

# The SHORT WAVE Magazine

VOL. XXIII

OCTOBER, 1965

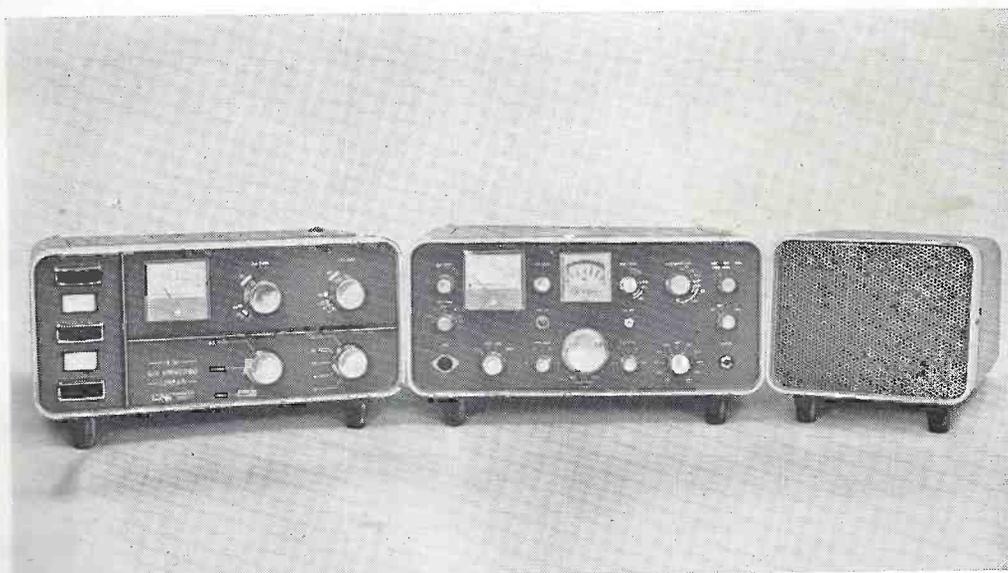
NUMBER 8

See the BEST of EQUIPMENT at STAND 21 International Radio Communications Exhibition, London, 27th—30th October, 1965

## K. W. ELECTRONICS for all your Amateur Radio Requirements

### The NEW "G" Line by K.W.

A new style cabinet with lift-up inspection lid, handsomely finished in two-tone grey stoved-enamel, fitted now to the KW2000, KW2000A and KW600.



The "G" Line—KW2000A Transceiver and KW600 Linear Amplifier.

#### CONVERTORS and CONTROL UNITS

TR1A recommended for 2M ...	£14. 0.0
ARC2 thousands in use ...	£21. 0.0
TR4 latest model ...	£37.10.0
HAM-H will handle a 'Big Bertie' ...	£61. 0.0

Carriage included.

#### KW MODELS, 1965

KW2000. SSB Transceiver (90 watts)	£173
PSU extra.	
KW2000A. SSB Transceiver (180 watts)	£195
PSU extra.	
KW600. Linear Amp. Complete with PSU	£105
KW "Viceroy" SSB Transmitter. Complete with PSU.	£156
KW "Vanguard." AM/CW Transmitter 10-160m.	£73/10/-

Carriage extra on the above.

KW stock includes: Adaptors, Aerials, Airdux Coils, Beams, Converters, Filters SSB, Mechanical and Crystal Filters, Microphones, Mobile Whips, Nuvistor Plugs, Pi-Coils, Plugs, Receivers, Relays, R.F. Chokes, Rotors, Signal Generators, Sockets, SWR indicators, Towers, Transmitters, VFO's, Walkie-Talkies, Collins 'S' Line Equipment, etc., etc. U.S.A. Equipment. Trade-in Receivers and Transmitters.

We accept trade-in equipment. Easy terms available.

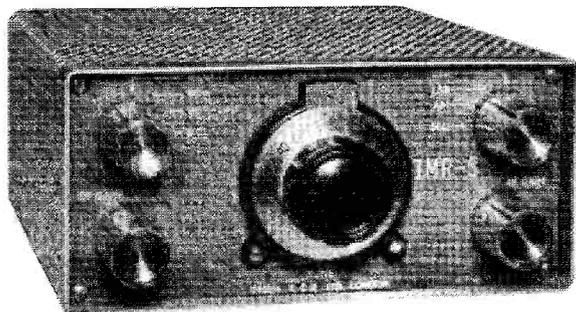
HAMMARLUND RECEIVERS, HQ170A, HQ145X, HQ180A, HQ170A-VHF now in stock.

# KW

## ELECTRONICS LTD Vanguard Works

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## SOLID STATE **GREEN** TMR-5 MOBILE RECEIVER



**The TMR-5 Communication Receiver**

THIS IS A FULL SPECIFICATION PROFESSIONAL COMMUNICATION RECEIVER. ITS REMARKABLY SMALL SIZE MAKES IT IDEAL FOR MOBILE USE. This is not to be confused with a number of modified broadcast receivers that are at present available as mobile receivers.

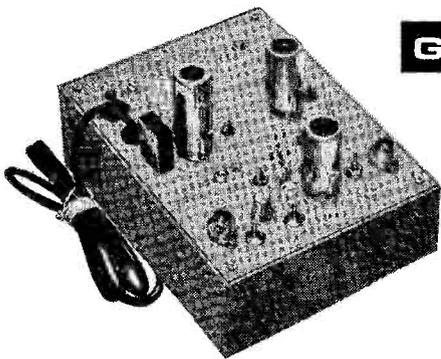
**Undoubtedly the TMR-5 is the first receiver of its kind with the following specification :**

- ★ 12 volt DC operation (direct from car battery)
- ★ Size only : 6" x 6" x 2 $\frac{3}{4}$ " high
- ★ 3 Bands, 3 functions, 160m., 80m., VHF/UHF · AM—CW—SSB
- ★ Top Band (bandspread 1·8–2·0 mc.) 2 kc. per division dial accuracy.
- ★ Eighty metres (bandspread 3·5–3·8 mc.) 4 kc. per division dial accuracy
- ★★★ VHF/UHF. The new "MK-FIVE" 4m., 2m. and 70 cm., all-transistor Converters plug on TMR-5 rear directly
- ★ B.C. facility (simple mod. shifts bandspread to ·6–1·6 mc.)
- ★ Controls : USB, LSB, CW, AM and Noise Limiter, AF and RF gains.

**The STABILITY and SENSITIVITY of this receiver is better than many Communication Receivers costing up to £120.0.0.**

Dial chosen for its functional stability making it ideal for mobile operation  100 divisions over 180°, calibration  Cost the TMR-5 yourself against *any* alternative if there is one  You will have to buy several separate Receivers to cover the same bands (cost £100 plus)  and that's only half the specification met.

**Companion 160m. ALL TRANSISTOR Transmitter, 12 volt Phone-CW 10 watt, will shortly be available.**



### **GREEN** VHF-UHF

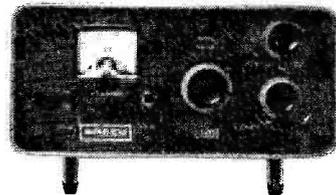
Our 2M1000 and 70CM1000, 150 watt, 2 metre TX and companion 90 watt, 70 cm. Trip-P.A. are proving very successful  the high output [90w. (2m.) and 50w. (70 cm.)]  stability  compactness  flexibility (AM—CW—QSY—PTT and 3 xtals) together with excellent modulation quality are features enjoyed by new owners of these Transmitters.

The 2m. and 4m. Converters Mk. III and Mk. IV are still available from stock with almost any I.F. These Converters include self-contained P.S.U. Mk. III, **£8.19.6.** Mk. IV, **14 gns.**

We can now supply NC-55 ex stock

For the discerning Amateur a sideband Linear—LA.600—a powerful Linear—purrring quietly—it's forced air cooled!—rugged construction—undoubtedly reliable—but decidedly inexpensive—£85—you will hear more than any other—drive it with *any* low power Tx or Transceiver (over 30 watts p.e.p.)—it will not go unstable—passive grid input cct.—this cool compact Linear will not eat up space—or cash—and its high efficiency 7094 is available at low replacement cost—off the shelf delivery (prefer you collect it)—the LA.600 is an all-band high power Linear you'll like—completely self contained, inc. psu and ant. rly.

### **GREEN** LA-600



H.P. and part exchange arranged

**SEE US ON STANDS 12 and 14 AT EXHIBITION**

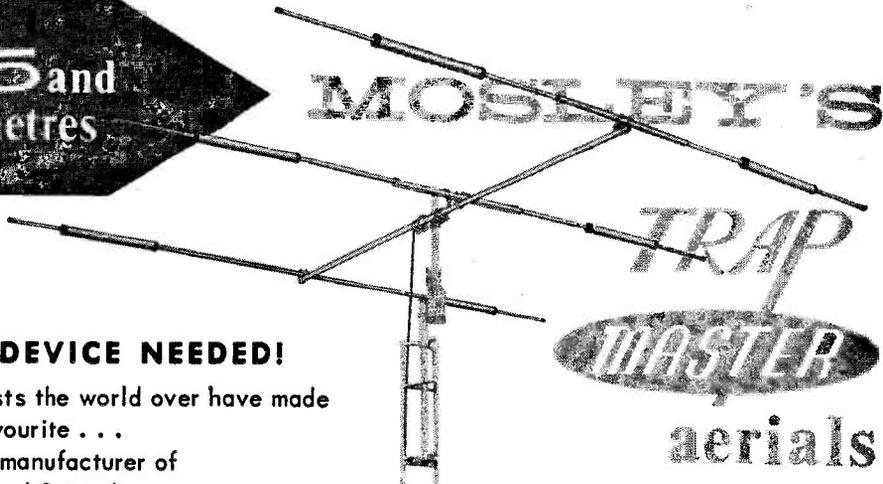
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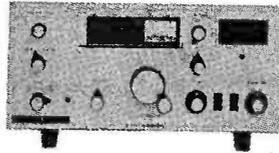
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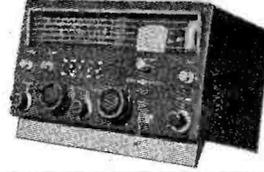
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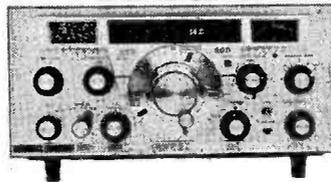
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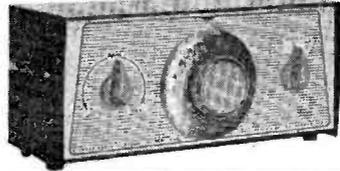
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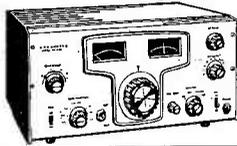
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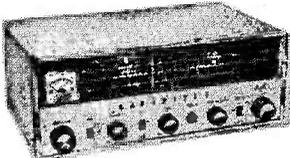
Opposite Victor Value



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**LAFAYETTE HA-350 AMATEUR RECEIVER**  
 10-80 metres dual conversion with mechanical filter for high selectivity. Incorporates 12 valves, crystal controlled osc., product detector, 100 kc/s. crystal calib., crystal B.F.O., A.N.L., "S" meter, etc. Supplied brand new and guaranteed. 75 Gns. S.A.E. for full details.



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 • Crystal Controlled • For 80-40-20-15-10 Metre Bands • As a Converter — Converts Receiver to Dual Conversion Operation • Improves Selectivity • Widens Bandspread. Three crystals are included for 20, 15 and 10 metre bands. Operates on 230v, 50/60 cycles AC, 2 stages of RF assures a high signal to noise ratio. S.A.E. for full details, 19 Gns. P.P. 7/6.



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 High quality Portable American Oscilloscope. 3" cr. T/B: 3 cfs-50kc/s. X Amp: 0-500 kc/s. Y Amp: 0-2 mc/s. Power requirements 105-125v. AC. Supplied in "as new" condition, fully tested, £25, carr. 10/-. Suitable 230/115v. Transformer, 15/6.

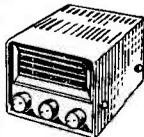
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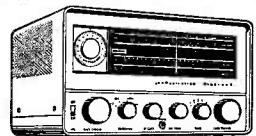
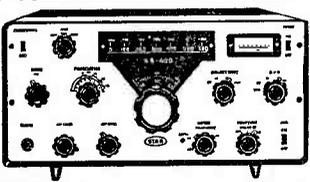
230 v. AC. or Battery operated. Incorporates built-in monitor oscillator, speaker and keying lever. Fully adjustable speed giving either auto, semi-auto or hold. 7 transistors, 4 diodes, £16/10/-, P.P. 6/-.

**COLLINS R-278/GR RADIO RECEIVERS**

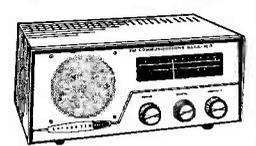
High quality military UHF crystal controlled receiver providing reception of AM and CW signals on any one of 1,750 channels in the frequency range of 225-399.9 Mc/s. Power requirements 115-230v. A.C. Size 13" x 19" x 20". Output 3 watts into 600 ohms. Original cost hundreds of £££'s. Available in as new condition, fully tested complete with all crystals. £60. Carr. 50/-.

**STAR SR.600 AMATEUR COMMUNICATION RECEIVER**

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



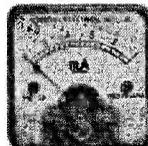
**LAFAYETTE HA-63 COMMUNICATION RECEIVER**  
 7 valves — Rectifier, 4 Bands 550 kc/s.—31 mc/s. "S" Meter-BFO-ANL-Bandspread Tuning 200/250v. AC. Brand New, 24 Gns., carr. paid.



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500µA	25/-	5mA	22/6	500mA	22/6	50v DC	22/6	50v AC	22/6
100-0-50µA	29/6	10mA	22/6	750mA	22/6	100v DC	22/6	150v AC	22/6
500-0-100µA	27/6	50mA	22/6	1A	DC	22/6	150v DC	300v AC	22/6
500-0-500µA	22/6	100mA	22/6	5A	DC	22/6	300v DC	500v AC	22/6

Larger sizes available — send for lists

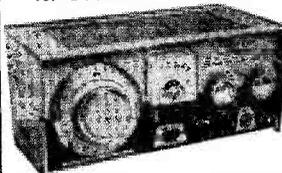
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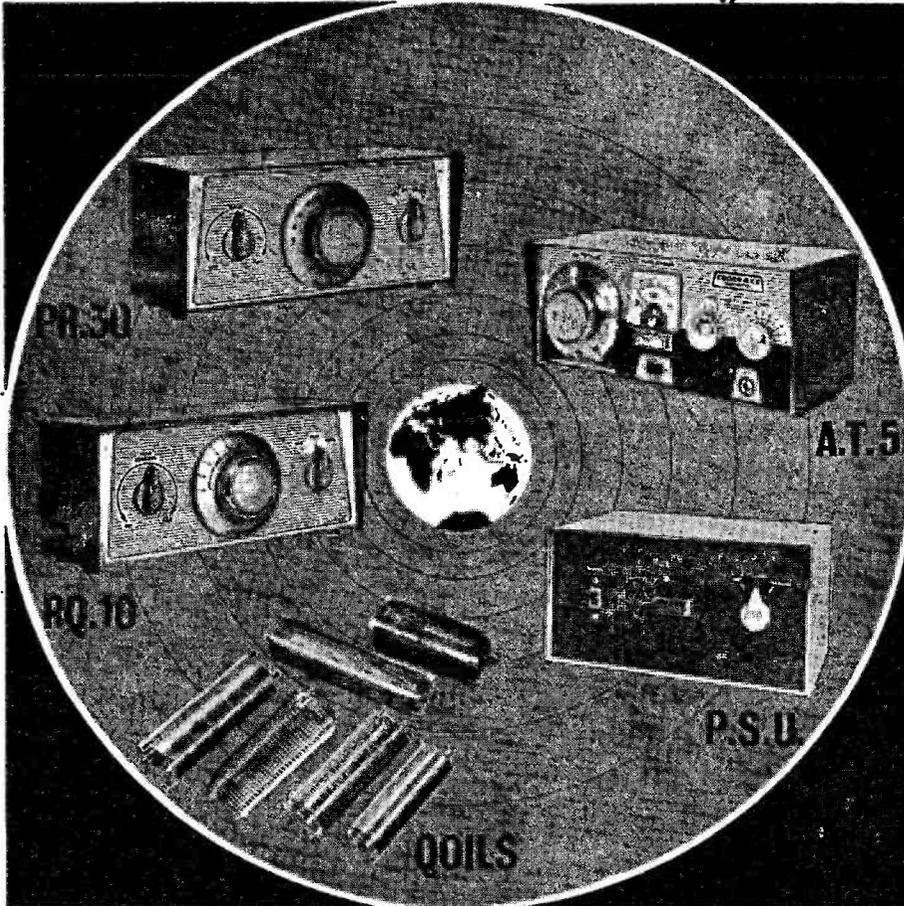
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# SHORT WAVE MAGAZINE

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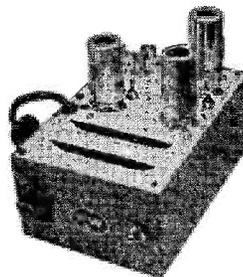
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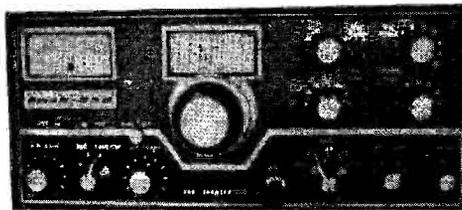
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# *The* SHORT-WAVE *Magazine*

## EDITORIAL

### **Convention**

*The official title of our annual exhibition is, nowadays, "International Radio Communication"—but whatever it's called, it is still the most important event of the Amateur Radio year, where people can meet, see and be seen. As usual, there will be all the latest in the way of amateur-band equipment on view, and many interesting Trade and Service stands.*

*Note that the International Radio Communications Exhibition will be at the Seymour Hall, Seymour Place, near Marble Arch, London, W.1, and that the dates are Wednesday, October 27 to Saturday, October 30, open all day and late into the evening every day.*

*For those who would prefer to avoid the crowds, the quietest times are usually Thursday and Friday mornings — otherwise, it's pretty hectic. As usual, we have a large stand and it will be fully manned throughout the period of the Exhibition. We look forward to meeting many new readers and old friends.*

*Austin Forster,  
G6FO.*

---

WORLD-WIDE COMMUNICATION

## YOUR BC-221 AS AN AUDIO SIGNAL GENERATOR

### NEAT APPROACH FOR ACCURATE FREQUENCY CALIBRATION

Rev. F. NESS (GD3ESV)

*Description of a simple unit giving a total range of audio frequency, with excellent calibration accuracy and stability. The same principles can be applied to any other type of well-calibrated wide-range heterodyne frequency meter.—Editor.*

**D**URING a period of enforced absence from the home QTH, the writer's interest was aroused by the excellent series of articles by G3CQE entitled "RTTY Topics," appearing regularly in *SHORT WAVE MAGAZINE*. The purchase of a Model 19 Teletype machine was the result—happy hours were spent oiling and adjusting it, and operating it on a "local loop" to see what made it tick. The next step was to try and copy some of the very loud signals to be heard on the 80-metre band, and for this purpose a Terminal Unit had to be built.

Here the writer came up against his first real snag. The station is equipped with a reasonable amount of test-gear. A multimeter, a valve-voltmeter assembled from a well-known kit, a grid-dip oscillator and absorption wave-meter, and of course the BC-221. But from the RTTY angle, there is one essential piece of equipment *not* on the list: an accurately calibrated audio oscillator. Anyone who has listened to the jingle-bells on 80 metres knows that RTTY signals come out of the receiver as two tones rapidly alternating. In amateur practice, these tones are usually 2125 and 2975 c/s, these providing the "mark" and "space" pulses to actuate the printer magnets. Commercial transmissions often make use of tones with a smaller spacing, and shifts of 150 c/s to 400 c/s have been used experimentally by amateurs as well. Home-built Terminal Units invariably detect these two tones by means of a discriminator of the Travis type employing tuned circuits resonant at the required frequencies. Audio tuned circuits of good Q are easily made from the various types of toroidal inductances available on the surplus market. But to tune them to the *exact* frequencies required calls for an accurately calibrated audio oscillator.

#### Audio Signal Generators

Building an audio-oscillator is not too difficult. Over the years a variety of circuits has been published in *SHORT WAVE MAGAZINE*, using valves or transistors and employing various types of circuits, e.g. phase-shift oscillators, Wien bridge oscillators, etc., all of which are capable of good stability and waveform. But when built, they all

leave the constructor in the same difficulty: How does one go about calibrating them accurately?

With the aid of an oscilloscope, and using the 50-cycle mains and the BBC tuning notes of 440 and 1,000 c/s as standards, calibration can be attempted. The writer has tried it and found the task both tiresome and frustrating. Moreover, as the work proceeds, it becomes obvious that most oscillator circuits give a scale calibration which is far from linear: the scale is open at the low end of each range and becomes cramped towards the high end. That this is not just a weakness of home-built apparatus can be seen by examining advertisements in which photographs of the products of quite reputable firms can be seen, displaying the same fault.

With his head full of these gloomy thoughts, the writer sat looking at page 1 of the calibration book of his BC-221. From 125 kc upwards, there is a calibration point every 100 cycles, and the average dial reading is 4 scale divisions per 100 cycles increment, making it possible to interpolate to an accuracy of around 25 cycles. If something like this was available at audio frequencies, it would be a real boon. Memories then came flooding back of a type of audio signal generator very popular before the War, but rarely heard of today. This is the Beat Frequency Oscillator. Shorn of its capital letters, a simple form of the device is used on every amateur receiver to enable CW, or SSB, signals to be resolved. But in the pre-war period, a much more sophisticated version was the only type of precision audio generator available. The mode of operation was briefly this: Two radio frequencies, one fixed ( $f/1$ ) and the other variable ( $f/2$ ) were applied to a mixer stage. The difference frequency ( $f/2 - f/1$ ) was extracted, the original frequencies filtered out, and the result was the desired audio signal. The whole frequency range of 10 kc or 15 kc could be covered in one sweep of the dial! The idea seems so simple that readers may wonder why it was abandoned. Some of the snags were as follows: (1) There were two oscillators, each liable to drift. Even in well-made instruments, frequency stability was hard to secure. (2) At low frequencies, when the two oscillators were close in frequency, "pulling" was liable to occur, and this tended to spoil the waveform. (3) Good filtering was necessary to remove the unwanted frequencies,  $f/1$  and  $f/2$ , and the unwanted mixer products generated.

#### Suggested Solution

In the arrangement to be described, some of these objectionable features persist, but there is one very great advantage to offset them. The variable frequency is provided with a high degree of stability and calibration accuracy by the BC-221. By using the beat frequency principle, these two highly desirable features can be transferred down to the audio frequency range. If a fixed frequency of 125 kc is mixed with the output of the BC-221 as it is tuned from 125 kc to 135 kc, the result is an audio range of 0 kc to 10 kc. The calibration book

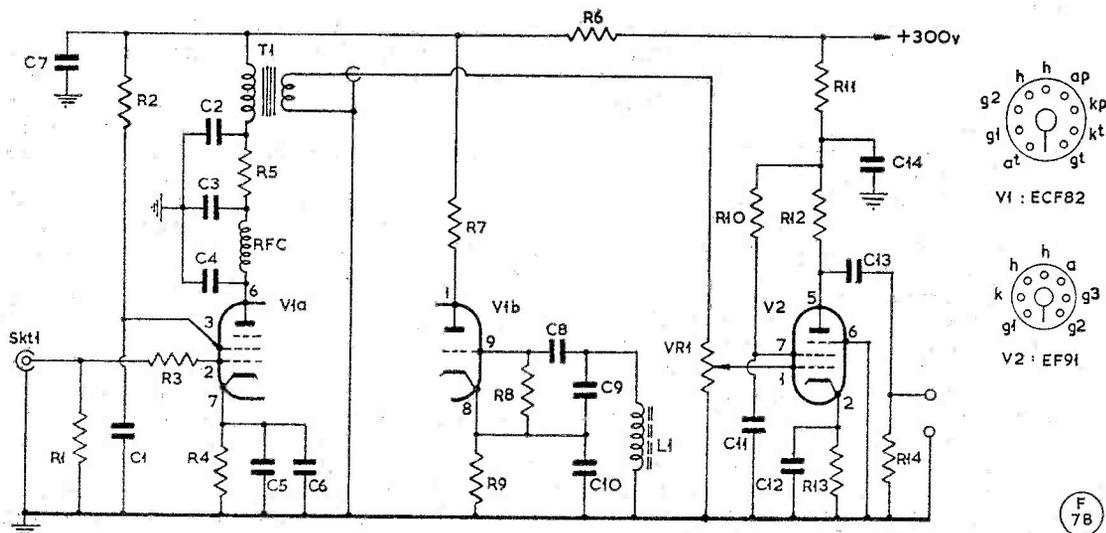


Fig. 1. Circuit of the unit discussed by GD3ESV, to obtain a controllable audio output from the low-frequency ranges of a BC-221, or any similar calibrated frequency-meter. As he shows in the text, it is possible to get measured audio frequencies to a high degree of accuracy.

can be used exactly as it stands by subtracting mentally 125 kc from the reading corresponding to any particular dial setting. (For the ultimate in stability, one would use a crystal to supply the fixed frequency.) At the low frequency involved, a Colpitts free-running oscillator gives excellent short term stability, and can be re-set easily against the 1 mc reference crystal in the BC-221.

