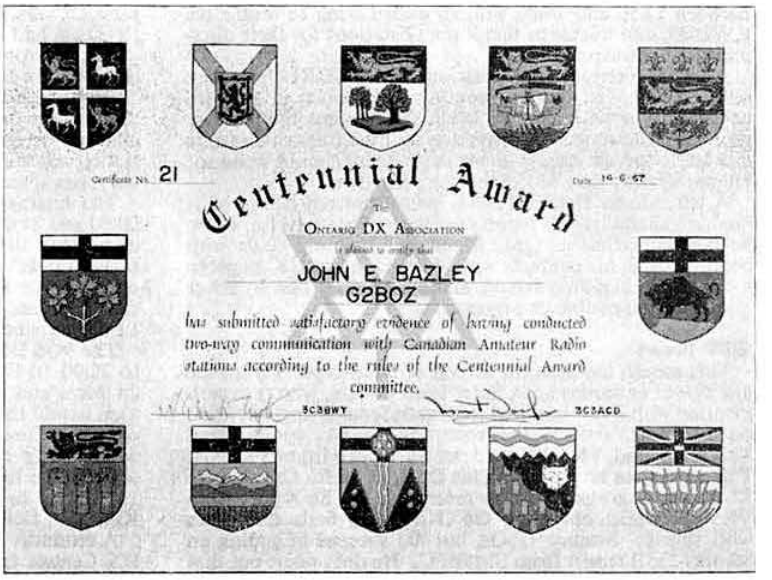
In a conversation with John, VQ9JW, on Aldabra Is., the writer learned that the super 600 ft. vertical aerial has not yet been used. It will not be possible to use each meteorological balloon on more than one occasion, and as only five are available it will be necessary to choose the very best opportunities to use them. However, if all goes to plan there will also be an inverted V aerial available for Top Band soon. G3PLQ reports receiving a report from UA1SZ on his G3PLQ/MM signals. He has set up skeds to take place during his next leave. This suggests that some amateurs in the USSR have been granted 160m operating privileges.

9V1LK reports that he will be on 160m from mid-November, mostly on Friday and Saturday nights at around 00.00 GMT on either 1802·5 or 1967 kc/s. Dick offers to fix skeds, and anyone interested is asked to write to him by airmail and he will advise precise times and dates. His address is: Dick Halls, 12B Robin Road, Singapore 10.

DL9KRA who visited Easter Is. and operated as CE0PC for a few days managed to contact W2EQS. He will be going to Senegal during the winter and may be on as 6W8CW.

News from Overseas

VP8GB has now returned to the UK and has sent in a résumé of details of some of the stations known to him to be active just before he left for home in June. Andy, VP8FL, has an SBE 33 and a G5RV aerial and is on 14 Mc/s s.s.b. most evenings. Tony, VP8DW, has an LG 300 and G4ZU beam and is to be found on 14 and 21 Mc/s a.m. at weekends. Buck, VP8JH, has a DX40 and dipole and specializes on 14 Mc/s c.w. John, VP8CW, had no equipment of his own at the time of Dave's letter, but Geoff, VP8JM, was busily building s.s.b. gear and a quad and hoped to extend his activity from the 14 Mc/s c.w. band. All these stations are in Port Stanley, Falkland Is. Stations in the Dependencies include the well known VP8IE (S. Georgia) who has been doing such a fine job of handing out contacts since receiving his s.s.b. gear, which consists of a Galaxy V and ZL special aerial. Another signal often heard over here comes from the rhombic antenna (directed on the UK!) being used by Steve, VP8JD from Signy Is. in the S. Orkney group. At present he is confined to 3·5, 14 and 21 Mc/s c.w. and a.m. A rather elusive one is Nick, VP8IY, who runs an RCA transmitter to an omnidirectional aerial and is usually heard



There is still time to apply for this centennial award issued by the Ontario DX Association. Details were published on page 391 of the June issue.

on 14 or 21 Mc/s c.w. or a.m. He is located on Deception Is. in the S. Shetlands.

From 22 September a radio beacon station will be in operation from Okinawa. It will be on 29·000 Mc/s and 52·975 Mc/s for 24 hours daily (except for occasional maintenance breaks) and will have the call-sign KR6TAB. The equipment will run 30 watts input to ground plane aerials and reports of reception of signals from it would be most welcome. They should be sent to: Albert Edwards, KR6TAB, 498th TMG Dwr 754, APO San Francisco, 96239, USA.

Latest information from Stu Meyer, W2GHK, gives the following list of presently active stations for who *DOTM* acts as QSL Manager: CN8FF, CN8FV, CR5SP, FM7WQ, G5AAM, HK0AI, I1RB, I1RBJ, DJ6QT/LX, OK4CM, OY2GHK, OY7ML, VK9DR, VK9XI, VP7CX, VP7NY, VP8IE, VQ9G, YV9AA, ZD8AR, ZD9BE, 7Q7PBD, 9J2BK, 9X5GG. QSL's for these stations should be sent to the address shown for VP8IE in *QTH Corner*.

Readers will be interested to know that Bernard Randell, GW3ALE/G3ALE, is now on the air from Mexico. He has an SB-100 transceiver and a trap dipole which enables him to operate c.w. and s.s.b. on 14, 21 and 28 Mc/s. His call-sign is XE1RV.

DL7FT (Franz Turek, Petunienweg 99, 1 Berlin 47, Germany) has asked to be put in touch with any UK amateur who is genuinely interested in a trip to Albania.

Dick Halls, 9V1LK, has been doing some research into his QSL returns. He QSLs 100 per cent through the bureau, and checks all incoming cards against the log, returning the 0·5 per cent or so which do not have enough legible information on them to check, to the senders. He finds that it is about four months before cards are received for any contacts and that the maximum return appears to be about 12 months after the QSOs. These figures from a relatively DX location show that patience should be exercised for QSLs expected to arrive via the world bureaux.

W2GT has informed your scribe that Earl Lucas, W2JT, a very well known DX'er, died very suddenly on 29 September.

A pat on the back for the UK boys from VS9ABL. He reports working 57 stations in Europe on 28 Mc/s one day

Seen here, from left to right: Tony, VP8DW, Buck, VP8JH, and Dave, VP8IE, who is currently very active from S. Georgia (in this instance at the controls of his old equipment) (see News from Overseas).

between 12.50 and 14.00 without even having to retune his KW2000, and wishes to thank the G stations for their discipline and manners.

A most interesting publication by SM4DXL has been received. This is *Quax* a monthly news sheet, in English, concerning activities on 28 Mc/s. It contains day by day reports of the state of propagation and the subscription rate is 5 IRCs for six issues, interested readers should write to: Ullmar Qvick, Box 611, Skattkerr, Sweden.

A letter from Hal, G3NMH, states that regretfully he is unable to handle SWL reports for the VP8 stations for whom he is now acting as QSL Manager. He only deals with confirmations for contacts with stations in the UK as problems of log handling would make extending this to cover elsewhere impossible at present.

QRP News

This month has seen the arrival of a few reports from the low power enthusiasts. A letter from G6XN, who is experimenting with a few hundred milliwatts from a single 2N3053 on 14 Mc/s, reports the reception of S4 reports from VK2AVA and VK4HR, and an S6 report from VK2NN. This was when he was using his Quad at 50 ft. On a dipole 12 ft. above ground he also received a Q5 S6 report from VK2NN whilst operating G6XN/P. Les finds difficulties with shorter distance QSOs, but did succeed in getting an S9 plus 25dB report from SM5BFC. He does point out that according to a BULLETIN article some while ago the 2N3053 would not be of much use on 14 Mc/s, but in spite of this he finds that it even works on 28 Mc/s.

G3TFX has been experimenting with a kite supported aerial, and found to his concern that during a rainstorm (not thunder) when the kite was at 200 ft. he received a very considerable " kick " from the aerial. This is a factor which should be kept in mind when handling this type of aerial. Richard is intent on having a contact with VK/ZL with his 100 mW transmitter.

Contests

Thanks to the kind co-operation of W1YYM, the results of the **1967 ARRL International DX Contest** have now been received and are as follows:

Phone Section

Single Operator

G4JZ	**1,171,596 points**	G3LNO	315,960 points
G3UML	1,162,800 ,,	G3TMN	133,522 ,,
G3IAR	905,958 ,,	G3USF	75,735 ,,
G2QT	588,141 ,,	G2AJB	24,882 ,,
G3CAZ	587,020 ,,	GM5AFF	23,214 ,,
GM3BGL	**329,703 ,,**	G5HZ	22,176 ,,

Multi-operator

G3RRJ (G3's JXC, RRJ) 1,589,193 points
GB2DX (G3's JBC, MPM) 1,342,191 points
G3SME (G3's SME, UQR) 701,552 points

C.W. Section

Single Operator

GI3OQR	**1,886,304 points**	G3KMA	200,970 points
G4CP	**1,446,552 ,,**	G3TXF	126,090 ,,
G2RO	861,883 ,,	**GM3SVK**	**119,277** ,,
GW3JI	**828,240** ,,	G2AJB	64,242 ,,
G2QT	610,050 ,,	G3VNR	55,160 ,,
G3IAR	457,530 ,,	**GD3AIM**	**50,688** ,,
G2MI	452,790 ,,	GM2HCZ	47,586 ,,
G2DC	447,447 ,,	G5AGA	42,570 ,,
G3JYP	441,450 ,,	G3OXI	14,835 ,,
G3APN	233,610 ,,	G3WP	10,179 ,,
G6KQ	215,855 ,,	G3JFY	6,612 ,,

Multi-operator

G3SSO (7 ops) 1,912,464 points
GI3SXG (GI3's OTV, SXG) 1,170,112 points
G3GRS (8 ops) 1,007,064 points
G3LPC (4 ops) 787,169 points
GW3ITZ (6 ops) 735,098 points

Congratulations to all winners (those in heavy type) and special congratulations to **GI3OQR** who wins the plaque as top European station in the single operator category of the c.w. section, he also came tenth in the overall world listing. **G3SSO**'s score was second highest in Europe (YU3LB had 2,049,906 points). There was a 33 per cent increase in turn out for this contest and an even better entry is hoped for next year.

Entry forms, zone maps, and log sheets have now been received for the **CQ Magazine WW DX Contest**. Intending entrants are invited to send an s.a.e. to G3FKM for supplies, stating *approximately how many sheets are needed* (each log sheet has space for logging 40 QSOs).

The **International OK DX Contest** will take place between 00.00 and 24.00 on 12 November. This is a c.w. only contest and covers all bands 160 to 10m. Contest exchanges consist of RST plus two figures indicating the number of years the operator has been licensed. Contacts count 1 point, if with OK 3 points. Prefixes worked are used as a multiplier. Leaflets giving fuller details are available from G3FKM.

The **9Q5 DX Contest** will extend from 01.00 9 December to 22.00 10 December. This will include all bands 3·5 to 28 Mc/s and all modes, stations may be worked once on each band. Exchanges consist of report plus serial number of contact. Contacts on 3·5 Mc/s count 60 points, on 7 Mc/s 30, 14 Mc/s 10, 21 Mc/s 5, and 28 Mc/s 20 points. Final score is the total of individual band scores. Entries before 15 March to Contest Manager, UCRA Post Box 1459, Kinshasa, Democratic Republic of Congo.

A reminder that the c.w. section of the **CQ Magazine WW DX Contest** takes places on 25/26 November. During this event TG0AA will be active on all bands 3·5 to 28 Mc/s; another special activity station for the duration of the contest will be PJ3CC.

The c.w. section of the Society's **7 Mc/s DX Contest** will take place over the weekend of 11/12 November. Full rules appear on page 408, June BULLETIN.

Awards

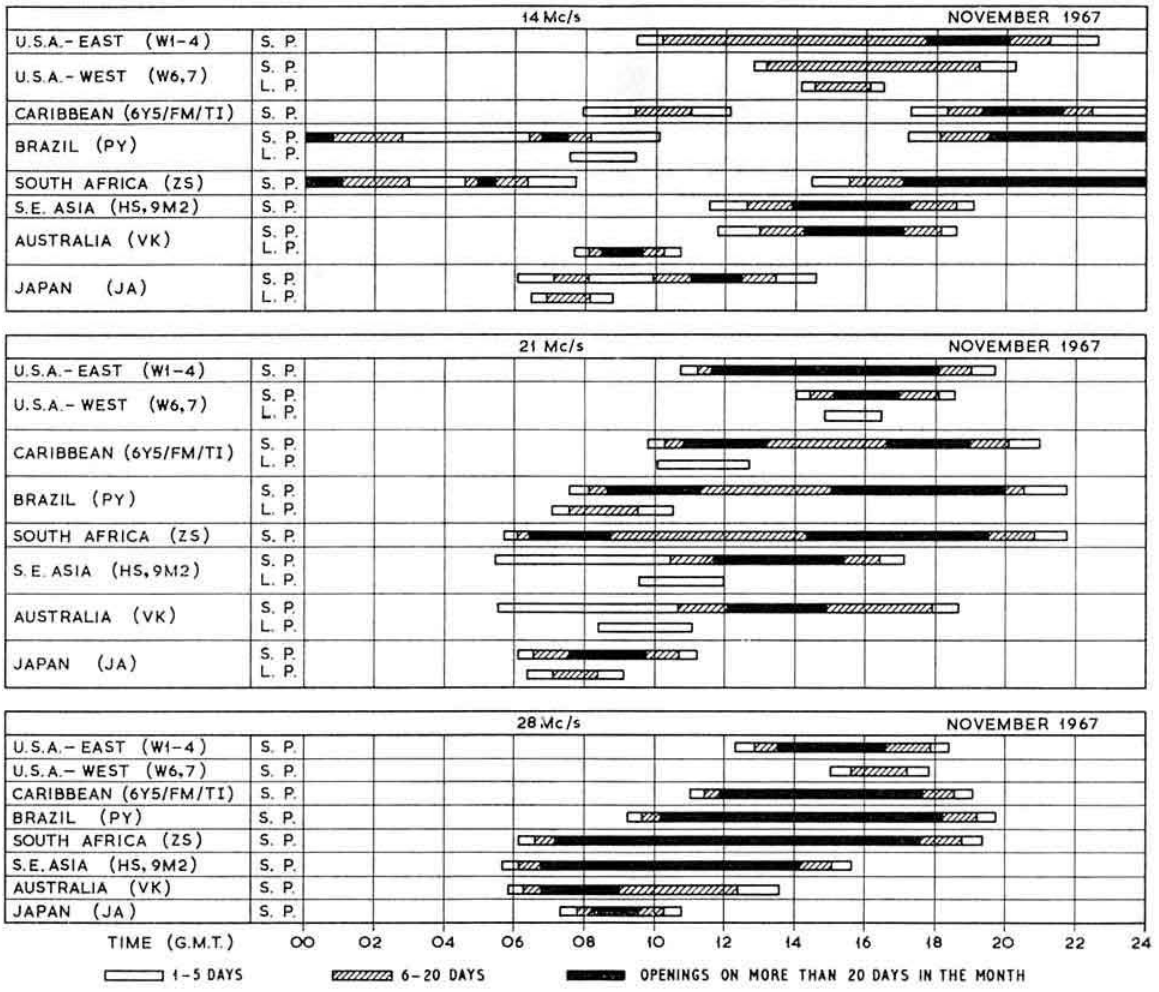
As a result of a change of policy by the Awards Manager of *CQ Magazine* it has now been arranged that in future UK applicants for **"Worked All Zones"** and the **"100 SSB," "200 SSB,"** and **" 300 SSB "** awards need not send their QSL cards to the US for checking. With immediate effect these applications should be sent to G3FKM who will check the cards and forward the application forms to *CQ*. Please note that all applications **must** be made on the official forms (which are also available from G3FKM) and cards submitted and listed in alphabetical order or prefixes (except for WAZ). It is essential that sufficient postage for the return of QSLs is enclosed, and a fee of 6 IRCs which your scribe has to forward to *CQ*. A number of points might be mentioned in order to save correspondence. With reference to WAZ if a two-way s.s.b. endorsement is required *every* QSL must say that it confirms a *two-way s.s.b.* QSO. Similarly for a telephony award QSLs must say *two-way phone*, this may be either a.m. or s.s.b. of course. With regard to the SSB Awards all cards must clearly state two-way s.s.b. or otherwise make it quite clear from the equipment being used that the contact was in fact on two-way s.s.b. As far as countries are concerned *CQ* now recognizes the ARRL DXCC countries list (these may be obtained from the Communications Dept, ARRL, 225 Main St., Newington, Conn., USA, 06111, in exchange for an IRC and large s.a.e.). Applications for **WPX** should continue to be made direct to *CQ*, QSLs do not have to be sent at first, but may be asked for for checking later (see last month's *MOTA*).

A reminder that the Czechoslovak Central Radio Club's **" 100 OK Award "** and **" S6S "** Award may be claimed if sufficient qualifying QSO's are had in the OK DX Contest and the applicant's log is submitted. The former requires contacts with at least 100 OK stations, and the latter with all six continents on any one band on one mode or on all bands phone or all bands c.w. (There are therefore 12 different classes). The 100 OK costs 10 IRC's and the S6S 6 IRC's.

The Zaragoza branch of Union de Radioaficionados

Espanoles is running a competition to see who is able to contact amateurs in at least 30 IARU recognized countries, plus one amateur in the province of Zaragoza, between 00.00 31 October, and 24.00 31 December. QSLs for all these contacts must be sent, together with 10 IRCs or one US dollar, to: Delegacion URE, Apartado 86, Zaragoza, Spain, to arrive no later than 1 March, 1968. A diploma will be awarded to all who satisfy these conditions, and prizes (donated by IBM) for the applicants with the three highest number of countries confirmed. The first prize will be a travel grant worth 30,000 pesetas for attending the International Convention in Zaragoza next May, the second is free registration for the Convention plus free stay, the third is free registration only.

PROPAGATION PREDICTIONS



In the northern hemisphere the F2 m.u.f.'s reach their maximum annual value in November. This means good conditions on the h.f. bands, 21 and 28 Mc/s. On 28 Mc/s, therefore all continents should be workable with certainty, but Western North America only on favourable days (i.e. those with above average F2 m.u.f.'s), and then only for a few hours. In general Southern European stations will be better placed for contacts with North America than those further north. Because of the winter season, 28 Mc/s will close between about 18.00 and 19.00 GMT. On 21 Mc/s also all continents should be workable. On this band, as well as on 14 Mc/s, the mid-winter months bring more opportunities for working DX via the long path. Towards the end of the month 21 Mc/s should close around 20.00 GMT. 14 Mc/s will carry the major portion of DX traffic from the afternoon until midnight. In the latter half of the night practically only South America and Africa will be workable. On 7 and 3·5 Mc/s conditions will change little from those of the previous month. On 3·5 Mc/s in the early morning, local traffic may be interrupted by the dead zone.

The provisional sunspot number for September 1967 advised by the Zurich Solar Observatory is 72·6 with the period of greatest activity occurring during the first ten days of the month. The predicted smoothed monthly numbers for January, February and March 1968 are 102, 104 and 106.

President of the Ex-G Radio Club and still very much a Worcestershire man after a lifetime in the US, Reg Cherrill, W3HQO, seen here in his Philadelphia home.

DXpeditions

Further information is now available concerning the proposed expedition by PY7AOA, PY7ACQ and PY7AKW to **St. Peter and Paul Rocks**. They hope to depart on 7 December and operate for 72 hours. Readers will recall that the previous operations from this location have been the subject of controversy—ARRL having decided to not accept contacts with PY0XA for it's awards (although an official licence was held), and give credit to the DI2LE operation, which according to LABRE and the Brazilian authorities was not licensed; Call-signs will be **PY0SP** on s.s.b. and **PY0DX** on c.w.

Latest news from Hermann, TJ1QQ, is that his much looked forward to trip to **Spanish Guinea** is off, at least for the time being. He has received a letter from the authorities telling him that he cannot have a licence. Iris and Lloyd Colvin, who were hoping to accompany him were, at the time of writing, in Ivory Coast using the call-sign TU2CA. It is believed that they have been enquiring about a 5N2 call, but in view of the very considerable delay experienced by applicants for these they could well have to return home to California for Christmas before receiving it. An interesting advertisement in the DXer's Magazine (W4BPD) offers copies of a new book by Iris and Lloyd—" How we started out building our own home in our spare time and went on to make a million dollars in the construction business " . . . .

It is understood that 5U7AL discovered during a recent visit to **Upper Volta** (XT) that all XT licences are suspended and no new ones are being issued. Fred was hoping to appear from **Dahomey** as **TY6ATE** shortly after this was written.

At the time of writing Don Miller, W9WNV, had just arrived on **Cocos Keeling Is.** and was operating as **VK2ADY/VK9.** His stay was expected to be extended over two or three weeks and he then expected to return to Western Australia. All QSLs for this, and any future operations by Don should be sent to K0TCF, 423 Marian Street, Kirkwood, Mo., USA 63122.

QTH CORNER

CE0PC	via DL9KRA, Johann Bruinier, Am Forsthaus 49, 6078 Neu Isenburg 2, Germany.
VK8AV/CR8	via K9JJR, 331 Annette Court, Rhinelander, Wisc., USA.
FB8WW	(all QSLs) via W4MYE, Dorothy Strauber, 10 Carjen Av., Asheville, NC. 28804, USA.
FY7YI	via W3AYD, Mike Solomon, PO Box 731, Rockville, Md., 20851, USA.
KJ6CD	via W5VWU, 6006 Alta Monte Av., NE., Albuquerque, New Mexico, USA.
KS4CF	via W4ZXI, P.O. Box 463, Miami, Fla., 33157, USA.
PJ3CC	(*CQ* WW C.W. test only) via W1JYH, 60 Warwick Drive, Westwood, Mass.
PY0DX } **PY0SP** }	Box 1043, Recife, Brazil.
TG0AA	via W4YWX, PO Box 2344, Macon, Ga., USA.
TU2CA	YASME Foundation, PO Box 2025, Castro Valley, Calif., USA 94546.
TY6ATE	via W4WHF, 255 Suntan Avenue, Sarasota, Fla 33577, USA.
VK9WD	via W2CTN, 159 Ketcham Avenue, Amityville, NY, 11701, USA.
VP1RC	via WB6EFA, 5060 Orcutt Avenue, San Diego 20, Calif. USA.
VP2GAR	PO Box 201, St. George, Grenada.
VP5AA/AB	via W1WQC, PO Box 368, Coventry, Conn., USA.
VP8IE	via DOTM, Box 7383, Newark, NJ, 07107, USA.
VP8DJ	HZ, IA, JB, JC, JD, JI, JM (UK QSOs only) via G3NMH, 24 Hook St., Hook, Swindon, Wilts.
YA1HD	via DJ9DK, Rainer Proescholdt, Wolfsfeld 23, 565 Solingen, Germany.
YJ8BW	(since 7/7/67/ W4NJF, 421 Saddle Rock Rd., Norfolk 2, Va., USA.
ZB2BD	G3TTG, 236 Sunderland Av., RAF St. Eval, Wadebridge, Cornwall.
ZC4GM	Flt. Lt. G. C. Moore, Officer's Mess, RAF Episcopi, BFPO 53, Cyprus.
ZD7FF	via W8UAS, Joseph Yurko, 9829 Colwell, Allen Park, Mich., USA.
ZD8CX	via G8KG, F. M. Smith, 4 Brook Court, The Park, Cheltenham, Glos.
ZK1AR	via W4ZXI, (see KS4CF).
4S7PB	via K6CAZ, 516 Reina del Mar, Pacifica, Calif., 94044, USA.
9M8RY	via WB6LED, 12631 Divan Place, North Hollywood, Calif., USA.
9U5DP	Paul de Smet, Burasira, DS 17, Bujumbura, Burundi. (W's only via W2SNM).

RSGB QSL Bureau, G2MI, Bromley, Kent.

DX Briefs

Ian Cable, MP4BBW, is at present on leave in the UK and will be at Rowallan, Cumberland St., Houghton Regis, Dunstable, Beds., until 19 December.

The Club station UP2KNP expect to operate from Georgia (UF6) using their special call-sign 4L7A again, during the *CQ* Contest weekend. QSL via Box 88. According to a report from W6PQT, I1RBJ has been told that no further operation by foreign visitors will be permitted in San Marino for the next two years. Activity by resident amateurs will continue.

It seems that normal activity has been resumed in the Arab countries in the Middle East, 9K2AM has been worked on 21 Mc/s and YK1AA has been in evidence on 14 Mc/s.

It is rumoured that VK9RJ may be on the air from Nauru in December. Final dates for the St. Peter and Paul Rocks expedition are given as leaving Brazil 5 December, arriving PY0 7 December, followed by 72 hours operation with several sets of equipment.

UB5UN has said that there will be a two week expedition to Wrangel Is. most likely in the spring. The operators will be UW3CS, UA3FT and himself, and they may use a 4L0 or 4J0 prefix.

HV1TD has been worked on 14 Mc/s s.s.b., he requested QSLs via I1UP. Ian Wollen, ex-4S7IW, is now back home in the UK and on the air with his G3UZI call.

Band Reports

Judging by the increase in correspondence received by your scribe the summer is over and the DX season is once again upon us. Gratitude is expressed to all who have written and especially to the following: G2BOZ, G2HKU, G2LB, GW3AX, G3DO, G3HCT, G3HDA, G3KSH, G3LNS, GM3MBC, G3OHC, G3PQF, G3SML, G3URX, G3VJG, G3VYF, G4MJ, G8AZP, G8DI, G8JM, G8VG, SM2BYD, BRS25429, BRS28198, A3942, A4038, A5105, A5126, A5182, A5224, A5459, A5610, and Peter Dowall. (In the following paragraphs stations listed in italics were on c.w., the rest on s.s.b.)

It seems that the l.f. bands have been improving considerably during the past month and **80m** has produced some quite surprising DX. Stations reported include CE0AF (05.40), FP8CA (05.38), VEs (05.00-06.00), VS6FS (22.03), VS9MB (22.00) Ws (05.00-06.00), 5H3KJ (21.20), and ZL's (including 2BCG, 2FQ, 4KE and 4LZ, between 05.00 and 06.00). **40m** likewise is improving and CT2AO (21.27), DU1EH (20.50), JA6YB (21.00), PZ1CF (21.23), TG9EP (05.50), XE1CCW (06.38), ZD7KH (21.27), ZD8RB (21.15) and 9M2DW (21.30) have been heard and worked. **20m** is beginning to take on an autumn look, and is now rather poor

during the small hours. However AP2MR (18.17), CE0PC (06.50), FB8WW (17.05), *FB8YY* (08.56), FO8's AB/AG (07.00 to 08.00), FR7ZC/G and FR7ZD/G (16.00), HC8JG (23.07), *HM2CM* (16.47), HR6EB (22.40), JW5YG (Svalbard. 06.40), KJ6BZ (06.45), *KJ6CD* (07.08), *KM6BI* (06.45), PY0TX (Trinidad Is. 18.45), PZ0AA (Special prefix in Paramaribo. 01.25), *ST2PO* (20.20), *TR8AI* (07.28), VK4HG (Willis Is. 08.00), VP2SY (21.10). VP8's (19.00-21.30), *VP8JD* (20.12), VP8JI (01.10. Argentine Is.), VR2FM (06.50), XE0KSQ (Special prefix used by reciprocal licence holders. 07.30), XW8CI (18.30), YK1AA (17.47), YJ8BW (07.35), ZD9BE (19.28), " 5X7XX " (? whereabouts, 04.36), and 9N1MM (15.50), were all available to those who were fortunate enough to be around at the right time. **15m** has had some very good spells, and a " CQ " call in the morning has been liable to produce a pile up of JA callers, the long path has also been open at this time. Two interesting stations mentioned have been BY5PX (12.35) working Ws and asking for QSLs via VU2LM, the other was *BY5JB* (11.55). It is to be hoped that these two are genuine, but in view of present international tensions the writer fears that they may be in the same category as the recent crop of ZA stations. Other stations reported include FW8RC (08.28), HS1RZ/6 (17.08), K0ILI/KG6 (11.02), KS6BH (07.25), KX6BQ (07.50), MP4MAY (16.58), *ST2SA* (11.30), *TJ1QQ* (11.00), TU2CA (09.35), VK9KS (11.57), VP8HZ (19.50), *VP8JD* (20.40), VQ9JW (14.05), K8NHW/XV5 (17.03), *ZD7GS* (19.15), ZS9H (18.45), and 5W1AS (07.34). Last but not least comes **10m.** As mentioned previously, *QUAX* by SM4DXL should prove most interesting to those who are devoted to this band. During the period under review there was less sporadic *E* and two particularly good DX openings—7/8 September and 5 October; signals from VK/ZL and SE Asia have been excellent at times between 07.00 and 11.00. Stations worthy of mention include DU1FH (06.28), EP2BQ (10.41), FH8CD (15.40), FL8FP (12.20), many JA's (09.00-10.30), PJ2MI (12.08), TJ1QQ (15.01), VK9s GN (T.N.G. 10.28), DJ (Papua. 10.42), and DR (Christmas Is. 06.11), VP2KR (18.44), VQ8CC (15.02), VQ9JW (15.22), VQ9TC (17.17), VR2DK (06.50), many Ws (11.00 to 20.00 or later), ZD7DI (11.42), ZS9H (17.07), 3V8BZ (12.14), 5H3KJ (09.41), 5R8s AS, CQ (16.20) and 7P8AR (14.48).

1967 Countries Table

	1·8 Mc/s	3·5 Mc/s	7 Mc/s	14 Mc/s	21 Mc/s	28 Mc/s	Total
G3IAR	10	52	53	156	124	67	462
G8JM	1	—	12	193	131	58	395
G8VG	1	19	27	49	71	60	227
7Q7LZ	—	—	7	91	80	49	227
GM3SVK	16	15	35	130	100	24	320
9V1LK	1	5	22	98	62	46	234
G8DI	—	25	37	94	78	25	259
G3VJG	—	3	13	22	28	72	138
G3KSH	3	22	26	47	47	36	181
SM2BYD	—	28	59	—	74	—	161
G3POF	3	25	36	31	19	46	160
9J2BC	—	—	2	29	16	43	89
G3ING	7	13	21	32	26	26	125
G3TBK	4	10	20	25	34	3	96
G3OJV	1	1	22	21	16	20	81
G3VWC	3	5	22	19	24	3	76
G3VOK	14	36	6	38	1	7	102
G3JVJ	14	10	2	1	2	4	33
A4038	7	12	16	114	190	132	471
A4568	9	42	39	165	138	107	500
BRS25429	5	56	65	165	130	100	511
BRS27806	3	23	40	116	121	103	406
A4886	10	35	54	241	127	81	548
A3942	13	51	59	127	100	79	429
BRS28198	1	42	42	133	71	59	348
A5273	5	48	42	93	71	52	311
A5105	2	27	27	110	65	42	273
A4182	3	29	25	69	56	48	230
A5135	2	21	28	81	71	23	226
A5004	4	54	29	112	41	48	288
A5126	3	19	16	73	56	24	191
A5153	2	17	12	57	31	8	127
A5459	—	2	7	42	29	1	81
A4552/VK	—	1	2	80	10	2	96

This month's table is in order of 21 plus 28 Mc/s totals. In view of the expected good conditions on the h.f. bands in 1968 it is proposed that the table next year should consist of 21/28 Mc/s scores only.

Thanks are extended to all contributors and special thanks and acknowledgements are due to the following: *The DX'ers Magazine* (W4BPD), *The West Gulf DX Bulletin* (WA5LES), *Florida DX Report* (W4BRB), *CQ DX* (ARI), *On The Air* (ON4AD), *DX'press* (PA0FX), *NARS News* (5N2AAF), *The LI.DX.A Bulletin* (WB2EPG), *The DX'er* (W6PHF), and the *DX News Sheet* (Geoff Watts). Please send all items for the **December** issue to reach G3FKM **no later than 15 November,** by **1 December** for the **January** issue, and by **17 January** for the **February** issue.

RSGB QSL Bureau Sub-Managers

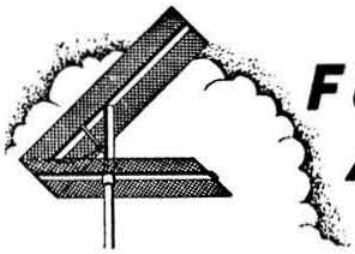
This is a list of the RSGB QSL Bureau Sub-Managers showing the call-sign groups for which they are responsible:

G2:	J. W. Russell, G2ZR, 45 Shakespeare Avenue, Bath.
G3, 4 and 5 two-letter calls and GC:	E. G. Allen, G3DRN, 65a Melbury Gardens, London, SW20.
G6 and G8:	A. J. Mathews, G6QM, 62 Ashlands Road, Hesters Way Estate, Cheltenham.
G3AAA-BZZ:	C. C. Olley, G3AIZ, 157 Wanstead Park Road, Ilford, Essex.
G3CAA-DZZ:	C. A. Bradbury, BRS1066, 13 Salisbury Avenue, Cheltenham.
G3EAA-HZZ:	W. J. Green, G3FBA, " Meadway," Links Avenue, Brundall, Norfolk, NOR86Z.
G3IAA-KZZ, BRS and A numbers:	G. L. V. Butler, G2BUL, 995 London Road, Thornton Heath, Surrey.
G3LAA-NZZ:	C. R. Emary, G5GH, Westbury End, Finmere, Buckingham.
G3OAA-PZZ:	J. H. Brazzill, G3WP, 43 Forest Drive, Chelmsford, Essex.
G3RAA-RZZ:	K. Walden, G3OLN, 250 Gloucester Road, Cheltenham, Gloucestershire.
G3SAA-TZZ:	E. G. Allen, G3DRN, 65a Melbury Gardens, London, SW20.
G3UAA-VZZ:	P. R. Cox, G3RYV, 22 Allenby Road, Maidenhead, Berks.
G3WAA series:	G. S. Milne, G3UMI, 23 Linacre Road, Eccleshall, Stafford.
G5AAA series:	E. G. Allen, G3DRN, 65a Melbury Gardens, London, SW20.
GD:	T. R. Moore, GD3ENK, " Glyn Moar," St. John's, Isle of Man.
GI:	R. R. Parsons, GI3HXV, 45 Erinvale Avenue, Finaghy, Belfast.
GM:	D. Macadie, GM6MD, 154 Kingsacre Road, Glasgow, S4.
GW:	J. L. Reid, GW3ANU, 28 Waterston Road, Gabalfa, Cardiff.

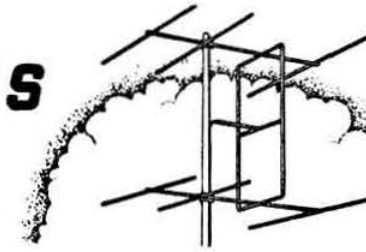
Cards must be sent to G2MI but envelopes may be sent to the appropriate Sub-Manager or to G2MI. Printed, gummed labels are obtainable from G2MI by sending an s.a.e.

Postage, letter rate: 2 oz. 4d., and 2d. for each additional 2 oz.

The address of the QSL Bureau Manager (Mr A. O. Milne, G2MI) is 29 Kechill Gardens, Bromley, Kent.



FOUR METRES AND DOWN



By JACK HUM, G5UM*

The Supreme Award

SOMETHING close to the heart of G3HRH during his term of office as the Society's V.H.F. Manager was the concept of a Supreme Award for V.H.F. Performance, to be available to all v.h.f. operators. "Don't rush it," Ray asked the V.H.F. Committee, " but come up with something worth while."

The obvious answer, thought the Committee, was another trophy, but two snags existed here; first, that this would be limited to *one* member per annum, when the idea was to initiate something of continuing and permanent value. The second drawback was that the Society already possesses a wealth of trophies which themselves involve it in a good deal of expenditure—not just the putting of new names on to memorabilia but the sheer maintenance cost of refurbishing trophies which holders allow to fall into neglect (this may surprise the majority of members who, like the writer, have never won a trophy in their lives, but sadly it is true).

In due course the V.H.F. Committee recommended to Council that a Supreme Award be instituted forthwith, the qualification being either the holding of three Senior Awards or two Senior Awards plus one 23cm Ordinary award. This recommendation was accepted by the Council earlier this year.

The order of difficulty in achieving a Supreme Award is evident from the following requirements (the first man to get it will indeed deserve bold type!):

Four Metre Senior: 60 counties and 6 countries;
Two Metre Senior: 60 counties and 15 countries;
70 Centimetre Senior: 40 counties and 9 countries;
23 Centimetre Ordinary: 20 counties and 3 countries.

At the last count thirteen Senior Transmitting Awards had been made for 2m but only one each for 4m and 70cm.

The precise form of the Supreme Award will be announced shortly.

* * *

Finally in the Awards context here are three topical items:

The Two Metre Ordinary has just reached its century: Certificate No. 100 was granted to G3UKV at the September meeting of the V.H.F. Committee.

At the same meeting the Four Metre Ordinary was allotted to ZB2VHF and the very first 70cm Senior to G3MCS, which will be a source of great pleasure not only to the recipients but to the many operators who appreciate the sustained activity which " Ossie " and Bill Hawthorne have put in on 4m and 70cm respectively.

" GEOREF " To Replace QRA Locator?

Since it came into use among British v.h.f./u.h.f. people—slowly, reluctantly and eventually resignedly—the QRA Locator system has been the subject of a considerable amount of adverse criticism. All who have accepted it, like the Income Tax, with as good grace as they could muster will be heartened to know that representations are being made to the IARU Region 1 Bureau to have it replaced with the Georef system.

Of the benefits of Georef members who read the letter in the June BULLETIN from G3JKV will already be aware. It is in fact G3JKV (he has professional associations with air navigation) who has sponsored the Georef system as something that already covers the whole world on existing co-ordinates and appears ideally suited for amateur radio v.h.f./u.h.f. contest purposes.

In a closely-reasoned paper—it is an extension of his June letter—G3JKV reviews the various available cartographical systems likely to be of use in an Amateur Radio context, and while not by any means damning the QRA Locator system out of hand, he presents an almost unassailable case for Georef. This paper will now go forward to IARU Region 1.

* * *

Still on the subject of " radio map reading " over now to Bill Scarr, G2WS, of Weston Super Mare:

Maps and Contest Scoring

Says G2WS: " Surely everyone admits by now that the QRA Locator map provides only a very rough method of estimating distances. It is useful and perhaps adequate for locating Continental stations, but for inter-UK contacts it is hopelessly vague."

Bill goes on to suggest that the answer does not lie in producing a better map (though when he wrote he could not have known about the Georef recommendations, which *do* postulate a better map), but rather in scrapping the QRA Locator system entirely and returning to " the old and very fair system of scoring in zones," namely, 0-50 miles one point, 50-100 miles two points, 100-150 miles four points, 150-250 miles six points and 250-400 miles 10 points.

G2WS concludes: "This is quick and easy for contestants and judges, fair and proof against ' minor fraud ' . . . can't we settle for it in future?"

* * *

On a very different subject—yet on reflection perhaps *not* so different, for QRB measurements are bound up with it—that of 13 cm, G2WS comes up with some thoughts sparked off by last month's significant news of the 31 mile contact on this band between G3THQ/P and G3PSH/P.

Developing " Thirteen "

Remarking that there is obviously a fair amount of interest in the 13cm band in various parts of the country but—so far—along uncoordinated lines, G2WS emphasises two requirements which exist at the present time in respect of this band:

First of all, it is important to know who are engaged in

* Houghton on the Hill, Leicester. Send reports for the December issue by 9 November, and for the January issue by 1 December.

work on 13cm equipment and what progress they have made so that like minded people can correspond with one another. We will add that " Four Metres and Down " will of course publish all information received in this context in its capacity as an " ideas exchanging forum."

The second immediate requirement is that some agreement on operating frequencies to be used should be reached among users of the band. Back in October last year Heath Rees, G3HWR, in an important (and prophetic) contribution to this page, voiced the advantages of centering activity around 2304 Mc/s, and G2WS now urges that this logical frequency should be more widely publicised: " On the transmitting side it enables an existing 144 Mc/s exciter to be employed, as 144 times 16 is 2304." On the receive side Bill already has a 13cm converter commissioned for this part of the band.

* * *

" Is this a UK record? " we asked last month in respect of the 31 mile contact on 13cm made by G3THQ/P and G3PSH/P, and this point is taken up by Gerry Farrance, G3KPT, in the sense that when history-making of this kind occurs, then there ought to be some form of official ratification for it.