Referring to the circuit diagram, note that the output from the Ant. terminal of the BC-221 is fed via a short length of coax to the signal grid of the 6U8 mixer. (This valve was used because it was available; there seems no reason why any other frequency-changer type, such as the ECF82, would not work just as well.)

The triode section of the 6U8 is a Colpitts oscillator, with R9 replacing the usual RF choke. L1 is the tuned winding of a long-wave aerial or HF coupling coil such as the Osmor QA9. By means of the slug, the inductance can be adjusted to tune, with the effective capacitance of C9 and C10 in series, to 125 kc. When first putting the unit into service, this frequency can be set approximately by listening to its second harmonic which should come in at 250 kc on the long-wave range, and to the third harmonic which should appear at 375 kc. Having got the tuning roughly correct by this means, it can then be set accurately by means of the BC-221.

At this point some more thoughtful readers may have asked themselves: "Why all this fuss with a separate oscillator and mixer system? Why not simply set the BC-221 to the Xtal Check position and take the audio beat note from the Phones socket?" The answer is this: When using the low frequency range of the BC-221, where the calibration is most open, with points marked every 100 c/s, the eighth

### Table of Values

Fig. 1. Circuit of the Audio Signal Generator Unit

C1, C13 = 0.1 $\mu$ F	R4, R13 = 1,000 ohms
C2, C3, C4 = .001 $\mu$ F cer.	R5, R9 = 4,700 ohms
C5, C11 = .01 $\mu$ F	R6 = 22,000 ohms
C6, C12 = 25 $\mu$ F 25v. elect.	R10 = 220,000 ohms
C7, C14 = 8/16 $\mu$ F 450v. elect.	R11 = 10,000 ohms
C8 = 180 $\mu$ F, s/m	VR1 = 250,000-ohm potentiometer, log lin.
C9 = .001 $\mu$ F, s/m	L1 = "see text"
C10 = .0027 $\mu$ F, s/m	T1 = "see text"
R1, R7, R8, R12 = 47,000 ohms	RFC = 2.5 mH RF choke
R2, R14 = 100,000 ohms	V1 = 6U8 or ECF82
R3 = 47 ohms	V2 = EF91, or equiv.

Notes: Other similar valve types can be used. The notation "s/m" indicates a silver-mica type; "cer." means ceramic; "elect." is an electrolytic condenser. Sk1 is an ordinary coax socket. All parts can be housed comfortably on an ali. chassis 7in. by 4in. by 2in. deep.

harmonic of the variable oscillator is beating with the 1 mc crystal. The beat note, therefore, increases in frequency at 8 times the rate indicated in the calibration book. A calibration point every 800 c/s is not very useful. On the instrument's high frequency range, the first check point (the obvious one to use) results from beating the second harmonic of the variable oscillator with the crystal. This is better, but unfortunately the calibration points are 1 kc apart, so this simple scheme won't work here either.

Sufficient injection from the triode of the pentode section of the 6U8 for good mixing is furnished by stray coupling (components are grouped fairly closely round the valveholder). The anode circuit of V1 must first reject the two radio-frequencies (and their harmonics) and this is done by the simple two-section filter composed of the RF choke, R5 and

the three small capacitors, C2-C3-C4. If a long-wave type of RF choke, with a higher inductance than the one used here, is to hand it might be more effective. The one actually put in seems to do the job quite effectively.

The difference frequency is selected by the transformer T1, and here again, a good quality component should be used if available. In audio frequency work, the lower frequencies below, say, 500 c/s will show poor waveform if cheap iron-cored components are used. The writer had no choice and used an old 1:1 driver transformer. As expected, frequencies below 500 c/s show increasing distortion as viewed on the scope, though the calibration is still perfectly accurate. It was decided to accept this shortcoming for the sake of economy. So long as one is aware of the poor waveform at the low end of the range, no great harm should result.

V2 is a buffer amplifier. Owing to the rather simple RF filtering used in the anode circuit of V1, the audio output from the mixer rises to a peak at about 1 kc and then falls off gradually. By advancing the gain control VR1, output from V2 can be maintained at a level of 10 volts or so up to at least 15 kc, beyond the limit of audibility. A well-smoothed HT supply is necessary; if in doubt on this point, add more electrolytics.

### Getting The Result

Setting up the equipment is straightforward. Allow everything to warm up thoroughly, and temporarily disconnect the coax lead at Skt1—see diagram. Follow the usual procedure for setting the BC-221 dial calibration exactly to 125 kc. Then switch back to Het. Osc, couple the coax lead to Skt1 and adjust the slug in L1 for zero beat with the BC-221. Switch back to Xtal Check for a few minutes and verify that all three oscillators are in zero beat. (This check can be performed at intervals while the equipment is in use, thereby ensuring the highest accuracy at all times.) Keep the Phones on and monitor the audio output *via* the BC-221. Attach the valve voltmeter leads to the output socket and verify that about 10-15 volts show at the output terminals. (If VR1 is turned up too far, it is possible to overload V2 at frequencies around 1 kc,

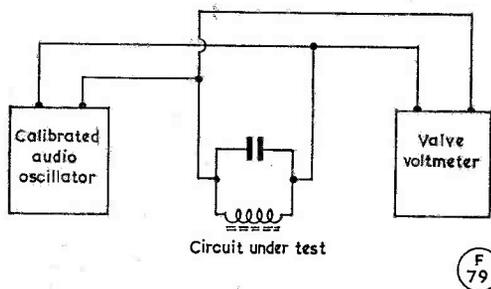


Fig. 2. The simple test set-up to make use of the unit in Fig. 1 and discussed by GD3ESV in the text. As he shows, audio frequencies can be measured to limits close enough for setting up FSK equipment for radio T/P reception.

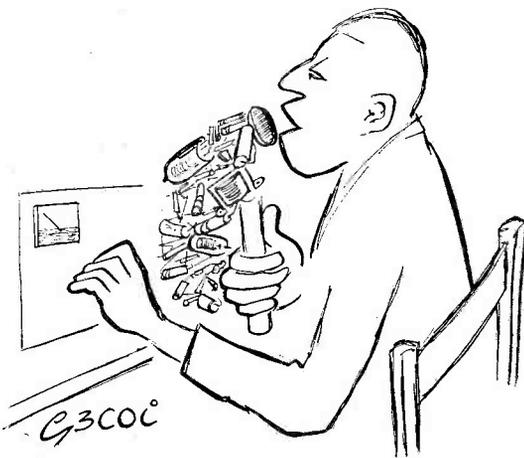
thereby generating square waves !)

When completed, the writer's instrument was put to work in the design of audio filters for 2125 and 2975 c/s. Toroidal inductances of 32.54 mH were available. Used in pairs, these presented an inductance of suitable value. Reference to the *Radio Data Charts* (as offered by the *Magazine Publications Dept.* at 11s. 3d.) showed that approximately 0.05  $\mu$ F and 0.09  $\mu$ F would be needed to resonate the inductances to the required frequencies. (The writer uses these Abacs for all his design work. It's much quicker and virtually fool-proof for the non-mathematical . . . no trouble with "those damned dots.")

Paper condensers vary somewhat from their nominal value. By trial and error it is possible to find a capacitor, or combination of condensers, which will bring the coil to resonance at the right frequency. At resonance the valve voltmeter reading increases sharply. Unknown inductances can be measured by finding the frequency at which they resonate with a known capacity. The Abac then gives the inductance at once. See Fig. 2 for the test set-up employed.

### "NEW QTH's"—ACCURACY, PLEASE!

It may hardly be credible, but we *still* get keen types sending in their callsign/addresses for the "New QTH" page who omit to mention either (a) the callsign, or (b) the name, or (c) the essential place-name. For instance, "156 Grove Avenue, Middlesex," gets us nowhere, nor does "G3VVV, 98 Moreton Road, Harpenden, Herts.," or "I am glad to tell you I have now got my licence, at the address above." What we want is precise information, on a separate slip. This ensures the earliest possible appearance in "New QTH's" and publication in the next quarterly issue of the *Radio Amateur Call Book*, the only guide and directory to the amateur stations of the world.



"... I've adopted chassis-less construction for the pre-amp here ..."

## SERVICING THE AR88

### IDEAS FROM PRACTICAL EXPERIENCE WITH THE "D" AND "LF" MODELS—SOME USEFUL AND EFFECTIVE CIRCUIT MODIFICATIONS

H. LEEMING (G3LL)

AS many readers will know, the "LF" version of the AR88 differs from the "D" model in only a few points, and is an excellent all-band receiver. These are available at very reasonable prices and it was thought that some notes giving details of the servicing and alignment might be helpful. It is also hoped that owners of the AR88D will find the following of interest and practical assistance—and it is presumed that the AR88D manual, but not the less readily available LF manual, is to hand.

Starting at the power supply, the only major difference from the "D" model is that the "LF" has only two mains tapplings, and by switching two windings on the primary of the mains transformer in series or parallel, the receiver is ready to operate on nominal voltages of 230 or 115v. AC. The 230-volt position is quite near enough for the normal U.K. mains voltages, and in practice the receiver will not come to much harm or show any deterioration in performance if your mains voltage is anywhere between, say, 220 and 245 volts. If, however, it should be outside these limits a dropping resistor or an auto-transformer might be advisable. Very little is likely to go wrong with the power supply that is not obvious, and the only point worth noting is that the psu smoothing condensers if replaced should be rated at 550v. DC, at least, or they will blow up when the receiver is switched to stand-by. Perhaps it should also be mentioned that the centre-tap of the mains transformer does not follow the normal practice (direct to chassis) but in all versions goes to deck through several low-value resistors which have developed across them the bias voltages for the various stages. R45 is the only one of these whose value is likely to have altered, and this should be checked.

Next we look at the output stage, which takes a 6V6 instead of the 6K6 used in the "D" model. Actually, these two valves are very similar and can be interchanged without making a great deal of difference, although in theory the bias and the output transformer ratios will be incorrect. The secondary winding of the output transformer on the LF model has only one tapped winding and the facility as in the D model, for killing the speaker when the phones are plugged in on the front panel socket, does not exist. The simplest way to get over this difficulty is to plug a 15-ohm speaker into the headphone

socket instead of connecting it to the tag-board at the rear—or, alternatively, an external switch can be fitted.

The output stage of the AR88, whilst not quite hi-fi, is of very good quality, with negative feedback taken via R54, which is 2.7K in both versions. The AF gain is considerably reduced by the negative feedback, and for amateur use a much more "communications-like sound" will be produced if R54 is disconnected, considerably improving the AF gain, and also if C118 and 122 are replaced by a single capacitor of about .001  $\mu$ F. As the tone-control circuit is now not within the negative feedback loop its action will also be found to be much improved by this modification.

The first AF stage is quite conventional except for the fact that it takes its bias, as does the output stage, from the negative supply provided in the power pack. As this is fed through rather high-value resistors, the condensers C111 and C99 should be checked to have an internal resistance of over 10 megohms, or else the bias will be shorted out. Whilst going over this stage, all the high-value resistors should be checked, or the voltages across them measured with a test meter having a high internal resistance.

#### NL and Detector Side

The noise limiter and detector stages come next, and before wasting time checking for high resistors or leaky condensers, an operational test should be made. With the receiver switched to AVC, NL only the very slightest distortion should be noticed on a broadcast station with the noise limiter control fully off, but with very considerable distortion at the other end of its range. If this is so the receiver should be tuned through Loran on 1.9 mc, with the selectivity switch in positions 1 or 2, where the noise limiter should be found to be extremely effective. If this is not so, all parts associated with the noise limiter should be replaced, or the stage should be systematically checked.

Since the noise limiter takes its bias from the diode detector, and as this varies from station to

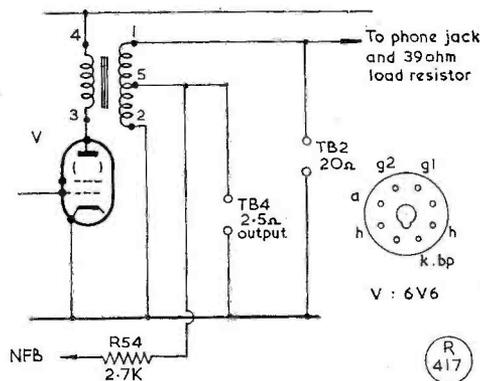


Fig. 1. The original AR88LF output stage circuitry. The suggestion is to remove R54, to improve the AF gain—see text.

station, its setting does not have to be altered with varying carrier levels. The second diode in the 6H6 detector is used to provide a delay on the AGC, and this delay, and hence receiver gain, is altered by the RF gain control. When switched to "manual" RF gain, a small degree of AVC is still produced due to R42 which can, if desired, be shorted out to give full manual control.

### BFO Circuit on SSB

The BFO does not follow the standard practice of coupling straight into the detector, but feeds into the grid of the last IF valve. Due to the gain of this stage the injection required is very small, and hence pulling or blocking on strong signals is not troublesome. The BFO injection is, in fact, by stray capacity, and to use the receiver for SSB work an increase in injection can be very much worth while. To do this set RF gain at maximum and tune the AR88 into a strong broadcast station, switching to AVC with the BFO off; measure the voltage between the top end of the noise-limiter control and chassis. Now remove the aerial, switch the BFO on, and again note the voltage reading, which should be much lower. After switching the receiver off, a small capacitor—made by twisting two pieces of wire about an inch long—should be connected between pins 3 and 4 on the 6J5 BFO valve; the value of this is then adjusted until the voltage measured at the top end of the noise-limiter control is of the same order as that obtained from the broadcast station when the receiver is operated with the BFO on, the aerial still being disconnected. The injection required is not too critical but it is worth trying the effect of further increases or decreases when tuning SSB stations. If this modification is carried out it is important that, as previously suggested, R42 be shorted, otherwise the gain of the receiver will be reduced due to the BFO output biasing the AVC back, even when switched to "manual."

The IF stages are more or less identical in the D and LF models, apart from the fact that the latter are tuned to 735 kc instead of the more standard 455 kc, as used in the AR88D. This is designed in so that the AR88LF can tune to the 600-metre (500 kc) shipping band without the whistles and instability that could result if the lower IF was used. Being higher in frequency is a disadvantage in that selectivity is somewhat reduced, but the higher IF shows a gain in that the already good image and "birdie" rejection on the HF bands is further improved. Not much needs doing to the IF stages apart from alignment (touched upon later) and normal voltage checks to trace high value resistors. The IF gain of the AR88LF is, in fact, so high that the temptation to increase it should be resisted, as this is more likely to detract from than to improve the performance of the receiver!

### Xtal Filter

The most worthwhile modification to the IF stages, especially the LF model, is to incorporate

a half-lattice crystal filter in place of the single filter fitted, and this can be done very simply. Two crystals are required tuned to, say, 1.5 kc either side of the nominal IF frequency, and in the simplest arrangement these are just wired in place of the original crystal and C75 which are disconnected—see Fig. 2. To give the best results a small condenser should really be connected across one of them—but even the simplest arrangement without this or any critical adjustment will make an adapted AR88LF leave a standard AR88D way behind for AM or SSB reception on a crowded band.

AVC is applied to the first two IF valves and also to the RF stages, and due to the high impedance of this circuit it is important that the decoupling condensers should be in good condition. Leakage here will upset the balance of gain in the receiver and either reduce the signal-to-noise ratio or produce cross-modulation effects. If no means are available for checking that each condenser has an insulation resistance of at least 10 megohms, and that total resistance from the AVC line to earth with R47 disconnected is not less than 5 megohms, (or if there is any doubt about the matter) all the AVC decoupling condensers should be replaced. There is no need to refit entire condenser blocks but just the AVC sections should be disconnected and replaced with good quality condensers, such as the new Mullard Polyester types.

### Front End Considerations

We now come to the heart of any AR88—the RF mixer and oscillator stages, which are contained in the extremely well-made coil box. Removing the cover from this is an education, and a glance at the good quality ceramic wave-change switch, the firm wiring, negative temperature-coefficient condensers, and the general "quality appearance," makes one realize just why this 25-year-old "out-of-date receiver," so called, can still give a good account of itself, especially as regards frequency stability. However, nothing lasts for ever, and a thorough check of the resistors and decoupling condensers will be very worthwhile. The screen resistors, it would seem, are particularly likely to have gone high in value.

If it is desired to use Ranges 1 and 2 on the LF model the value of the damping resistors in parallel with the RF and mixer coils should also be checked, as these are liable to have gone off. If there is any doubt about the screen decoupling condensers these should be replaced by disc ceramics, it being important to note that the earth points used on the chassis should be the original ones.

Before going any further a few words regarding noise and modern *versus* older type valves might not be out of place. Whilst there is no doubt that the performance of the latest valves is considerably in advance of the older octal types, in terms of gain produced in proportion to noise generated, it is doubtful (in the writer's view, at least) whether very much improvement would be noticed by their introduction in place of the original valves in this

receiver. The reason for this is that in any well-designed communications receiver, the noise that matters comes from the first tuned circuit, and no improvement in valves can reduce this.

### Receiver Assessment

This fact amounts to a very simple way of assessing the general condition and alignment of a communications receiver, whether AR88 or any other type. Try the receiver out on the 10, 15, and 20 metre bands first of all, with aerial on to check the calibration, and then *without* aerial but with a resistor of around 100 or 200 ohms connected across the AC terminals. If the receiver is in reasonable condition and alignment, the sharsh should at least double as the aerial tuned circuit is brought to resonance by the aerial trimmer. Any receiver failing this test is either inadequate for amateur use, or requires servicing and possibly alignment.

From time to time one reads of users of the AR88 putting on a pre-selector to increase RF gain. This should never be necessary with any quality receiver because RF gain is already very high, and if any great improvement in signal-to-noise ratio is noted by tuning up with a pre-selector, it is a sure indication that either the aerial is not matched, or that something is far from right with the Rx itself. However, due to the high gain of the RF stages cross-modulation can occur if one happens to be near another local station, as the older octal valves are rather more prone to this than the latest miniatures.

If you fancy rebuilding the RF end of your AR88 with miniature valves, good luck to you, but a simpler—although perhaps not quite as effective—cure for cross-modulation can be obtained by fitting a separate RF gain control. All that this need consist of is a variable resistor between, say, 1K-5K, connected in series with the cathode of V1, with two suitable decoupling condensers mounted on the valve base between the original earth tags and the two cathode connections. If cross-modulation is still troublesome the gain of the RF stage can be reduced until the best compromise between signal-to-noise ratio and reduction of cross-modulation is obtained.

### Cleaning Up

Any troublesome carbon controls should be cleaned with a suitable product, *Electrolube* or *Three-in-One* oil being particularly recommended. The range, selectivity and function switches should be attended to with switch cleaner of the non-oily variety, or even carbon tetrachloride may be used if this is not available. These fluids must not, of course, be used whilst power is on and it is important that this is not restored until the non-ceramic switches have dried out, or else the insulation may break down. Most faults that occur on the AR88 are quite straightforward and will be cleared by normal systematic checks, hence there is no need to produce a "cause, cure and effect table." One fault, however, that the writer has come across and

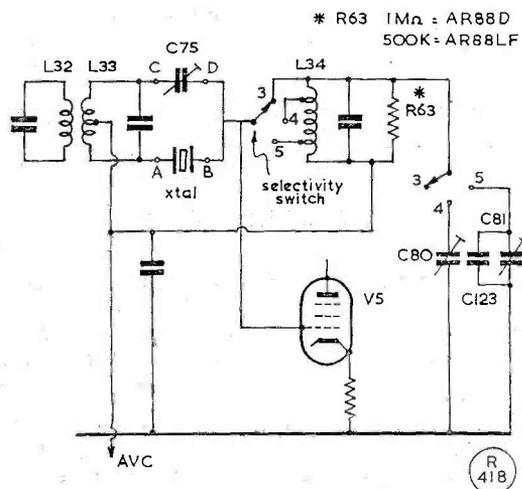


Fig. 2. Simplified diagram of the crystal filter on positions 3, 4 and 5 in the "D" and "LF" versions of the AR88. For the suggested new half-lattice filter, remove C75 and the original crystal, and wire the new crystals (see text) to points A-B and C-D. The selectivity will not now be variable in positions 3, 4 and 5, and the Sel. switch should be left at the setting which gives best results. The IFT's should be lined up to a frequency half-way between the new crystal frequencies, and any dip taken up by adjustment of L34. It is also worth experimenting with the value of R63 and fitting a small 15  $\mu$ F variable across the higher-frequency crystal.

which can be rather tricky to locate is perhaps worth a mention.

Many old receivers in the AR88 category can by now have collected large quantities of dust and grime on their chassis, and this can make spring contacts go high resistance. One section prone to cause trouble is the tuning-gang mounting, which relies for effective earthing on a large number of these contacts fitted underneath. Despite the fact that the tuning condenser itself is very effectively earthed, instability or changes of gain will result on the highest frequency bands if the contacts on the mounting are not well made. If any such fault is suspected the tuning gang should be rocked side ways on Range 6 with the aerial trimmer tuned to resonance, and without an aerial connected. If any trouble is noted, such as noise or intermittency, these contacts almost certainly require attention.

To tighten and clean the gang mounting, earth contacts would require the removal of the complete tuning gang, which, to put it mildly, would be rather a difficult task. But this is not necessary, as the fault will disappear if the gang mounting is connected to chassis by short lengths of flexible wire—such as coax sheathing. To be effective, multiple earths *must* be used, so as not to set up any common impedance between stages. About a dozen one-inch lengths of coax braid between chassis and mounting, evenly spaced down both sides of gang, will be found to meet the requirement.

(To be concluded)

## CRYSTAL-CONTROLLED TRANSISTOR OSCILLATORS

USING SERIES-RESONANT MODE  
— FOR WIDE FREQUENCY RANGE

C. SHARPE (G2HIF)

SO many amateurs seem to run into difficulties when attempting to design CC oscillators using transistors that some notes on the subject may be helpful. Most of the failures to produce a satisfactory circuit stem from one or more of three main causes.

Chief of these is really to appreciate that the basic difference between transistor and conventional valve oscillators is that a transistor is a low-impedance device requiring a *current* input, whereas a valve has a high input impedance across which a *voltage* must be developed.

Secondly, there is the all-too-common use of the wrong type of crystal. Most transistor circuits require that the xtal should be in series-resonance—but the majority of crystals ordinarily obtained as surplus have been ground to give a good parallel resonance, without necessarily displaying any well-defined characteristics at all in the series mode.

Thirdly, the relative importance of the crystal self-capacity in its two modes of resonance is not always understood. It is, in fact, this capacity which enables it to exhibit any parallel resonance at all. However, this shunt capacity is not an integral factor when the crystal is in series resonance. Actually, since it is in parallel with the series-resonant parameters, at the higher frequencies its effect can become significant enough completely to destroy the crystal's ability to exert a controlling influence on the oscillator frequency.

Once these basic facts are really grasped, it is obviously a waste of time trying to control the frequency of a current oscillator (transistor) using an

element (crystal) specifically designed to exhibit voltage resonance. In order that the crystal, as the frequency-determining factor, can exercise maximum control of the oscillator stability, it is necessary that it not only be adequately selective to the frequency of the oscillating *currents*, but also that it be inserted at a point in the feed-back loop where it can best control the currents flowing in the loop.

Two particular tests should always be applied to all CC oscillators before the circuit constants are finally decided: (a) Oscillation should cease when any other frequency-determining elements in the circuit are tuned off the crystal frequency; and (b) Oscillation should not occur when the crystal is removed and substituted by a condenser equal to the crystal self-capacity.

### Choosing Suitable Crystals

Many crystals, particularly surplus types, will go off at frequencies other than that marked on the case. For this reason, oscillators which have no frequency-determining elements, *i.e.*, a separate tuned circuit, other than the crystal itself should be carefully checked to make sure the xtal is controlling on the right frequency and in the correct mode. An incorrect mode need not be harmonically related to the frequency for which the crystal was initially cut.

Very low frequency and very high (overtone type) crystals are particularly prone to oscillate in the wrong mode—therefore, they should never be used as an oscillator without a separate tuned circuit which is selective to the frequency at which the crystal is required to take control.

### Some Practical Circuits

The diagrams show two circuits embodying the foregoing design principles, with the crystal controlling in the series-resonant mode in both cases.

Fig. 1 is an oscillator for the frequency range 1-15 mc, with the crystal working on its fundamental. The inductance value for L1 is, of course, dependent on the actual frequency involved, but the ratio of the turns should be as shown, with L1, C4 to resonate at the xtal frequency. The feed-back is determined by the ratio of C2 to C3, the former being made variable pre-set so that this can be properly adjusted; it is important that the feed-back is not excessive (which could rupture the crystal)—C2 should be set just enough to make sure the xtal starts every time, and holds.

For the circuit of Fig. 1, the transistor can be a Mullard BYF50 or SGS-Fairchild C111, or any of their equivalents or near-equivalents in the n-p-n silicon types. Other values are: C1, .01  $\mu$ F; C2, 5-30  $\mu$ F, pre-set; C3, 47  $\mu$ F; C4, 10-50  $\mu$ F, tuning; R1, 33K; R2, 10K; R3, 2.2K, and R4, 1K. The crystal can be any suitable type (*see* discussion) that will go off at the required frequency.

### Overtone Oscillator, Series-Resonant

The arrangement of Fig. 2 will function in the overtone mode at frequencies up to 70 mc or so, and so has many obvious uses in amateur working.

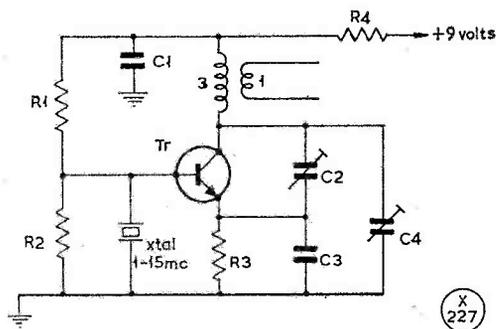


Fig. 1. Transistorised crystal oscillator suitable for the range 1-15 mc, with the xtal in the series-resonant mode and working on its fundamental. It is said that this circuit makes a very good VFO if the crystal is replaced by a .001  $\mu$ F condenser.

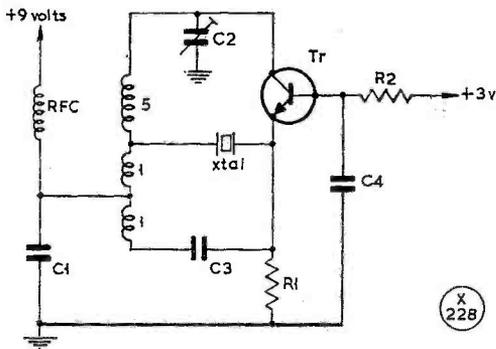


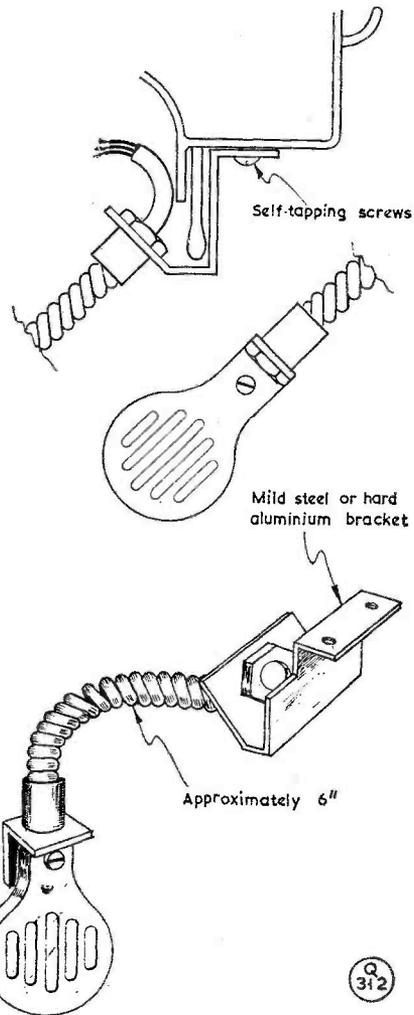
Fig. 2. This circuit is adaptable for any usually-required frequency range but is specially suitable for overtone crystals oscillating in the series-resonant mode up to 70 mc. All values are given in the text.

For the transistor, types 2N918, 2N2369, 2N3137 or MM2711 are suitable—all being n-p-n. For p-n-p transistors such as the Mullard AFY19, or the MM2712, which could also be used in the circuit of Fig. 2, it is only necessary to reverse supply polarity.

Again, inductance values depend upon the actual frequency involved, but the turns-ratio should be as indicated in Fig. 2. The 15  $\mu\mu\text{F}$  condenser C3 is to neutralise the self-capacity of crystal-in-holder; it is not critical, and probably the value suggested will be near enough.

Remaining values for Fig. 2 are: C1, C4, .01  $\mu\text{F}$ ; C2, 3-10  $\mu\mu\text{F}$ , tuning; C3, 15  $\mu\mu\text{F}$ ; R1, 1K and R2, 470 ohms. RFC is a suitable VHF type RF choke.

*Editorial Note:* This article is based on material appearing originally as a technical supplement, by G2HIF, to QAV, the news letter of the A.E.R.E. (Harwell) Amateur Radio group.



## MOBILE MICROPHONE MOUNT

### NEAT BRACKET FITTING

Having experimented with various types of suspension for a lapel microphone and having found them either cumbersome or uncomfortable the writer eventually settled for the arrangement shown in the sketch which seems to be quite practical.

The main component of the mounting is a piece of flexible tubing from an inexpensive table-lamp, which fortunately was fitted with threaded bushes. A suitable length of such tubing can be made by wrapping a heavy-gauge copper wire round a core made of lengths of solder.

Small brackets were made and fitted to the end bushes. The screw retaining the metal grille on the lapel microphone was removed and a hole drilled

right through the casing to take a 6 BA bolt.

The upper bracket was fastened to the car body-work above the middle of the door. This allows the mike to be pushed up towards the roof out of the way of direct sunlight and prevents it cooking.

G3SFV

### NOTE ON THE BOOK LIST

In every issue, we offer a wide variety of books and manuals on the subject of Amateur Radio—some specialist, and others generalised. Of the latter, the most interesting and the fastest-selling title is the *ARRL Handbook* (42s. 6d.), still the basic English-language guide to all interested in radio amateur techniques and construction. For more than 40 years, the *ARRL Handbook* has set the pace and shown the way—because it is revised and brought up-to-date every year. In the newer specialised field, we now have the *ARRL's VHF Manual*, and it only costs 21s. 6d.

## SIMPLIFIED TRANSISTOR TRANSMITTER FOR THE LF BANDS

### AERIAL COUPLING — THE T / R SWITCH RESULTS ON TEST

#### Part II

E. L. GARDINER (G6GR)

*The first part of this article appeared on pp. 403-407 of the September issue of SHORT WAVE MAGAZINE and discussed design considerations in some detail. Though the circuit (and all values) was given on p.405, September, it is repeated here as a matter of convenience, since there is a good deal of cross-referring involved.—Editor.*

OUTPUT from the AUY10 oscillator to the aerial coupling circuit is by a one-turn link winding inside the pot-core, and this is brought out to the usual Belling-Lee concentric socket CS1 so that it can be taken to a whip aerial, or any external aerial-coupling unit. An internal matching system is also provided, consisting of a tapped coil L2 wound in a similar pot-core. Tappings are brought out to a six-position selector switch S4 from the 1st, 2, 4, 8, 16 and 28th turn respectively, this being the maximum number which could be accommodated by the core with the particular wire in use. A somewhat thinner wire such as 24g. enamelled would permit an increased number of turns, and might be of some advantage when using very short aerials. The selector-arm of the switch is brought out through a .001  $\mu$ F mica blocking capacitor C4 and 0-500 mA RF thermo-ammeter, M1, to the aerial socket CS2, the condenser being there to protect the meter and coil from accidental outside voltages, such as mains wiring. The circuit is tuned by a 500  $\mu$ F variable C6, similar to that used for the tank circuit, permanently connected to the 8th turn from earth. The arrangement has proved satisfactory when loading into random lengths of wire, but any particular form of coupling circuit or Z-match favoured by the user could readily be substituted, as this section is in no way peculiar to the transmitter. The unit functions particularly well when coupled directly from the link into a centre-loaded vertical tuned aerial, similar in general construction to a mobile whip, and the additional selectivity of such an arrangement is also helpful during reception in preventing "break-through" from other bands.

#### Send-Receive Switch

The right-hand part of the circuit, which may be omitted if desired, is an experimental solid-state TR

switch. This has proved very helpful when feeding a receiver from the common aerial under portable conditions, eliminating the need for an aerial switch or relay which, in the writer's view, should be regarded as obsolescent in low-powered equipment. It consists essentially of an OC170 transistor operating as an additional RF amplifier for the receiver, and R-C coupled to the latter through socket CS3 and short length of feeder. The receiver aerial circuit acts as the tuned load for the OC170 collector and R5 is the collector feed resistor. The base of this transistor receives signals from the tank circuit of the transmitter through a protective diode D1, and an adjustable capacitor C7 of 100  $\mu$ F, to reduce coupling into the receiver when a large aerial is in use.

When the separate 9v. receiver supply is switched on by S3, and the Tx is off, the isolating diode D1 receives a forward-bias through the resistor R3 which renders it conductive. There is no voltage on the AUY10, and hence no biasing takes place through the second resistor R6 and diode D2. The OC170 receives its working base-bias through the usual network R4 and R7, so that it operates as a normal RF stage for incoming signals. The very common trouble in valve systems where noise is radiated or fed into the receiver from standing anode current in the PA does not arise, since there is no voltage on the AUY10 when the key is up, and VR3 at zero. Upon keying the transmitter, the maximum positive DC line-voltage is fed to the base of the OC170 via D2 and R6, and this cuts off the transistor completely. Simultaneously, a high positive bias is applied to D1 through the adjustable resistor VR5 considerably exceeding the negative bias present through the higher resistor R3, and D1 is therefore reverse-biased. It may be questioned whether this bias will be adequate to maintain D1 non-conducting at all times. It is sufficient under CW conditions to do so in practice, and provided that the receiver in use has an effective transient-noise suppressor, which will eliminate key clicks, and an effective AVC action, listening-through is possible with a pleasant level of side-tone.

Under AM phone conditions the TR switching is not perfect, and some noise reaches the receiver on speech peaks. The system is undoubtedly capable of further development, and indicates a useful line of attack. VR5, for example, could with advantage be returned to a higher DC voltage, but it is a matter of opinion whether this is justified under portable conditions, as it would require additional batteries. In addition to a more complete cut-off of D1, the self-capacitance of the diode could be neutralised by an anti-phase voltage taken for example from a link-winding on L1. An additional capacitor can be added to improve rejection, and may be an assistance when working with a large aerial system. Results will depend very much upon the characteristics of the receiver in use, and provided the gain control is kept down, may be quite acceptable in providing "push-to-talk" operation from the key alone when working comparatively strong signals. Under DX conditions the receiver on-off switch is

always available, and the system adequately protects the receiver from damage. For D1 a silicon diode having sufficient reverse-voltage and current rating, with good RF performance, is required. This was discussed with *Texas Instruments*, who selected their 1S44 as a suitable choice at the present power levels. The duties of D2 are less exacting, and whilst the same diode may be used, many other types such as the *Mullard OA81* will meet the case, since it is only called upon to perform DC blocking at some 30v. reverse bias.

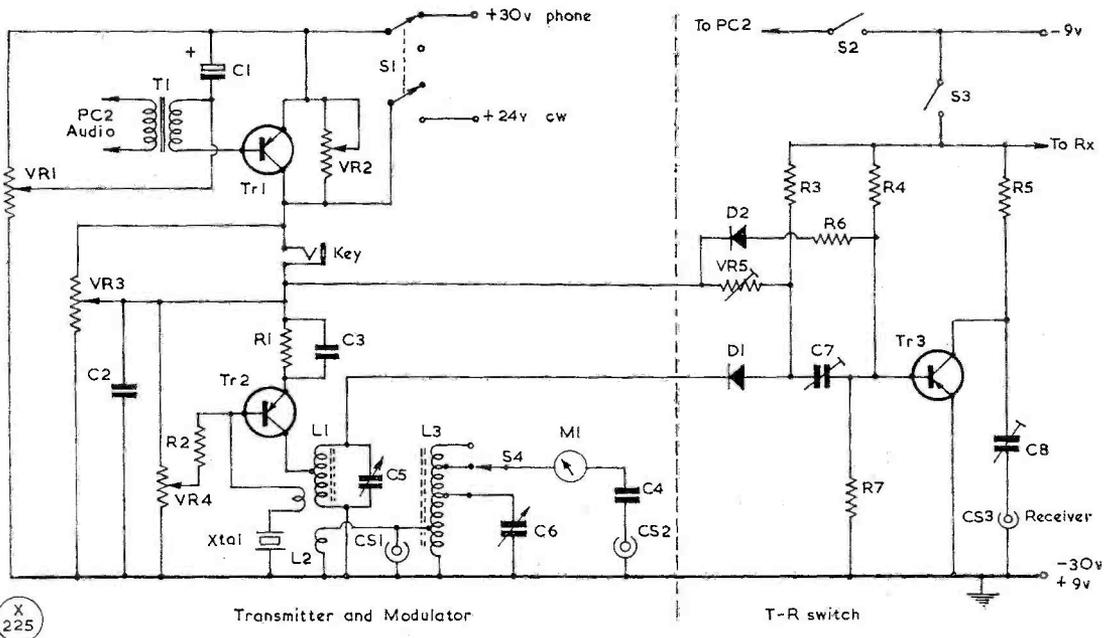
**Putting it Together**

Construction of the transmitter will not be described in any detail, since one of its most attractive features is that in the absence of buffer or multiplier stages (which could become unstable) layout is quite unimportant, and provided that a simple, direct plan giving short RF leads is chosen, screening is not necessary. In the model, the Tx side is built into an 8in. *Eddystone* die-cast box, and the parts are so closely packed together that room could be found for a ten-stage transistor receiver for Top Band and Eighty in addition. This receiver follows conventional lines, two IF stages at 300 kc, coupled by *Repanco* transformers, being used, and as many equal or better designs have been published, a full description would serve little purpose. It was incorporated so as to give a complete station in a single compact package, the only additions being a set of dry batteries, a 0-500 mA DC

meter to measure input, a key and crystal microphone, crystals, and an aerial system, in order to go on the air. With the exception of the latter item, the whole lot can be carried in a medium-sized attaché case. Frequently when they are available, separate receivers having greater refinements are used, plugged into the socket CS3. Many transistor portables will perform well in this manner, and a *Heathkit* "Mohican" has also given good service.

**Results and Experiences**

The performance of the transmitter depends to some extent upon the activity of the crystal chosen, the skill shown in erecting and matching into the aerial, and the battery voltage one is prepared to risk on the transistors! A safe and conservative choice appears to be four 7.5-volt blocks in series, giving 30 volts overall for phone operation, tapped at the 22.5v. position for CW use. On the latter setting, from 200 to 400 mA can be drawn by the AUY10, Thirty volts can safely be used on CW, when at 330 mA the input will be ten watts, and it is estimated that from three to five watts of RF will be available at link socket CS1. For telephony the nine-volt supply is switched on to the PC2 speech amplifier, and bias on the OC23 is adjusted by means of VR1 until approximately half the CW collector current is drawn by the oscillator. Initial adjustment can be arrived at with the help of an oscilloscope if this is available, when VR2 can also be advanced to the minimum necessary to prevent clipping of negative



Because there is so much cross-reference in the accompanying text to the original circuit as shown on p.405 of our September issue, the diagram is repeated here for convenience. All values were given in the table on p.405, September. For some installations, the T/R switch (to the right of the dotted line) could be omitted—but this part of the circuit by G6GR is, nevertheless, of considerable practical interest. As he explains, it is capable of further development.

peaks. Alternatively a very fair idea of performance will be given by a suitable bulb as RF load plugged into CS1. Bias is increased by VR1 until this bulb brightens up nicely on modulation, and during actual transmission the increase in aerial current will confirm that modulation remains incremental. As with all transmitters the adjustment of aerial loading plays an important part in arriving at the optimum condition.

Set up in this way, the RF output and power dissipation in the AUY10 on speech peaks will be approximately equal to the CW figure, the mean unmodulated carrier being considerably less. A typical setting might result in a collector-current of from 150 to 200 mA, at a supply voltage of 30v. Collector dissipation in the OC23 would be about 3 watts, and that of the AUY10 less than 2 watts.

Both transistors are mounted on the back wall of the aluminium box, using the mica insulating washers and fittings provided by the manufacturers. The box forms an effective heat sink, and the transistors will be barely warm to the touch, and very considerably within the manufacturers' ratings. The working conditions are clearly conservative, and no limitation is imposed by heat dissipation, but rather by maximum transient collector-voltage limits. These are given in the published schedules as -60 volts for the AUY10, and -55 volts for the OC23, or some 115 volts for the two in series. In this respect, the OC28 with a maximum of -80 volts, or the OC20 with -100 volts would be even better as series modulators, but the gain and HF response of these types is lower, and some doubt was felt if the 400 milliwatts of audio output from the PC2 module would drive them fully.

Clearly, there is considerable voltage-rating in hand, and the supply could be safely increased to well above 30v., but it is difficult to say how far this process should be carried. Since there are no iron-cored components to set up inductive transients, it would appear that the peak collector voltage on the oscillator should not rise above one-half of the supply voltage, *plus* the RF peak developed across L1, on the assumption that half the supply at least is dropped in the series modulator. In fact, since the collector is tapped down on L1, it is improbable that the RF peak could even reach the mean DC collector voltage. On this assumption the AUY10 should remain within limits at 30, or possibly 40v. emitter-to-collector, and the limiting factor would in practice be the OC23 transistor, since when this is cut-off (during negative modulation peaks) the collector-to-emitter voltage can theoretically reach the line voltage. Under this transient condition, however, no collector current is flowing, and the collector rating is a maximum at zero current. From these considerations it would seem that 60v. could be applied for telephony without exceeding the permissible ratings, either in regard to voltage or dissipation, and the transmitter would then compare favourably with any ten-watt valve version. The equipment has been operated at 40v. for considerable periods, and has been tested without mishap at 60v. input, the collector current being limited

to 400 mA; but the author cannot hold himself responsible for any unfortunate mishaps which might occur at these more ambitious operating levels!

This little transmitter would not be described had its performance over the air not been the subject of many favourable comments. Provided that the CW adjustment is monitored, and not degraded by excessive aerial loading, it has the characteristic bell-like ring of the keyed crystal oscillator. Since the modulator works effectively in Class-A, and there are few components likely to cause distortion, it is perhaps not surprising that reports of "BBC quality" are usual, and many operators have reported speech as superior to most valve transmitters. Unless artificial restricted, frequency response is in the "hi-fi" category, and there is a complete absence of mains hum and background noise.

### On Test

The transmitter was operated from Tenby on the South Wales coast, using as an aerial 80ft. of thin wire thrown from the hotel window (terminating on a rose-bush in the adjacent garden). Earth was to a "H & C" bedroom water-tap, and the site nicely in the clear. On phone, S9 reports were received from Lands End, at over 100 miles in daylight, and from most parts of South Wales, Somerset, Devon and Cornwall, and inland to Bristol and Cheltenham. On CW, results after dark were limited only by the very high levels of local noise and marine QRM. In the early mornings 80m. contact with the Midlands was nearly always reliable.

There is no significant difference in performance as between the 3.5 and 1.8 mc bands, with the exception that on 80 metres, phone signals cannot be expected to compete with the high levels of power common on that band during busy weekends. As has been mentioned, the transmitter will go on 7 mc, with the more active crystals, but the circuit as given is not intended for this band, and output tends to be somewhat lower.

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### THE DEAD-LINE & THE QTH

Correspondents are particularly asked to note that the dead-lines given for our various feature articles *must* be adhered to if they are to be included in "next month's" report. This is because *Magazine* production has to be run to a schedule—and a pretty tight one it is, too. Likewise, the only address for all such correspondence, and Editorial matters generally, is simply **Short Wave Magazine, Buckingham, England**—no other need be used. Editorial correspondence sent to our London Office (which is concerned only with the business side—circulation, subscriptions, advertising, book sales and the like) can be delayed several days before it reaches the right quarter. As this partition of working responsibilities was made in the interests of efficiency, and to improve our organisation, readers can assist considerably in making it work!

## RTTY Topics

### MORE ABOUT THE TWO-TONE TERMINAL UNIT — WORLD-WIDE RADIO T/P CONTEST, OCTOBER -- AN AUTOMATIC FREQUENCY CONTROL UNIT

W. M. BRENNAN (G3CQE)

*Having now appeared regularly every alternate month for more than four years, this feature has attained pre-eminence in the relatively restricted field of radio amateur teleprinter activity, operation and technique. Each of our distinguished contributor's offerings covers some aspect of topical RTTY interest.—Editor.*

**A**UTUMN and with the start of the indoor season there is more than just a promise of better conditions on the HF bands as the sunspot numbers slowly start to climb. Still, with the weather during our so called "Summer" there are those who would maintain that the indoor season has been with us all the time—however, these are just bitter and twisted remarks from the /P fraternity and so, adjusting the battery of sunray lamps here, let's see what's on the brighter side.

G3LLV is one correspondent who is certainly not likely to require any additional UV treatment this winter since he has just taken up an appointment in Malawi for an initial period of two years. Unfortunately, this also means that the British Amateur Teleprinter Group has lost its secretary and the U.K. a very active RTTY operator. But G3LLV writes to say that a KW-2000 was shipped out ahead of him and following hot on his heels is a consignment of RTTY gear which includes a Teletype Model 15 and a Kleinsmidt Reperf/Auto-Tx, etc. This should arrive in Malawi in November and so we can expect to hear a new 7Q7 station on the air and a new RTTY country before Christmas.

From hot to cold—G2FUD reports that OX3SL (Greenland) has RTTY gear and has promised to be active on 80, 40 and 20m. by the time you read this.

#### RTTY World-Wide Sweepstake Contest

This is without doubt the most popular event of the year for radio T/P operators and one which gives all RTTY stations the chance of operating during a period of extremely high activity and perhaps collecting some new countries. It is also one of the most effective ways of discovering any inherent weaknesses in the gear since anything that is liable to snap or dissolve in a cloud of smoke will almost

certainly do so right in the middle of the party!

The rules are the same as for last year's event and briefly are as follows:—

- (1) The Contest Period will be from **0200 GMT 16 to 0200 GMT 18 October 1965**,
- (2) The Contest will take place in the 3·5, 7, 14, 21 and 28 mc bands,
- (3) Country status will be in accordance with the A.R.R.L. list except that KH6, VO and KL7 will count as additional countries.
- (4) To complete a QSO stations must exchange (A) Message Number, (B) Report (RST), (C) Time in GMT, (D) State or Country.
- (5) Stations outside of North and South America score 10 points for each QSO and for each country worked (not including their own) a further 200 points.
- (6) Stations may be printed only once on each band. Each country can be claimed once on each band but North American States may be claimed only once,
- (7) The final score is the number of contact points earned, multiplied by the number of States worked, plus the number of Country points earned, multiplied by the number of continents worked. For example:
 

(a) 20 QSO's x 10 x 5 States =	1,000
(b) 16 countries x 200 x 3 continents	= 9,600
Add the two totals for the	-----
final score	= 10,600
- (8) Logs should be sent to: RTTY Inc., 372 West Warren Way, Arcadia, California, 91007, U.S.A.

If you have ever complained about lack of RTTY activity, you should just tune the Rx over 14,090 kc during either afternoon of the Contest and see how many different layers of RTTY stations you can dig down through. Six is average, nine is quite good—and eleven excellent!

#### Two-Tone Terminal Unit Again

The unit described in this feature for August has stirred up much interest and several readers say that they have built it with variations, whilst others have queried the availability of some of the components. To set the record straight, there was just one drawing error and an obvious one at that. The resistor immediately above VR1 and R13, on p.346, should have been shown as R14. Since there was already another "R1" this proved to be only a minor detail. The channel balancing potentiometer VR1 was originally specified as a one megohm one and the writer's version actually made use of a 250K pot. that was to hand. However, an even lower value

(100 or 50K) improves the performance of the unit and it is worthwhile modifying the circuit for this. Some readers were at a loss to know where they could obtain the two small neons. A suitable type is available from *Radiospares* and therefore should be obtainable to order through most radio dealers. Others were worried about not being able to find four matched diodes, and these would certainly take a great deal of sorting out even if one had access to a large enough stock. However there is no need to use matched diodes (they weren't specified, anyway) since there is an input balancing control in the T.U. and to a certain extent the circuit is self-balancing. Several constructors have used ordinary thermionic diodes of the 6AL5 variety.

Reader A. C. Blake of London used EB91 diodes and built his version on a chassis and not a printed circuit board. He found that a single EL86 could be used in place of the two parallel EL84's for the keyer stage. This still produced a comfortable 60 mA for his Lorenze T/P. As he had been running the well-known FSY/FSR commercial type of T.U., his remarks may be of interest to other owners of that equipment who wonder if there is really anything to be gained from the two-tone limiterless circuitry. His comments on the performance of his new T.U. are: "I was amazed at the results obtained with this unit. It is far and away the best T.U. I have ever come across. I can now run my receiver—a new AR88—and the T/P for an hour or more on a commercial without a misprint and what a joy it is to hear the T/P running rhythmically for long periods." He adds that he now has new heart to start winking out the elusive RTTY DX. Since SWL Blake had had experience with the CFS TU and a German commercial unit, too, he is in a position to make a few comparisons.