It is worth mentioning that what was the first breakthrough on " the next band down," *i.e.*, 23cm, occurred almost exactly five years ago when G3KPT himself was at one end of a link (the West Bromwich end) with three Surrey stations, G2RD, G3FP and the late G2FN, on 1296 Mc/s on 5 December, 1962. Almost certainly this was a 23cm record at the time, deserving of official ratification.

In harking back to this event G3KPT reiterates the importance of the collective effort: " A number of other amateurs had been involved in the basic experiments to get gear operational on a band where the possibilities looked very dubious at the time."

The 23cm Contest

It is a couple of years since 1296 Mc/s graduated from a " tests " to a " contests " status, the first fully fledged contest on the band being organized in 1965, followed by two such last year and two more this.

The second of this year's (over the weekend of 7/8 October) produced a turnout that seemed to be at least as good as that witnessed by the May event, and something like a score of stations were active. In the 14/15 worked category were G3NNG/P, G2RD (everyone comments on Ron's fine signal from the new home at Caterham, on 70cm as well as 23), and G3MCS (he repeated the May feat of working G3OXD/A at 125km).

And there may have been others. What seems to us indisputable is that contests on 23cm are quite the most useful of any which the RSGB sponsors, and if we have said that before we make no apology for repeating ourselves. Such events help to develop an important new frequency area, and promote the home construction of equipment which is challenged by its owners, the 23cm enthusiasts, to overcome formidable odds—*and succeeds marvellously in doing so.*

The October 23cm contest was notable for something else: what is believed to be the first 1296 Mc/s portable entry for the Listeners' Championship was turned in by BRS26234/P. Ewen Macduff took *two* 23cm converters and an EC10 out to the high spots together with an aerial of his own design (details please).

Long Range on 70cm

Information continues to come in on the subject of " Seventy Cems " as a long haul band: in any event, you need but look under the headline " Skeds Operative " to obtain some idea of the considerable path distances being covered by today's schedule keepers almost as a routine.

Even so, to cover 300 miles on 70cm is still a top DX feat, especially when sustained irrespective of conditions. This is

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

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

* Not operational.

RSGB V.H.F. BEACON STATION GB3VHF

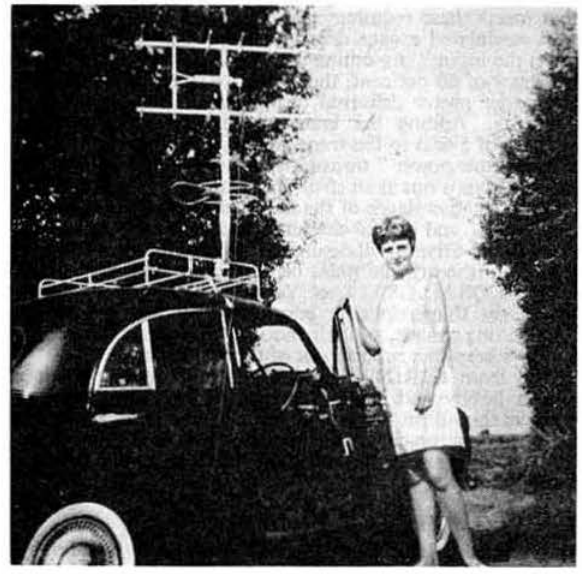
The frequency of the Society's v.h.f. beacon transmitter at Wrotham, Kent, when measured by the BBC Frequency Checking Station, was as follows (nominal frequency 144·50 Mc/s):

Date	Time	Error
20 September	10.15 GMT	40 c/s low
25 September	12.08 GMT	100 c/s low
3 October	09.10 GMT	30 c/s low
18 October	08.42 GMT	100 c/s high

the path length from Bridgnorth in Shropshire to Jersey in the Channel Islands, and it was covered by G8AEV/A to GC8ARS/P when the latter was on holiday in the Islands. Reports were Readability 2/3, Strength 3/4 with rapid fading. The car-roof aerial used by John Oliver at the GC8ARS/P end is shown in the accompanying picture. It was fed from 2 watts of r.f. from an all-transistor transmitter (described in Tech Corner). Receiver front end: two AF139.

The Jersey site was 220 ft. a.s.l. on the north coast of the Island—nothing much in the way of height but possessing that all-important attribute of good take-off.

At the Shropshire end G8AEV operated " Stroke A " from a site some two miles west of Bridgnorth and 360 ft a.s.l., using a similar receiver but a 50 watt QQV06-40 transmitter with a 64-element stack.



Path lengths up to 300 miles on 70cm were covered by GC8ARS/P from Jersey using this 8-over-8 slot array mounted on the vehicle roof rack. The lady is Mrs. G8ARS.

(Photo by G8ARS)

Another operator who has done well with long haul coverage on 432 Mc/s even though he has been on the band only since mid-August is Mike Dormer, G3DAH, whose fine sea scanning site at Herne Bay in North Kent, which makes him a " local " to many Continentals on 144 Mc/s, was of no help at all on 70cm when he was after GB2GC and GW8ASA, both of which are separated from him by large tracts of hilly England. These path distances, says our fine new coloured-counties RSGB map, are 320 and 190 miles; and the gaining of these two particular prefixes helped Mike to lift his total to five countries and thirteen counties worked in one month.

Stations up country whose beams tend to be magnetized by London might bring in G3DAH if they were notched a few degrees further eastwards. His 75 watts to a 6/40A and a 14-element aerial at 52 ft. make him a potent signal.

Power from Portables

The comment was made here last month that, irrespective of conditions, big signals will always come off well-sited hilltop portable stations during v.h.f. and u.h.f. contests. It is a basic law of v.h.f./u.h.f. life that they should.

Also last month two prominent Sussex BRS men gave some idea of the proximity effect which can result from such operations. What seems fairly certain is that as receiver and converter sensitivities improve—and they are doing so all the time—the amount of interference experienced is going to increase, because stations further away will add to it.

Amplifying this point, Derek Thom, G3NKS, reminds us that in high activity areas such as London the use of low cross-modulation converters and highly directional aerials is now virtually mandatory by reason of the proximity of many fully modulated 150 watt transmitters.

G3NKS is not alone in advocating the use of really top line transmitters when field days come along, adding: " Successful contest participation means that the best possible equipment, including the use of the maximum permitted power, must be employed," a sentiment not unknown in respect of the " d.c. bands " National Field Day.

He goes on to describe a transmitter developed by G8AMU that meets these requirements. It utilizes " a well tried 25 watt modulated exciter driving a class A linear p.a. to 150 watts d.c input." Assuming that the linear has a theoretical efficiency of 50 per cent, then with a d.c. input of 150 watts the carrier power delivered to the base of the aerial will be 75 watts. Adding the linear results in an approximate increase of 5·6dB to the transmitted signal compared with a typical " low power " transmitter running at 30 watts in and giving 21 watts out at an efficiency of around 70 per cent. But among the advantages of the linear is its ability to deliver a clean signal, and careful checks to detect either over-modulation or over-driving will ensure that it continues to do so.

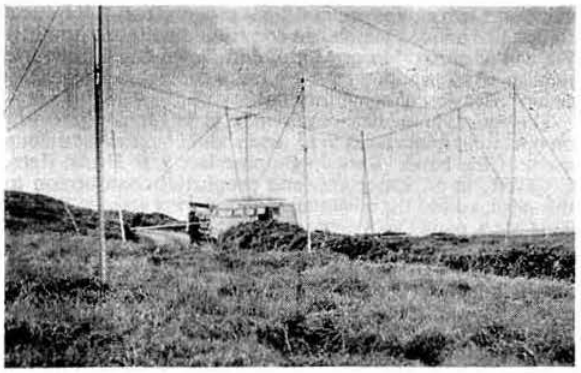
Back to the original point of the Sussex BRS men's complaint of QRM: G8ATK of Yateley in Hants says shortly: "Let's get things in their perspective: it was primarily a transmitting contest, and fair enough, they were swamped . . . but let's keep this rubbish out of the BULLETIN . . ."

And from G3RIN of Redhill: " Please remember it is only a hobby and such situations should never arise . . . listeners should get themselves some decent receivers instead of converters preceded by two or three amplifiers which can't handle signals more than 100 microvolts without overload . . ."

The Value of Expeditions

" I thought Amateur Radio was supposed to be a hobby, not an imposition." The thought pops up again, this time in a different context and from a different part of the country.

Writing from Shrewsbury, G3VQL finds himself out of sympathy with much that was said last time about the All Ireland Expedition on 2m, and " the so called lessons to be learned from it."



A double rhombic on 2m used by EI amateurs during V.H.F. NFD. See " West of the Irish Sea."

" Has Amateur Radio stooped so low as to result in a series of ' thou shalt or shalt nots '? Presumably those who had skeds arranged were merely county chasers and not interested in a ragchew," continues G3VQL trenchantly, adding that much as he admires all that G3BA (one of the EI2AX/P operators) has done for Amateur Radio, it is not necessary to glorify a v.h.f. expedition " as if it were some feat akin to Marconi spanning the Atlantic! "

Fighting words! And likely to find as many assenters as dissenters among a lively v.h.f. fraternity. Comments concisely, please!

West of the Irish Sea

Writing from Birr in County Offaly, Bob Williams, EI7AF, confirms the enthusiasm that exists for the " Friday Night is Ireland Night " project on 2m sideband and c.w. He reports the following as regularly active on the band: EI2A, 2AK, 6AS, 6D and 9BC—and of course the crew of three who made up the party that braved the elements of V.H.F. National Field Day, 1967, namely, EI4AL, 5BH and 7AF.

The accompanying picture, taken during the Field Day foray, typifies the effort which EI members put into v.h.f., the aerial shown being a double rhombic for 2m. " It is supposed to have a gain of 27dB over a dipole," remarks EI7AF, " and we did during Field Day get one report which checked 6dB better than the 10-element Skybeam."

Australis Plans and Parameters

All who deposited stamped addressed envelopes with Bill Browning, G2AOX, will have had the highly informative six page *OSCAR Newsletter* which went out earlier this month with its full description of the Australis Amateur Radio satellite. Almost certainly this device will become *OSCAR 5* when the Americans can find a corner for it in a space vehicle.

Australis is not a translator type like the last two *OSCARs* but will emit identical signals on the 2m and 10m bands. The 10m transmitter will be energized by command signal from the ground, but the transmitter on 144·05 Mc/s will send continuously with an output of 50mW amplitude modulated (you won't need the b.f.o. on). One of the eight telemetry channels will emit the familiar HI HI signal in Morse, the other seven details of equipment behaviour in space. How to decode the telemetry is explained in the G2AOX newsletter.

For the first time in an amateur satellite an attempt has

been made to stabilize the package to ensure reliable reception free from fading due to tumbling effects.

When *OSCAR 5* is aloft (no date predictable so monitor GB2RS for news), the use of a special report form for return to G2AOX will be imperative. All depositors of SAEs will get these forms, which are of computer card type and will be fed to a master computer. Any reports that do not use these forms will be ignored. So we will say once again that Bill Browning's QTH is 47 Brampton Grove, London, NW4, for all correspondence on orbital affairs. He has not asked for SAEs for ordinary satellite correspondence but it would be common courtesy to send him one if a reply is expected. Once *OSCAR 5* goes up so will the G2AOX postbill: it is pretty heavy even now.

Beaconry

Let BRS15744, Ron Ham, speak for many where the Cornish beacon is concerned: "A word in support of GB3CTC. It is a 'must' to keep this beacon going," he writes; "This and the other constituents of the beacon service are among the finest aids to v.h.f. that the RSGB has provided . . . let us not forget the service they give to Continental radio operators as one of our country's invisible exports! I am sure Northern members must look for the Cornish beacon as we in the south looked for the Lerwick one, so let's keep it going."

From Sweden comes news that a 2m beacon is now operational. It is SM4MPI on 145.962 Mc/s, commissioned on 20th September. Already it has been logged in the UK, by auroral reflection on 10th October, by David Guest, GM3TFY.

Group Activity

The Leicestershire V.H.F./U.H.F. Group was duly formed at an enthusiastic meeting of 25 members on 21 September. As with most other such groups, formalities are being kept to a minimum, and cash will be raised by a shilling a head collection from those who attend. A different chairman, appointed beforehand, will take each meeting.

The next, to be chaired by G8VN, will be a lecture-demonstration about microwaves by Roger Meredith of AEI Electronics Research. *Place:* College of Further Education, The Newarke, Leicester, at 7.30 p.m. *Date:* 16 November. All v.h.f. and u.h.f. enthusiasts within travelling distance of Leicester will be cordially welcomed.

* * *

Whether the universe began with a bang or not, there's no doubt that the South East U.H.F./V.H.F. Group is going out with a bang so far as its 1967 programme is concerned (we can't wait to see what the 1968 fixture card will offer.) It has persuaded no less a person than Professor R.C. Jennison, the world authority on space electronics, to speak on the subject of Radio Astronomy at the 8 December meeting, to be held at the Rutherford College of the University of Kent at Canterbury.

Keep in touch with G3DAH on South East Group matters.

Skeds Operative

North Yorks, Durham and Northumberland Activity Night on 70cm: every Monday between 10 and 11.30 p.m., clocktime. Reports on results obtained and level of activity would be of great interest to "Four Metres and Down."

By GW4CG, South Wales, with G3FP, South London, on 70cm every Monday at 7.30 p.m., clocktime. Frequencies respectively are 432·27 and 432·0 Mc/s—and of course c.w. is a "must" at times over this long path.

By G8AUE, Derbyshire, with G3MCS, Buckinghamshire, every Monday at 8.30 p.m. clocktime, again on 70 cm. Frequencies: 433·15 at the Derby end and 432·9 Mc/s at G3MCS.

Skeds Wanted

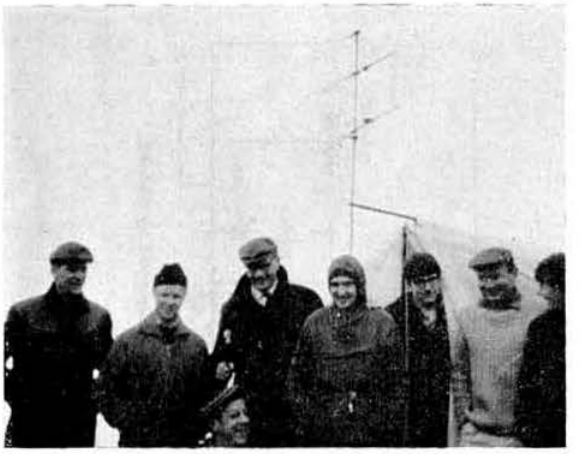
John Butcher, G3LAS, newly installed at his Hertford QTH, asks all who can be on 2m at lunch times to look out for G3VZN at his place of work, the Enfield College of Technology. Schedules over 50 miles would be welcomed, as s.s.b. is extensively used—but contacts on any mode at any distance are also sought.

Xtal Xchange

Wanted: 8014 to 8027, 8073 to 8083, 6010-6020, 6054-6062 Mc/s, any base. *Offered:* 7811·47, 7840·26, 8043·47, 8091·24, 8091·48 (all 10X); 7811·31, 7850·32 (both 10XJ); 5850·66, 5852·82, 5860·17, 5875·88, 7825·41, 7840·27, 7850·42 (all FT243). All certificated by Royal Signals at RSGB Exhibition. Write G3GGL, Graeme Wormald, Top Orchard, Merricks Lane, Bewdley, Worcs.

North Western Contest

The always enjoyable North West V.H.F. Contest on 13 August—this year enjoyable in spite of poor weather and poor propagation—was won by the Windscale Cumberland Group, G3WIN/P (a singularly appropriate call-sign), with G3OHH second. The accompanying picture of an octet of Ainsdale Radio Clubbers who went to Westmorland for the contest sums up the day: thick clothing but a pleasant time. Their three band aerial system (background) handsomely braved the elements.



Tech Corner

From G8ANQ (Bill Burton, Whitby):

A Pye base station transmitter has been modified for 2m to serve as a drive source for a BAY96 varactor tripling to 70cm with the object of using a.m. instead of the f.m. which is the more usual mode with these devices. In the a.m. mode the idler tuning was found to be quite critical if good speech quality was to be obtained. The BAY96 operated quite successfully fed direct to the aerial.

In the course of bench tests on this tripler some interesting information was obtained on unwanted products with the help of a spectrum analyser—a piece of test equipment which can be strongly recommended. It was possible to reduce the 288 Mc/s component to a level 87dB down on the 433 Mc/s component. *(Continued)*

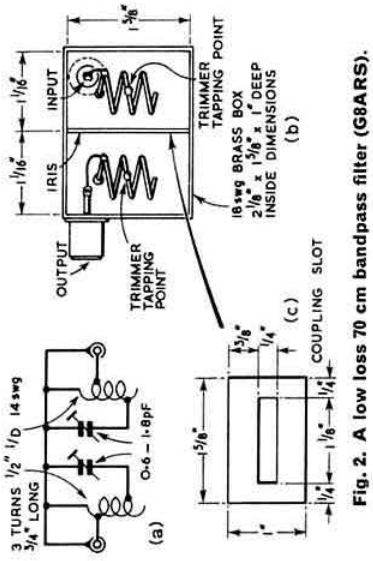


Fig. 2. A low loss 70 cm bandpass filter (G8ARS).

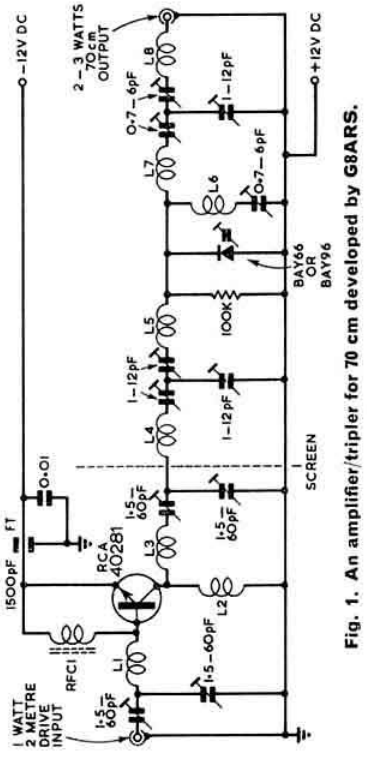


Fig. 1. An amplifier/tripler for 70 cm developed by G8ARS.

From G8ARS (John Oliver, Bridgnorth):

Here are details of the semiconductor 432 Mc/s transmitter used for portable and mobile work by G8ARS. Fig. 1 shows the 2m p.a., an RCA 40281, followed by a Mullard BAY96 or BAY66 tripler. The p.a. is driven by what may now be regarded as a conventional 1 watt output 2m transistor transmitter.

Driven at 2m, the 40281 overlay delivers 6 watts output at 2m and the BAY66/96 about 2 watts output, filtered, at 70cm.

The mode of modulation employed is n.b.f.m., obtained by swinging the 12 Mc/s crystal oscillator by a capacity diode, deviation being set for plus or minus 10 kc/s for normal speech level.

It is strongly recommended that some form of bandpass filter be included in the output of the tripler to avoid the radiation of unwanted harmonics. A simple form of helical two-section iris coupled filter has been used, imposing an insertion loss of only 1dB and providing a protection of 30dB against drive frequency and second harmonic of drive frequency, and 70dB protection against harmonics of the output frequency. See Fig. 2.

Here and There

For those perturbed by loss of signal when a 23cm parabola whips away from its intended heading in a wind, an article in the October *Industrial Electronics* called " A Mast Twist Measuring System " will provide a few answers. Its author, E. A. Milton of ITA Engineering Branch, discloses that a mast twist of as little as 0·8 degree can cause a signal loss of 3dB from a 6 ft. diameter dish operating at 7 Gc/s.

• • •

Still *in re* aerials, is it possible that 18 element 70cm Parabeams prefer to work stations equipped with—18 element Parabeams? Bill Hawthorne, G3MCS, has conducted some extensive tests that suggest there might be something in this theory. When he used one best results were obtained with other stations similarly aerial'd. Any comments?

• • *

" There is wild speculation in this area and conflicting reports on whether G8's will be allowed on 2m. Could the position please be clarified on the Society's recent recommendation to the GPO?"—G8ARS.