#### The A.V. DX Contest

This was recently put on by the "SSB and RTTY Club of Como, Italy." It seems it was quite well supported in spite of the fact that it was a new Contest and was first announced rather too close to the actual activity date to allow of much advance publicity. The organisers have done a first-class follow-up job by compiling a ten-page information hand-out about results and so forth and sending it to most of the interested organisations. A report was given in the "Communication and DX News" feature in September *SHORT WAVE MAGAZINE* (p.424), so need not be repeated here. However, apart from the actual scores and placings, the contest organisers also give quite a comprehensive breakdown on the number of stations, by countries and bands used, and include the comments of the contestants. In general, these were enthusiastic about the Contest but a general complaint was the lack of any Asian activity for the event. This could have been because the few Asian RTTY stations were ignorant of the fact that a contest was on. Several radio T/P operators suggested changes in the rules and fifty of them, accordingly, were asked for their ideas. Boiled down, the replies indicate that RTTY'ers no

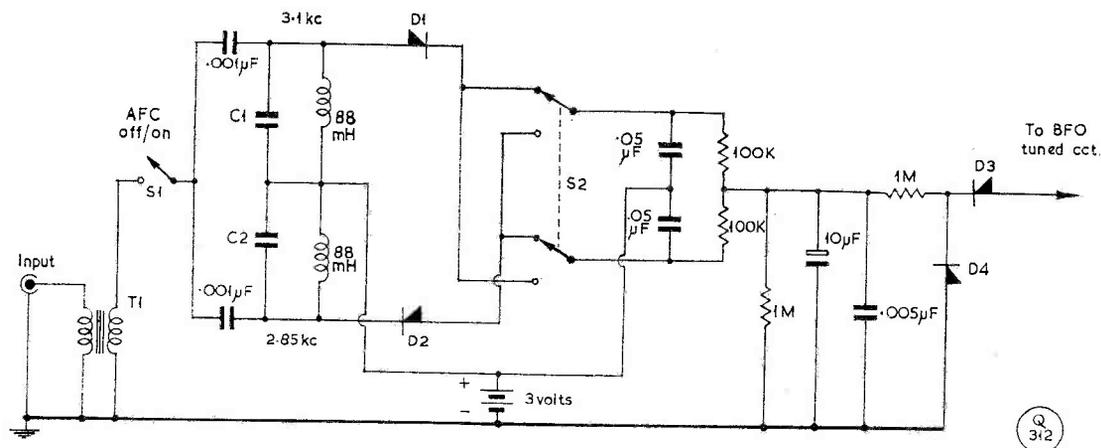
longer regard North America as being the only area where a large number of radio T/P stations are located and that Europe now has a fair share, thus giving Europeans an unfair advantage over stations in other continents which have only the same scoring value as Europeans with none of the advantages of having a reasonably high RTTY population in the local area.

Also, European RTTY'ers have the advantage over the North Americans who, although having a high RTTY population, are penalised for it by being given a lower scoring rate in RTTY contests. Though there has never been any request for preferential scoring rates from stations in Asia or Australasia there is certainly quite a case for it. Since the aim of these contests is (a) to promote RTTY activity, and (b) give everyone a reasonable chance of winning, it looks as if the rules of all three major contests may be changed for next year and that the World-Wide S.S. Contest this month may well be the last in which European stations will have it "quite so good"!

#### Automatic Frequency Control Unit

One of the advantages of RTTY is that given reasonable reception conditions the operator at the receiving end should be able to leave the gear to get on with the job of printing by itself, so that he is free to go for a cup of cheer, or get on with some building. The RTTY bulletins transmitted by BARTG on Sunday mornings, and also the well-known VERON bulletin, are examples of quite lengthy radio T/P transmissions that take place at times when the operator may well wish to be wanting to do other things "while the story unfolds." Although PAØAA is crystal-controlled other stations are not, and over the 20-30 minute period involved the Rx at the receiving end and the Tx at the other end may drift away from one another, and more than one T/P owner has left the shack only to return to find thirty or forty words crowded into that last little one-eighth of an inch at the end of a line. At such times, a small AFC unit comes in useful. Also, of course, on two metres these days there is increasing use of FSK for RTTY instead of AFSK. Although FSK is far superior as a means of communication, it is much more demanding in terms of frequency stability in both Tx and Rx. The xtal controlled transmitter for two metres usually starts with an LF crystal so that even a small amount of drift can become a serious matter when it is multiplied perhaps 18 times to achieve the final working frequency. The same applies to the receiving converter which more often than not has local oscillator injection from a xtal operating on its third or fifth overtone. On two metres, particularly, where there is very little QRM under normal conditions, some form of AFC is extremely useful.

The unit shown in the diagram will, if correctly installed, hold the receiver BFO in tune with the "mark" component of an incoming RTTY signal so that a 2975 c/s audio frequency is always produced at the receiver output for the "mark" signal. The



An Automatic Frequency Control unit which can be added to receivers used for T/P reception, to maintain accurate tuning of an RTTY signal which may be drifting in frequency. D1, D2 can be OA81's, or equivalent. The function of D3, D4 is discussed in the text, as are the values of C1 and C2.

actual amount of drift that the unit can correct depends upon the capacity change per volt of the diodes D3 and D4 in relation to the BFO tank circuit capacity and is finally limited by the receiver selectivity.

The operation of the circuit is quite straightforward. An AF feed is taken from the output of the receiver in parallel with the normal feed to the Terminal Unit. If possible, the feed should be taken from a point in the circuit immediately after any input bandpass filter in use. T1 is a step-up transformer and its ratio is not critical; anything between 1:5 and 1:20 will do. The AF signal is passed via S1 to the two tuned circuits comprising C1, C2 and the two 88 mH coils, the latter being the usual telephone line loading coils. The two tuned circuits form part of a Travis discriminator circuit with peaks at 125 c/s above and below the maintained freq. of 2975 c/s. C1 is chosen to resonate at 3.1 kc with one coil, and C2 at 2850 c/s with the other. With this type of discriminator the DC output at the junction of the two 100K resistors will be zero when the input frequency is at 2975 c/s. At frequencies above or below the centre-frequency there will be a positive or negative output depending upon the position of the reversing switch, S2. This "centre error voltage" is used to control the action of two silicon variable capacitance diodes D3 and D4 which in turn control the frequency of the BFO tuned circuit. The components placed between the diode loads for D1 and D2 and the control diodes D3 and D4 are for AF decoupling and time-delay purposes. The function of the latter is to maintain the control voltage during the relatively short periods when the incoming signal is a "space" and no "mark" is present.

The two variable capacity diodes D3 and D4 are placed in series across the receiver BFO circuit because in this way they represent little loading on the oscillatory circuit. One diode is sometimes used

but it does clip the tank circuit voltage and can result in the BFO ceasing to oscillate. The series diodes overcome this difficulty.

### Capacity Diodes

To some readers capacitance diodes may be something of a mystery—however, simply they are diodes the internal capacity of which varies in response to a reverse bias voltage applied across them. All silicon *p-n* junction diodes show this effect and the writer has used a pair of ordinary 400v. p.i.v. silicon diodes for D3 and D4. Specially manufactured devices usually have closely controlled characteristics, including a more linear capacity/volt curve. They cost no more than normal silicon diodes. Two suitable types are *Brush Semiconductors* Type BA111 and BA112.

The necessary reverse bias voltage is supplied by the 3-volt battery shown; the current taken from it is negligible and it may be left in circuit.

The success of this AFC unit lies not so much in the construction of the unit itself as in the care with which it is included in the receiver BFO circuitry. Some readers may not like to modify an expensive receiver—in which case there is no reason why they should not build a complete BFO as part of this unit, merely removing the existing BFO valve and coupling the output of the new unit into that valve base.

When connecting the AFC unit to an existing BFO tank circuit there are a few points that must be borne in mind, the first being that any leads carrying RF (because they are part of an oscillator tank circuit) should be kept not only short but rigid. The D3 and D4 diodes can be mounted actually adjacent to the tank components and connected in by screened cable. Adding the two diodes to the circuit means that two capacities in series have

been connected across the original tuning components and some of the original capacity or inductance will have to be removed to bring the BFO operating frequency back to normal. The BA111 diode has a capacity of about 60  $\mu\mu\text{F}$  at the 3v. reverse bias used, and the two diodes being in series, this represents some 30  $\mu\mu\text{F}$  that is being added. The BA112 diodes will introduce a total of 57  $\mu\mu\text{F}$ . The BA111 diode gives a capacitance change of 5.5  $\mu\mu\text{F}$  per volt but again there being two in series this is an effective change of only 2.75  $\mu\mu\text{F}$ /volt. The two BA112's in series give an effective 7  $\mu\mu\text{F}$ /volt change. As to which type is best depends really upon the receiver BFO tank circuit L/C ratio and at what actual frequency the BFO operates. In general, for receivers with IF's in the 455 kc region the BA112 will probably be best.

### Operating the AFC Unit

Putting the device into operation is quite simple once the BFO frequency has been restored to within a kilocycle or so of its normal frequency. With the switch S1 broken, tune in a carrier on the receiver and switch the BFO on, adjusting it to give 2975 c/s in the T.U. Next, switch in the AFC by making S1 and if all is well this should produce *no* change of note. Then slightly tune off the receiver and listen for any change in the AF tone. If there is a momentary change of note which immediately corrects back to the original note—you are in business. If, however, the note jumps and then

becomes quite unstable, the control voltage is reversed and the switch S2 should be moved to its other position—and all should then be well.

The unit is well worth adding to the receiving set-up and although, of course, a very strong interfering signal may quite well take over the AFC at times — which is why a disabling switch is included!—the AFC can be left in circuit much more often than not even on the crowded HF bands. On VHF, S1 is only used to disable the AFC whilst tuning in some FSK. All signals should be tuned in the the AFC unit *off* since it will correct for signals that are not properly centred in the pass-band of the receiver and later drift may shift these right out of the passband.

### In Conclusion

Finally, the regular plea for all—including those not interested in contests (!)—to put in a few hours' operating during the 16th-18th Uprising. Contests are chiefly put on to encourage activity and activity encourages those who give up some of their spare time to organise these events. See you?

Oh yes, before rising to set about tea-proofing the PA (it has been spilt on again) your scribe would be obliged if anyone who sees a T/P with G6QB and a Mini attached would photograph the apparition and mail the result to "RTTY Topics" post haste. No doubt there will also be a prize for the first ten correct solutions opened! Figs. "U E." May see you at the Exhibition? 73 de G3CQE.

### SCOUT INTERNATIONAL EVENT

The 8th Annual Jamboree-on-the-Air, for Scouts and Scout Groups all over the world, as well as for those interested in the Scout movement, will take place during the weekend October 16-17, on all bands 10-80 metres, AM/CW/SSB. It is expected that operation will be mainly on 20-40-80m., and as far as possible on or near the following spot frequencies (for Scout stations): 14020 (CW), 14130 and 14310 kc (SSB); 7020 (CW), 7190 and 7290 kc (SSB); and 3510 (CW), 3790 and 3805 kc (SSB). As in previous years, the international control station will be VE3WSB, Ottawa, on the air continuously and working probably three or four bands simultaneously, depending on conditions and activity. If the 10-15m. bands open, the spot frequencies will be 28.49 and 28.51 mc, and 21.19 and 21.35 mc.

Those AT-station operators, not only in the U.K. but anywhere in the world, in a position to entertain local Scout parties to show them the workings of an amateur station—and perhaps to contact VE3WSB as well as other Scout stations—should get in touch with the local District Commissioner or Scout leader. The usual U.K. licence condition must, of course, be observed, *i.e.*, that only a visitor who is a licensed amateur may actually operate. The national organiser for the U.K. is G3BHK, *QTHR*.



The farthest west radio amateur in the U.K. is GM3IGY, Lieut. W. Dellar, stationed with the Royal Artillery at the rocket range on the Island of Benbecula, Outer Hebrides. GM3IGY is second from right in this picture, with his wife and daughter, and the wife of G5UM, who took the picture. GM3IGY (home QTH Nazeing, Essex) has also been VK5DK. His nearest amateur neighbour is now 70 miles away, so operation is mainly on bands to give penetration well into the U.K. and Europe. Top Band is worked most Friday evenings from 2200z, when he can be found on CW at the low end.

More than 80% of U.K. licensed amateurs are regular readers of "Short Wave Magazine"

## INTRUDERS IN THE AMATEUR BANDS

WITH SPECIAL REFERENCE  
TO TWENTY METRES

N. A. S. FITCH (G3FPK)

*This is a useful and thought-provoking discussion on a situation that affects all AT-station operators, and has often been commented on in this Magazine and the radio amateur press generally. Our contributor reaches conclusions and makes suggestions with which we are in entire agreement.—Editor.*

**R**EGULAR users of 15 and 20 metres will be aware of the increasing number of non-amateur stations now occupying those bands. In daylight hours, especially during weekdays, the top 50 kc, of 20 metres is so full of RTTY and CW intruders that it is quite rare to find an amateur QSO in progress. The purpose of this article is to examine the problem and suggest ways to combat these intruders.

### Reasons for the Situation

There is an increasing demand for more frequencies from press organisations, telephone companies and broadcasting authorities. The latter want frequencies to dispense political propaganda and to "Project the image" to a world which probably couldn't care less, anyway. Very often, these high power broadcasting stations attract even louder jammers. These factors have caused some communications networks to creep into the amateur bands where the interference is less severe.

### Present use of Frequencies

For the present, the great majority of the world's radio communication system occupy the 2-30 mc area of the spectrum and utilise the various reflecting layers that exist above the Earth. In the next decade, more and more long-distance circuits *via* orbiting satellite networks will be established, thus relieving the LF a little. In Region I, 2.9 mc, just over 10 per cent of this part of the spectrum, is allocated to the Amateur Service, 2.4 mc exclusively as agreed at the 1959 Geneva conference. No wonder so many interests cast such greedy eyes at us. It should be obvious that we must fully occupy the 10-80m. bands more effectively than we do at present, so that we have a strong case for retaining them when the next "Geneva" occurs.

The 80m. band in Region I is shared with fixed and mobile services which have as much right to be there as we have. Therefore, it is an infringement of the British licence to interfere deliberately with non-amateur stations. In the 40m. band, however,

7.0-7.1 mc, was allocated exclusively to amateurs at the Geneva Conference. As everyone knows, several high-power broadcasters use this area—some operated by countries which did not even attend the conference. Periodic complaints to the Governments concerned are made but meet with little response. It seems that we shall have to get along as best we can on 40m.

The 20m. band was agreed to be exclusively amateur by all the 80 countries which signed the Geneva agreement, the U.S.S.R. only requiring to use the portion 14.25-14.35 mc, for their internal, fixed services. However, a lot of RTTY and CW stations are appearing on 20m. which are not amateur signals. In some cases, these are from countries which did sign the agreement. A specific example is the station "TCQ" which Turkey operates regularly on 14,200 kc.

The minimum of the present sunspot cycle having passed, the 15m. band is often open to several parts of the world. It is not used as much as it could be for North-South QSO's, for example, and it is only common sense to use this band more often to relieve the congestion on 20m. Because of the low occupancy of the 15m. band by amateurs, who own it, there are already some commercial RTTY stations illegally operating all day and this trend is bound to increase.

After a period in the doldrums, the 10m. band is now opening frequently and some recent reports have listed 50 countries heard during a weekend. This band is 1.7 mc, wide and exclusively for amateurs. Even so, European activity seems to be concentrated in a small section from 28.3-28.6 mc. As the sunspot numbers increase during the next few years, it will be surprising if a few commercials do not encroach into this band, too, if we do not make fuller use of it.

### Who are the Intruders?

The non-amateur signals detected in the 15 and 20m. bands fall into several categories. The first can be readily dismissed since they are not there at all but are generated by the receiving equipment itself. This may be due to poor image response, second channel interference, cross modulation effects, overloading of the "front end" and internal beats from BFO's, VFO's, etc.

The second category is due to the harmonics of broadcast—and their attendant jammer—stations operating in the 40m. band. By international agreement, harmonic radiation has to be kept down to certain limits and usually this sort of trouble should be a local effect. This happens to the writer when operating at 3AØBT in the Principality of Monaco, the second and third harmonics of the Radio Monte-Carlo station on 7,135 kc making reception impossible on 14,270 and 21,405 kc.

The third category comprises signals which are generated as the result of operating two high power stations on similar frequencies from one transmitting site, a prime example of which can often be found on 21,390 kc. Sometimes it can be received as an ordinary broadcast signal but at other times with two

separate programmes on one carrier. The method of generation of this spurious signal is as follows:— When the BBC is operating stations simultaneously from one site, usually Rampisham, on 21,550 and 21,470 kc, a difference of 80 kc, a signal can always be detected on  $21,470+80=21,550$  kc. As soon as either transmitter is shut down the spurious signal disappears. When both transmitters are carrying the same programme, only one normal-sounding signal is received, but when they carry different transmissions, two apparent programmes are received from one station. The remedy is the obvious one of not transmitting on similar frequencies from the same site. This suggestion has been put to the Corporation in the past and at first it denied that the spurious could occur in the manner described. It suggested faulty receivers but the signal had been carefully monitored on a 75S-3, Drake 2B, KWM-2, SB-300, Heath "Mohawk" SX-117, Courier CTR-1 and others. As conclusive evidence, complaints of this spurious signal have been received from many sources outside the U.K.

So much for the signals detected but which are not being deliberately transmitted in the amateur bands. We now come to those which really are in our exclusive bands. The first category of these is those casual CW and RTTY stations which inhabit the top part of the 20m. in daylight hours. These intruders do not use the same channel always as does the notorious Peking propaganda machine on 14,335 kc. Usually, these stations send endless code groups of five figures, rather like weather reports. Almost all these stations seem to be VFO-controlled and some have, squelchy, T5 notes. One MCW signal recently logged had "birdies" every 10 kc and at least thirty signals were counted. Obviously a humble disciple of G9BF.

Examination of the copy received from this kind of intruder suggests they are probably some sort of trainee set-up since the sending and procedure is rather sloppy and the operators exhibit near panic when any QRM comes up. These casuals sometimes give calls such as REW, OMZ, PEN, NCY, although these could be some weird abbreviations. Generally, these stations are nowhere near as potent as Peking and can often be driven quickly out of the band. One that the writer recently caused considerable trouble told its mate to "QSY to 12,572" and it is obvious that they know they have no right to be in our band.

The last of these intruder groups are the biggest headache and are the regular pirates such as Peking and "TCQ," both of which churn away practically all day. TCQ often transmits a sort of composite signal which sounds a real mess of jingle bells. These stations are very high power by amateur standards and it is difficult to carry on anything other than a local, high field strength QSO on the frequencies they have commandeered.

Generally, the intruders in the 20m. band originate between East and North East, whilst all the ones so far detected in the 15m. band peak in the direction of Africa.

### What Action can Amateurs Take ?

One of the main reasons why these intruders continually and brazenly operate in our exclusive bands is because as amateurs we usually give way to them. They seem quite sure that if they start transmitting in our bands the amateurs will steer clear of them. Logically, if we continue to "chicken out" this way, we stand a good chance of being driven off parts of our own bands. This is fast becoming the situation at times in the 14,300-14,350 kc area of 20m. There is a well-known adage that attack is the best form of defence and it is now essential for all amateurs to take aggressive action to rid our exclusive bands of these pirates. This must be a concerted and sustained effort.

As far as the British Post Office is concerned, the 20m. and 15m. bands are allocated exclusively to the Amateur Service. There is no question of its being an infringement of our licence conditions to interfere deliberately with non-amateur intruders, illegally occupying the band. If the U.S.S.R. alone wants to use part of the 20m. band for its own internal services then it cannot expect any amateurs, apart possibly from its own, to give these services any priority.

Most of the traffic passed by the intruders is in the form of code groups which must be received 100 per cent correctly. Consequently, a clear channel is essential for them. Therefore it is up to us to deny them this luxury on all possible occasions. Do not think that because your signal is relatively weak whilst the intruder's is very strong that you will not cause interference. Remember that it is the *receiving* station which will have to cope with any QRM and that under certain short-skip conditions, amateur signals can be extremely strong. Interference above a certain level relative to the wanted signal will cause mistakes in RTTY copy. This necessitates repeats which take time and are a nuisance to the transmitting station. If the interference you cause is too severe, the stations will have to close down, wait for you to finish or QSY to their allocated channels.

Usually, the regular RTTY intruders communicate with other stations on different frequencies (cross-frequency operation) probably outside the amateur bands. The casual CW and RTTY stations, which are generally weaker than the regulars, often do hold QSO's on one frequency and seem to "listen through." As soon as interference crops up they stop sending and either wait for it to subside or QSY. Typical procedure is then to send a string of dots on the bug key whilst sliding up the band so that the other station can follow. Three can play this game, of course, and it is not difficult to chase these pirates right out of the band.

All regular users of the 20m. band should get into the habit of deliberately holding QSO's on frequencies being illegally used by non-amateur stations. Naturally, it is more pleasant to conduct a QSO on a clear channel, but it is more useful to put up with some QRM and annoy the intruders. Aggressive action of this kind will certainly discourage some of the present pirates from continuing to use the band, but it is too much to expect that the situation will be

transformed overnight by adopting these tactics.

### Frequencies of the Intruders

At least fifteen RTTY stations regularly use part of the 20m. band. When not passing traffic, they idle away just to hold the channel. The frequencies of these stations are:— 14,175; 14,182; 14,191; 14,200; 14,256; 14,271; 14,289; 14,296; 14,301; 14,305; 14,309; 14,314; 14,321; 14,328; 14,335 and 14,346 kc. The origins of those on 14,200 and 14,335 kc are known but information on the identity of the others is sought. Amateurs with RTTY reception facilities can help with this although some of the intruders use shifts and speeds not used by amateurs.

### What Other Action can be Taken?

Before anything can be done officially about an intruder, a complaint has to be made by the legal user of a frequency to his country's Government department dealing with telecommunications matters. In Britain, the Post Office is not obliged to make complaints of interference to the amateur service if its own monitoring stations hear foreign intruders in the exclusive amateur bands. If we suffer in silence and do not complain, then the situation will only worsen. It is no use moaning, "Why don't 'they' do something about these intruders?" If we, as a body, do not report illegal stations, then "they" can take no action through the proper channels.

Various national societies have set up intruder watch committees and full use must be made of these. However, it is important that these reports are acted upon and not filed away and forgotten. This is always a danger when someone does this chore on a voluntary basis. Everyone can help in reporting intruders and it is not necessary to spend hours monitoring. The writer only has time at weekends to listen for the occasional hour or two but even so, a pattern of the operating habits of many of the intruders on 20m. is evolving. Reports from people on shift work, or those who have retired will be very useful as they can listen during the time when most people are at work.

Reports should show date, time in GMT, frequency, type of signal, e.g. RTTY/CW/BCI harmonic, etc., any positive identification, "copy" from an RTTY station where possible, beam direction and signal strength relative to Peking on 14,335 kc, for example. It is essential to give details of your receiving station. Information required is number of RF stages, whether crystal controlled "front end," intermediate frequencies, VFO tuning range, and frequencies of all heterodyne oscillators. Brief details of the aerial system would be helpful.

### Conclusion

It is hoped that the ideas suggested in this article will be widely adopted and discussed on the air, at Club meetings and in Amateur Radio magazines. The assistance of stations licensed to run high power and with good aerial systems is essential if this plan is to

succeed. In this connection, a lot of criticism is often made of American stations which run high power. The writer feels that we owe these stations a debt of gratitude because it is most noticeable that, as soon as the 20m. band gets really full with loud W/K signals, the lower power intruders vanish—proof that they cannot cope with the QRM.

To summarise:—

- 1 When testing or calling "CQ" *always* choose a frequency occupied by an intruder,
- 2 If an intruder should appear during a QSO, *do not* QSY unless the interference is paralysing. Remember always that radio amateurs have every right by international agreement to use the 10, 15 and 20m. bands exclusively, whereas the pirates have no right to be there at all,
- 3 If you happen upon a non-amateur CW QSO on one frequency, break in and tell them to QSY out of the amateur band. If they do not, then call "CQ" on the frequency yourself.

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### ANOTHER FAIR DEFINITION

*Query:* What the heck does the Editor do?  
*Answer:* He takes all the blame if the slightest thing goes wrong—but gets none of the credit when everything goes right.

### BIG SUCCESS STORY

It is hardly for us to make a song-and-dance about how the Readers' Small Advertisement section in SHORT WAVE MAGAZINE is going—but the fact is that if you have anything worth anyone else's while to sell, exchange or buy, it is through our Readers' Smalls that you will find the readiest market. For years now, we have been carrying far more small advertising in the strictly Amateur Radio field than any other periodical. Every month, £1000's worth of equipment changes hands, and in most cases the notice costs an individual advertiser less than ten shillings. While we do not, and certainly would not, guarantee a profitable response, what we do say is that if you have anything worth selling at a reasonable price—and this excludes weary junk items only fit to be ditched or given away—you cannot go far wrong by chancing a small advertisement in SHORT WAVE MAGAZINE. The cost is only 3d. a word, with a minimum charge of five shilling. Draft your notice carefully, using the accepted abbreviations, and send it, with remittance, to: Small Advertisement Section, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1. Receipt will be acknowledged, and the month of publication notified. (This is because we only have so-much space available for Small Advertisements, and as there is a carry-over of at least 40 from month to month, it means that yours should be sent in as soon as possible.)

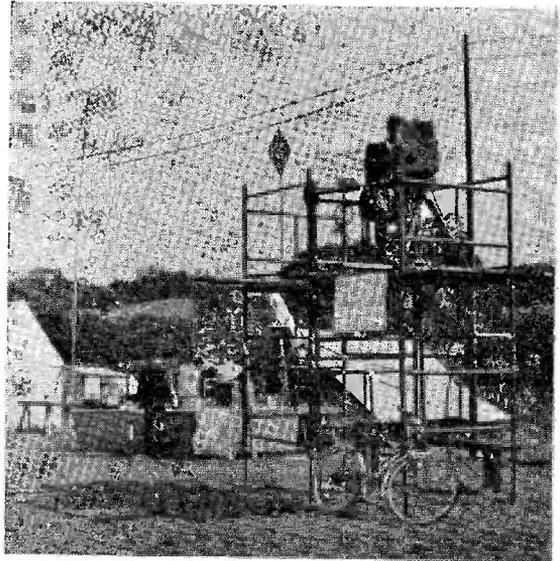
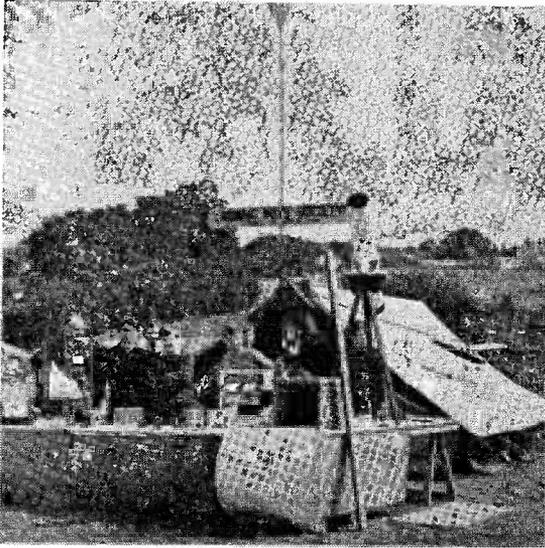
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*"Short Wave Magazine" covers the whole field of Amateur Radio, has been established for nearly 30 years, is independent and unsubsidised, and circulates in 80 countries outside the U.K.*

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## • • • The Mobile Scene • • •

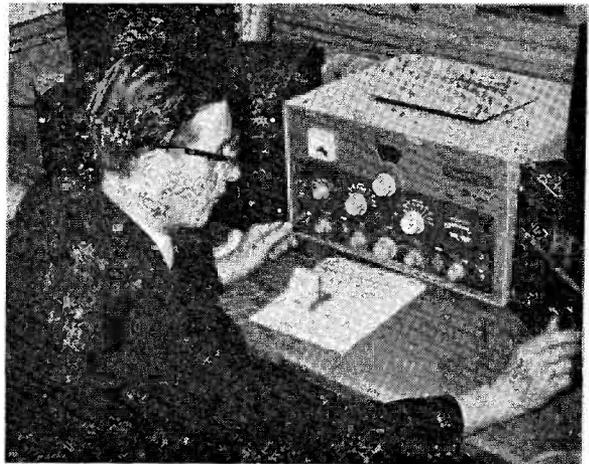
SOME RECENT RALLY EVENTS  
REPORTED IN PICTURES



At left, the stand of the very active Roding Boys' Society, who had their own display for the Harlow two-day event at the end of August. On right, the amateur TV set-up provided by the British Amateur Television club, represented by G6ABA/T and G6OUH/T, working closed-circuit round the grounds.

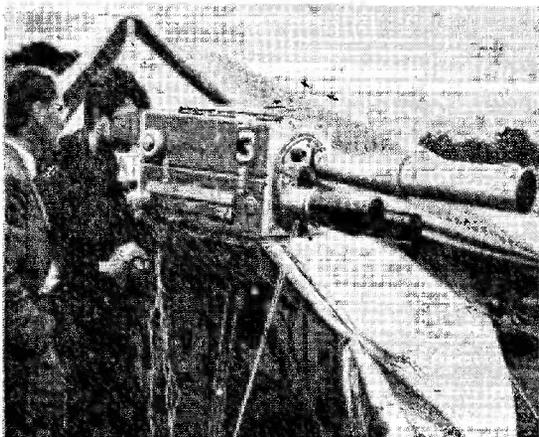


QSL card used by the Wessex Amateur Radio Group in connection with British Aircraft Corporation Fete and Mobile Rally at Hurn Airport, Bournemouth, on September 5. This was essentially a B.A.C. "family event," 16 /M's being the final count—but there was a large attendance of the public, many of whom visited the radio tent, with a good display of amateur-band equipment and a big-scale wall map showing the QTH of every local amateur known to be active.



Mobiles on 80m. approaching Denbury Camp for the Torbay Rally were worked by G3PYZ (club callsign of the Junior Leaders' Regt., Royal Signals), operated by G3SNU. The Tx is a Heathkit DX-100U and the Rx an AR88.

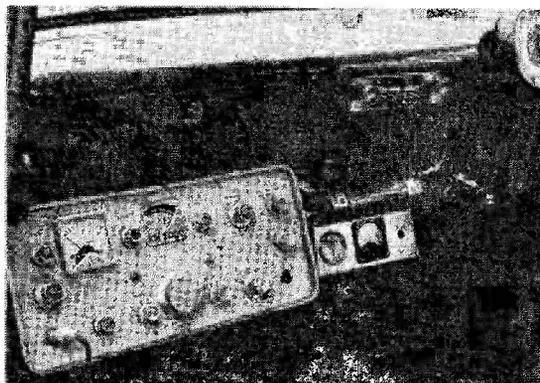
A G3GMN print.



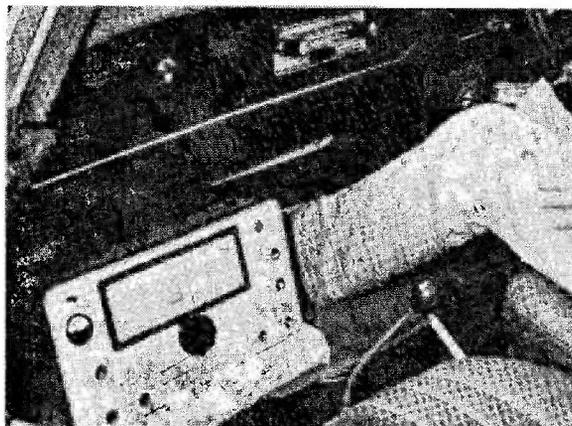
At the Peterborough Mobile Rally on August 30, G6REH/T was in action with his amateur TV camera. At left, G3POX/DL2OX. A G3GMN print.



Probably unique—the “mobile” rig contrived by 16-year old Vic Mallows, GW3TSM, of Swansea, consisting of a small 160m. Tx, a transistor converter for Top Band reception, with power from a car battery, and a loaded whip with a detachable top section. The wire-mesh frame near ground level is to provide the necessary capacity to earth for correct quarter-wave operation of the aerial. Under actual “mobile” conditions, the vehicle is propelled by a small boy, flogged on by GW3TSM while he operates! It is proposed to prowls this rig round the Gower Coast of Wales during the winter as a /P,/M station on 160 metres—so look out for GW3TSM—this will be it!

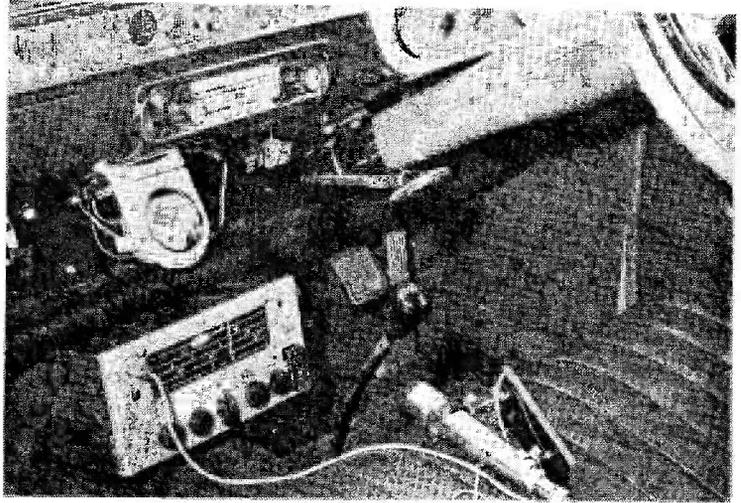


G3POX/DL2OX runs a KW-2000 for 80/160m. mobile working. A G3GMN print.



A transceiver capable of USB/LSB operation on 20-40-80m., running 100 watts, and using an HF filter-type exciter. It is owned by G3IWV/M and the car is a Renault Gordini Sports—seen at Longleat. A G3GMN print.

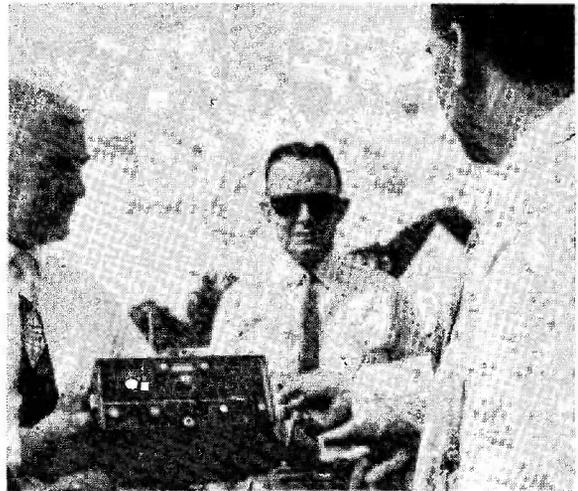
G3COE/M (Williton, Som.) has a two-band (2m./160m.) transceiver for mobile operation. It is home-built and gives very good results on both bands. G3COE is, of course, our regular feature contributor on RTTY matters. *A G3GMN print.*



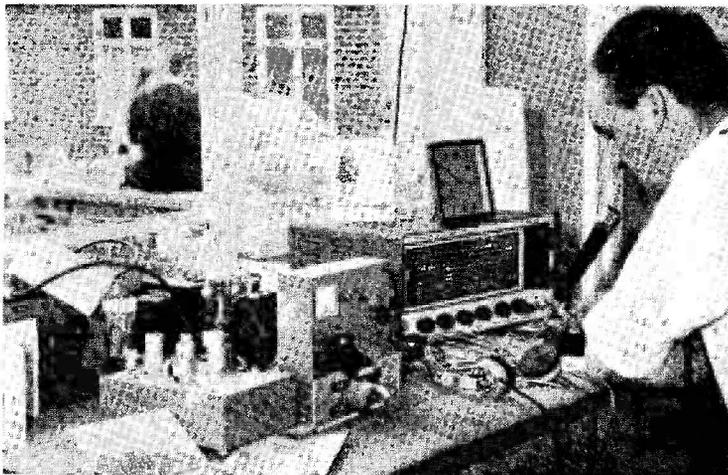
General view of the visitors' park for the Peterborough Rally, for which they had 150 visitors in 50 cars. One of the scheduled events was a treasure hunt run over a circuit of about 30 miles; it took some competitors more than two hours to get round this, and one never returned at all! *A G3GMN print.*

Seen at Longleat Mobile Rally: G3MOE/M, left, discussing his new S.B.E. transistorised transceiver with G2FYT (centre) and G3CHW (right)

*A G3GMN print.*

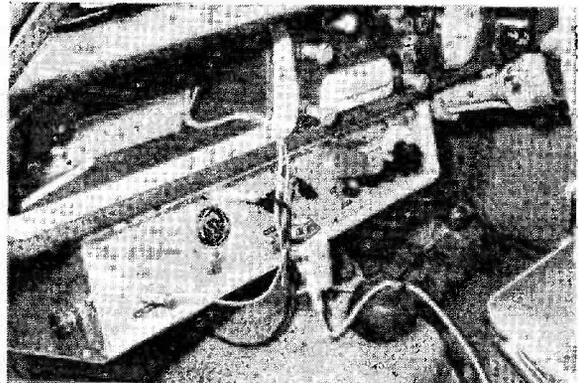


Impression of one of the four parking spaces for the Derby & District Amateur Radio Club Mobile Rally, for which they had a very large attendance, estimated in thousands, with more than 400 cars in the parks by 3.30 p.m. G3ERD/A, the 160m. control station, worked about 90 mobiles. Many attractions and activities are always laid on for this Rally, the eighth in Derby's series and now established as one of the principal mobile gatherings of the year.



The two-metre control station for the Derby Mobile Rally on August 15 signed G2DJ/A, here seen operated by G3TOV. No less than 35 /M's were worked by G2DJ/A.  
*A G3GMN print.*

Interesting mobile installation shown by G2BCX/M at the Peterborough Rally. He has an all-transistor Tx/Rx for Top Band, running 10 watts to a 2N1907 transistor in the PA. *A G3GMN print.*



## Miscellany

### SOME IDEA OF WHAT THE WORLD OUTSIDE IS SAYING AND DOING

A few opinions on operating practice, all from letters in the August issue of *QST*: "Surely there must be many ways to express ourselves without falling back on the weary bone-dry clichés that have become our verbal stock-in-trade in Amateur Radio" (*KOTYO*) . . . "With conditions as they are today, there should be an absolute minimum of CQ'ing . . . the constant din of CQ'ers is a factor which is gradually keeping DX stations off the American phone bands" (*W4NJF*) . . . "It is ridiculous to hear QSO time being wasted for repeat after repeat to get the 'handle' . . . many of us are far more critical of the appearance of our station than the way they sound on the air." (*W6FB*.)

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"People without a lot of patience should buy a ready-made receiver."

(*Echelford A.R.S. "News Letter"*)

— • • • —

"To listen to Gus operating is to listen at the feet of a master of DX. I shall always remember him saying 'OK, OK chaps, all stations up ten, all stations up ten.' The heavy-metal brigade all moved up ten and called long and loud, and I heard Gus mutter 'that will take care of the lids,' and he proceeded to pick off stations at three a minute, anywhere except 'ten up.' Work it out, I was trying to work him but I collapsed with laughter as soon as I realised."

(*5Z4ERR, in "QTC" (East Africa)*)

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In an F.C.C. (U.S. Federal Communications Commission) action to strengthen its powers concerning QRM in general, the A.R.R.L. recently testified that "Not only do poorly designed radio and television receivers radiate unnecessarily, but are more susceptible to interference from other sources, including properly operated licensed transmitters on other frequency bands, than is necessary. The Bill should cover the proper design and construction of receivers to make them less susceptible to unwanted signals."

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4S7EA complains that members are not making sufficient use of the 4S7 QSL Bureau—he has many unclaimed cards. And he suggests "If you do not QSL, tell the other station, and then he won't waste his time and money (and clutter up the Bureau) sending you a card." (*"4S7 Bulletin," Ceylon*)

Coventry A.R.S. have a member (G3THU/M) who works from the m.c. *Blossom*, a Maid Line Cruiser on the inland waterways (canals). We understand from another source that he would be within the terms of his licence if he signed /MM instead of /M!

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A recent reference to the VLF station at Anthorn, Cumberland (*Miscellany*, p.125, June, 1965, *SHORT WAVE MAGAZINE*) omitted a few interesting facts which are now being offered by G3NWT. The aerial, consisting of 100 tons of stranded conductor, is "equivalent to a homogeneous conducting plane, 600ft. high and 0.22 square miles in area." It is engineered to a degree of precision that takes into account the curvature of the Earth . . . the tops of the outermost masts are "nearly an inch" further apart than the bases. (*Perfectionists putting up a Top-Band dipole please note.*)

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Still on this LF QRO job, the valves in the final are fitted with what, remarkably, is known as "crowbar protection." Circuits which sense the onset of an arc cause an ignitron to fire; this puts a dead two-ohm short across the 13 kV power pack, which is designed to take it. Overload protection is so effective (happening in 6 microseconds) that a piece of tinfoil could be bridged from anode to cathode without rupture. That's the sort of protection that has to be built in when one is not messing about with 807's or even 813's but valves which cost . . . well, they are officially described as "very expensive."

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The VLF theme leads to sheer size, but VHF demands height. The new ITA mast at Emley Moor, near Huddersfield, now nearing completion, will be 1,265ft. high, making it the tallest man-made structure in Europe. Its twin will later be erected at Belmont, Lincs. To reduce wind resistance, these masts are in the form of cylinders, 9ft. in diameter, of curved high-tensile steel, surmounted by a lattice section 350ft. in height. Access to the structure from within will be possible in the worst weather. (Oh yes—the stays are 2½in. in diameter, of which a 1,140ft. length will weigh 7.8 tons, and, just for the record, there will be three equally-spaced stays at each of six levels. The nine anchor blocks require up to 250 tons of concrete each, and the base raft for the mast a further 300 tons). And now, back to the problem of that 40-metre ground-plane, standing in a puddle in the yard.

# COMMUNICATION and DX NEWS

L. H. Thomas (G6QB)

AN exciting month, with conditions ranging from mediocre to downright spectacular, but keeping up a pretty high average. Still no sign of any great breakthrough on *Ten*, but *Fifteen* improving all the time. *Twenty*, bursting at the seams for years, seems to swell even more—the merest hint of better conditions brings out, it seems, every creepy-crawlie in Europe, hoping to exploit them. And the short-skip business is always with us, except for those who start on the air around 2300z.

A pleasant surprise has come from the LF bands, too. Despite the increase in sunspot numbers and the steady improvement of the HF bands, the LF bands seem to be better than last year, rather than showing any tendency to fall off. DX on six bands (yes, Top Band is included!) has been possible on almost every day of the last thirty-day period (mid-August to mid-September).

This month's mail reflects the good conditions with an unusual mood of optimism, but there is also a good deal of critical comment on this and that—from contests and QRM to some of the strange manifestations we have to put up with—and it will all receive an airing in due course.

## It Takes All Kinds . . .

Has it ever struck you that Amateur Radio must be the most diverse, "compartmented" hobby that there has ever been? It has been brought home to us very forcibly of late that this is so. Consider this: It is quite possible for two amateurs, living in the same town, to be completely ignorant of each other's work . . . not in the sense of not knowing what the other one does, but in the sense of being truly ignorant of the branch of the subject in which he specialises.

A few thumbnail sketches of some "specimen" amateurs will illustrate the point. We'll have to be content with calling them "A",

"B" and so on, because it's difficult, if not impossible, to invent a fictitious callsign these days. (These "specimens" are life-size and bear some slight resemblance to people we know, but no direct implications are intended—our characters are composite ones, but true to type.)

First let's take "A", licensed about two years, a dyed-in-the-wool Top-Band man who prefers CW. (Lots of "A's" write to us every month.) Less than half a mile from him is "B", who has an enormous score of countries worked on SSB; he has a professionally-built exciter, receiver and linear, a tower and a beam; he has neither had a CW QSO, nor listened on One-Sixty, for about 20 years.

A little further across town is "C", who "got fed-up with all the tripe they talk on Eighty and One-Sixty" some years ago, and went all VHF—much as one would go into a monastery. He has never listened on the HF bands since that day. He builds his own gear, may usually be counted upon to have a different beam—or beams—up each time one visits him, and the total amount he has spent on his hobby over the last 15 years wouldn't buy one single piece of the equipment in "B's" shack.

Now these three are all real enthusiasts, each one practically the tops in his own particular class. But what about "D", who runs the same HRO as he had in 1950, the same rather rocky VFO and 807 PA, and various pieces of wet string as aerials? He doesn't boast about his achievements, but you'll find QSL cards on his wall from the most unexpected places like AC4, ZK2, KS6 and the like. Nearly all done on Twenty CW—no el-bug, no relay change-over, in fact no mod. cons. at all. Just a rather lazy, easy-going type who goes on the air "just to see what's on." At least he doesn't inconvenience his neighbours or behave incon-

siderately . . . and who's to say that he enjoys his hobby less than "B", with his hundreds of pounds' worth of modern equipment? (And, really, is he any less of the "real enthusiast" than the other three?)

Some pound brass, some stick to the mike; some build their own, others go out and buy it; some stick to VHF, some to Top Band, others to the band carrying the most DX at the time; some use RTTY or transmit TV; and any one of all these types could be virtually ignorant of how to carry out a single operation in one of the shacks belonging to the others. Crazy, isn't it? But that's Amateur Radio, for better or worse, and we could go on moralising about it for pages. (Don't worry, we won't.)

Final thought . . . where else in the entire field of hobbies could one find such a collection of real *mugs* as radio amateurs? They will buy an expensive piece of gear one day, and then work for days or weeks trying to build some brainchild of their own which will improve on it.

They will even spend much hard-earned cash on commercial gear, flip the pages of the manual to be confronted with some fiddly modification that the makers say they should carry out before putting it on the air . . . and they don't even grumble. In fact, to some of them it is the height of enjoyment to be made to feel that they have got to take it apart. There's no hope for any of the them . . . just great big lovable nitwits!

## The Overseas Mail

ZB2AM (G3JFF in Gibraltar) writes to say he is active on 14050 kc CW, and 14220/250 kc SSB, with operations at present about fifty-fifty. He also "wanders around 7 mc and 21 mc," and has made over 1800 contacts in three months, with 91 countries. ZB2AP is ex-G13SLI, also working the HF bands on CW and AM.

Current activity on The Rock is high, with at least seven ZB2's active, mostly R.A.F. types, though 2AK and 2AL are U.K. civilians. ZB2AM is the only representative of the Royal Navy.

Ian, of 4S7IW (Dickoya) hopes to have his beam up soon—he has shifted QTH and “has been existing with a dipole.” He will be home next April for six months' leave (goodness, how time flies!).

5X5AU (Kampala) thinks it is time to straighten out the 5X5 position once more, and gives the following gen.: Legal stations are 5X5AU, 5FS, 5GY, 5IH, 5IU, 5JK, 5KD and 5KRL. Quite the reverse are “5X5ID, 5KK, 5ZQ, 5RU, 5LR, 5JV and 5AR” (the latter signing “VQ5AR,” although they changed callsigns in 1962!). 5X5AU says: “Give them the widest possible publicity, please—we must discourage these types.”

VO1FB (St. John's) writing on Top Band activities, says the band has been much quieter of late, with only the occasional QSO across the Pond. However, thanks to a contact with G3GDW/P during June, he has managed it *every month this year*. On July 24 he was listening to GM3TMK and G3LYW working each other (at 0130) and managed to make a three-way of it. VO1FB has listened at least twice a week throughout the summer, and has never failed to find DHJ audible. This convinces him that summer contacts would always be possible except for lack of activity. This season Joe is going to concentrate on the really weak signals from the U.K., especially on the “First Timers' Mornings”—December 19 and February 6.

Some of us may feel that a place like Newfoundland is ideally situated for Top Band—in fact G3IGW suggested some time back that VO1FB could win the 160-metre Contest from there. Joe shows us the other side of the picture by pointing out that he has only *five* active stations within a radius of 600 miles. But he still likes it that way (besides, it reduces the paperwork after a contest!).

W1BB points out that, in addition to the two First-Timers'

Mornings just mentioned (which are for the European side), there will be two more (January 9 and March 7) on which, if plans go as intended, only the W/VE stations who have not yet made it will be on. It is suggested that on all these mornings the people on “the opposite side” should be content to *listen* until they hear a call which is worth answering. Aimless CQ's from the side which is supposed to be listening will merely clutter up the band—and goodness knows there is enough clutter there already.

#### Top Band Topics

While on the subject of One-Sixty, we may as well squeeze it dry! G3SED (Portsmouth) reports that a suitable transmitter is being sent to KH6FHO, who promises activity for the whole season. KL7JDO will also be active throughout, it is hoped. G3SED has already worked VO1FB and W1BB, the two old reliables, plus

K1GD, K1BM, VE3DDR, W1MO and ZB2AE. And GWTJE (listening /MM off Gibraltar) reported G3SED as early as 1700 BST.

G3TZM and G3SED recently toured the Midlands for a week, visiting Top Band enthusiasts, and were amazed by the prevailing high noise level compared with the relative “quiet” of the South Coast. Despite the absence of fish-fone, they wouldn't swap.

G2NJ (Peterborough) writes that G3RCW/P, operated by members of the North Notts. A.R.S. from the Scillies, made 350 QSO's during the fortnight they were there. The operators were G3NHE and GW3PMR.

G3TXS (Rainham), reporting for the first time, says he got as far as a “QRZ?” from both W1BB and VO1FB on September 5, but couldn't make contact. He wonders whether OE1FLW, heard on the band, is genuine (so do we!). And he is shortly taking down his 160ft. horizontal and

FIVE-BAND DX TABLE

Station	21 mc	14 mc	7 mc	3.5 mc	28 mc	Countries Worked
GW3AHN	301	324	71	21	151	333
G2DC	282	307	167	112	170	322
G1BIVJ	260	310	102	83	177	319
G3DO	223	316	86	83	183	322
G6QB	200	295	117	56	143	318
G3NOF	190	263	32	39	132	283
G3IGW	129	153	115	67	123	189
G3FTQ	91	118	58	27	46	144
G3KMQ	90	208	95	54	3	233
G3PEK	88	142	119	75	18	175
G3IDG	70	54	27	17	60	101
GM3RFR	51	70	13	10	6	91
VP8HJ	46	148	22	11	5	152
G3MDW	46	51	8	8	43	82
G3TJD	40	65	51	30	15	109
G3UML	35	132	17	4	2	141
G3RJB	24	112	46	1	11	119
G3PLQ	15	34	6	20	1	76
G3WBI	14	53	3	21	5	67

trying a 50ft. top-loaded vertical for the DX season.

G3PPE (Wallasey) also has a 160ft. wire, and he says that by bending it four times he has managed to get the high-current section into the highest portion; He also gets far better results with a 120ft. counterpoise than with direct earth, and has managed to work practically every European station he has heard. Finally he has a word of praise for CW, which, for sheer "copiability," is far better than Phone. And up comes a new argument for a tired old warhorse of a controversy: "My approach to Amateur Radio is that I always want to be improving something. Now, it is pretty impossible to improve the process of *talking*, but it is possible to improve one's CW, and I think half the fun of the mode is practising and trying to improve proficiency, both in sending and receiving."

GW3TLW (Llantrisant) runs a Tx with a single 6BW6 PA, feeding a wire which has a quarter-wave horizontal and 33ft. feed. His earth is a bare wire buried underneath the aerial, and he finds his "main lobe" is northwards. But he says the GM's are difficult to get before 2100 GMT. G3TJD (Stafford) also runs a Marconi aerial, 40ft. up, but doesn't mention its dimensions. It is very noticeable, these days, that many of those with space for a half-wave have come to prefer the quarter-wave, preferably with the high-current portion vertical. It has its disadvantages as well as its advantages, but on balance it seems to work out very well.