Answer: As was reported in August under " Society Affairs," the Council approved a recommendation from the V.H.F. Committee proposing that the RSGB should negotiate with the GPO for an extension of the terms of the Class B licence.

Decision: None at the time of going to press, but watch GB2RS for news.

• • •

Former Midlands man G3KEF, Tom Fishpool, widely known on v.h.f. and a keen mobileer on " Two," is now VK4KE at Toowoomba in Queensland.

* * *

" Very glad to hear of the success of G3MCS in winning the first RSGB certificate for 23cm. I think out of those in the running he deserves it the most for his perseverance and truly amateur approach."—VQ8CG (Peter Burt, perhaps better known in UK v.h.f. circles as G3NBQ).

* * •

" The notes on the G8AMK varactor tripler for 23cm (FMD, October, page 680) are good, and should inspire even more activity on ' Twenty-three.' May we now have some guidance on 13cm, and particularly information on the gear used by those two pioneers, G3THQ/P and G3PSH/P " —G3KPT.

Third Knokke Convention

By SYLVIA MARGOLIS

RSGB Public Relations Officer

A gathering of distinction at Knokke: PAOWX (President VRZA), PA0LOU (President VERON), GI3KYP (President RSGB), DL1QK (President DARC) and ON4AK (President UBA).

ONE remarkable thing about the Knokke Conventions is the people who organize them. The verve, drive and big-thinking which go to making Knokke are what you would expect from a national Society—and a big one at that—rather than from a small group of a small Society, Union Belge Amateur, in a small, sea-side town in a small country. It's like expecting an RSGB Group from Little Puddlecombe-on-Sea to put on the International Communications Exhibition.

But the Knokke UBA Group have enthusiasm, energy and local influence, qualities that guarantee success for whatever they do.

There were other things that made Knokke memorable—the seven ton crystal chandelier in the Conference Room at Knokke Casino, where most of the programme took place; the puzzling murals in that same room; the Fashion Show, where I saw clothes with some of the longest skirts and highest prices I have been asked to view for years; and the enormous number of British visitors.

There must have been 20 British radio amateurs, with their wives, in a Convention of 150 people. This was significant of the attraction of the kind of event that Knokke offers, for it was right at the end of the holiday season, so that most of the British must have travelled to Belgium specially for the Convention, a venture that couldn't have cost less than £50 a couple for a weekend, including fares, hotel, Convention fees and assorted goodies, which could include, if you were inclined that way, champagne at the Casino at £6 a bottle!

Knokke has been in existence for long enough to have its own traditions. The procession and wreath laying ceremony at the War Memorial, to commemorate the Belgian radio amateur who died in the Belgian Resistance in 1943, is an unusual keystone on which to build a Convention, but it provides a very effective and throat-catching tradition.

British visitors included the RSGB President, GI3KYP, Barney Patterson, and his wife. Mrs Patterson helped sell tombola tickets, along with RSGB Public Relations Officer, Sylvia Margolis, coping competently with the conversion of currency into Belgian francs, French francs, sterling and Deutschmarks. Fortunately the Americans at the Convention were paying in Belgian francs!

The four other Presidents of Amateur Radio Societies were there, the Presidents of UBA (Belgium); DARC (Germany); VERON and VRZA (the Dutch organizations).

The programme included lectures and forums, an exhibit by the Belgian Air Force, Convention stations on several bands, a mobile rally, the fox-hunt which characterizes most European events, but which is practically unknown in Britain. But it is by its social activities that a Convention stands or falls. The Belgians excel in organizing splendid entertainment for the visitors. Through the auspices of the Belgian Royal Air Force the 55-man Belgian Air Force Band gave an hour-long concert on the Saturday night, before the Dance. Prominent among the guests were Cdt. Robert Jamine, Assistant Director of Communications for the Belgian Air Force, who has been closely connected with Belgian radio amateurs since he was a Spitfire pilot in the Free Belgian Air Force during World War II. He took a leading part in the organization of the Convention.

Prizes worth more than £300 were distributed at the end of the Convention. But the organizers are more modest than most. They have sent out a letter to several of the participants, asking for suggestions for next year's event. I would suggest they come over here and show us how to organize a British Convention on the same lines as Knokke!

The expensive prizes with their proud owners photographed at the close of the convention.

The International Amateur Radio Club Convention

The 1967 IARC Convention commenced on Friday, 22 September, and continued until the afternoon of the following Sunday. M. Mohamed Mili, the Secretary General of the International Telecommunication Union, had consented to become Patron of the IARC and before the technical sessions commenced on the Saturday he was presented with a Certificate. In reply M. Mili made a speech which showed that he was fully aware of the benefits of an active amateur service.

Mr Mili said:

"It is both a great honour and a great pleasure for me to learn that you have chosen me as Patron of the International Amateur Radio Club. I very much appreciate this honour for a number of reasons; first of all, because the Amateur Radio movement, which is spreading more and more throughout the world, has humanitarian aims which everyone acknowledges—aims which foster a sense of brotherhood among all mankind and all races, without any distinction whatsoever.

I am also conscious of this honour because of the many worthy and eminent people in every country of the world who support this movement. A number of them spring to mind at this moment whom I am not going to name as I am sure that I should forget several others. These people of note, scattered all over the globe and belonging to all countries, to all races, are known principally for their contributions to science, and it is indeed an honour for me to know that I am about to have a chance to collaborate with them in strengthening this fraternalism.

After referring to his friendship with Dr Joachim, Chairman of the IARC, Mr Mili referred to the work carried out by amateurs who were enthusiasts in their field and working without any financial gain.

Mr Mili went on to say—

" That was true in the past and it still holds good today. You are technicians, so I am not going to remind you of all that the radio amateurs have accomplished in the technical sphere, but I have a few notes with me which recall that on 27 September, 1923, the first two-way link was established by radio amateurs between the United States and France on a wavelength of 100 metres, disproving the theory current at the time that such links were impossible with low-power sets. Naturally that was a very significant achievement in the development of science.

Subsequently you accomplished something quite different: the linking of one point on the earth to another by using the moon as a passive relay and, still more recently, the use of the artificial satellites " *OSCAR*."

In brief, your movement is a scientific movement which has achieved solid results—results that have contributed to progress in the sciences and particularly in radio communications.

But there is another very important aspect too—the brotherhood of mankind; for your movement has rendered valuable service to all men."

In referring to an article written by Peter Shroeder in the ITU Journal in January 1958 M. Mili went on to say:

" One of the most significant aspects of the IARU lies in its role as a force for world peace and understanding. It has already been noted above that the furthering of international fraternalism was a stated objective of the Union, and to this aim it has consistently adhered since the organization was first devised a quarter of a century ago.

Once again I thank you for giving me this opportunity to make my humble contribution to this international fraternity and it is my hope that the radio amateur movement will progress, expand and prosper as it deserves."

M. Mohamed Mili, The Secretary General of the ITU accepting a copy of " World At Their Fingertips " from R. F. Stevens, G2BVN at the time of the IARC Convention in Geneva.

The Technical session, under the chairmanship of Dr M. Joachim, began with reports from representatives of the following National Societies: REF (F3FA), ARRL (W1IKE) RSGB (GI3KYP), USKA (HB9GM), IRTS (EI4N), the Brazilian Society (LABRE) and the newly formed Society of Laos.

Mr G. Gross, a former Secretary General, spoke in connection with the defence of the amateur bands on which subject W1IKE and G2BVN also made contributions. Talks on the subject of space communication were made by J. Herbestreit (W0IIN) the Director of the CCIR and by W. Orr, W6SAI, on " How to Become an Amateur Without Really Trying."

The second session of technical lectures began with contributions on propagation research by DJ7AA, G2BVN and OK1WI. DJ7AA presented a programme of beacon stations and asked for co-operation from National Societies and the IARU. At the conclusion of his talk G2BVN briefly mentioned *Georef*, which aroused considerable interest amongst delegates. The concluding lectures were given on the subjects of amateur TV and moonbounce. The latter, which was given by F8DO, described the excellent results that he had achieved in this field.

M. Mili was presented with a copy of *World At Their Fingertips* and a second copy was handed to Dr M. Joachim for inclusion in the ITU library.

The World Administrative Conference for the Maritime Mobile Service was in session at the time of the Convention, and members of the Club had an opportunity of meeting delegates to the Conference at a reception in the ITU building. The Conference had elected as its Chairman, Mr R. M. Billington, T.D., D.L. Head of Wireless Telegraphy, Radio Services Department, GPO.

The Conference has no power to alter frequency allocations affecting other services and the opinion of delegates was that any recommendations in connection with the amateur service to a World Frequency Allocations Conference were unlikely.

The 1967 edition of *Interadio* was published on the opening day of the Convention which was attended by a substantially greater number of persons than in 1966. The members of the IARC resident in Geneva are to be congratulated on arranging a successful Convention.

G2BVN

From Stock—New

RSGB

RADIO DATA REFERENCE BOOK

SECOND EDITION

By G. R. JESSOP, AMIERE, G6JP

The new edition of this comprehensive reference manual has undergone considerable revision and expansion, and also bears a new look. There is new data on power rectification, r.f. cables, TV standards and channels, including overseas countries, transmitter ratings, waveguide, formulae etc. This book is now even better able to provide a single source of data vital to amateurs and professionals who are designing radio transmitting and receiving equipment. Much of the data appears in chart and table form for simplicity.

12/6
postage 1/- extra

AMATEUR RADIO CALL BOOK

1968 EDITION

104 pages provide a complete guide to the owners of call signs in the UK. Calls for "A" licences now finish at G3WOM, u.h.f. phone-only licences reach G8BAG, and the list of reciprocal licences stops at GM5AHS. Eire calls and amateur TV licence holders are included. The *Call Book* is also a useful source of information on band plans, call-sign prefixes, the *Q*-code, beam headings, RSGB affiliated Societies, Zonal and regional boundaries.

6/-
postage 6d. extra

RADIO SOCIETY OF GREAT BRITAIN

28 LITTLE RUSSELL STREET, LONDON, WC1

News from Headquarters

BBC World Radio Club

World Radio Club is a weekly 15 minute programme broadcast in the BBC World Service produced by John Pitman and having licensed amateurs on its production staff. Beginning on 1 July 1967 the programme rapidly attracted attention and the Club now has a membership numbered in thousands. Membership is open to anyone who writes in to World Radio Club which basically aims to cater for the DX listener rather than for the transmitting amateur, although a number of the recent programme topics would have been of interest to all classes of radio amateurs. The transmissions are directed to various areas of the world in the Overseas Service but can usually be heard in the UK. Up to date schedules of the broadcasts may be obtained from: World Radio Club, BBC, Bush House, Aldwych, London, WC2.

Pirates Fined

As a result of Post Office enquiries into the suspected unlicensed use of wireless telegraphy transmitting equipment, the following convictions have been obtained on using wireless transmitting apparatus without the appropriate licence, contrary to the provisions of Section 1 of the Wireless Telegraphy Act, 1949. On 21 August at Wimbledon Magistrates Court a Mr Thomas George Carroll, of 146 Worple Street, London, SW20 was fined £5 on each of four charges and ordered to pay £5 5s. costs with forfeiture of apparatus. On 17 August at Newham Magistrates Court and on 6 September at Stratford Magistrates Court (Division of Becontree), a Mr Anthony William Storey of 21 Paul Street, Stratford, London, E15 was fined £10 and ordered to pay £2 costs with forfeiture of equipment and fined at the second Court £15 and ordered to pay £3 3s. costs.

Affiliated Societies

The following Societies are now affiliated to RSGB:

PLESSEY—WEST LEIGH—RADIO SOCIETY: M. H. Walters, The Plessey Company Limited, Avionics Laboratory, Martin Road, West Leigh, Havant, Hampshire.

HEREFORD AMATEUR RADIO SOCIETY: S. Jesson, 181 Kings Acre Road, Hereford.

BISHOP'S STORTFORD AND DISTRICT RADIO CLUB: A. Marriott, G3VWC, 21 Thorley Hill, Bishop's Stortford, Herts.

FARNBOROUGH AND DISTRICT RADIO SOCIETY: D. G. Arigho, G3NVM, 6 Frensham Close, Yateley, Camberley, Surrey.

Can you help?

● F. C. H. Hinton, G3AS, 12 Clarence Road, Dorchester, Dorset, who wishes to borrow the circuit of the Panda Cub transmitter?

● A. Winter, 105 Donnithorne Avenue, Nuneaton, Warwickshire, who requires the full alignment procedure, circuit and layout diagram of the HRO-MX receiver?

● R. Bowell, G3LRL, 16 Margarite Way, Wickford, Essex, who wishes to hear from anyone who has experienced, and cured, low drive using the Green ECE Ltd. CTX2 2m transmitter?

● M. Timnis, 17 Penn Road, Southcourt, Aylesbury, Bucks., who requires the circuit diagram for the 62H set?

Representation 1966-1967

RESIGNATION OF REGIONAL REPRESENTATIVE FOR REGION 9: R. Griffin, G5UH, 13 Alexandra Road, Uplands, Bristol, 3.

Overlay Transistors

In Sven Weber's article in the June issue of the BULLETIN, the star network of Fig. 9 (b) should be rotated clockwise through 120 deg. to correct the relative annotations.

RAOTA Reunion 1967

The call-sign of Don Morgan, who joined the Radio Amateur Old Timers' Association recently, is G3SM and not G2SM as printed on Page 597, September BULLETIN.

Silent Keys

We record with sorrow the passing of the following Amateurs:

S. J. Munro, G8APE of Chessington, Surrey.
A. W. Fowler, G3FR of Sutton in Ashfield, Notts.
J. F. Lucke, Jnr. W9RMQ of Harvard, Illinois.
A. B. Hughes, BRS26596 of Seaforth, Liverpool.
F. G. Maynard, G4OU of Sheerness, Kent.
B. Joel, ZS1AB/ZS3AB of Cape Town, S. Africa.

Obituaries

H. Longuehaye, G2KC/G8KC

Old timers and newcomers alike will learn with the deepest regret of the passing of Hugh Longuehaye, G8KC, on 11 September, at the age of 68.

Hugh's career in radio began in the early 20's under his original call-sign G2KC. He pioneered, with his contemporaries, long distance, short wave communication. Hugh served for many years as radio officer with the Union Steamship Company of New Zealand and many old friends will remember his famous sideswiper, signing " GDVB " from M.S. " *Aorangi*." For several years the " *Aorangi*," described as " the world's largest motor liner," was employed on the Vancouver to Sydney run and reports of GDVB's signals on 25-49m figured prominently in world-wide lists of " calls heard " published in the *T & R Bulletin* and *QST*.

Coming ashore in the 30's, Hugh was relicensed as G8KC and, after a short time in commerce, joined the Engineering Division of the BBC where he served with distinction until his retirement in 1961. Hugh never lost his early enthusiasm for amateur radio and, until shortly before his death, had regular skeds both on 'phone and key, with many of his old sea-going friends. Equally " at home " on straight key, sideswiper, bug or El-bug, G8KC was a pillar of strength in FOC and a founder member of RAOTA. His disposition was such that he rag-chewed as happily with beginners at 10's as with experts at 3's.

Hugh will be sadly missed by his wide circle of contacts in the morning 'phone nets on 3.7Mc and by listeners in all parts of the country, who came to know his friendly voice. Among many friends and colleagues present at the funeral were G5DF and G5XB of RAOTA.

The sympathy of all will go out to his wife Pat and 16 year old son, Tracy.

S. A. G. C.

Leonard B. Newbold

We record with great sorrow the passing of Leonard Newbold, of Hythe, near Southampton, Hants. Len had been completely paralyzed from his neck down, but he maintained a very enthusiastic interest in short-wave listening, and this in itself had lifted him from deep depression resulting from his disability.

He became cheerful at all times, and was very content to operate his receiver by means of an extended cigarette holder. Len's interest in radio developed to such a point, in fact, that just prior to his passing he admitted he was ready to take the examination to obtain a transmitting licence.

Our sincere sympathies are extended to his mother and family in their sad loss.

T.V.L.

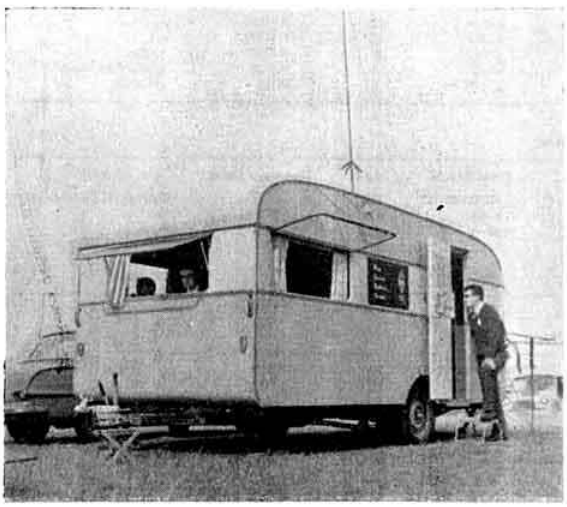
Radio Amateur Emergency Network News

By S. W. LAW, G3PAZ *

AMONGST all the good things one expects to find at the Woburn Rally the Manchester Independent Group's Mobile Communications Centre really stood out as a thoroughly workmanlike unit. The accompanying photograph cannot possibly hope to do justice to the many hours of painstaking work that have gone into the equipping and testing of this very useful Group project, and those who managed to find a chance to get inside and absorb the " set-up " came away with a better idea of what a live and determined RAEN Group can do when they get down to serious business. The fact that the trailer was constantly in use as a " talk-in " station amply proved its utility from the radio angle, and for those who cared to look more deeply into things there were many points that might have escaped the casual observer (don't waste time on the " kitchen sink " gag—this Group is way ahead of you!).

The Unit is contained within a 16 ft. caravan, and has the following facilities:

1. Two-way radio communication on 160, 4, and 2m (for the moment the RTTY channel will be confined to 2m).
2. Duplicated power systems (mains and battery) with fully automatic " fail-safe " change-over from mains to battery operation in the event of mains power failure.
3. Remote operators' positions with full monitoring facilities for outgoing transmissions.
4. Facilities for both Field telephone and GPO telephone connections.



The RAEN caravan was on display at the RSGB Woburn Rally and provided 4m talk-in facilities.

5. Large Conference Area, complete with table and seating.
6. " Brew-up " and washing facilities (How did you guess?).

Needless to say, the above gives only a general picture of the unit. There are quite a number of minor, but well thought out, facilities which we have no space to enumerate. Those who have a genuine interest in such a project for their own Group might care to send a s.a.e. for data to G3MBQ (QTHR). Please remember, however, that he is a *very* busy man.

Am I Blue?

Protective colouring is Nature's way of ensuring that, by living only amongst creatures or environments of similar colour, one can remain unobserved. Should one, however, actually desire to be readily identified in a crowd it is a little disconcerting to find that one is merely one of the crowd, particularly if an effort *has* been made to try to ensure ready identification of onself by others. Now we of RAEN have accepted that a red badge cannot be a " World Copyright " and we hasten to assure the RTTY boys, for example, that we have more than a brotherly regard for their enthusiastic work in that field (in any case we have every intention of getting in on the " band wagon " in the course of time—we know a good thing when we see it!). However, we *had* thought that our privilege of showing a green flashing light when " static mobile " or portable for the benefit of the User Services was exclusive to RAEN. It now appears that, as from 16 October, there are no less than 250 doctors whose cars will carry the new green flashing identity lamps originated by the B.M.A. to ensure free passage on emergency calls. Well, we've been urging for an " integrated emergency service " for some time—so if we find the pace getting faster we should be the ones to do the cheering! Let us make the distinction quite clear, however. The doctors flash whilst in motion—*we must not*. Moreover the doctors light will only show green to the front (they show a special sign to the rear) whilst the RAEN temporary station is privileged to show a green flasher in every direction. So please remember that we must *only* use our flashers at the right time and place.

The Show

What can we say about " The Show " that has not been said already? RAEN, although not so much to the fore as last year, was nevertheless well in evidence if the happy greetings and handshakes (and subsequent discussions!) were anything to go by. As usual, a great effort; and may it go from strength to strength in the years to come.

The Contest

How did you get on this year? This Column was unfortunately laid low with one of the prevalent " Bugs " (even our long-suffering doctor is under the weather!), but we crawled out in a dressing gown and, steaming gently from the ears and barking regularly, made sufficient contacts to keep the flag flying, albeit rather weakly. We hope that you enjoyed it and can wait in patience while the harrassed " computers " digest all those logs you sent in.

* 11 Chisholm Road, Croydon, Surrey, CRO 6UQ

CONTEST NEWS — RESULTS—REPORTS—RULES

Second 432 Mc/s Contest (Open) 1967

A total of 43 stations took part in the second 432 Mc/s (open) contest held on 12-13 August, 1967. Section A attracted the most entries with 22, followed by the portables section C with 16, and section B with five. This was an encouraging entry considering that it was held in the middle of the holiday period (an unavoidable situation owing to a full calendar) and justified an extra contest.

G8AHE/P protested that 24 hours was too long, and suggested nine hours would be quite adequate. However, as this was the only remark about the rules it can be assumed that everyone else is satisfied, except for two SWLs in the South Downs area who suffered severe QRM from a strong local portable station. The listeners suggested that a limit of 25 watts should be imposed.

Results

Congratulations go to G8AMU/P, the overall winner, with G8ARL/P as runner-up. G8AKE won the single operator fixed station section with G3MCS as runner-up. G3PMH was the leading station in section B with G8BAO/A as runner-up.

It is not surprising to note that the leading stations in each section were using 150 watts input. G8AMU/P ran 150 watts to a 4X150A feeding two 14 element stacked Yagis at 30 ft. a.g.l. from a QTH 700 ft. a.s.l. with an AF186 in the front end of the converter. G8AKE ran 150 watts to a 4CX250B feeding two 14 element stacked Yagis at 45 ft. a.g.l., with two BF180 transistors in the converter r.f. amplifier feeding a cavity mixer. G3PMH also ran 150 watts to a 4CX250B feeding into a pair of 18 element "Parabeams" at 60 ft. a.g.l. with a GM0290 transistor in the pre-amplifier of the converter.

As overall winner, G8AMU/P will receive a miniature cup, and G8ARL/P will receive a certificate of merit as runner-up. G8AKE will receive a certificate of merit as leading station in the single operator fixed station section. G3MCS will receive a certificate of merit as runner-up. As there were only five entries for section B a certificate of merit will only be awarded to G3PMH, the leading station in this section.

The above awards will of course be subject to approval by Council.

Check logs were received from G2WS and BRS26234/P, and listeners' logs from BRS28005 and A5032 are acknowledged.

SECTION A

Position	Call	Score	QSOs	QTH	Final Stage	Input	Receiver Input	Aerial
1	G8AKE	5717	56	Melton Mowbray	4CX250B	150	BF180	2–14 ele.
2	G3MCS	4757	69	Aylesbury	4CX250B	100	BF180	10 ele.
3	G8AAY	4045	36	Poole	320A	28	A2521	2 × 18 ele. B1 squares
4	G8ACI	3603	37	Fareham	6–40A	90	AF239	2 × 14 ele.
5	G8ABP	3053	48	Birmingham	6–40A	65	GM0290	14 ele.
6	G8AUE	2931	40	Derbyshire	2 × PC88	10	AF239	18 ele. Parabeam
7	G8AHM	2656	29	Portsmouth	4CX250B	150	AF239	2 × 18 ele.
8	G2XV	2234	26	Cambridge	6–40A	100	AF186	40 ele. stack
9	G8AAZ	1988	52	Wimbledon	6–40A	35	BF180	14 ele. & 8/8
10	G3VYB	1701	30	Liverpool	6–40A	80	BF180	10 ele.
11	G8AKT	1583	33	Biggleswade	3–20	28	AF139	24 ele.
12	G5UM	1340	25	Leicester	3–20A	24	AF139	14 ele.
13	G8AOD	1264	12	East Grinstead	02–6	12	EC88	10 ele.
14	G8ANS	1153	33	Herts	3–20A	26	AF186	18 ele. Parabeam
15	G8AVL	1060	30	Croydon	3–20A	24	BF180	8/8 slot
16	G8ATK	972	19	Surrey	02–6	10	GM0290	14 ele.
17	G3WMS	946	19	Bristol	6–40A	80	TIS34	18 ele. Parabeam
18	G8ART	735	24	Herts	3–20A	35	AF186	24 ele.
19	G3PSH	373	8	Uxbridge Middx.	3–20A	20	GM0290	4/4
20	G8AVC	268	8	Chesterfield	CTR70	6	AF186	10 ele.
21	G8AUM	263	11	Herts	02–6	5	AF139	18 ele. Parabeam
22	G8AXU	86	4	Nottingham	2 × PC88	5	PC88	14 ele.

SECTION B

Position	Call	Score	QSO's	QTH	Final Stage	Input	Receiver Input	Aerial
1	G3PMH	2218	24	Cambridge	4CX250B	150	GM0290	2 × 18 ele. Parabeams
2	G8BAO/A	523	16	Herts	3–20A	20	GM0290	6/6
3	G8AJC/A	281	6	Canterbury	02–5	10	AF239	16 ele.
4	G8AXU/A	196	7	Nottingham	6–40	66	PC88	8/8

Disqualified- GW8ASA. General Rule 11B

SECTION C

1	G8AMU/P	8195	79	Worthing	4X150A	150	AF186	2 × 14 ele.
2	G8ARL/P	6563	77	Newbury	3–20A	17	BF180	32 ele. stack
3	G8ACP/P	5287	61	Beds.	3–20A	30	Transistor	14 ele.
4	G8AWO/P	4523	64	Beds.	6–40	50	Transistor	18 ele. Parabeam
5	G3EFX/P	4442	51	Wilts.	DET24	25	GM0290	8/8
6	G8ARC/P	3578	42	Wilts.	3–20A	25	AF239	18 ele.
7	G3TND/P	2781	37	Somerset	3–20A	20	AF239	48 ele. stack
8	G8AHE/P	2723	34	Birmingham	02–6	8	GM0290	14ele.
9	G8ADC/P	2689	22	Cheltenham	02–6	10	AF139	10/10
10	G8APQ/P	2563	57	Surrey	3–25	16	Transistor	6/6
11	G8AKQ/P	2281	29	Sheffield	02–6	10	GM0290	8/8
12	G8AFA/P	1331	25	Somerset	3–20A	35	AF139	24 ele.
13	G8AWY/P	1082	26	Wigan	BAY66	8 on 2 M	AF186	6 ele.
14	G8ADH/P	1055	18	Hants	02–6	8	AF239	14 ele.
15	G8ANU/P	726	13	Stafford	3–20A	12	GM0290	4/4
16	G3VXK/P	571	16	Liverpool	320–A	25	BF180	18 ele. Parabeam

Fourth 70 Mc/s Contest (C.W.) 1967

1. **When:** 09.00 to 16.00 GMT Sunday, 3 December, 1967.
2. The **General Rules** of RSGB Contests published in the January 1967 issue of the RSGB BULLETIN will apply except as superseded by the rules of this contest.
3. **Section:** (a) Fixed stations—single operator.
   (b) Club, multi-operator and /A stations.
   (c) Portable stations.
4. **Modes:** Contestants may only transmit on A1 or F1.
5. **Scoring** will be 1 point per km.
6. **Contest Exchanges:** (i) RST report followed by serial number.
   (ii) Location information; QRA locator and QTH may be sent.
   The QTH must consist of a town (identifiable on the Ordnance Survey, Ten Mile Map), a distance (in km) and a bearing from the town.
7. **Logs** should be submitted on RSGB Contest logsheets, suitably completed, with the QRA entered in Column 5, QTH in Column 6. Multi-operator stations should enter the operator's call-sign in Column 7.
8. **Entries** (a) The cover sheet must be made out in accordance with General rule 4 and the declaration signed.
   (b) Entries must be postmarked not later than 15 days following the contest.
9. At the discretion of Council awards will be made to the winner in each section, and to the runners-up in each section provided that there are ten or more entries in the section.

Midland Contest Club

The well known v.h.f. contest club call G3RUF is to be taken over by Douglas Lowden, 23 Pear Tree Drive, Birmingham, 22A. The original licensee R. A. Swain, G3KXA flew to New Zealand on 17 October.

Society Affairs

A Brief Report on the September, 1967 Meeting of The Council

THE Meeting was held on Friday, 8 September 1967 and was attended by Messrs A. D. Patterson, President (in the Chair), B. Armstrong, J. Etherington, J. C. Graham, E. G. Ingram, H. E. McNally, L. E. Newnham, R. F. Stevens, G. M. C. Stone, J. W. Swinnerton, E. W. Yeomanson (Members of the Council), D. W. Robinson (General Manager), H. J. Hallen and C. P. Pope (Headquarters staff).

Apologies for absence were submitted on behalf of Messrs N. Caws, J. F. Shepherd and G. Twist.

Membership and Affiliation

The Council approved the election of 164 members (127 Corporate and 37 Associate) and accepted nine transfers from Associate to Corporate membership.

Affiliation was granted to:

(1) Hereford Amateur Radio Society.
(2) The Plessey (West Leigh) Radio Society.
(3) Farnborough and District Radio Society.
(4) The Bishop's Stortford Amateur Radio Club.

Society Trophies, 1967

The Council finally approved the award of the following:

Calcutta Key to E. Wagner, G3BID for outstanding service to the cause of international friendship through the medium of Amateur Radio.

Founder's Trophy to J. Wilson, GM3KJF, for distinguished service to the Society.

ROTAB Trophy to H. P. Wiggins, G2CP, for outstanding and consistent DX work.

Norman Keith Adams Prize to Reverend Paul Sollom, G3BGL, for his article in the November 1966 and December 1966 issues of the RSGB BULLETIN entitled "A Little Flutter on V.H.F."

Bevan Swift Memorial Prize to G. F. Gearing, G3JJG, for his article commencing in the July 1966 issue of the RSGB BULLETIN entitled "G3JJG, S.S.B. Exciter."

Courtenay Price Trophy to Sven Weber, G8ACC, for his article in the June 1967 issue of the RSGB BULLETIN entitled "Overlay Transistors."

Wortley Talbot Trophy to A. J. Hodgkinson, G3LLJ, for his article in the March 1967 issue of the RSGB BULLETIN entitled "Multi Band Parametric Amplifier."

Ostermeyer Trophy to L. Williams, BRS25769, for his article in the January 1967 issue of the RSGB BULLETIN entitled "Amateur Bands Receiver."

Varney Trophy to M. Gibbings, G3FDW, for his article in the May 1967 issue of the RSGB BULLETIN entitled "The TVI Problem on Four Metres and How to Cure It."

Amateur Radio Call Book

The Council received a report on the production of this and it was agreed to ask Mr J. Clarricoats to compile the 1969 edition.

CCIR General Purposes Committee

The General Manager was nominated to fill the vacancy caused by the death of Mr. John A. Rouse.

Amateur Radio Handbook

The Council accepted a proposal that the title of the next edition of the Handbook should be *The Radio Communication Handbook*.

Scottish Beacon Station

It was reported that arrangements had been concluded with the UK Atomic Energy Authority for the establishment of the Scottish beacon station (formerly at Lerwick) at Dounreay, near Thurso, Caithness. Mr A. J. Oliphant, GM3SFH, had agreed to set up the station, which would operate under the call GB3GM, and he was allocated a float for the initial expenses.

Minutes of the following Committee Meetings were accepted as reports:

V.H.F. Contests (3.7.1967), Membership and Representation (7.7.1967), Exhibition (4.8.1967), Scientific Studies (7.8.1967), Mobile (10.8.1967), H.F. Contests (17.8.1967), RAEN (19.8.1967) and Finance and Staff (21.8.1967).

The Council was in session for 4¾ hours.

CLUBROOM

A Monthly Survey of Club and Group Activities

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

THE National Radio Club, Malta, recently visited the Cambridge University Solar Research station at Rabat. The party was met by Dr and Mrs H. Von Kluber who are in charge of the Solar station. Dr Von Kluber first showed the group around his laboratory showing how the sun is picked up through a system of mirrors and lenses and projected onto a panel in the lab. Most of the research done at the Malta Station is distributed to world scientists, especially those engaged in space exploration.

The editorial in a recent issue of *QAV* newsletter of the **AERE (Harwell) ARC** refers, amongst many other things, to a comment by one of its members that it is a waste of time sending a copy of the newsletter to the RSGB because " with so many newsletters received each month, no-one would have time to read and digest ours." There is an essence of truth in this, for there is always a considerable volume of material to digest, and coupled with the fact that priority must be given to special reports of club activities, information which is gleaned from Newsletters generally only furnishes our memories at HQ. We only hope that clubs will not be upset by these meanderings, and think twice before depriving us of news of their activities. *G2HIF.*

Bedford ARC, now comfortably installed in its newly decorated HQ at the Dolphin Inn, has drawn up a programme to cater for a wide variety of interests. Recent activities have included a visit to the GPO station at Balstock, where envious eyes were cast at the arrays of Sky Wires. *G3VBA.*

Bradford Radio Society re-opened on 5 September with an RSGB Tape/Slide lecture on Aerials and an attentive audience of juniors. It seems that over the past two years, membership has changed drastically to its present level of 50 per cent juniors. The change coincided with the move from premises offering licensed liquid refreshment to Bradford Technical College. *G3HJP.*

On Friday 1 September the **Bangor and District ARS** was inaugurated in the presence of RSGB President, Barney Patterson, GI3KYP. About 35 amateurs and SWLs turned up for this meeting including a number from the Belfast and District Group. Potential members should note that the Society meet on the first Friday in the month at 8 p.m. in Silverstream Unionist Hall opposite Silverstream Garage on the Belfast Road, Bangor. *GI3OLJ.*

Bristol RSGB Group met on 25 September under the new Chairmanship of Eric Chambers, G2FYT. At this meeting it was decided to attempt an increase in membership and enhance local interest in Amateur Radio. The date for the annual dinner has been fixed for 9 December at the Cornice Room, Old Bristol Restaurant, 33 King Street, Bristol 1. Tickets £1 1s. *G3PFD.*

Among the 36 Amateurs and SWL's who turned up for the first meeting of the Bangor and District ARS was RSGB President, Barney Patterson, GI3KYP.
(Photo by H. Irvine)

Cambridge ARC has confined itself to informal meetings during the holiday season, permitting the junior members full use of the main clubroom for constructional projects. Any prospective members can receive a copy of the newsletter on request by contacting G2AIQ. *G5BQ.*

Clifton ARS held its twenty-first AGM on 8 September when the committee, less chairman, were re-elected *en-bloc*. Other activities during September included a Junk Sale and on the 24th a D/F Hunt on Farleigh Common, Surrey. *G3UAD.*

Crawley ARC took part in V.H.F. NFD and for the second year in succession were nearly blown off their site by inclement weather. Ron Vaughan, G3FRV, the Hon. Secretary has been blamed for bringing the bad weather with his statement that " it can't be that bad two years running." The club has now been licensed as G3WSC—West Sussex Club—the new shack being nearly completed. *G3FRV.*

Dorking and District RS made the long treck to the Devon/Somerset border to participate in V.H.F. NFD, the journey being made, of course, in the ex-GPO van, and with only one minor mishap with an oil pipe, which was quickly rectified. Later during the month the club met for a junk sale when various interesting and amusing items were auctioned. *G3MBK.*

Douai School RS met on 17 September for its Annual General Meeting at which the following officers were elected: President, Paul Sollom, OSB, G3BGL, Secretary, Gerard Bulger, G3WIP, Treasurer, James Batt and Committee members Oliver Cox, Antony Slave and Edward Way. *G3WIP.*

Glenrothes ARC met on 1 October when Ted Ross, GM3LWS presented a number of slides of the Antarctic, Whaling Stations in South Georgia and a few of Montevideo taken whilst he was with the British Antarctic Survey. A number of slides of NFD 1963 in Cyprus were also shown. In addition, GM3OLK showed some interesting cine film. Future meetings include a visit by RSGB Scottish Zonal Representative, Fraser Shepherd, GM3EGW on 15 November, a visit to Elliott Automation provisionally arranged for 6 December and a practical demonstration of RTTY. *GM3LWS.*

Radio Society of Harrow has just finished its 21st anniversary month with a series of programmes and lectures on each evening. A special Anniversary Dinner was held on 20 October at the Clay Pigeon Hotel. Earlier lectures on hi-fi by G3JVM and a Technical Forum were among features presented. *G3JVM.*

Liverpool and District ARS continues to meet regularly. On 7 November a Constructional Contest is scheduled followed on 14 November by a Junk Sale. We trust that there's no link between these events! *G3TYE.*

Medway ARTS report interesting lectures by R. Springet and Mike Winter G3OHP during recent weeks. R. Springet lectured on Electronics in the Paint and Plastic Industry while Mike Winter followed up at the next meeting with a talk on Test Equipment, and how to interpret readings. *G3UXH.*

Norfolk ARC have yet again produced a mammoth 26 page plus covers edition of *Challenge* printed, incidently, on Quarto paper. Included was a transistor d.c./a.c. inverter incorporating just two 100 ohm, two 15 ohm resistors and two OC19, OC26 or OC28 transistors, plus of course, a suitable transformer, in this case one originating from a vibrator unit. However, in common with most club publications they need, or so some believe, " more technicality and less philosophy "; this, however, only brought the retort " Amateur Radio has more in it than mere technicalities, and the social side is at least as important as any other aspect." That's the case, it's to you to decide. *G3PNR.*

Northern Heights ARS report an unusual lecture last month entitled " Can your log book tell a story " when many interesting facts came to light—a fox hunt by Mike Fisher, G3UBI and Richard Constantine, G3UGF was one. It appears that a monster trophy will be awarded at the Annual Dinner. Some forthcoming events include a talk on s.s.b. trends by G6LD on 8 November followed on the 22nd by L. M. Dougherty, who will lecture on Radio Astronomy. *G3MDW.*

North Notts ARS held its AGM on Thursday, 21 September. The Treasurer's report showed the Society in a very favourable financial position and future programmes include lectures, tapes, and film shows and a visit to the Rugby Radio Station and Jodrell Bank Radio Telescope. Club meetings are held regularly every Thursday at 13 Gateford Road, Worksop where any prospective members would be welcomed. *G3OZN.*

Paddington and District ARS, in preparation for the winter months, has obtained a bug key for the h.f. band equipment, while Eric Holt, G3MHQ has temporarily loaned the club his s.s.b. exciter. Meanwhile the work of mounting 4m, 2m and 70cm beams on the roof is nearly complete. *G8AQO.*

Purley and District RC met on 15 September when nearly 50 members turned up for a constructional contest in which Alan Shepherd, G3RKK came first of 13 entries, with a 80, 20 and 15m, 300W transceiver. Second was Roger Whitbread, G8AYN with a 23cm converter and Fred Scowen, G3TSD came third with an El-Bug. In view of much larger attendances the club will in future be meeting at the larger hall adjoining the present one for the third Friday in the month meeting and continue to use the small hall for the Natter Nites held on the first Friday. *G3FTQ.*

Redbridge ARS is to be formed shortly in the Ilford area meeting at 62 Dudley Road, Ilford, Essex. Members in and around this district are cordially invited to contact the Secretary at the above address for fuller details. It is hoped to commence regular meetings at 8 p.m. on the first and third Monday of each month shortly. The organizer T. L. Stoakes can also be contacted by telephoning 478 7346 in the evenings. *G3JTS.*

Reigate ATS report that a series of tutorial evenings at members' homes is well under way for SWLs intending to sit the December RAE. The club is also well satisfied with the results obtained during V.H.F. NFD in September and is looking forward to the publication of the final placings with considerable interest. The member who said that the weather couldn't possibly be as bad as last year was made to eat his copy of the 1967 Amateur Radio Call Book! *G3NKS.*

The Autumn Junk Sale and Hamfest of the **Skegness and District Group** was held as usual at The Bull, Spilsby on 13 October. All the popular features were available for an admission charge of 2s. 6d. *G2ABK.*

South Birmingham RS met on 20 September when Bob Fisher, G3PWJ gave a talk on the working of the RSGB and answered various questions on the RSGB and in particular the new RSGB Headquarters. *G3OHM.*

Another inspired newsletter was the *Wiltshire Hams* published by the **Swindon and District ARC.** Amongst its 17 pages were two of photographs and two pages of cartoons. One of the many technical articles included was a 10-element 2m long Yagi beam originating from DL6AL in Oldenburg. It was interesting to note that all measurements were given in mm. For instance the total length was 3633mm (not 3634, but 3633mm!). *G3JAP.*

Thames Valley ARTS recently met to hear talks on unusual design of receivers and the use of surplus mobile radio equipment on four and two. Meetings are held regularly on the first Wednesday of the month at the " Cardinal Wolsey," Hampton Court. The main event for November is the Annual Dinner to be held on 11 November at the Court Restaurant, Hampton Court. *G3JKA.*

At the **Verulam ARC** recently, nearly 50 members attended one of the most interesting lectures this year when Ian Turner, G3DGN, talked about Optical Communication Techniques. Himself in the forefront of research in this new field, Ian described systems now being developed to provide multi-channel wideband video links using optical " aerial " systems with gains approaching 60dB. After a series of excellent slides describing the operation of various devices with outputs ranging from the 100 megawatts of the ruby laser down to the 1mW of the c.w. gas laser, G3DGN demonstrated a number of interesting pieces of equipment including a semiconductor injection laser using a photo-emissive diode. Other fascinating items shown were a flexible " light pipe " using fibre-optics techniques, and the " Luxphone "—a light operated walkie-talkie! The special properties of coherent light were demonstrated using a low-power c.w. gas laser. Verulam's decision to meet twice monthly has been confirmed by the good attendance at the " extra " meetings held at Salisbury Hall, London Colney, and to enable these meetings to continue additional accommodation at The Cavalier Hall, Watford Road, St. Albans, has been secured. The club now meets there on the first and third Wednesday of each month, 7.30 for 8 p.m. *G3GJX.*

Wakefield and District RS has at last collected its call-sign G3WRS and is now trying to acquire equipment to use it. On par with many other clubs it is felt that membership could and should be increased and a publicity campaign is under way in the Wakefield district. The full programme up to the end of the year should help the club reach this goal. *G3TQV.*

Laser demonstration at Verulam. Ian Turner, G3DGN, spectacled and in centre of picture, looks pensive as G3WER puts a question.