G3PLQ, temporarily home from his /MM duties, sends various lists of stations heard on the band. August 22, off the *Ivory Coast*, VE2UQ and W1BB/E; August 29, south of *Mauritania*, G6BQ, G3RPB, G3TTK; August 30, 140 miles south of *Las Palmas*, GW3HUM and G5RP, with many weak unreadable stations; September 2, nearing *Lisbon*, G3SED and G13ZA; and September 5, off *Finisterre*, VO1FB, W1TX, W1BB/J, WA8CPI, W4DGL and various G's.

Stations heard during his /MM

## Reporting the HF Bands

tests, from September 1964 to August 1965, work out as follows: 180 G's, 38 OK's, 34 W's, 11 GW's, 7 VE's, six DL's, five GM's, three GI's, two each of EI, VO1, PAØ, ZB2 and 9L1, and one each of OE, HB9, JA, HP1, ZP9 and HR. An interesting check on band occupancy, and if anyone has worked them all he can feel pretty pleased.

### The HF Bands

This heading really means "Twenty and Fifteen," because nothing of note has yet turned up on Ten. (It will, though—and what a commotion there will be when *that* band suddenly opens wide, as it will. Panic stations for those who haven't tried to tune up on Ten for five or six years!)

GM3JDR (Golspie) spent more time on Twenty CW than SSB, and mentions JY74 (Gus with his latest exotic call!), 16 JA's, VQ9J, YJ8WW and a few more nice ones. On SSB, JY74, 9M6BM, 4XØTP and a couple of OD5's (who are now very active again).

G3NOF (Yeovil) found most of the DX on Twenty, with a noticeable improvement in September. He was hearing the U.S.A. West Coast both at 1500 and 2300; VK's at 0630, 1230 and 2230; early mornings, KL7's, KS6, KX6 and KH6; early afternoons, S.E. Asia including 9M2, 4, 6 and 8, XW8, 4S7, YA, DU and the like. (What more could anyone ask for, on one band?) Best contacts, on SSB, were with FG7XL, JY74, KX6DR, PY2BZD/Ø, VP2KJ, YA4A, 4W2AA and 9M6BM. On Fifteen, little was heard except South Americans, Africans and occasionally W4 and KP4. Sad note: G3NOF worked "ZA1RR" in July, and sent a card, as requested, to W2JNN. The latter replied saying that he has no knowledge of the station. (The phoneys strike again.)

G2DC (Ringwood) found Twenty "very lively" and opening up to the East as early as 0500, followed by VK's on the

long path at 0700. The rarer Pacific stations were good, early in the period, but then seemed to fall off somewhat. In the afternoons, Far East stations gradually appear, and by 1600 there are signals from all the 9M areas, as well as VS6, CR9 and the other odd prefixes around that area.

Fifteen, Jack says, is full of surprises, and one should *never* take a quick look and decide that the band is dead. Between 0930 and 1100 the 9M and JA stations have been workable; Africans there all the time from 0700; South Americans during the evening. Then there is VR6TC, who comes on at 2100 on Mondays, sometimes peaking around S7; if he is working W6's, things are pretty hopeless, but about one Monday in three the conditions seem to favour the European path.

GW3AHN (Cardiff) sends a tremendous amount of gen., including a note that the first European to work VR6TC was DL7AA (in June), followed by a DM and GW3AHN himself in July, two HB9's and IILGR in August. Best catches of the month were as follows: Twenty SSB, BY4SK, CR8AE, YJ8WW, VR1S, KX6, KW6, KS6, VP2SJ, 9M8KZ and 4XØTP. Twenty CW: YJ8WW, 5W1AZ, 4X1DK, 9M4MX, JA and ZL. Fifteen SSB, 4X1DK. Fifteen CW, VQ9J and 5W1AD. For all the other DX gen., see later paragraphs.

G3UML (Ilford) reports for the first time, with a list of about 200 DX stations worked on SSB between the date of getting his licence (August 12) and writing (September 8). On Twenty he raised most of the current DX, from KX6 and KS6 to CR8 and 9M6, to say nothing of "about twenty KL7's" and "about 30 JA's in all districts." On Fifteen, likewise most of the stuff that's going. But, lest you should think this phenomenal for a newcomer, we might mention that the rig comprises SB-300, SB-400, linear, 60ft. tower, TH4 beam and

sundry other mod. cons. G3UML, to explain, is the son of G3NMR, now licensed in his own right, and obviously ready to punch some real holes in the DX bands.

He says Fifteen is his favourite band and adds "During a chat with a local the other day, VK4DD broke in." Having been a keen SWL for some years, G3UML doesn't admit that conditions have ever been really bad, but he's certainly started up at an exciting time, when they are coming up to such a peak that we shall all find it a bit of a strain to know just what to work!

Several other 'chasers have written on various subjects, and some have included lists of DX worked, but they mostly describe it as "nothing of note." Surprising how they overlap . . . the high-power types with beams have nearly all worked the same rare DX, and the less ambitious types, likewise, have nearly all worked the same set of less exotic

stations—DX on a lower level, but still good DX by their own standards, and giving them just as much of a kick as YJ8WW, W9WNV/8F and the like do for the Big Boys.

(Quote, at this point, from a cynical but occasionally humorous acquaintance: "DX is like water—it finds its own level." It sounds a bit obscure, but you'll probably see what he means.)

#### Forty and Eighty

These bands are too often dismissed, like Fifteen, as uninteresting, whereas a little more patience would have revealed something good. Even a small-scale contest such as the FOC's DX Marathon (September 11-12) will produce some surprising activity and show what can be done. On the night of September 11, few people would have said that Eighty was open to the U.S.A., but a little careful scratching revealed several W's and VE's near the band edge, some of them as early as 2200 GMT.

G2DC thought he would really find out how much his 40-metre ground-plane was worth, and emerged with the following (all, he says, "without burning any midnight oil"): CR5AD and 5EZ, JA6AK and 9AAV, UL7BF, 7CT, 7KAR, U18LB, VP9AP, ZL2AWJ, 9M2OV, 4LP, 4MX, UWØAF and all W districts. Of course, the average unskilled operator could probably scan the band without hearing more than one or two of these . . . to exploit the DX on Forty to the full, one really has to know what CW is all about.

Not that there is a shortage of SSB on 40 metres; G3UML, in that mode, raised OA4KY, PY7, VK2, YV5BMR, ZL2WS and OX3JV, to say nothing of the odd ZL on 80m. SSB.

It's surprising how unintelligent the majority of 40-metre operators really are, though. Listening during a weekend of intense activity, at times when the CW part of Forty was really buzzing, we found that 90 per cent of the stations persisted in working between 7000 and 7010 kc. What's the matter—do they think

#### TEN-METRE ACTIVITY TABLE

(Starting Date, June 1st, 1964)

Station	U.K. Counties Worked	Countries Worked	Total Figure
9J2DT	32	113	145
G3OHP	9	50	59
G3OAD	17	27	54
G2CDI	19	31	50
GM3SKX	27	16	43
G3HCU	13	19	32
G2DC	5	23	28
G3IDG	5	23	28
G3EHL	8	9	17
G3SQX	2	2	4

we only have a 10 kc band, or something? Believe it or not, this small space at one time was occupied by the FOC types in their DX Marathon, by a mixed European pile-up after Gus (JY74, who was on about 7002), by another pile-up, mostly W's, after FP8CP, on about 7009 kc, and by all the usual dreary CQ's normally put out by people who rarely hear a reply if it is less than S8-9, and start calling all over again. Howling Bedlam for 10 kc, and above that—very little! Surely there are *some* people with receivers good enough to distinguish the empty spaces in between the pirate broadcasters, especially late at night, when most of them are moderately weak? There were times when one could have copied DX CW in complete comfort, almost anywhere between 7010 and 7040 kc—three times the width of the slice carrying all the activity and all the QRM. How blind (or deaf) can one get? We noticed the occasional W trying a "CQ Europe" up in the quiet region, but finding no takers and having to go back into the bedlam-sector again. If we go on like this, the pirate broadcasters will surely multiply, and it only wants one of them to crawl into the 7000-7010 kc bracket to mess up the picture completely. We need a "Spread out on Forty" campaign. See you on 7035 kc some time?

#### TOP BAND LADDER

(G3S-- and G3T-- stations only)

(Starting Date, January 1st, 1965)  
U.K.

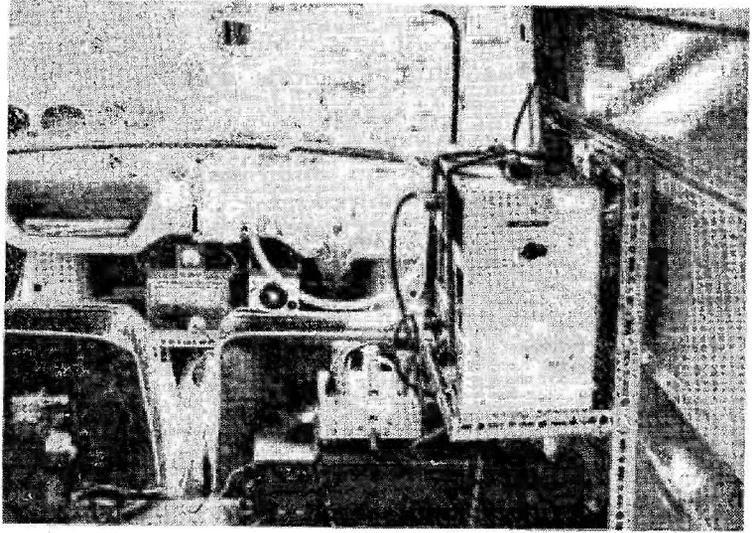
Station	Counties	Countries
G3TBJ	81	16
G3SYS	78	14
G3SED	75	22
G3TYK	72	14
G3SWH	71	13
G3TTK	70	12
G3SJJ	67	11
G3TXS	66	11
G3TIK	62	13
G3TVW	62	9
G3SHY	60	8
G3SVW	54	10
G3TJD	53	11
G3TSS	53	7
G3SVL	50	10
G3SGC	45	12
G3SZA	45	11
G3TON	41	8
G3TQZ	40	8
G3SQX	40	7
G3TZM	34	7

**This-and-That**

G3IDG (Basingstoke) was amused to read the reference to "Fish-bone" in last month's Top Band notes, but doesn't mind a misprint when both fish-bone and fish-fone can be equally sick-making . . . and, regarding his 13½ years spent chasing WABC, he points out that he doesn't want it to read like a hard-luck story, because he feels he is fortunate. "I have a better bargain than those characters who strive madly to chalk up DXCC, WABC, 3000 contacts, and so on, during their first year on the air. In their case the fire may be too intense to last, and will probably burn out in a comparatively short time." (It does happen in very many cases, too, but there is always the occasional phenomenon who starts off like a rocket, but instead of coming down like the proverbial stick, goes up and up. Not into outer space, maybe, but into the extreme limits of human endurance and suffering, winning innumerable contests and credits on the way. We know quite a few such, who show not the least sign of burning out after thirty years or more . . . call them "the keen ones," if you like understatement.)

Also from G3IDG, a note for the CW fans. He says that much of the indignation about unwanted breakers-in is unwarranted, because their presence is invited. If people use only "K" at the end of each over, then someone is justified in chipping in. If "KN" is used, it should indicate to all except the thickest-skinned that their presence is unwanted. We agree, but rather feel that it is just these thickest-skinned types who usually cause the trouble. Many of them don't understand what KN means, anyway—they use it all the time just like K. We have even heard some of them signing off with VAN!

It's a sad thing, but those of us who are—well, not so young, shall we say?—rather tend to live in the atmosphere of the old days, when nearly everyone on the air was fairly courteous. One overlooks the fact that a great proportion of present-day operators



Above, the two-metre and LF-band gear as mounted in the car for the GD2CZM/P expedition to the Isle of Man. Below, the party, consisting of G2CZM (left) and G3JBF, with their XYL's and a friend. That high ground behind them is South Barulle, shown on the Ordnance Survey sheet as 1585ft. a.s.l.



are still rather like excitable children. They will grow out of it; some will make fine operators for the future, who will in turn be annoyed by the next generation of excitable children. And come to think of it, can't you tell, even by listening to some CW-bashers (we won't give them the title of operators) just how excited, and how childish, they are? "Must get him for his QSL . . . raise him or bust . . . faster and faster . . . too many dots, who cares . . . wish I had more power,

or a T5 note instead of this T6 . . . put the aerial up another 30 feet tomorrow . . . need a fatter fuse in there . . . well, even if he is calling CQ DX, he's bound to come back to me if I'm loud enough and send fast enough." Sit back and laugh, that's all we can do . . . perhaps he won't be on tomorrow.

**On Exhibition**

At the other extreme are those who really care about how their

signals sound. Some carry it to extremes and need a certain amount of courage before they will face the world. G3NWT (Risley) sends in a nice little summary of how one *can* feel: "To contract a series of skeds is a beginning. To do it on Eighty would almost qualify me for an O Level in Moral Fibre. Think of the myriad critical ears which undoubtedly assess and weigh every word spoken . . . the Greater Ones in silent surveillance . . . the exposed salients of our band where the Pundits watch us over open sights . . . the sudden terrible fate of those who don't watch their audio gain controls . . . the ultimate humiliation of Being Addressed Through a Third Party." (Given us the creeps, he has . . . it will take days to work up the courage to come on Eighty SSB again.)

#### DX Past and Future

The chasers of new ones and rare ones have been having a picnic of late, and it seems that it will continue for some time.

Don Miller, W9WNV, is almost beginning to rival Gus Browning in his travels and his enterprise. (Who else would have contrived to lend gear to a couple of Chinese operators to use from their own territory?) The result was the operation from BY4SK, located at Canton. Then Don proceeded to Indonesia (which one would also think pretty difficult) to put in a spell as W9WNV 8F3.

Prior to this, of course, he was on for a period as YJ8WW, and future plans seem to run on the lines of XT2TZ, then a ZM7 call from Tokelau, then the Maria Theresa and Minerva Reef operations to come.

In parallel with much of this, DJ2KS/PYØ came up from St. Peter and Paul Rocks (but only for a very short time), and PY2BZD/Ø was activating Trinidad Island.

Now, at the very last minute, we hear that Lloyd (W6KG) has just turned up on Saipan, signing KG6SZ, and is going to use this call with the appropriate suffix from all his stops on the Pacific

Islands (G2DC worked him on September 14 and passes on the information).

Other unusual activity has been noted from CR8AE on Twenty SSB; FP8CA and 8CP on several bands; VK9JO (Cocos) on 14124 kc SSB; VS6AJ, working 7045 kc SSB and promising activity on 3790 kc sideband.

VR4ED says he will be on the LF end of Forty, every Thursday and Saturday, from 100 onwards . . . Gus was heard promising some action from OD5BZ, probably followed by YI and YK . . . VK9VG is yet another on Cocos-keeling Island (14110 kc SSB) . . . For the WPX-hunters, OE7ZGI/8 (Twenty CW) was interesting, once they had mastered the call; and all these 4X1, 4X5, 4X9 and 4XØ manifestations must have stirred up some of the card-indexes. (As we said before, it's much easier to invent new prefixes than to institute new "countries.")

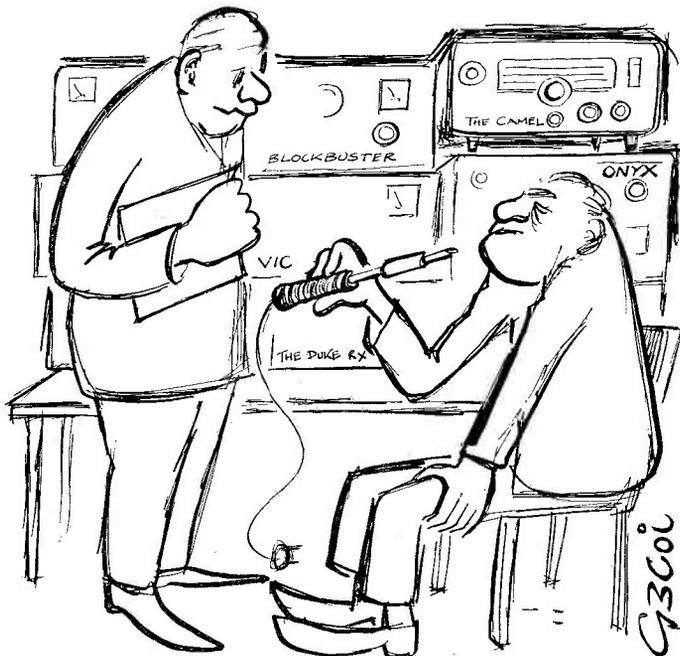
#### VK/ZL Contest, 1964

Results of this event, only recently received, show even lower U.K. interest than usual. The CW half attracted entries only from G4CP (1344), G3FKM (888), G2DC (583) and G6XN (329); the Phone section was supported by G8PO (1453), G6XN (670), G3OOB (95) and G14RY (48).

Offsetting the poor entry is the cheering fact that G4CP and G8PO put up the highest scores from Europe in the two sections, but as there are no awards for continental leaders they don't appear in the roll of honour. Highest scores in the world came, as one might expect, from JA, W6, VR2 and KH6. By far the biggest number of entries from Europe came from the OH's (who, we have noticed for many years, seem to be able to work VK/ZL at all sorts of times when they are not audible to us). But they didn't get anywhere near the two highest "G" scorers.

#### More DX Shorts

Marcus Island is another rarish spot that should be active by



" . . . Thanks a lot, old man — but what on earth is it for . . . "

now, with two new operators for KG6IF . . . FR7ZI and his XYL will be setting sail in their 30-ft. ketch in late October, and FR7ZI/MM will be on the air. The route appears to be via ZS6, ZD7, ZD8, then South America and the West Indies. Thence to Northern Europe for the summer months of 1966, and winter in the Mediterranean. There is a possibility of operation from FH8ZI, FR7ZI/G and FR7ZI/T.

KS6 is represented by several W's with "slant" calls—two such are W4MCI/KS6 and KØVYC/KS6. KH6FIF/KS6 has also been around for some time . . . TJ1AC has been heard at various times, Twenty SSB in both sections of the band. Kilowatt linear, 3-els. beam and the kind of signal to go with it.

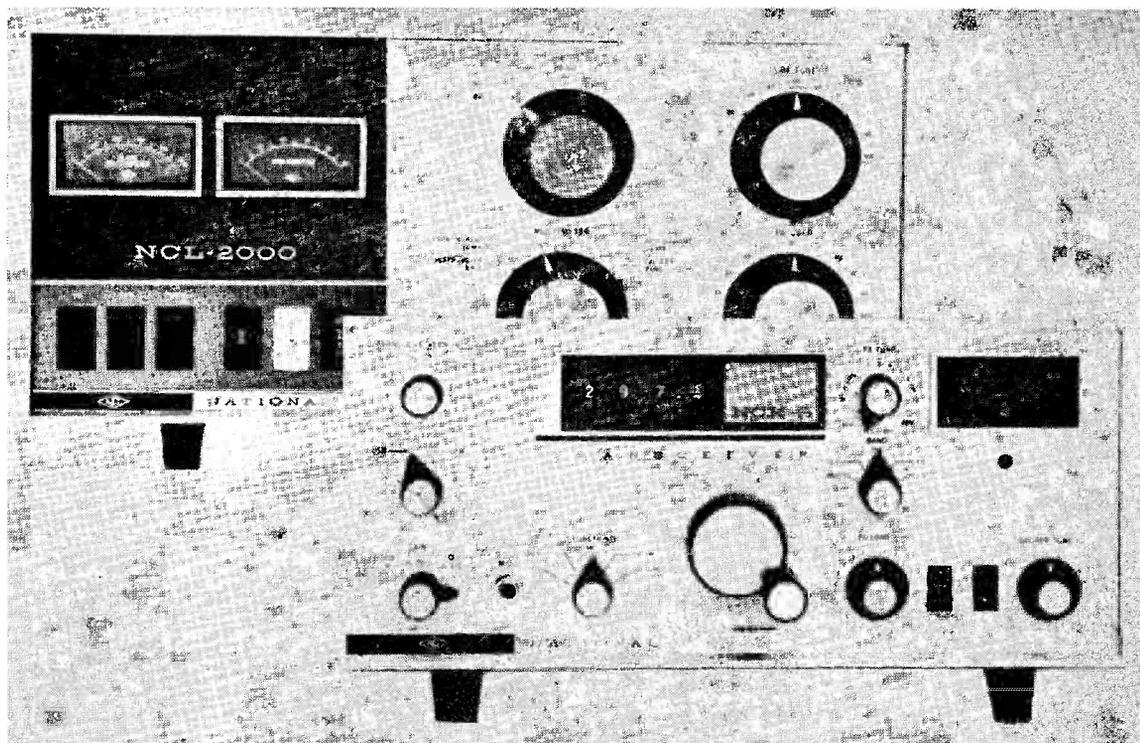
### Contests and Awards

Don't forget the **CQ Worldwide DX Contest**. This is the last possible reminder for the Phone section, on October 23-24. Fuller details were given last month, p.423. The CW section follows five weeks later—November 27-28. With conditions as they are likely to be, we predict that heaviest QRM of all time . . . but at least it shows that someone is awake!

The WZA ("Worked Zambia Award") is issued by the Radio Society of Zambia (P.O. Box 332, Kitwe). Applicants from the U.K. need to score 10 points for contacts with 9J2, on the basis of one point for each QSO on each of the HF bands, and two points for 160 and 80 metres. Separate classes for CW AM, SSB and Mixed, and seven IRC's with the application.

### Sign-Off

Another month gone, with the promise of enormous activity from now on, what with improving conditions, the end of gardening chores, the contest season and the usual seasonal DX boom. Let us hear all about how you are faring. Meanwhile, thanks for much of the information in this instalment to the West Gulf DX Club *Bulletins*, the *DX News-Sheet*, and many individual correspondents, especially G2DC, GW3AHN and G3NOF. Next month's deadline is *first post on Monday, October 18*, and address everything to Editorial Dept., **SHORT WAVE MAGAZINE**, Buckingham, England, marking the letter "Communication and DX News." Good Hunting 73 and—BCNU.



Two very interesting items of amateur-band equipment by the National Radio Co., Inc. (U.S.A.). At lower right, the NCX-5 five-band SSB transceiver covering the 10-80m. bands in 500 kc segments, featuring a solid-state high-stability VFO and dial calibration accuracy to within 100 cycles, with a digital counter reading out to one kc. At upper left is the NCL-2000, a 2 kW linear amplifier of remarkably compact design, with built-in solid-state PSU, designed for 10-80m. operation and rated at 2 kW p.e.p. on SSB, and one kilowatt for CW, AM phone or RTTY. The RF output stage consists of two RCA 8122 ceramic tetrodes, rated for a plate dissipation of 800w. A feature of the NCL-2000 is its passive (untuned) grid input circuit, making it suitable for use with any transmitter or transceiver capable of giving from 20 to 200 watts of driving power. It is fully protected against overload and has all necessary safety precautions built in.

## A.2219 PSU MODIFICATIONS

FOR VARIABLE REGULATED HT OUTPUT

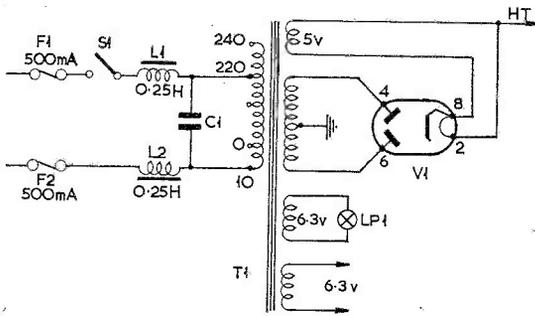
W. BOURKE

A VERY handy power supply can be derived from the Admiralty Type A.2219 Power Unit, obtainable cheaply from surplus sources, which can be modified to give a variable regulated HT output, with a fully stabilised supply of 150v. at 30 mA. Both can be used together, up to the output limits of the trans-

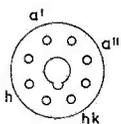
former (40 mA). A 6.3-volt supply for heater circuits is also available.

Looking at the circuitry herewith, the inductors L1 and L2, with C1, are removed. F2 is taken to the 0v. tap on transformer T1, and F1 to the appropriate tap for the local mains supply. The original pilot-lamp winding is now used for the heater of V2 (an 807, for variable output control); this winding must *not* be earthed to chassis, as it is connected to HT+. The pilot lamp is replaced by a 40 mA bulb and its connections are between the centre-tap of T1 secondary and chassis; this bulb will then function as a fuse, and in normal use will give a dim indication of the current being drawn (F3, below).