(Photo by Paul Fletcher)

The Westmorland RS are now meeting on alternate Fridays at 20 Kendal Green, Kendal, Westmorland where advantage is taken of the amenities offered by G3WBZ. On 20 September an equipment exhibition was held by courtesy of Stephens-James Ltd. of Liverpool who provided the equipments. For award hunters it is planned to shortly introduce an " English Lakes Award " details of which will be published when available. *G3UEC.*

The **Wirral ARS** spent an enjoyable evening as the guests of Messrs Shell Research at Thornton, Wirral on 2 October. All aspects of Electronics in industry were seen. On 4 October the AGM was held and G2FOS was re-elected Chairman, G3PXX, Secretary and G3KXR Treasurer. The future meetings are to be held on 8 and 22 November at the Club Headquarters, the programme to be announced later. *G3PXX.*

On 2 September **Wolverhampton ARS** held its second D/F contest on Kinver Edge near Kidderminster. One competitor forgot where he had parked his car—maybe he should have left the mobile rig switched on!

On 4 September C. Ramsbottom of the Wolverhampton College of Technology described the construction and operation of the logic circuits which form a basis of computers. He also had some interesting examples of integrated circuitry.

On 18 September a meeting entitled " Discussion—what do you want from a radio club? " took place at the clubrooms. Comments ranged from " more about aerials " to some well thought out ideas for improving the warmth of the club room. All this was intended as preparation for the AGM held on 2 October.

Yeovil ARC have the club station back on the air operating s.s.b. on 80m, 20m, 15m and 10m using a Viceroy Mk.I, Drake 2B receiver and G8KW trap dipole at 60 ft. The youngest member of the club to join was Keith Orchard at the age of 12, and who at the age of 14 was licensed G3TTC. Now at the age of 18 he has been selected by the BBC to enter its transmitter school. The news was reported in the local press giving good publicity to the club. *G3NOF.*

Newsletters were also gratefully received from **Cornish RAC, Addiscombe ARC, Civil Service RS, Crawley ARC, Cray Valley RS, Crystal Palace and District RC, Echelford ARS, Midland ARS, North Kent RS, RAIBC, Saltash and District ARC,** and **Surrey RCC.**

It would assist the compiler of clubroom if reports could be typed double spaced and *concise* in content. If you use long hand please print unusual words. **Deadline** for the **December** issue is **10 November.**

Forthcoming Events

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

REGION 1

Ainsdale (ARS)—1, 15, 29 November, 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)—2 November (Talk by Maurice Jackson, G2FMU), 7 December (AGM and Discussion Night).

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

Bury (B & RRS)—14 November, Constructional Competition and Quiz v Manchester & District Radio Society 8 p.m., Old Boars Head Hotel (Private room) Crompton Street. Club meets Tuesdays, 8 p.m. Sundays 11 a.m.

Chester (C & DARS)—Tuesdays, 8 p.m. YMCA, 7 November (Net Night), 14 November (Hot Pot Supper), 21 November (" NFD Transmitters," by Norman Kendrick, G3CSG), 28 November (" Brains Trust " by J. L. Goldberg, G3ETH).

Crewe & District—6 November, 4 December, 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)—10, 24 November, 8 December, Landsbury House, 13 Crosby Road South, Liverpool, 22.

Macclesfield (M & DRS)—7, 21 November, 5 December, 8 p.m., The George Hotel, Jordangate.

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

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

Morecambe.—1 November, 6 December, 125 Regent Road.

North West V.H.F. Group.—Tuesdays, 8 p.m., 7 November (AGM), Club Headquarters, Chapeltown Street, Manchester, 4.

Preston (PARS).—2, 16, 30 November, 7.30 p.m., "Windsor Castle " (Private room), St. Paul's Square.

St. Helens (SES).—14, 28 November 7.30 p.m., IVS Centre, 55 College Street.

Southport (SRS).—Wednesdays, 8 p.m. and Sundays 2.30 p.m., The Esplanade. Tuesday, 7 November (Visit to HMS *Inskip*) Nr. Preston, 8 p.m.

(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.—1, 15, 29 November, Royal Oak Hotel, Castle Street, Edgley.

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

Westmorland.—3, 17, November, 1 December, 7 p.m., The Allen Technical College, Sandes Avenue, Kendal.

Wirral (WARS).—8, 22 November, 6 December, 8 p.m., Harding House, Park Road West, Claughton, Birkenhead. 3 November (Annual Dinner), Coach & Horses, Moreton.

REGION 2

Bradford (BRS).—14 November (Mullard Film Show), Queen's Hall, Bradford, 21 November (" Approach to V.H.F.," by J. Burgess, G3KKP), 5 December (" Semi-Conductor Devices "—RSGB Tape/Slide Lecture), 7.30 p.m., Bradford Technical College, Great Horton Road, Bradford.

Northern Heights.—6 November (Visit to Websters Brewery, Wheatley), 8 November (" Electronics," by G. F. Craven), 22 November (" Radio Astronomy," by L. M. Dougherty), 6 December (Annual Dinner), 7.45 p.m., Sportsman Inn, Ogden, Halifax.

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

York (YARS).—Thursdays, 7.30 p.m., British Legion, Micklegate, 30 November (Dinner), 7.15 p.m., Granby Lodge Hotel.

REGION 3

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

(MARS)—Third Tuesday in the month, 7.45 p.m., Midland Institute.

(South)—Third Wednesday in the month, 8 p.m., Scout Hut, Pershore Road.

Bromsgrove (B & DARC).—Second Friday in the month, 8 p.m., Co-op Hall.

Cannock (CCARS).—First Thursday in the month, Bridgtown, Walsall Road, Cannock.

Dudley (DARC).—3, 17 November, 1 December, Art Gallery, Dudley, 4 November, Annual Dinner, Stewponey, Stourton.

Hereford (HARS).—First Friday in the month, 7.30 p.m., Mortimer Hall, Mortimer Road.

Mid-Warwickshire (MWARS).—13 November (" Simple Test Equipment," by G3HCM), 27 November (" Aircraft Radio Communication," by G3TFC), 7 Regents Grove, Leamington Spa.

Nuneaton (NARS).—Thursdays, fortnightly, Anchor Inn, Hartshill.

Salop (SARS).—9 November (The Irish Tour—G3BA, G3BHT), 23 November (Members' Colour Slide Show), Old Post Office Hotel, Milk Street, Shrewsbury.

Stourbridge (STARS).—7 November (" Tape Recorders," by G3CLG), 7.45 p.m., 5 December (Annual " Junk " Auction), 7.45 p.m., The Library, Longlands School.

Stratford (SuA & DRC).—3 November (Eddystone Evening), 17 November (" Computers," by G3OMP) 1 December, Hall's Croft, Old Town, Stratford.

Sutton Coldfield (SCRS).—13, 22 November, The Fox, Walmley.

REGION 4

Derby (D & DARS).—1 November (Surplus Sale), 8 November (Ten Minute Topics), 15 November (Coffee Evening—Ladies invited), 22 November (Colour TV—Part 6), 29 November ("Microwave Equipment," by I. Brown Esq., G3TVU), 7.30 p.m., Room 4, 119 Green Lane, Derby.

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

Leicestershire V.H.F./U.H.F. Group.—15 November ("Microwaves," by Roger Meredith of AEI Electronics.) 7.30 p.m., Room 45, Regional College of Education, The Newarke, Leicester.

Melton Mowbray (MMARS).—16 November, 7.30 p.m., St. John Ambulance Hall, Ashfordby Hill, Melton Mowbray, Leics.

Newark (NSWC).—Mondays, Thursdays, 7.30 p.m., The Guildhall, Guildhall Street, Newark.

Nottingham (ARCN).—Tuesdays, Thursdays, 7.30 p.m., Room 3, Sherwood Community Centre, Woodthorpe House, Mansfield Road, Nottingham.

Peterborough (P & DARS).—Fridays, 8 p.m., (Informal), Old Windmill, behind The Peacock Inn, London Road, (opposite Murkitts Garage).

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

REGION 5

Bedford (BARC).—2 November (Club Project—The TDO), 9 November (Using the Oscilloscope), 16 November (The Club Award—The Bedford Cup), 23 November (Question and Answer Evening), 30 November (Using the TDO or GDO), " The Dolphin" Broadway, Bedford.

Bishop's Stortford (BS & DARC).—20 November (Lecture by MP4MAX or theW1BB Tape and Slide Lecture), 8 p.m., The British Legion Club, Windhill, Bishop's Stortford, Hertfordshire.

Cambridge (C & DARC).—3 November (" Know-How " for Beginners—The Two Stephens), 10 November (Informal), 17 November (" Station Planning" by Peter Simpson G3GGK), 24 November (Informal), 1 December (Film Show), Fridays, 7.30 p.m., Club Headquarters, Corporation Yard, Victoria Road, Cambridge.

Cambridge University (CUWS).—Meetings 8 p.m., on Alternate Thursdays. Freshmen particularly welcome at Psychology Department, Downing Site, Cambridge.

Luton (L & DARC).—Tuesdays at 8 p.m., at New Headquarters. Details from Hon. Sec.—G3VES please.

March (M & DARS).—Tuesdays, 7.30 p.m., 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).—2 November (Films on Industrial Electronics—G3TDW), 9 November (Programme and Annual Dinner Planning), 16 November (" Using the HRO on C.W.", by G3AUA), 23 November ("Radio and TV Servicing " by G2DPQ). Thursdays, 7.45 p.m. (Morse Classes), Meetings, 8 p.m., Church Hall, High Street, Shefford, Bedfordshire.

REGION 6

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

Gloucester (GRC).—Second and fourth Thursday each month, 7.30 p.m., with Morse practice, Lamb Inn, Market Parade, Gloucester.

REGION 7

Acton, Brentford and Chiswick (ABCRC)—21 November (Discussion Night), 7.30 p.m., Chiswick Trades and Social Club, 66 High Road, Chiswick.

Addiscombe (AARC)—8, 22 November, 7.30 p.m., 158 Lower Addiscombe Road (Toc H Hall).

Ashford (Middlesex) Echelford (ARS)—9, 23 November, 7.30 p.m., St. Martin's Court, Kingston Crescent, Ashford.

Bexleyheath (NKRS)—9 November (" Crystals " by G3FRB) 9 p.m., Congregational Church Hall, Chapel Road, Bexleyheath.

Chingford Group—3, 17 November, Royal Forest Hotel, Chingford.

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

Croydon (SRCC)—21 November, 7.30 p.m., Blue Anchor, South End.

Dorking (DR & DRS)—14 November, 8 p.m., Wheatsheaf. 28 November, 8 p.m., Star & Garter, Dorking.

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

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

East London—19 November (" The Licence," by S. Smith), 2.30 p.m., Wanstead House, The Green, Wanstead, London, E11.

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

Edgware & Hendon (EADRS)—13 and 27 November, 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)—10 November (" 23cm," by G3HWR), 24 November (" Film Show," by G3NDF—films by AEI and Mullard), 8 p.m., Guildford Engineering Society in Stoke Park.

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

Harrow (RSH)—3 November (" Frequency Synthesizing," by G3HBW), 10 November (Final deciding Quiz with Verulum Club at Harrow), 17 November (Junk Sale), 24 November (Practical). 8 p.m., Roxeth Manor School, Eastcote Lane.

Havering (H & DARC)—15, 29 November, Romford.

Holloway (GRS)—Mondays (RAE), 7 p.m., Wednesdays (Morse), 7.30 p.m., Fridays (Club), 7.30 p.m., Monten School, Hornsey Road, London, N7.

Hounslow (HADRS)—13, 27 November, 7.30 p.m., Canteen, Mogden Main Drainage Department, Mogden Works, Isleworth.

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

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

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

London U.H.F. Group—First Thursday in each month, 7.30 p.m., White Hall Hotel, Bloomsbury Square, Holborn.

Loughton—3, 17 November, 7.30 p.m., Loughton Hall (near Debden Station).

Maidenhead (N & DARC)—21 November, 7.30 p.m., Victoria Hall, Cox Green, Maidenhead.

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

Norwood & South London (CP & DRS)—18 November, 8 p.m., CD Centre, Woodyates Road, SW12.

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.

Reigate (RATS)—8 November (Construction Contest), 7.30 p.m., George and Dragon, Cromwell Road, Redhill.

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

Science Museum (CSRS)—7 November (Demonstration, Exhibition and Talk by R. S. Gibson of KW Electronics Ltd), 6 p.m., 22 November (Informal Meeting), 6 p.m., 5 December (Film Show in Colour), 6 p.m. Science Museum, South Kensington.

Scouts ARS—16 November (Club Meeting), 7.30 p.m., Baden Powell House, Queensgate, South Kensington, SW7.

Sidcup (CVRS)—2 November (" Auroral Propagation on V.H.F.," by G2FKZ), 7.30 p.m., Church Hall, Court Road, 16 November (Natter Night), 7.30 p.m., All Saints Church Hall, Bereta Road, New Eltham.

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

South London Mobile Club—11, 25 November, 7.30 p.m., Clapham Manor Baths, SW4.

Southgate & District—9 November, 7.30 p.m., Parkwood Girls School (behind Wood Green Town Hall).

St Albans (Verulam ARC)—15 November (" Aerial Tuning and Matching," by G3HRH), 7.30 p.m., Watford Road, St. Albans.

Sutton & Cheam (SCRS)—21 November, 8 p.m., The Harrow Inn, High Street, Cheam.

Welwyn (Mid Herts ARS)—9 November, 8 p.m., Welwyn Civic Centre, Welwyn.

Wimbledon (W & DRS)—10 November (" S.S.B. for Beginners," by G3GKF), 7.30 p.m., 24 November (Club Night), 7.30 p.m., St. George's Road, Wimbledon, SW19.

Wembley (GECARS)—Thursdays, 7 p.m., This Club is now open to non-GEC Employees by invitation. ARNold 1262 first. Sports Club, St. Augustin Avenue, North Wembley.

REGION 8

Canterbury (EKRS).—Details of meetings from Hon. Sec., D. N. T. Williams, G3MDO, 65 New House Lane, Canterbury.

Crawley (CARC).—8 November, (Reigate ATS Constructional Contest judging), George & Dragon, Redhill, 22 November (Lecture by G6LX), 8 p.m., Trinity Congregational Church Hall, Ifield.

Medway (MARTS).—6 November (Talk by R. Springet), 18 November (" Social Evening" at Cuxton Workingmen's Club) 20 November (" Lecture " by GPO).

Mid-Sussex (M-SARS).—1 November (Informal), 15 November (" Practical Gear for 23cms " by Bob Standley). Meetings at 8 p.m., Lindfield Primary School, Nr. Haywards Heath.

Worthing (W & DARC).—Meetings every Tuesday 7.30 p.m., Rose Wilmot Youth Centre, Littlehampton Road, Worthing.

REGION 9

Bristol RSGB Group.—20 November (" Amateur Radio, Past, Present, and Future, by John Clarricoats, OBE, G6CL), 7.15 p.m., Becket Hall, St. Thomas Church, St. Thomas Street, Bristol 1.

(BARC).—Mondays and Thursdays, 7.30 p.m. 43, Ducie Road, Barton Hill, Bristol 5.

Burnham-on-Sea (B-O-SAPS).—Second Tuesday in each month, 8 p.m., Crown Hotel, Oxford St., Burnham-on-Sea.

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

(CARC V.H.F. Group).—Third Thursday in each month, 7.30 p.m., The Coach and Horses, Pydor St., Truro.

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

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

Saltash (S & DRAC).—Alternate Fridays, 7.30 p.m. 3 November (AGM), 17 November (Film night), Burraton Toc H Hall, Warraton Road, Saltash.

South Dorset (SDRS).—First Friday in each month, 7.30 p.m., Labour Rooms, West Walks, Dorchester.

Taunton.—Alternate Thursdays, 7 p.m., Lecture Theatre, Taunton Technical College.

Torquay (TARS).—Last Saturday in each month, 7.30 p.m., Club Headquarters, Belgrave Road, Torquay.

Wells (WARS).—Mondays from 8 p.m., EMIE (Wells) Sports & Social Club, Chamberlain St., Wells, Somerset.

Weston-super-Mare.—First Friday in each month, 7.30 p.m., W-s-M Technical College.

Yeovil (YARC).—Wednesdays, 7.30 p.m., Park Lodge, The Park, Yeovil.

REGION 10

Pontypool (PARC).—Tuesdays, 7 p.m., Educational Settlement, Rockhill Road, Pontypool, Mon.

Blackwood (ARC).—Fridays (Lecture Programme with section devoted to RAE), 7.30 p.m., Blanche Cottage, off High St., Blackwood, Mon.

Cardiff (RSGB Group).—13 November (" Field effect transistors," by R. A. Stevens, GW3GQM), 7.30 p.m., TA Centre, Park Street, Cardiff.

Pembroke (ARC).—Last Friday of month, 8 p.m., Defensible Barracks, Pembroke Docks.

REGION 13

Edinburgh (LRS).—9 November ("Contest Operating," by GM3UM), 23 November (Junk Sale), 7.30 p.m., YMCA, 14 South St. Andrew Street, Edinburgh, 2.

REGION 14

Ayrshire (AARG).—1, 15, 29 November, 7.30 p.m., Fusilier House, Seaforth Road, Ayr.

Auchenharvie (A & DARS).—2, 7, 9, **14,** 16, 21, 23, 28, 30 November, 7.30 p.m., Auchenharvie Community Centre, Stevenston.

North Ayrshire (NAARC ATC).—5 November, 7.30 p.m., Ardrossan ATC, The Academy, Ardrossan.

Glasgow University (GURC).—10, 24 November, 7.30 p.m., Engineering North Building, University of Glasgow.

Lowland Royal Signals (ARC).—7, 14, 21, 28 November, 7.30 p.m., 21 Jardine Street, Glasgow.

Greenock (G & DARC).—3, 17, 31 November, 7.30 p.m., Art's Guild, Campbell Street, Greenock.

Mid-Lanark RSGB.—17 November (Film Show), 7.30 p.m., YMCA, Barndon Street, Motherwell.

REGION 15

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

REGION 16

Chelmsford (CARS).—4 November, 7.30 p.m., Marconi College, Arbour Lane, Chelmsford.

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), 7.30 p.m., Victory Hall, Con Green.

Portsmouth (P & DRS).—Wednesday, 7.30 p.m., Room 5, Twyford Avenue Community Centre, Portsmouth.