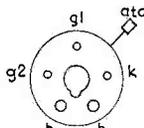
Bases for V2 (UX) and V3 (octal) are bolted to the chassis on stand-off insulators, allowing enough



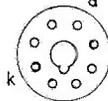
ORIGINAL CIRCUIT



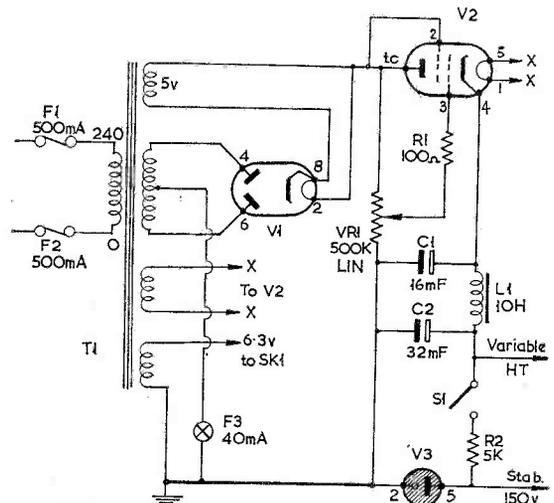
V1: 5Z4G



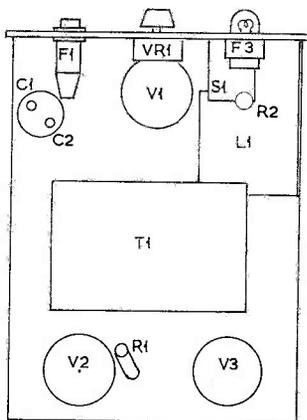
V2: 807



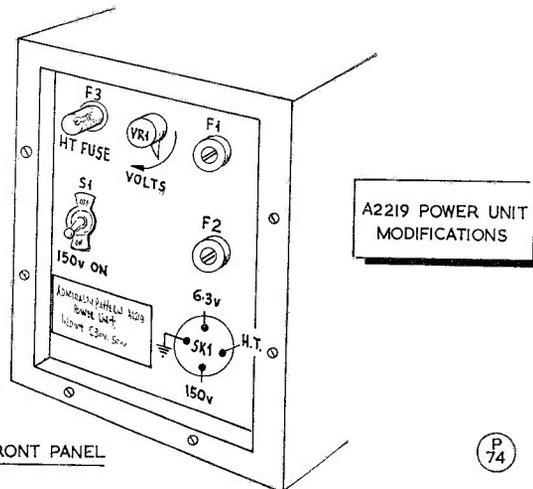
V3: VR150/30



MODIFIED CIRCUIT



CHASSIS LAYOUT



FRONT PANEL

height for their connections to clear the chassis. The original front-panel octal base connector may be utilised, or replaced (as in the drawing) by an old B5 base, enabling wander plugs to be used to pick up the outputs. The front panel must be drilled to accommodate the (miniature) 500K potentiometer VR1. L1 can be fitted using a longer bolt through the front rubber foot, and R2 is conveniently mounted on the back of S1, which is now used to bring V3 into circuit for the 150-volt supply. Before testing for output, all the wiring should be carefully checked through.

### "THE AMATEUR IS HELPFUL . . ."

THE other day I found in my archives *circa* 1939 an irate letter from a local BBC listener complaining that G3ZO gate crashed the morning service. He must keep out—or else.

Glossing over the "or else" bit with all its unsavoury implications, and trusting in a faithful adherence to the Amateur's Code *à la* the official organ of the A.R.R.L., sections 1 and 4, quote: (1) ". . . never knowingly uses the air for his own amusement in such a way as to lessen the pleasure of others . . ." and (4) ". . . kindly assistance and co-operation for the broadcast listener . . ." I speedily hurried to effect a conscience-stricken conciliation. The receiver concerned turned out to be a two-valve effort, Det/LF, with a selectivity curve like a female film star's contours. At my own expense I inserted a wave-trap and HF choke in the 99-9ft. aerial down-lead, and also an HF choke in the detector grid lead, which minimised the interference. As a result I committed myself to service the set, charge the accumulator and guarantee the reception of Radio Paris, all for free, with a codicil not to blend my discordant croak with the hymns, Palm Court Orchestra (top group of that day), the evening news bulletin and the children's hour, not to mention shouldering full responsibility for all future short-comings and breakdowns of the wretched little thing. When word was passed round I ran out of wave-traps, RF chokes, and *bonhomie*. Twenty sets to service for free does seem rather a lot. And all this for running a genuine ten watts to an RFP.15/28.

Then came the *contretemps* at the nearby cinema. Boyer was just getting worked up on some good basic stuff with Hedy Lamarr, and with a curl of the inimitable lip. "I loff you—very FB, lovely mod., indeed, Q5 R9 QRK? over to you" surprised and delighted the more enlightened section of the audience—alas in the minority. Next morning a contumacious manager greeted me with a distinct air of no enthusiasm, and expressed his assured opinion doubting the validity of my parents' marriage, using a vocabulary of unusual and surprising flexibility. Somewhere in the talkie-wiring there must have been a semi-screened circuit broadly resonant at my frequency, leading to the P.E.C. stage

where rectification took place, to be further amplified by four powerful stages of LF.

The solution, my brothers? One pre-booked seat for every performance—which eventually increased to two and culminated in the acquisition of an XYL. Indeed, 'tis a thorny path we tread. G3ZO



" . . . Have had the third call, so must QRT for lunch now . . ."

### SWEDISH DX BULLETIN

We are asked to announce that—for the benefit of those interested in the 15-metre band—an SM group is keeping a regular schedule, as follows: Sundays, 0930z, 7045 kc CW, as a bulletin broadcast in English; Fridays, 1700z, 7045 kc CW and at 2130z on 3775 kc, SSB and CW, for reports *inwards* on 21 mc activity; also on Saturdays, 1430z, 3550 kc CW and 3775 kc SSB, and at 1500z on 7045 kc CW. The Friday and Saturday sessions are for gathering information, to be collated and broadcast on the Sunday 7045 kc transmission. The operating callsign heard will be either SM4AIQ, SM4ATA or SM4DXL.

### THE D-Y-K-T FEATURE

This has not been lost, forgotten or overlooked—it is just that, for this month and last, it has had to be held over because of considerations of space. It is intended to resume the feature next month. In the meantime, if you have any brief items that may be worth 10s. 6d. for publication, send them in, to: Editor, SHORT WAVE MAGAZINE, Buckingham.

### UNFORTUNATE PUBLICITY

It is now said that the exaggerated reports about casualties caused by Hurricane Betsy in the Southern States of the U.S.A. (in particular, Louisiana) were due to the activities of over-enthusiastic radio amateurs who were busy providing emergency communication facilities. (*BBC News, September 14*).

# VHF BANDS

A. J. DEVON

THERE have been some bright flashes during the period under review, with good openings starting about September 12—and, as this is being written, there is every sign that the large anti-cyclone holding to the south of the U.K. should produce EDX conditions (from September 19 onwards) when the glass took a high lift, the Wx was warm and sunny, with a cool evening and a frosty morning. It is not possible to report any hard facts, because at this late stage in our "production cycle," all your A.J.D. can do is to prophesy—let's hope there will be some facts to talk about next time out.

The same rather tiresome dead-line factor applies to what should be another very interesting possibility—about the middle of the month, the buzz went forth that the DL boys intended to fly that balloon again, some time during the weekend, September 25-26, depending on the local Wx forecast. It is to be hoped that as many two-metre operators as possible did get to hear about this, announced at the VHF Convention in Manchester, and on the various news-bulletin broadcasts since. We would be particularly glad to have as many reports as possible on this event, whether from those who took part or they who just listened.

Yet another project, offering good opportunities for VDX, is the proposed launching of *Oscar IV*, "before the end of the year." No firm date can be given, for

many obvious reasons, one of the more important being that, as on previous *Oscar* occasions, it is simply part of a U.S. military experiment. This time the launch is to be from Cape Kennedy, using a Titan IIC rocket, and the intention is that translation shall be on *two bands*, 144 and 432 mc, possibly also on 23 cm. (1296 mc) as well!

We must all hope that this very important experiment will have the success it deserves. The "Project Oscar" group over in W6 have learnt a great deal from the previous *Oscar* tests—and we over here will quickly know whether the instrumentation is functioning correctly, by the experience gained from the Dutch Balloon (see p.428, Sept. issue). Here again, reports would be appreciated from all quarters, when the time comes.

## GM3RUF/P Expedition

This is generally regarded as having been a great success, in spite of indifferent conditions and some difficulties in keeping to such a tight itinerary. More than 50 firm skeds were arranged, and ten GM counties were penetrated.

Our report from G3KXA is full of interesting detail—and proves that he himself must be a strong and healthy chap, with plenty of stamina. He carried out the last part of the operating programme virtually single-handed!

In the 10-day period from August 27, over 600 contacts were made, only 95 of which were on Phone! As G3KXA says, it shows that people *can* use CW when they really want a QSO. It also proves, as he points out, that GM should be workable, on the key, most of the time, because conditions were never really good (except perhaps for the first session, from Roxburgh). Contact was held, from all sites and at every sked time, with G3BA (Sutton Coldfield), Tom's signal always being R5 with the expedition. Others mentioned as being outstanding for strength and consistency during the tour include G3AOS, G3EDD, G3PTM, G3XC, G5JU and G5MA.

All sorts of odd and interesting incidents are described—such, for instance, as the fact that though

G3XC was heard on each morning and evening sked at every site, it took a 17/6-telegram from G3KXA to alert G3XC to this, and ensure a contact for Cornwall from Lanark! G3OCB (Truro) was likewise worked, following this alert. The expedition's most distant location was in Perth, from where, in spite of the poor conditions, they made 80 contacts, the GDY including G3IMV (Bletchley). Other good DX worked from various locations is listed as GB2GC, G3FAN, G3KEQ, G3LAS, GC3SHK/P and GW3MFY. An unfortunate miss was with GC2FZC, heard on sked in Roxburgh and Perth—the latter would have been a beauty for distance.

For the GM3RUF/P expedi-

## TWO METRES

ANNUAL COUNTIES,  
FINAL PLACINGS

Starting Figure, 14

From Home QTH only

Worked	Station
63	G3EDD
52	G3HRH, G3SAR
47	G3PSL
44	G3CO, G3OWA
43	G3FNM
42	G2BJY
40	G2AXI
39	G3LAS, G3PTM, G3TNO
38	G3AHB
35	G2CDX, G3IOE, G3TLB
34	G3FIJ, G3GWL
33	G13SLI
31	G3KWH
29	G3TKQ, G4LU
28	G3JHM/A
26	G5UM
25	G3SML
23	G3GSO, G3THC, G8VN
22	G3KQF, G3SXX
21	G2BDX
19	GW3CBY
17	G3CKQ
14	G5FK

This annual Counties Worked Table closed on August 31st, 1965, for the year from September 1, 1964. Above are the final placings. The new Table for 1965-'66 opened w.e.f. September 1, 1965.

tion, highlights of the trip were the generous help and hospitality they had from GM3EGW, GM3FYB, GM3TFY, GM6TF and GM6XW—the interesting visit to the station of GM3FYB, with his beautiful home-built gear and high-gain 70-centimetre dish for E-M-E working—the fact that GM3EGW and GM3FYB, armed with the expedition's sked sheet, found that they could hear (from their own home stations) many of the G's calling or working GM3RUF/P, among those mentioned being G2CDX, G2UN, G3AOS, G3EDD, G3FAN, G3IMV, G3KEQ, G3LFF, G3XC, G5MA and GW3KYT, suggesting that there could be much more G/GM working if people would only try, on CW—the enthusiasm for VHF up in Scotland—and in general the excellent procedure and accurate schedule keeping of the G's on the sked list. One of the items of gear used by GM3RUF/P was a Withers TW converter; though bolted down in the Land Rover, driven over some very rough country during the ten days they were on safari, this Rx worked perfectly and winkled out many of the weak signals which otherwise might never have been heard at all. Another interesting point brought out by G3KXA is that without their Land Rovers, it just would not have been possible to reach at least five of the chosen sites.

Altogether, very much a worthwhile effort, on which the GM3RUF/P boys are to be congratulated, with the thanks of all those many G's to whom they gave interesting QSO's. An undertaking of this kind demands a great deal of careful preparation and background organisation if it is to be successful—and, as all who were in any way interested will know, G3BA had a lot to do with it.

#### The Tabular Matter

Displayed this time are as many Tables as could be made space for—and your A.J.D. hopes he has compiled them with accuracy. If anyone is wrongly placed, it is not for want of diligence; it was quite a job!

Probably the most important is the Final Three-Band Annual, in

which G3BNL (Keyworth, Notts.) has done so well, with G3EDD (Cambridge) in close pursuit. It is interesting to see how our method of taking aggregates makes scores so close in the middle part of the Table—this is as it should be, because it just about reflects average activity and band occupancy. As promised in our last, old-man Ed. has been talked into awarding a few small prizes for the Three-Band Annual, as follows:

To G3BNL, for consistent VHF work, and scooping the pool; to G3SKR, for making the highest total of four-metre counties worked; to G2CIW, for showing the highest aggregate, 33, in terms of counties-and-countries worked on 70 cm. during the year; and to EI6AS, for doing so well on a three-band basis after a late start from a relatively remote location. These prizes are not gaudy, but we hope they may be acceptable,

**THREE-BAND ANNUAL VHF TABLE**  
*Final Placings, September 1964 to August 1965*

Station	FOUR METRES		TWO METRES		70 CENTIMETRES		TOTAL pts.
	Counties	Countries	Counties	Countries	Counties	Countries	
G3BNL	36	4	54	13	25	4	136
G3EDD	19	3	63	14	21	2	122
G3HRH	18	3	52	11	11	1	96
G3LAS	26	3	42	15	6	1	93
G3OWA	36	4	45	8	—	—	93
G3FIJ	22	3	34	8	14	3	84
G2BJY	32	2	43	6	—	—	83
G2AXI	22	3	43	10	2	1	81
G3SKR	49	5	22	5	—	—	81
G3BOC	23	4	35	10	—	—	72
G3AHB	—	—	38	12	18	2	70
G3PTM	—	—	39	10	16	1	66
G3EKP	20	6	22	6	6	3	63
G5UM	16	2	27	3	12	3	63
EI6AS	12	5	34	6	1	1	59
G3FNM	4	2	43	9	—	—	58
G2CIW	—	—	17	5	26	7	55
G3TKQ	12	1	29	6	4	2	54
G3TLB	8	2	36	7	—	—	53
G3HWR	19	3	16	3	9	1	51
G3TNO	2	1	39	6	—	—	48
G3OHH	34	6	—	—	—	—	40
G5FK	13	2	14	1	8	1	39
G3KQF	—	—	22	7	4	1	34
GW3CBY	2	2	19	6	—	—	29
G2DHV	9	2	12	1	1	1	26

Scores are since September 1st, 1964, and the Table closed on August 31st. This "Three-Band Annual VHF Table" opened again immediately, w.e.f. September 1st, to run till August 31st, 1966. All VHF operators are invited to send in claims, set out in the form shown here, so that the new Table for 1965-'66 can be started as soon as possible. Position is shown by last-column total, as aggregate of all scores. Own county and country score as one each. Entries may be made for a single band, any two, or all three. From time to time, multipliers will be announced (with at least one month's notice) to give a loading in favour of some particular band. Points so earned will be taken into the aggregate and carried right through till the end of the VHF year. Claims should be sent in as often as possible to keep the Table up-to-date.

and all recipients have been notified.

The other Tables shown are self-explanatory, but let it be said here that your A.J.D. is not too happy about the 70-Centimetre All-Time; though records have been kept as carefully as possible, it is a long time since (December '64) this one last appeared, so some further amendments may be necessary. What is certain is that in it Gerry of G2XV is well on top.

Countries Worked is right up-to-date and takes in about a dozen movements since the last appearance, including several more Europeans who have applied direct. In particular, we welcome a new claim from OK2WCG (Brno), one of the leading EDX operators, who for years has been feeding us valuable inside gen. on the European VHF scene.

The Four-Metre All-Time is once again headed by another old friend of this column's—Louis, G3EHY, of Banwell, Somerset, with a commanding 56C to keep him in the hot seat. He has been a keen and consistent 4-metre operator since the band opened, and can put a good signal all round the U.K. on 70 mc. The 4m. A/T shows numerous movements since it was last presented and, according to the file, should likewise be right up to date.

For many years now, the Two-Metre Annual has reflected the state of play on that band. This year's final result, showing G3EDD well in the lead, once again points the fact that our 144-146 mc band is the mainstay and backbone of VHF effort in the U.K. Over the years, many hundreds of different VHF operators have "been through" the Two-Metre Annual. Though there are those who have suggested (and your A.J.D. is one of them) that we might perhaps now dispense with the Two-Metre Annual in view of the fuller picture given by the new Three-Band Annual, it may surprise you (as it did A.J.D.) to realise that we already have sufficient claims in to start another one for 1965-66. So we will keep it going (first appearance next

month), if you are one of those who stick to two metres as your exclusive VHF band, perhaps you would claim accordingly; this applies, in particular, to those who are starting on VHF. And to add some operating interest to the Two-Metre Annual for 1965-66, we will bracket after the call sign the total of different stations worked in excess of 50S. Hence, all future claims for Two-Metre Counties Worked since September 1st, 1965 can include a station-total, starting from fifty . . .

Which brings us to the Two-Metre All-Time, the master list, which shows the whole picture "since time began on two metres." It has by now assumed colossal proportions—so much so, that it is a long time since there has ever been enough space available for it. However, A.J.D. is preserving carefully 100's of pieces of paper to keep the record straight, and some month soon we may be able to show it again.

Another such important record is the "Table of Two-Metre Firsts," which would require nearly two columns to include all the data now held on file. In the nature of things, it can only be occasionally that these historical records can be displayed.

Finally, on the subject of the Tabular Matter, don't forget that the Three-Band Annual will start again next time out, so please claim for whatever VHF bands you work.

### A Problem of Distance

Going back to the sporadic-E results of July 4 and the question of who now holds the distance-record for EDX on two metres, EI2W (Dublin) has been conducting some researches—because in terms of distance the EI2W/YU1EXY and G3MPS/YO9KBP results are pretty close. Two separate calculations give, near-enough, 2220 kilometres for EI2W and 2182 km. for G3MPS—but these figures are not necessarily final, because of the great difficulty of pin-pointing the EDX stations to the required degree of accuracy—when it comes down to the last few kilometres.

## TWO METRES

### COUNTRIES WORKED

#### Starting Figure, 8

- 28 G5YV (DL, EA, EI, F, G, GC, GD, GI, GM, GW, HB, HG, I, LA, LX, OE, OH, OK, ON, OZ, PA, SM, SP, UA, UP, UQ, UR, YU)
- 26 ON4FG (DL, EA, EI, F, G, GC, GI, GM, GW, HB, HG, LA, LX, LZ, OE, OH, OK, ON, OZ, PA, SM, SP, UA, UP, UR, YU)
- 26 G3LTF (DL, EA, EI, F, G, GC, GD, GI, GM, GW, HB, HG, LA, LX, LZ, OE, OH, OK, ON, OZ, PA, SM, SP, UA, UP, UR)
- 26 UA1DZ (DL, DM, G, HB, HG, LA, LX, LZ, OE, OH, OH0, OK, ON, OZ, PA, SM, SP, UA, UB, UC, UO, UP, UQ, UR, YO, YU)
- 24 UP2ON
- 22 G3CCH, G3LAS, OK2WCG
- 21 G3HBW
- 20 OK1VR
- 18 G2JF, G3BLP, G6NB, OKIDE, ON4BZ
- 16 G2CIW, G2XV, G3AYC, G3BA, G3CO, G3EDD, G3GHO, G3HRH, G3KEQ, G3MA, G6RH, G6XM, PA0FB
- 15 G3DKF, G3FZL, G3PTM, G3RMB, G4MW, GM3EGW, UR2CQ
- 14 G2FJR, G2HDZ, G3AOX, G3FAN, G3HAZ, G3IOO, G3JVK, G3KPT, G3NUE, G3PBV, G3SAR, G3WS, G4LU, G5BD, G5DS, G6LI, G8OU
- 13 EI2W, G2CDX, G2HIF, G2HOP, G3AOS, G3DMU, G3DVK, G3EDD, G3EHY, G3FIJ, G3GPT, G3GWL, G3HIT, G3KQF, G3LHA, G3NNG, G3OHD, G3PSL, G6XX, G8VZ
- 12 EI2A, F8MX, G2BJY, G3AHB, G3BNC, G3BOC, G3GFD, G3GHI, G3GSO, G3JAM, G3JLA, G3JXN, G3OBD, G3WW, G5CP, G5JU, G5ML, G8DR, GC2FZC, GW2HIV, GW3MFY
- 11 G2AJ, G2AXI, G2CZS, G3ABA, G3BDQ, G3IUD, G3JHM/A, G3JYP, G3JZN, G3KU/H, G4RO, G4SA, G5UD, G6XA, PA0VDZ
- 10 G2AHP, G2DHV, G2FQP, G3BK, G3DLU, G3GSE, G3LAR, G3LRP, G3LTN, G3MED, G3OSA, G3RTF, G3XD/A, G5MR, G5TN, G5UM, G8IC, GW3ATM, GW5MQ
- 9 G2BHN, G2DVD, G2FCL, G3BYY, G3FNM, G3FUR, G3OJY, G3OWA, G3SXX, G4LX, G8GP, GC3EBK, G13ONF, GM3DIQ, GM3LDU
- 8 G2BDX, G2DDD, G2XC, G3AEP, G3AGS, G3CCA, G3EKX, G3GBO, G3HCU, G3HWJ, G3KHA, G3PKT, G3MPS, G3VM, G5BM, G5BY, G8SB, GM3JFG

Into this context of crediting records also comes the question of who made the first GW/YU contact (again, during the July 4 spor-E opening). Going back to p.365 of August "VHF Bands," it was thrown out that GW3CBY (Swansea) might hold this credit, with YU2BO/P. Of course, it was a fair certainty that this would be challenged by somebody—so now we have a letter from GW3KYT (Colwyn Bay), saying that he was in QSO with YU3OV and YU3EO/P "within seconds of the YU's appearing." As neither of them mentions the actual time at which their contacts were made, the issue is still in doubt; we would like to hear from both quoting QSO times to the nearest minute.

This is a good example of the sort of situation—which can often arise on VHF—when it is important to give date, time, QTH and estimated frequency when making claims which might affect records.

#### Notes on G8/3 Stations

For some extraordinary reason—which is beyond the power of your A.J.D. to divine—the idea seems to have got around that "we are not interested in the G8+3's." Nothing can be further from the truth. Those holding call signs in the G8AAA-G8ZZZ series are amateur-station operators who specialise in the frequencies from 430 mc upwards. They are, if you like, in the technician-grade, in that they design, develop and operate gear for our highest-frequency communication band.

There are many G8-three's now licensed, and this time we discuss reports and comments from:

G8ADD (Birmingham), who has built his own gear for 70 cm., and is now lined up with a G2DD converter (SHORT WAVE MAGAZINE, March, 1953) with an AF139 pre-amp, feeding into an Eddystone S.840A on the Rx side; a slot-fed 4/4 beam; and the Tx runs a QQV02-6 as a tripler. With this rig, he has worked three counties and "most of the 70 cm. stations around the Birmingham and West Brom. ghetto" (cor—we've never heard it called that before!) He

adds that some of the local stations are so strong that Seventycems in the Midlands "bears a startling resemblance to Top Band, except that I have never heard any fish-fone."

G18ACY is in Belfast (and thinks he must be the only G18/3 so far) who has a 6CW4 converter into a Heathkit RG-1 tuning 12-16 mc; a G. & D. CTX2 driving a pair of QQV0's; and for aerial what he describes as "a rather modest 12-ele stack." He is anxious to fix skeds for 70 cm. working across the Irish Sea.

From up near Chester, G8AAP writes to say that he has been "having some adventures" in getting the 430 mc gear going, proving that it works, and getting contacts. Starting from the back mark, he has been doing well on the /P front and says "after reading for the last 18 years about everyone else's activity, I am pleased to be on the Tx end at last." Nicely put—and we are with him in these sentiments.

G8AGT (Bristol) was on for the last 70-centimetre contest—but it was not until near the end of it that he realised he was unable to receive weak signals, because of a very high local noise level. He promises to overcome this and "do much better next time."

#### Two-Metre Clip

As usual, this is very thick, and so we must work quickly through it. As mentioned earlier, OK2WCG reports this time, with news and claims. Ivo runs high power on two metres and 70 centimetres, has been trying for KP4BPZ (heard on 432 mc at signal levels up to S8 on CW and SSB) and is now cooking up a 16ft. parabolic array, with more power and a better converter. He would like MS skeds with anyone interested in EI, GC, GD or GI—these being about the only EDX countries he has not yet worked. In the MS context, his latest successes have been with EA4AO (Madrid) and SV1AB (Athens). Yes, SV1AB is available on two metres, and knows the form!

Before going out to Gibraltar, ZB2AP was EI5AW and GI3SLI, and very active on two metres; he ended up with 76 stations worked in 33 counties and six countries, his first contact being with EI2W

on September 12, '64, and his last before the move to ZB2 on July 10, '65—also with EI2W. A nice record, covering a lot of ground. Now out at ZB2AP, he has all the two-metre gear with him and is operational from the very top of

#### FOUR METRES ALL-TIME COUNTIES WORKED LIST Starting Figure, 8 From Home QTH Only

Worked	Station
56	G3EHY
52	G3IUD
50	EI2W, G3OHH (264)
49	G3SKR (430)
40	G2OI
39	G3OWA (372), G3PJK
38	G3JHM/A
35	G3BOC, G3MOT (261)
33	G2BJY, G5FK, G5JU
32	G3NUE
31	G3PMJ
30	G3BNL, GM3EGW
29	G3AYT
26	G3LAS, G3LQR, G3LZN
25	G3FIJ
24	G2AXI
23	G13HXV
22	G3HWR (236)
21	G3PPG, GC3OBM
19	G5SUM (122)
18	G3HRH
17	G5CP
16	G3BJR, G3FDW, G3OJE
15	G3RDQ
14	G3OKJ
12	G3TKQ, G5DS
11	G3LHA, G3PRQ, G3SNA, G3TOT
10	G2BDX, G3ICO
9	G2DHY, G3EKP
8	G3NNO, G8VN

This Table records Counties Worked on Four Metres, on an all-time basis. Claims can be made as for the other Tables, e.g. a list of counties with the stations worked for them, added to from time to time as more counties accrue. QSL cards or other confirmations are not required. Totals in excess of 100 different stations worked can be claimed and will be shown in brackets after the call.