Southampton (RSGB Group).—Second Saturday in the month 7 p.m., Engineering Lecture Theatre, Lanchester Building, The University, Southampton.

CONTESTS DIARY

11-12 November	—RSGB 7 Mc/s DX Contest (C.W.) (see page 408, June 1967)
12 November	—International OK DX Contest (C.W.)
18-19 November	—Second Top Band Contest (see page 689, October 1967).
18-19 November	—VU2/4S7 Contest (C.w.) (See page 672, October 1967)
25-26 November	—VU2/4S7 Contest (Phone)
25-26 November	—CQ WW DX Contest (C.W.)
3 December	—Fourth 70 Mc/s Contest (C.W.) (see page 765).
1968	
13-14 January	—Affiliated Societies' Contest
17-18 February	—First 1·8 Mc/s Contest
9-10 March	—BERU
31 March	—Low Power Contest (3·5 Mc/s)
8-9 June	—National Field Day
6-7 July	—Summer Top Band Contest
14 September	—80m Field Day
12-13 October	—21-28 Mc/s Contest
26-27 October	—7 Mc/s Phone Contest
7-10 November	—7 Mc/s C.W. Contest
16-17 November	—Second 1·8 Mc/s Contest

*Qualifying contests for V.H.F./U.H.F. Listeners' Championship.

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 Bulletin 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

Have Hallicrafters S25 Super Defiant, rusty but working all bands in exchange for scrap HRO which must be sufficiently complete to enable rebuilding—valves or p.s.u. not necessary. D. T. Price, G3LYU, 5 Capulet Close, Woodlands Estate, Rugby, Warwickshire.

Complete s.s.b. station, HQ170 RX, 1·8—74 Mc/s, G2DAF TX, linear, Acos mic., key, monitor 'scope, Z-Match, p.s.u., circuits, finished in grey, £180. Payments arranged. R. J. C. Broadbent, G3AAJ, 94 Herongate Road, Wanstead Park, London E12. (Tel.: 01-989 6741).

Two TA33 jnr. beams—one in use—one S/H untested, £20 o.n.o. the pair, buyer collects. J. C. Taylor, G3RDT, 82 Victoria Drive, Bognor Regis. (Tel.: Bognor Regis 5254 between 6.30 p.m. and 7.30 p.m.).

Pyrex glass tubes 1·1in. long, 1·7in. i.d. 4s. Driver/Modulation transformers for pair 807's, 30s., Valves, two 807's, 10s., three 5B255M's 20s. VCR97 unit, e.h.t. transformer, three e.h.t. rectifiers, £3. Carriage extra. R. W. Martin, G3RWM, 76 St. Pauls Crescent, Coleshill, Warks.

Thordarson transformer 700-0-700V, 175mA, £2. Auto transformer 250/110V ideal for RX e.t.c., 10s. Command RX 28-41 Mc/s, £2; QQV03-20A with base, 15s. 6146, 12s. 6d. Home brew transistor El Bug, 10s. All postage extra. F. G. Sargent, G3BLO, 20 Priory Drive, Plympton, Plymouth, Devon.

SB1OU, built from new kit exactly to specifications, 15 months old, absolutely mint, working all bands, £30. Will deliver around 30 miles. J. V. Hoban, G3EGC, 96 Ashworth Lane, Astley Bridge, Bolton, Lancs. (Tel.: Bolton 51502).

New unused Tanberg 64 Stereo Tape Recorder complete, offers. Mosley D6BCa base loading coil for 80m as new with perspex cover, £4. Quad, cast spider, 25s. E. W. L. Brownjohn, G8AJ, St. Christopher, The Close, Sway, Lymington, Hants.

BC221 mod and p.s.u., £17 10s. Pye 25W TX/RX high band, TX on 2m., £10. Wanted for KW2000A d.c. p.s.u. and *Q*-Multiplier. R. Reynolds, G3IDW, Orchard Cottage, Hook, Swindon, Wilts.

G2DAF RX, complete though needs tidying up and alignment. May require new i.f. Xtals, £35. A. J. C. Park, G3NZV, 25 Bryanston Court, Grange Road, Solihull, Warks.

Four metre TW Communicator Mk.2. Brand new, one month ago. Bargain at £55. R. Price, 20 Manor Road, Wrea Green, Nr. Preston, Lancs.

KW Viceroy IIIa, extra ½ lattice filter, 6146B's in final, KW77 RX and speaker, Dow key change-over relay plus all cables, Shure 201 mic., all in mint condition. Offers to P. D. de la Mothe, 35 Brookside, Wokingham, Berks. (Tel.: West Forest 4048).

Agiflex III camera outfit, stacks of radio parts, sell or exchange 2m TX, 70cm gear, w.h.y? M. C. Osment, G8AIP, 116 Parsonage Leys, Harlow, Essex.

AR88D, with original speaker and handbook, good condition, free delivery within 50 miles, £33. R. G. Houghton, G3SCL, 147 Fox Lane, Leyland, Preston, Lancs.

65W a.m. TX type 102 with mod. suitable 2m 75s. p.s.u. to suit, 75s. Standard sig. gen. 9·5 kc/s—30 Mc/s. Calibrated attenuator, £10. 8 vols., (1956-64) *R & TV Servicing*, mint £10. D. M. Harrington, 30 Heathwood Gardens Swanley, Kent.

Vanguard Mk.II, 160m-10m, three years old with one satisfied owner now gone s.s.b., £35. Marconi CR300 with original p.s.u., handbook e.t.c., £10. H. Julian, G3UFX, 1 Hervey Terrace, Shotley Gate, Nr. Ipswich, Suffolk.

Exchange EC10 with p.s.u., manual, few weeks old, R216 RX or one with same coverage. W. Hodkinson, 29 Wellhouse Street, Barnoldswick, Colne, Lancs.

2m, Printset RX, comprising wired superhet up to Detector less tuning condenser, and kit for audio stages/modulator, new with manual, half price, 67s. 6d. W. M. Lee, GW3MFY, Avondale, Bryntirion Hill, Bridgend, Glam., S. Wales.

CR100, £10. S27, £8. Q5'er (unmodified), £3. New Goodmans Axiom 10, £3. TBY8 TX/RX unit, £3. Numerous other items and spares at give away prices as space wanted. Callers only. B. R. Smith, G3NNM, Anvil Corner, 1 Belle Vue Road, Herne Bay, Kent.

Hallicrafter S40B with manual, 540 kc/s to 44 Mc/s in four switched bands. Ideal self-contained table model, professionally aligned. Seen working, £15. A. T. Simpson, 9 Dunheved Road South, Thornton Heath, Surrey.

Codar AT5 transmitter with Codar mains p.s.u. Both unused and as new, £16. C. P. Howard, G8ANU, Heather House, Milford, Stafford.

Advance constant voltage transformer type MT140A, in new condition. Input 190-260V 50 c/s, output 230V, 150W. Sell or exchange for items of TX/RX or test gear. D. J. Munro, GM3TCM, 4 Harrow Terrace, Wick, Caithness.

Variable p.s.u. 250V a.c. in 30-80V at 100A out. Ideal for arc welder. £5. P. J. Case, 96 Westwood Road, Bemberton Heath, Salisbury, Wilts.

G2DAF Mk.II RX, XTAL controlled converter, bills for parts, best quality recommended, s.a.e. list or exchange AT5 TX, also TGY2 TX, No p.s.u. W. G. J. Shepherd, 52 Holland Street, Ebbw Vale, Mon.

Eddystone 888A mint, £70, Labgear LG50 revalved, £25, Heathkit Mohican, £20, Marconi Geiger rate meter/case/built in 9V p.s.u., £5, 40ft. tripod leg mast, £3, 160m TX £8. A. Choraffa, G3PKW, 355a Park Road, Liverpool 8, Lancs.

Pye Reporter, high band, needs attention, £5 o.n.o. G. & D. 2m converter, 28-30 Mc/s i.f., mains p.s.u., £4 10s., new KT88's 10s. each. Buyers collect. T. R. Wiltshire, G8AKA, 12 Leslie Road, Winton, Bournemouth.

Hallicrafters Skybuddy TX, 50s., Marconi transponder, F200 for £3. includes Oscilloscope, cavity tuned Sig. Gen., 51-997 Mc/s, digital readout, 36 valves, p.s.u., circuit dia. TR3582A with RF25, 40s. s.a.e, particulars, w.h.y. A. G. Thorburn, G3WBT, 27 Banklands, Workington, Cumberland.

KW Vanguard, 160-10m with manual, HRO with 9 coils, spare set of valves with manual, Model D wave meter and manual. All in perfect condition as new £50 complete. Buyer collects. W. C. Spence, G2BCA, 9 Walton Street, Enfield, Middlesex.

Compact table-top TX 80-10m, mod./p.s.u., £26, 36 TX, £15, 52 RX, £10, BC639A, 100-156 Mc/s, p.s.u., £16, 4X150, 17s. 6d., o.n.o., all plus carriage. D. Byrne, G3KPO, Jersey House, Eye, Peterborough, Northants.

Valves, 6AG5 v.h.f. pentodes 1s., 6J6 triodes 2s., 12AX7 triodes 3s., postage 6d. any quantity, all tested good. A. D. MacDonald, G3NPM Murane, Main Road, Elm Green, Danbury, Essex.

HE-30 RX condition as new in original carton, with manual, cost £34 new, accept £25 o.n.o. J. G. Wylie, 82 Glenpatrick Road, Elderslie, Renfrewshire.

STR 18 Auto RX, 24 XTAL control, 2·8—18 Mc/s, good for s.s.b., £20, BC221, £14, AD94 RX, £15, v.h.f. TX output meter, TF912, £10, BC348N, £14. G. H. Taylor, G3IUL, 4 Edward Road, E. Bedfont, Middx.

Amateur Station, HRO RX's, 120W c.w. TX, 160 & 2m gear. All in desk console with p.s.u.'s & controls, £100 o.n.o. Also various hV transformers & components, s.a.e. for details. D. A. S. Holmes, G3JSV, 24 Brookside, Billericay, Essex.

XTALs, B7G glass ATM 30 Mc/s, 12s. 6d., STC 2 Mc/s, 12s. 6d. STC 100 kc/s wire ends, 12s. 6d., FT243, 7825 and 7806·6 kc/s, 7s. 6d. RCA 455 kc/s wire ends, 7s. 6d. G. N. Glover, G3AAV, 30 St. Chad's Avenue, Leeds 6, Yorks.

R109 RX 6V ideal mobile, £3 15s., Valves miniature, 1s. 6d. each, New dial drives cheap, Test Meters, £2 5s., RSGB Handbook, 15s., two ARRL Handbooks, 7s. 6d. each, variable capacitors, 1s. 6d. each, six HC-6/U XTALs 2s. each, s.a.e. for details. D. Bowers, 95 Grenfell Avenue, Saltash, Cornwall.

Stabilized p.s.u. Type 715, 220-360V adjustable at 200mA maximum, 6·3V at 5A twice, 19 in. panel, circuit diagram, £3. BC221-AF, wooden case, mains p.s.u., re-calibrated, complete, £10. J. G. Whitney, G3MFD, 104 Grand Drive, London, SW20.

RSGB Bulletins, 10 vols., SWM, 5 vols., from 1956, mostly bound, £5 plus carriage, B. C. Christian, G5XD, Ballacorey Cottage, Andreas, Isle of Man.

TBY8, in perfect order, £7 10s. o.n.o. B44 Mk. II, part modified as per Bulletin, £8. Also Bulletins & SWM's from 1958-1965. D. Quigley, G6PRI/T, 77 Mill Hill Road, Cowes, Isle of Wight.

GPO WT 10 RX 150-600 Mc/s, mains p.s.u., £10, Two 19 sets, 12V p.s.u., £7 each, complete. One B44 Mk. II, No XTALs, £6. Buyers collect. M. Fisher, 169 Almondbury Park, Almondbury, Huddersfield, Yorks.

BC348L RX, mains p.s.u., slightly modified, needs some attention and alignment, but working, £10 o.n.o. AEI 12A, 12 in., 15 ohm, 20W speaker, cost £14, £6 o.n.o. plus carriage on both. J. L. Haine, Grafton, Easenhall, Rugby, Warwicks.

AVO 8 Mk. 2, £10, AVO Multimeter Mk. 4, unused, £6, LED two tone test oscillator, new £3 10s., Hi Z, dynamic mic. and stand, £2 10s., ditto 30s. Eddystone percentage modulation meter with five coils, £4 10s. J. L. Barry, G3UFU, 15 Fairlawn Court, London, W4.

QSL cards in two colours at £3 per 1,000, £1 15s. per 500, also listeners' cards and general printing for amateurs and Societies. Enquiries and requests for sample QSL's to J. H. Adams, 85 Rosecroft Gardens, Twickenham, Middx. (Tel.: 01-892 9062).

SWL needs money! and has the following to dispose of: RAE course, AR88D and speaker, 2 & 4m RX's, 40 hard bound novels, open to offers, s.a.e. for list. W. Wynn, 8 Marlborough Avenue, Bridgewater, Somerset.

Wilcox-Gay master Oscillator, with booklet, B2 TX, TCS 12 RX, 160m TX, mod., 6J5 and 2 x 6V6, ECO EL32, p.a. 6V6. RSGB Bulletins, March 1959 to August 1967, best offers. H. Bolton, G3HTR, 11 Longlands Road, Halesowen, Birmingham.

AR88D, £40, Minimitter Mercury, £40, BC221 with charts & p.s.u., £20, all in excellent condition. Free to purchasers a 10m Quad, BCC69. Offers to E. C. Gray, G3CPS, 111 Ravenor Park Road, Greenford, Middx.

3kV, 25mA transformer, oil filled, 230V 50 c/s input, £2. Johnson 30 uH precision variable inductance, £1, both post free. Marconi TF643A, 20-300 Mc/s wavemeter, £5. M. Mann, G8ABR, Flat 71, Queens Road, Tewkesbury, Glos.

Minimitter MR 44 RX in good condition with suitable speaker, £25 o.n.o. Deliver 25 miles. Kokusai 455 kc/s s.s.b. filter, offers, A. V. Bryant, G3NVB, 101 Mays Lane, Stubbington, Hants.

Joystick De-luxe and type 4RF tuner as new, £8 15s. C. G. Powell, 1 Wenwell Close, Buckland Wharf, Aston Clinton, Aylesbury, Bucks.

Collaro Studio Tape Deck, complete with Linear Pre-Amp and Power Amp, little used and in good condition. Would exchange for pair of matched speakers for Stereo. W. E. Bramham, G3OPI 11 Falmouth Street, Walney Island, Barrow in Furness, Lancs.

Selection of Bug Keys for sale, new and used, 50s. each, plus 2s. 6d. postage. S.a.e. for details. J. S. H. Garner, G2BGG, Barbon, Aigburth Hall Road, Liverpool, 19, Lancs.

Heathkit SB400 factory built and mint condition, £138, 813 new with base, 25s., KW2000A few months old £200 with speaker and p.s.u. D. T. Boffin, G3HS, Woolstone, Nr. Farington, Berks. (Tel.: Uffington 627).

Lafayette Communications RX with speaker and manual, £18. Brand new W1191A wavemeter with charts and spare valves, still in original Ministry wooden case, £6 10s. Callers only. H. C. Pryse, 36 Hart Road, Byfleet, Weybridge, Surrey.

RTTY frequency shift RX unit No. AP66862 complete with p.s.u. AP66863 in perfect working order, to clear £8. J. C. Farlow, 49 Mount Pleasant Road, Chigwell, Essex.

Mc Coy, 9 Mc/s filter, Golden Guardian, complete with crystals and circuit, new and unused, Cost £25, accept £18. J. H. McEwing, 33 Hazelwood Avenue, Newton Mearns, Renfrewshire, Scotland.

Heathkit OS1 oscilloscope, little used, in excellent condition, £13. Buy or borrow charts and manual for G73 Wavemeter, Wanted, h.f. filter cheap. T. Brook, G3WBQ, Saxonholme, Orestan Lane, Effingham, Leatherhead, Surrey.

Eddystone EA12, in excellent condition and a bargain at £100 o.n.o. Good reason for selling! V. J. Bartlett, GW5BI, 171 City Road Cardiff, Glam.

HRO spares: main tuning variable, 30s., coil pack, 50-100 kc/s, 15s. First i.f. transformer with crystal, £1. Remaining i.f. cans and b.f.o. coil, 10s. each. B.f.o. variable capacitor, 5s. A. R. Williams, GM3KSU, 35 Howard Place, Edinburgh 3.

Grundig TK1 tape recorder in perfect condition, complete with manual, mic and other accessories, £13. Brown's Hi Z headphones, 15s. Heathkit Balun manual, 2s. 6d. Carriage extra. M. E. Hardisty, "Gleneagle," Carleton, Carlisle, Cambs.

Heathkit RG1 and 2m converter, £30. TW2 TX and a.c. p.s.u., £20. Advance constant voltage transformer 190-260V input, 240V 500VA and 70VA output. Size CV1000, £12. M. A. Trundle, G3TCG, 16 Stephens Crescent, Hordon-on-the-Hill, Essex.

TW 160 RX, TW 160 TX, TW mobile p.s.u., Collins 51H3 RX, BC221, AN/TRC 2m 4X150 p.a., NW 12V transistor p.s.u., Advance a.f. Gen., HRO Senior, b/s and g/c coils. Wanted Mono or Multi-Band s.s.b. transceiver—must cover 20m. A. J. Hodgkinson, G3LLJ, 30 Moorthorne Crescent, Bradwell, Newcastle under Lyme, Staffordshire. (Tel.: 51509).

TW 2m Nuvistor converter 28-30 Mc/s i.f., unused a.c. p.s.u., £12. J. Millie, GW8MQ, 21 Steele Avenue, Carmarthen, South Wales.

Codar AT5 TX, a.c. and d.c. p.s.u., station control unit CC/40, mobile switching unit 12 R/C, £27 10s., Star 550 amateur bands RX, £27 10s. or £50 the lot. J. R. Middleton, G3USP, 2 Blythe Road Mosspit, Stafford.

Proop's radio mic, m.w. £2. GECophone radio—1934-6—r.f. stage original components, working £2. AVO 8 Mk. 2, £14, blank chassis ⅛ in. ally, welded corners 14 in. x 10 in. x 3 in., 12s. 6d. RSGB Amateur Radio Handbook, £1. Buyers collect. B. R. Makowski, 66 Manor Avenue, London, SE4.

EC10 in perfect working order, modified for mobile use, separate on/off switch on panel, provision for remote control, large tuning knob, £25. A. O. Milne, G2MI, 29 Kechill Gardens, Bromley, Kent.

XTALs, two new 448·35—451·65 kc/s, miniatures, 2 Mc/s, 2090, 2460, 3000, 3220, 3820, 4000, 5000, 6500, 7777, 9710 kc/s, B40 h.f. turret dial. Wanted XTALs, 16, 23, 23·5 Mc/s. C. T. Stagg, G3KPW, 62 Prospect Place, Grays, Essex.

Dinsdale 15 ohm design, 10W transistor Amp., plus 42V stab. p.s.u. —pre amp required—£4. Postage extra. G. J. Morgon, G3ROG, 115 Arosa Drive, Harborne, Birmingham 17.

AR88D RX with handbook, £35. Unmarked condition. Call evenings or write J. W. Heaviside, Park Hill, London, NW5.

30W hi fi amp in good condition, will exchange for surplus RX—1155 e.t.c. A. Defty, 119 Westmorland Rise, Peterlee, Co. Durham.

6SN7, 6AG7, EF80, PCL82, PCL83, PCL84, PCL85, PL33, PL36, PL38, PL81, PL82, PL83, PY80, PY81, PY82, PY800, PZ30, RL18, UU5, UU8, U10, U404, 10s. for six, your selection. G. A. Jeapes, G2XV, 165 Cambridge Road, Gt. Shelford, Cambs.

KW Viceroy Mk. IV, with extra half lattice filter, £105 o.n.o. Japanese FT100 TX with a.c. and d.c. p.s.u., £140 o.n.o. or exchange for KW2000 with a.c. p.s.u. J. Colegate, "Glenhaven," Batheaston, Bath Somerset.

LG50 TX and 840C RX, both in excellent condition. £50 the pair buyer collects; or £55 delivered 75 miles. Will split if necessary. G. K. Adams, GW2BOU, Stella Maris, Romilly Park, Barry, Glam. CF6, 8RP. (Tel.: 2703).

Eddystone EA12, nearly new, £135. HRO with p.s.u. and coils, £25. W. F. Morris, 34 Birch Avenue, Romiley, Stockport, Cheshire.

Heathkit DX4OU with VF-IU v.f.o., mint condition, manuals, £30, buyer collects; copies SWM March 1956—February 1966 (except March 1957); RSGB Bulletin, July 1960—December 1965; 18s. per volume. R. Balister, " La Quinta," Mimbridge, Woking, Surrey.

SX100 Mk. II, R46B speaker, 230/115 transformer, spare valves, good condition, £60 o.n.o. Elizabethan 120W, c.w. transmitter, 80-10m, p.s.u., £10. Buyers collect. R. Edginton, G3AGF, 8 Springfield, Kegworth, Derby.

Eddystone 888A, S-Meter and loudspeaker, in perfect order, £75. J. H. Longhorn, 9 Foxlands Avenue, Penn, Wolverhampton, Staffs.

Electroniques transistorised i.f. amp type IFA/1·6/s.s.b. for 1·6 Mc/s i.f., 2 kc/s bandwidth new, in makers' packing, at less than cost price, only £7, post 2s. 6d. G. Elliott, G3FMO, 3 Sandgate Avenue, Tilehurst, Reading, Berks. (Tel.: Reading 28603).

Heathkit HA14, 1kW linear and a.c. p.s.u. Professionally built, little used, mint condition. Major D. A. Barry, G3ONU, 67 Harcourt Road, Bushey, Herts.

KW s.w.r. bridge, £5 plus postage, new 5B254M valves, 10s. plus postage. D. T. Boffin, G3HS, Woolstone, near Faringdon, Berks.

R107 RX, good condition in case, with handbook, EF89 in front end, with XTAL controlled converter for 15-10m, £12. R. J Ward, G2BSW, 69 Bromsgrove Road, Studley, Warwickshire.

160-40m bandspread RX, one r.f., one i.f. stage, internal p.s.u., £5. Hy-Gain 14-AVS trap vertical, little used, £7 10s. E. Wake, G5RP, College Farm House, West Hendred, Wantage, Berks.

M & G, s.s.b. transceiver plus a.c. p.s.u. 90W p.e.p. 160-80-20m, new March 1967. Owner building own gear, £85 o.n.o. D. A. P. Carter, G3VYW, 4 The Terrace, Morice Yard, Devonport, Devon.

80-10m, 120W s.s.b. TX in " S " line style cabinet, matching p.s.u., fitted s.w.r. indcator, £45, also table top 80-10m 50W a.m./c.w. TX, £15. E. W. Dyer, G30HU, 69 Kirkland Avenue, Ilford, Essex. (Tel.: 01-550 0639).

Murphy TPG11 TV pattern generator, complete with p.s.u. but less r.f. unit, £8. Carriage paid. L. L. N. Cobb, G3UI 27 Moorlands Crescent, Cousin Lane, Halifax, Yorks.

Grampian DP4/L dynamic mic., table stand, swivel adaptors, lead, new condition, £5 10s. Meceblitz 118 electronic flash with leather case, charger, excellent condition, £11 o.n.o. P. Fry, G3TZV, 3 Geneva Road, Bramhall, Nr. Stockport, Cheshire. (Tel.: 061-439 6174).

I1HC 2m collinear aerial, £3. Collins TCS RX with p.s., £3. Exchange BCC base station control unit, incl. a.f. amp and p.s.u. Buyers collect. R. F. Stevens, 51 Pettits Lane, Romford, Essex.

New Lafayette HA-410, ten metre transceiver, compact, with self-contained a.c. and 12V d.c. p.s.u., mic and cables. 15W r.f. see August *CQ* page 30, £50. Group Capt. C. K. Street, G3DKS, 6 Green Brook Avenue, Hadley Wood, Herts.

Elpico Integrated Stereo Amplifier, £6. Garrard TA Mk. 2, 4-speed deck with diamond stereo plug-in head, £5. Collaro 3-speed deck—cream—with plug-in head shell, £3. R107 full service manual, offers. W. G. Semmens, 11 Tredarvah Road, Alverton Penzance, Cornwall.

Heathkit RA1 RX, CL1 XTAL Calibrator and Codar PR30X preselector, £40 o.n.o. Buyer arranges carriage. D. A. R. Poulter, G3WHK, 279 Aragon Road, Morden, Surrey.

AR88LF, H/B, l.s., £30. KW Viceroy Mk. II with Mk. IV facilities, extra half lattice filter, TT21's p.a., p.s.u. £85 o.n.o. H.B. 1 kW linear—2 x 813—p.s.u., £25. 7 ft. enclosed equipment rack, £7. T S. Cooper, G3SEC, " Ga-Shea " Ashwell Road, Steeple Morden, Nr. Royston, Herts.

Two metre co-axial p.a. with 4X1000 bias and screen supply, £8, harmonic indicator, 50s., " Q " Fiver, 50s., Hunts Capacity and Resistance Tester, £100, Truvox Tape Recorder, £15, 2-4E27, 2-813 30s., complete TW Mobile, TW2 TX, TW mobile RX, transistor p.s.u., £50, or exchange for modern communication RX. E. R. Martin, G6MN, 6 Kedleston Road, Worksop, Nottingham.

Heathkit AO-IU Sine Square Wave generator, £10. Heathkit Service Oscilloscope OS.1, £15. Both as new, buyer collects. E. H. Doubel, 33b Windmill Hill, Enfield, Middx.

AR88D " S " meter, manual and tools, in good condition, £25. G5JU, 90W mod and speech amp, all Woden transformers, £10. 1250V p.s.u., Woden transformers less rec valves, £7 10s. o.n.o. P. R. Soo der, G5FA, 35 Torrington Gardens, New Southgate, London, N11.

Bargain—Good condition HRO with 20-10m bandspread coils, plus two extra coils. Complete with a.c. p.s.u. and loudspeaker. Best offer over £10 plus packing and carriage. S. R. R. Kharbanda, 39 London Road, Harston, Cambs.

Heathkit DX40 scarcely used, £20. Cpl. Coombs, G3VTO, Police Flight, RAF Colerne, Chippenham, Wilts.

Surplus to club requirements, brand new, unused and unopened, " Eagle " products, s.w.r. Bridge K110, £7 19s. 6d. Transistorized g.d.o. K126B, £10 15s. R.f. field indicator, RF40, £3 10s. Multimeter, KEW66, £6 15s. Communications RX, RX 60N, £18 17s. 6d. P. Avill, G3TPX, 7 Moorland Crescent, Staincross, Barnsley, Yorks.

SCR 522 TX, 30s. Minimitter Mobile TX, control unit, 20s. 160-80m coils for old type 3FIF Whip, 20s. H.D. 12V 2-pole make starter relays, 5s. each. W. H. Fletcher, G3NXT, Holmdale, Martin, Lincoln, Lincs.

LG300 with companion mod/p.s.u., £60, three band Quad with feeders, £10, Mohican, £20, Heathkit balun, £1, 30 ft. vertical, £2, Joystick, £1, buyer collects or pays for petrol. K. E. Brockway, G3KIV, 4 Benford Road, Hoddesdon, Herts.

Offers for six volumes of the RSGB Bulletin, 1961-67 perfect, 28 ft. sturdy pole 4 in. dia. base also smaller 12 ft., 100 good valves all types, many unused, frequency meter, 1191 (see March 1967 Bulletin), £5. R. L. Castle, 7 Caxton Road, Wimbledon, London, SW19.

Exceptional HRO, solid state p.s.u., b/s coils on 40, 20 and 10m, g/c 50 kc/s—30 Mc/s, excellent on s.s.b., external " Q " multiplier, sacrifice at £28, s.a.e. for details. R. J. King, G3PVA, 10 Holne Chase, Morden, Surrey.

2m TX, 18W output, with p.s.u. and 70cm multiplier unit all in one rack, £12. 23cm RX and Aerial stack, used in 50 mile contacts, £10. BC348 with " S " meter, £8, buyer collects or carriage extra. W. F. Neal, G3FUL, 18 Newark Road, Luton, Beds.

CR150, £25, 1049 Mk. II scope, £25, 30W TX 160/80m, £5, c.w./n.b.f.m. 160m TX with two p.s.u., £5, large variac, £5, Pye 4m mobile reporter, £4, all as seen, but will haggle if necessary, M. Hearsey, G8ATK, 10 Denham Drive, Yateley, Camberley, Surrey. (Tel.: Yateley 2161).

HQ170 mint, £80 o.n.o. BC221T fair, charts, p.s.u., £16. Taylor 3½ in. scope, good, £8. Pentax S1A, meter, 2 x converter, cases, £75. R. J. R. Rothery, G3RJR, The Flat, 520 Coventry Road, Small Heath, Birmingham 10.

Codar CR66 RX, b.f.o. modification, internal speaker, £10. R. Idiens, 77 Amersham Road, High Wycombe, Bucks.

" Telecomm " u.h.f. RX, 300-1000 Mc/s, 9 valves, a.c. mains, list £175, accept £150. Also v.h.f. model 70-170 Mc/s accept £125. Both superb new sets, exchange either for 770R. E. H. Page, G3HKV, 16 Abbey Street, Crewkerne, Som.

Marconi v.h.f. TX/RX type H19, w.s. No. 19 Mk. III complete, w.s. No. 38 Mk. II with junction box, whole lot, £5. M. D. Watson, G3WMQ, 36 Hamilton Road, Dollis Hill, London, NW10.

Heathkit DX40 TX and v.f.o. type VF1U, £25 o.n.o. Students Union Radio Club, Southampton College of Technology, c/o A. L. Hart, East Park Terrace, Southampton.

KW Vanguard 160-10m & Eddystone 840C, hardly used, £75, Heathkit assembled oscilloscope O-12U, £30, hardly used. R. H. Gwinett, G3TQT, High Cote, Dutton Valance, Maidstone, Kent.

KW Mk. II Viceroy with a.c. p.s.u. H/B and circuits. Superb performance and uttery reliable. £70 plus carriage. C. H. Parsons 90 Maesycoed Road, Heath, Cardiff. (Tel.: 68768).

Gone Transceiver selling, little used " Cannonball " plus p.s.u., £25. Home brew s.s.b. TX, 20-15-10m, 180W p.e.p. Geloso 209R, £50. Buyer collects. T. Delvin, G2FLK, 165 Central Park Road, London E6.

KW2000 with a.c. p.s.u. exc. cond., £150, KW2000 d.c. p.s.u. as new, little used with connecting lead. £25. 12-15V positive earth home-brew TX, 160m with control box—suitable mobile, £17. Collection preferred. C. N. Whittingham, G3DSR, 8 Corden Avenue, Mickleover, Derby.

Microwave unit 2/726A klystrons 2/717A, £3. 2/726A, £2. STC 4242A, 10s., 4/RK34, 5s. N14, DK1, DF1, VK92, 1D8GT, 7S7, 1291, 7C6, VR56, 1s. each. J. Cassoh, G2ACT, 14 Station Road, Upper Poppleton, Yorks.

Eagle mixer, type MM-4, four channel transistorized mixer, sold at 49s. 6d., only £1 5s. including postage. Also w.s. 38 with p.s.u. in good internal condition although valves in poor shape, £2 5s. including postage. M. G. Bay, 13 Elmbank Avenue, Barnet, Herts.

Eddystone 888, "S" meter and mounting blocks, v.g.c., £48. Pair TT21 valves, unused, £1 each. R. H. Newland, G3VW, 10 Holmstall Avenue, Edgware, Middx.

EC10, £32, TW equipment, 2m TX, £15, converter 4-6 Mc/s i.f., £7, 4m TX, £15. Converter 2·1—2·7 Mc/s i.f., £7. 12V p.s.u., £8. Nombrex sig. generator, £4. AVO resistance capacity bridge, £5. B. G. Meaden, G3BHT, 14 Aulton Road, Sutton Coalfield, Warks

HRO complete with nine coils and p.s.u., £18. Another with p.s.u, but no coils, £10. Both FB condition throughout. Prefer buyers collect or might dellver certain areas. W. F. Stratton, 14 Kingsthorpe Grove, Northampton.

R107, valve volt meter type "S" meter, external speaker, excellent condition, £11. Prefer buyer inspects and collects. R. G. Kerridge, 101 College Road, Norwich, Norfolk, NOR. 52F.

Lafayette HE30 RX, £25 o.n.o. SWM 1952-64 from 15s. per volume, s.a.e. for details. D. A. Pilley, G3HLW, 27 Oxted Rise, Oadby, Leicester.

WANTED

GDO, Heathkit preferred, also service manual for Pye transistor Ranger 2007. Offers to J. Bell, G3JON, 25 Edale Road, Sheffield 11 Yorks.

Copies of *QST* issued prior to 1931, *Radio* before 1940 and a pre-war copy of the Amateur Radio Call Book. K. C. Lay, G5LY, Plot 226, Riders Bolt, Hurchington Manor Estate, Bexhill on Sea, Sussex 2.

RX for use as tunable i.f. 28-30 Mc/s in one sweep, i.e. SX23-SX28 e.t.c., condition not important but drive mechanism to be perfect. H. Collett, G3KI, The Horns Inn, Farnham Road, Crondall, Hants.

HRO plug-in coils including I.f., also tuning dial and XTAL for same. K. G. Selleck, G3SNU, Coplands Farm, Dartington, Nr. Totnes, S. Devon.

Circuit diagram and adjustment details for XTAL Calibrator No. 7, Mk. 2. Cat. No. ZD.00477. postage e.t.c. refunded, G. L. Bolton, G3UDZ, Pelynt House, Lancaster Lane, Leyland, Preston, Lancs.

XTALs, FT243 type 80-40m c.w., Z-Match a.t.u. r.f. meter, 0-1A, 100mA meter. J. Walker, G2DCF, 16 Himley Road, Clayton, Manchester 11, Lancs.

Information on v.h.f. TX/RX units manufactured by Pye type 113. All replies answered, will copy or purchase suitable information. All postage refunded. N. T. Shephered, 10 Worth Park Avenue, Pound Hill, Crawley, Sussex.

Co-axial aerial relay and FT243 crystal 8060 to 8065 kc/s. For Sale, pair of side band XTALs 479·3 kc/s at 10s. each. A. H. Parker, G3KH, 133 Station Road, Cropston, Nr. Leicester, Leics.

Any person who can loan me a good sig. gen. with good accuracy for one week—will get 50 XTALs covering the Amateur Bands, Freq. from 270 kc/s to 172 Mc/s. P. J. Turner, 58a Stroud Green Road, Finsbury Park, London, N4.

TR1196 A or C TX/RX, RCA AVT 15 TX R1082 RX, BC728 push button RX, AN/AMQ-1 meteorology TX, Sell Labgear Top Bander good condition with circuit, £7. Letters only. A. Cockle, 14 Leewood Way Effingham, Surrey.

Non-working or unserviceable transistorised and low power equipment and parts, test gear, instruments e.t.c. Also WW Jan. 1962, Radio Constructors, July '59, Radio-Electronics, October '65 and '66. J. Heinrichson, 4 Winterhope Road, Annan, Dumfriesshire, Scotland.

Ceramic Yaxley switch 2 pole, 6 way or 1 pole 2 bank, 6 approx. 1¼ in. dia. wafer. Also carrier XTAL for 453,15 kc/s. D. K. Jagger, GW3KAJ, 27 Penmaen Walk, Ely, Cardiff.

Television-SW World, February to April and September 1935, August 1936 to August 1937. Any copies *SW Craft*, *RSGB Annual* 1928. *RSGB Bulletin*, July 1933, with covers, Call Books before 1937. F. A. Herridge, 96 George Street, Basingstoke, Hants.

HRO 28-30 Mc/s b/s coil. For Sale Codar T28 RX, £9. GCRE diversity switch type 455, £5. Marconi TV10 TX 3·5—30 Mc/s, £6. S.a.e. for details. W. E. Gates, G3ENB, 1 Stonescross Road, Castle Park, Whitby, Yorks.

TW Top Mobile or Codar T28 in good condition. G. P. Gaunt 28 Laurel Street. Middlesbrough, Yorks.

KW Valiant TX, condition unimportant. A.m. or c.w. model. Incomplete kit acceptable. For Sale. XTALs 1 Mc/s, 500 kc/s and 100 kc/s. Geleso v.f.o. 4/104 new boxed, exchange for B2 or w.h.y. D. V. Walters, G3MXO, 161 St. Saviours Road, Alum Rock, Birmingham 8.

Panda a.t.u. offers to E. T. Ward, G3JWC, 21 Rangemore Street, Burton on Trent, Staffordshire.

Loan or buy manual for R216. V. R. Ledger, G2FKY, 81 Uplands Road, Bournemouth, Hants.

Brushes for Prop-Pitch motor, scrap motor considered or suggestions welcomed. B. Armstrong, G3EDD, 39 Angle End, Gt. Wilbraham, Cambs.

HRO bandspread coil, 14-30 Mc/s, and lens, suitable for TV Camera. G. D. Davies, G2FXA, 35 Kensington Road, Stockton on Tees, Co. Durham.

Circuit of Suitcase TX/RX type 122. Your circuit copied or purchased. Assistance appreciated. A. W. Foster, G3GAH, 59 Orme Crescent, Tytherington, Macclesfield, Cheshire.

Correspondence course for RAE, Morse course and records. Hallicrafters S27/36, Eddystone EB35. R. H. Baker, 57 Chillerton Road, Tooting, London, SW17.

Borrow or buy, SWM, October '58, April '59 and May '59. B. Pettman, G3MLN, 17 Birchdale, Dukes Wood, Gerrards Cross, Bucks.

Conversion XTAL's for G2DAF Mk. 2 TX (Mechanical Filter Type). C. H. McLewee, G3OML, 111 Camborne Road, Morden, Surrey.

Bead thermistors needed, four or more of same type photocells, used pen recored and used 2m RX in working order. Please send all details. C. L. Meadow, 22 Westside, London, NW4.

Information and circuit diagram for Panda—Cub TX also main tuning and amateur bandparead Ivorine dials for Hammerlund super-Pro RX, 1·3-40 Mc/s model. C. A. Collins, G3THX, 32 Albany Road, Skegness, Lincs.

Good Communications RX to suit keen SWL of limited means, will pay around £15 for such a receiver. R. Threlfall 13 Victoria Road, Whalley Range, Manchester 16.

4m and 2m converter and TX, keying relay, swop 3·5 XTAL for 3·525 Mc/s. J. Worthington, G3COI, 65 Hurst Street, Birmingham 5 Warks.

Manual or information on wavemeters Type 1238 and W1117, both A-M. A. Solomons, G3ICT, 70 Fairholt Road, Stoke Newington London, N16.

Six XTALs, ½ in. space, 3960, 9160, 7720, 8080,, 10720 and 10054 kc/s. F. Barrett, G8CO, 2 Whitehall Road, Grays, Essex.

Circuit and Manual for the Eddystone 358X—DS348 RX and p.s.u. to buy or loan (postage will be refunded). A. J. Humphries, 14 Fosseway Crescent, Tredington, Nr. Shipton-on-Stour, Warks.

GDO preferably Heathkit also small 'scope OS1, OS2 or similar. G. Moon, 28 Elm Road, Winwick, Warrington, Lancs.

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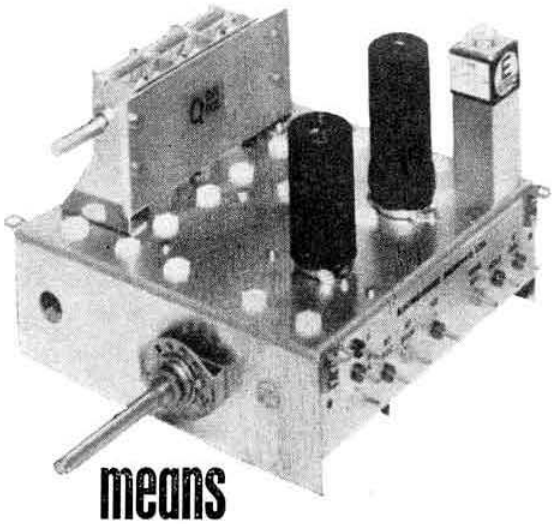

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