The Rock at 1,400ft. a.s.l. Using also the 14 and 21 mc bands, he would be glad to fix two-metre skeds, either over the air or through the Club—ZB2A, R.A.F. New Camp, Gib.

Rather unhappily, G2BJY (Walsall) writes that he wishes to "withdraw from all tables because the commercial interests have taken over our hobby—constructional work and ability are no longer the criteria for getting results, when you can buy them." Well, we can see his point—but the fact remains that *operating* ability and know-how (irrespective

of gear and power used) still determine results, on VHF as on any other band.

For G3IOE (Newcastle) the GM3RUF/P outing was a huge success—in spite of all the difficulties, he missed them only in Dunbartonshire. Alan now has a 10-ele Yagi for two metres and finds he can raise the GM's fairly easily. An interesting observation from him is that while working G3EDD in Cambridge during a thunderstorm, signals from the distant end peaked to S7-9 whenever there came a flash of lightning.

G2CDX (Cambridge), from a few feet above sea level, has now worked 529 different stations on two metres, with 19C accounted for since September 1.

Very much in the new-boy category on two metres are G3UAV and G3UAW, father and son of Harborne, Birmingham—and, of course, we are delighted to welcome them to this feature. They took the R.A.E. together, and passed, "which relieved the tension somewhat." Père G3UAV, being already a first-class CW operator in quite another context, meant that in the end there was no difficulty for either of them when it came to the Morse Test. The joint gear consists of a 10-ele J-Beam at 420ft. a.s.l., with a reasonable take-off in all directions; a crystal-controlled converter into an AR88LF on the Rx side; and the Tx runs a QV02-6 in the PA on 145.35 mc. "Not much by some people's standards but good enough for a start," says G3UAW, who was with G3KXA on the GM3RUF/P expedition.

Another interesting first-report on two metres comes from G3UFA (Digswell, Herts.), who has already worked no less than 22 counties for the new Two Metre Annual. He is aiming to become operational on the other two VHF bands as well, in due course. Yet another new claimant this month is G3UCS (Kidderminster), who is making a start in the Three-Band.

G3CO (lately of Hartley, Kent, and soon to be near Colchester) writes to bring his year's work up to date, and explains that really, what with the preoccupations of

moving for a change of job, his activity has been low. However, Jack is looking forward to coming on again from the new QTH—and he will find a keen group round that way.

G3AOS (Hale Barns, Ches.) says they are claiming 27,773 points for the N/W VHF Group in the recent two-metre portable contest, and 39,225 for their three-band entry—which should put them somewhere up near the front! In this particular category, the A.E.R.E. boys claim 36,200 points.

Reports and claims for the various VHF bands are also acknowledged from G2XV, G3TNO, G3PSL, G3FIJ, EI6AS, G3TOT, GC3OBM, G3TPF (who was GD3TPF/P in August, with some 20 stations worked on four metres); G3PMJ (who reports on the GM3PLX/P trip to Kirkcudbright, also on four metres, with 24 stations worked, including G2AUD, G2BKC, G3EHY, G3IMV and G3SKR); and from G3DVQ, G3HRH, G3FNM, G3HWR and G3OWA.

#### Manchester VHF Convention

This was another very successful event, the product of much hard work by the North-West VHF Group. The highlight of Saturday, September 18, was probably the lecture and discussion on E-M-E working, by G3CCH /G3LTF, who held their audience for over an hour. Speakers at the Dinner, for which about 110 places were taken, included G3AOS, G3BA, G3HRH and G6FO (from the chair).

The very active N/W Group have undertaken to put on a VHF/P station for the Northern Amateur Convention at Belle Vue, Manchester, on October 10. when they will be signing GB3BVC; they ask for QSO's on two metres and 70 cm.

#### Conclusion

Space has once again run out, with much still to say. Deadline for our next must be **Monday, October 18**, with everything addressed simply: *VHF, Short Wave Magazine, Buckingham*. See you at the Exhibition, October 27-30. 73 de A.J.D.

#### SEVENTY CENTIMETRES ALL-TIME COUNTIES WORKED Starting Figure, 4

Worked	Station
44	G2XV
40	G2CIW
36	G3JMA
35	G3KPT, G6NF
33	G3JHM/A, G3LTF
32	G3JLA, G3LHA, G3LQR, GW3ATM
31	G3JWQ, G5YV
30	G3EDD, G3KEQ
28	G3HAZ, G3HBW, G3NNG
26	GW2ADZ
23	G3BKQ, G6NB
21	G3AYC, G3IOO
19	G3FIJ, G5UM (122)
18	G2OI
17	EI2W, G3BA, G3BNL, G3MPS, G5QA
16	G2DDD, G3BYV, G3MED, G3OBD
15	G4AC, G4RO
14	G2BDX, G2HDZ, G3FAN, G5DS
13	G3HRH, G3HWR, G6XA
12	G3NJO/T, G5BD
10	G3IRW, G3LZN, G5FK
7	G2HDY, G3JHM, G6AX/P
6	G3EKP, G3KHA, G3WW
5	G3FUL, G3IRA, G3IUD, G3LTN, G5ML
4	G3JGY, G3KQF

On working four Counties or more on the 70-Centimetre band, a list showing stations and counties should be sent in for this Table, and thereafter new counties worked notified as they accrue.

# THE OTHER MAN'S STATION

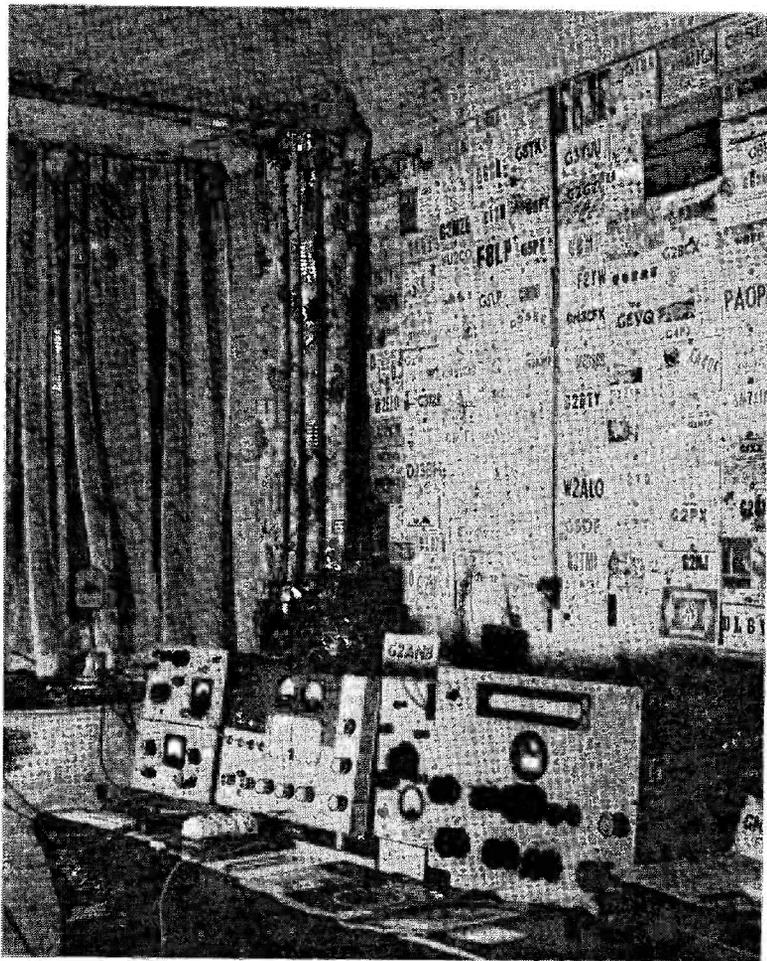
**G2ANB**

**T**HOUGH it was not until 1936 that he got his non-radiating licence under callsign 2ANB, our subject this month—R. Brand, 78 Broad Walk, Hockley, Essex — has been interested in Amateur Radio for a good 40 years, and a regular reader of *SHORT WAVE MAGAZINE* for nearly thirty. Indeed, he must be one of the very few who still have a copy of our issue No. 1, for February 1937, which featured a small Tx using a twin-triode in CO/PA—and a very handy little job it was, too!

First practical work in "wireless" was in 1921, at the tender age of 12 years, from Loughton, Essex, with Capt. Eckersley's famous station 2MT at Writtle within range. In 1925, while using an Rx involving five bright-emitter valves, thirteen independent variable controls and an enormous horn speaker, a local amateur transmitter was heard (in the next road)—and after that interest was quickened and progress became rapid.

With the full radiating permit issued after the War to all pre-1939 AA licence holders, G2ANB has graduated to the set-up shown here. The main Tx is a Gelo VFO into a 6146 PA modulated by a pair of EL84's, with a smaller Tx for local working on Top Band, the receiver being a CR-100. The ancillaries at G2ANB include two ATU's, covering between them 15-20-40-80-160m.; a field strength meter-cum-monitor; an SWR indicator; and a Type 10 Crystal Calibrator. Aerials available are a doublet variation and a 130ft. end-on wire.

Main activity nowadays is on 80 metres but the



other bands are also worked. A feature of the station of G2ANB is a complete card-index system, 100 per cent accurate and right up-to-date—and there can be few who could claim that! In addition to the interesting selection of QSL's to be seen on the wall, many hundreds of QSO record-cards, all filed in correct order, note every contact made over the last 15 years, with brief details of the other man's station as gleaned during the QSO. These index cards are written out in the course of each contact.

Before the war, 2ANB (as he was then) was in the radio trade as a dealer. By 1950, he was with the Air Ministry, and now he is responsible for the procurement of radio equipment for an important department of the Government.

He remarks that over the years he has built many items of equipment described in *SHORT WAVE MAGAZINE*—and, with a slight blush, we admit that he also says he would not be without the *Magazine*. It would be interesting to know how many of our readers of today not only go back to our No. 1 of February 1937, but still possess that copy!

# NEW QTH'S

This space is available for the publication of the addresses of all holders of new U.K. calligns, as issued, or changes of address of transmitters already licensed. All addresses published here are reprinted in the U.K. section of the "RADIO AMATEUR CALL BOOK" in preparation. QTH's are inserted as they are received, up to the limit of the space allowance each month. Please write clearly and address on a separate slip to QTH Section.

**G3TNR**, A. J. H. Field, 3 Coppice Avenue, Hatfield, Doncaster, Yorkshire.

**G3TOO**, D. Morgan, 50 Newhall Street, Cannock, Staffs.

**G3TZL**, P. A. Bowen, 147 The Crossway, Portchester, Fareham, Hants.

**G3UAL**, J. P. Price, 20 Arden Close, Royal Leamington Spa, Warks.

**G3UBB**, D. Fill, Candleford, Brook Close, Packington, Ashby-de-la-Zouch, Leics.

**G3UBP**, C. Riches, 83 High Street, Wellington, Kent.

**G3UEN**, R. W. Stiles, Up'ands, North Marine Road, Flamborough, Bridlington, Yorkshire, E.R.

**G3UFW**, J. Stevens, 28 Orchard Way, Addlestone, Surrey. (Tel. Weybridge 44876.)

**G3UGE**, T. W. Willetts, 11 Milton Street, Tantany, West Bromwich, Staffs.

**G3UHE**, J. Bolton, 10 Meadow Close, Lillington, Leamington Spa, Warks.

**G3UHX**, A. B. Thorpe, 12 Newnham Lane, Binstead, Ryde, Isle of Wight.

**G3UJD**, T. Hulme, 78 York Road, Farnborough, Hants.

**G3UJK**, J. W. Burnham, 304 Desborough Avenue, High Wycombe, Bucks.

**G3UJN**, G. O. Aboh, 161 Ilford Lane, Ilford, Essex.

**G3UJU**, M. E. F. Haslam, Holmwood Park Farm House, Holmwood, Dorking, Surrey.

**G3UJZ**, J. G. McNaught, 20 Hillfield Mansions, Haverstock Hill, London, N.W.3.

**G3UKH**, P. A. Hopwood, 58 Bolbec Road, Fenham, Newcastle-on-Tyne, 4.

**G3UKQ**, J. R. Pencavel, 17 Westover Road, Copnor, Portsmouth, Hants.

**G3UKV**, M. Vincent, 7 Pittville Crescent Lane, Cheltenham, Glos.

**G3UKZ**, E. Grupman, 151 Downham Crescent, Prestwich, Lancs.

**G3ULA**, E. H. Hopper, 57 Mill Road, Fareham, Hants.

**G3ULD**, G. H. Cawkwell, 50 Station Road, Patrington, Hull, Yorkshire.

**G3ULN**, M. Hibbitt, 123 Stanborough Road, Plymstock, Plymouth, Devon.

**GM3ULP**, G. A. Hunter, 107 Bonkle Road, Newmains, Wishaw, Lanarkshire.

**G3ULU**, V. H. Baldwin, 7 Oldbury Court Road, Fishponds, Bristol. (Tel. Bristol 653307.)

**G3ULY**, D. Youngman, Hallowell, Culgaith, Penrith, Cumberland. (Tel. Culgaith 286.)

**GW3UMD**, N. A. Maxwell, B.Sc., 367 Gower Road, Killay, Swansea, Glam. (Tel. Swansea 22909.)

**G3UMK**, T. W. Jones, 37 Birmingham Road, Aldridge, Walsall, Staffs.

**G3UML**, L. S. Margolis, 95 Collinwood Gardens, Clayhall, Ilford, Essex. (Tel. CREscent 0882.)

**G3UMM**, P. T. Hudson, 8 Johnstone Street, Bath, Somerset.

**G3UMQ**, H. S. Blades, 4 Park View, Botley, Southampton, Hants. (Tel. Botley 2833.)

**G6ABK/T**, S. J. Birkill, 31 Stanhope Gardens, Queens Drive, Barnsley, Yorkshire.

**G8AIW**, P. S. Adams, Icknield Way House, A.E.R.E., Harwell, Didcot, Berks.

**G8AJM**, C. J. Payne, 122 Ryefield Avenue, Hillingdon, Middlesex. (Tel. UXBridge 37624.)

**G8AKG**, G. H. Gardener, Grad.I.E.E., 114 Shirley Avenue, Reading, Berks. (Tel. Reading 84177.)

**G8AKJ**, E. C. Forster, 9 Hawthorn Drive, Cadishead, Manchester. (Tel. Irlam 2950.)

**G8AKQ**, S. J. Birkill, 31 Stanhope Gardens, Queens Drive, Barnsley, Yorkshire.

**G8AKR**, E. O. T. Sabin, 8 Abbots Close, Monkmoor, Shrewsbury, Salop.

## CHANGE OF ADDRESS

**G3AUU**, A. J. Hill (ex-9M4JH), 9 Trull Green Drive, Taunton, Somerset. (Tel. Taunton 3121.)

**G3DII**, J. Bell, Ash Lawn, Ryland Road, Welton, Lincs.

**G3EMD**, M. R. Hassall, 45 Gower Road, Halesowen, Birmingham. (Tel. Woodgate 4470.)

**G3JLF**, L. Beevers, c/o The Golden Lion Hotel, 136 Manchester Road, Clifton, Manchester, Lancs. (Tel. SWinton 3036.)

**G3JQS**, J. Guttridge, 226 Wimpole Road, Barton, Cambridge, Cambs.

**G3KKF**, J. Court, 2 Martin Dale Crescent, Martin Hill, Dover, Kent.

**G3LXJ**, F. J. Fisher, 158 Severn Drive, Upminster, Essex.

**GM3NKG**, A. Campbell, 2 Charlotte Street, Shotts, Lanarkshire.

**G3NNG**, C. L. Desborough, 22 Westland Road, Faringdon, Berks.

**G3OMA**, S. Kay, 27 Hawthorn Crescent, High Grange Estate, Belmont, Durham.

**GM3ONA**, J. Paterson, 55 Main Street, Patna, Ayr. (Tel. Patna 309.)

**G3PHN**, S. B. Lord, Newfield House, Moira, Leics. (Tel. Swadlescote 7537.)

**G3RRL**, W. S. Teanby, 1 Gothic Villas, Ealand, Scunthorpe, Lincs.

**G3SCD**, D. B. Dunn, The Poplars, Scamblesby, Louth, Lincs.

**G3SRM**, S. Hulme, 52 Bentley Road, Chell Heath, Stoke-on-Trent, Staffs.

**G3SRW**, G. McGimpsey, 57 Athenaeum Place, Muswell Hill, London, N.10.

**G3SVH**, D. H. Perks, Arvon, Wolverhampton Road, Cheslyn Hay, Walsall, Staffs.

**G3TIN**, B. M. Taylor, 11 Mob Lane, High Heath, Pelsall, Staffs.

**G3TKU**, W. R. Griffiths, 13 South Crofts, Nantwich, Cheshire.

# THE MONTH WITH THE CLUBS

By "Club Secretary"

(Deadline for November Issue: October 15)

(Please address all reports for this feature to "Club Secretary," Editorial Dept., SHORT WAVE MAGAZINE, Buckingham.)

ANOTHER "MCC" is almost upon us, and it seems quite incredible that this should be the *Twentieth* of the series. The form of the contest changed a lot during its first few years, but it has now been pretty well settled for some time, except for experiments in the method of scoring.

It has been decided that last year's set-up is the fairest yet devised, and the rules have not been altered this year, and will probably stay as they are for quite a time.

Any scoring system based on *boundaries* is certain to be unfair to someone, somewhere. But all Clubs should remember that they are competing, primarily, with the others in the same *region*—and that to come first in their own region is just as creditable as being at the head of the table, since inconsistencies of all kinds are bound to exist.

The handicappers have devised the present system with the intention that the top-scorers in the various regions shall show *roughly* the same numbers of points, and in their opinion this is entirely possible. Last year three different regions shared the top three places, and although the highest GM and GW stations were somewhat lower down the list than in previous years, the fact remains that those stations actually made *fewer contacts* than the other GM and GW stations who, in previous years, were right up at the top.

"Fair do's for all" is the aim of the organisers, and they stand by the scoring method in the conviction that this is possible. Apart from this, think of all the Clubs who enter just for the fun of it, or for the operating experience it gives their members.

We also gather that meetings during October and November tend to be livelier than usual, on account of spirited (or even heated) debates on the subject of aeriels, receivers, and whether so-and-so is as good an operator as he thinks he is!

All entrants should be well down to the practical details and organisation by now, and all that is left for us to say is that a little thought and action *now* is apt to be far more valuable than panic measures on November 13! And may the best club win . . .

## ACTIVITY REPORTS

**Blackpool & Fylde**, at their Squires Gate Club-room, meet every Monday at 7.30 for Morse instruction, 8 p.m. for the lecture, if scheduled. October 11, however, is an exception, with an evening meal at the Stuart Hotel. On the 4th there is a Junk Sale; on the 25th, G8GG will talk about, and demonstrate, his latest receiver. October 18 and

November 1 will be Open Evenings.

**Bromsgrove** recently had a talk from G5SS on Curing TVI, and their meeting on October 8 (8 p.m.) will take the form of a "Radio Twenty Questions" session. Morse classes now precede the meetings and are well supported.

**Stoke-on-Trent** have started a competition for the best home-built equipment, and the winner will receive a silver cup in mid-December. November 4 is Ladies' Night, which will include a film show, and GB3NSS will be operated (for North Staffs.) during the J.O.T.A., the Scout event during October 16-17, from Kibblestone Camp, near Stone.

**Coppull** now intend to meet every Saturday at 2 p.m. and also to have a lecture-meeting on the third Friday of the month. G3KXO operates the Club Tx on Top Band every Saturday, and this seems to attract new members. A visit is planned to the ITA station at Winter Hill, Lancs., when a film will be taken, but no date is yet fixed.

**Coventry** will hold their usual four meetings, as follows: October 4, Slide Show by G3CZS; 11th, G2LU on "Twelve Months with a Beam"; 18th, Mullard Film Show; 25th, Night on the Air. **Harrow**, too, have their programme well filled in, with Practical Nights on the 8th and 22nd; a Manufacturer's Demonstration on the 1st (K.W. Electronics or J-Beams hoped for); G6CJ's well-known Antenna Lecture on the 15th; and a Junk Sale on the 29th—all in the Science Lab. of Roxeth Manor Secondary School, Eastcote Lane, 8 to 10 p.m. with tea served at "half-time."

**Newark** propose to publish a new club bulletin shortly; meanwhile they have had talks on Transistors and SSB, and a visit to the local Fire Station. One of their members visited 4U1ITU at Geneva while on holiday, and will be showing a film he made there.

**Torbay**, at their August meeting, had a very informative lecture-demonstration on Modulation Equipment, by G3ABU. **Stratford-upon-Avon** announce their "special" annual lecture—this time by G5PP on the subject of Mobile Operation. This will be on October 15, 8 p.m. at the Union Club, with a "talk-in" by G3PGU/A. On October 1 there will be a talk on the club, with slides, aimed at attracting new members; on the 8th, G3OOQ will discuss Aerials; the 22nd is "Club-Night"; and on the 29th G3HZG talks on "Ham Hop in Sweden." Normal meetings at the Clubroom, Mason's Arms, Sanctus Road, at 8 p.m.

**Spenn Valley** forward their nicely-produced syllabus, giving details of club events right through to next

July. They must be both clever, and fortunate, to be able to organise so far ahead! On October 14 they will have a talk from BICC on the TV Mast at Emley Moor; on the 28th the subject is Radio Astronomy (L. M. Dougherty, B.Sc., F.R.A.S.). For the "juniors" (separately listed in the syllabus) there is a talk on Morse Code on October 7, and "Starting on Two Metres" on the 21st. Ready to follow up are three meetings devoted to Transmitter Design.

**Uxbridge** seem to have had a very successful time at the Hounslow Flower Show, despite being asked "Can you contact my son in Brisbane?" while they were on Top Band. On October 4 and 11 they will be preparing for the I.O.T.A., for which they will be signing GB3UBS from a camp site at Stoke Poges, and all bands from Two upwards. December 13 is the date fixed for their "Bangers and Mash Supper" —no venue yet fixed.

**Northern Heights** have visited an atomic power station, and run an exhibit at the Halifax Agricultural Show. On October 13 they will be setting up their I.O.T.A. station; on the 20th they visit Baird TV in Bradford; and on the 30th they have organised a party to visit the Exhibition at the Seymour Hall.

**Acton, Brentford & Chiswick** are holding a "Members' Holiday Slides" evening on October 19—7.30 p.m. at 66 High Road, Chiswick, and visitors welcome. **Derby** will hold their contest for the President's D/F Cup on October 3—7.30 p.m. in Room 4, 119 Green Lane, Derby. On the 6th there will be a Junk Sale; 13th, Tidy-up and Inventory Check; 20th, Social Evening and Ladies' Night; 27th, Component Quiz Competition (the parts ranging from 1911 to 1965!).

**Bradford** will be meeting, in the Technical College at 7.30 p.m., for their usual events, but on October 12 they pay a visit to the Bradford Police Hq. On the 26th the title of the talk is "Transistors in the Shack," by G3TDZ. **Guildford** will hear a tape lecture on Tx Design and TVI on October 8, and will hold a general meeting on the 22nd. They have recently visited a TV relay station, and held a mobile rally in collaboration with other local clubs.

**Crawley** report a "mammoth junk sale," with G3FRV as auctioneer (anyone need any mammoth junks?). G3PHG is in the chair for the local R.A.E. course at the Evening Institute. The main October meeting will be held on the 13th, to avoid a clash with the IRC Exhibition later in the month.

**Mid-Warwickshire** will be taking part in the I.O.T.A. and on October 4 they will have a lecture on Workshop Practice; October 18 is booked for a Junk Sale. **Reading** report their new clubroom (St. Paul's Hall, Whitley Wood Lane) taking shape nicely, and they hope to have the club Tx (G3ULT) operating soon. They now meet twice monthly, on Tuesdays—details from the secretary.

**Yeovil** have been operating GB2YC from the Yeovil Youth Centre during the past week, continuing on October 1-2. All modes, all bands 160 to Ten. **Wimbledon** meet on the second Friday, at their Hq. at the Community Centre, St. George's Road, beginning at 8 p.m. and including refreshments. They have over 50 members, but room for more. Their

## MCC—TWENTIETH ANNUAL TOP BAND CLUB TRANSMITTING CONTEST

### RULES

- Duration** : Saturday, November 13 and Sunday, November 14; on both days between the hours of 1700 and 2100 GMT (eight operating hours in all).
- Frequency and Power** : All contacts to be made in the 1800-2000 kc band, using CW, with a power input not exceeding 10 watts to the final stage. All reasonable precautions will be taken to avoid interference with other services using the band.
- Call Signs** : Where a Club has its own transmitting licence and callsign, that callsign is to be used. Clubs without their own call may nominate a member's station as their official entry.
- Calling** : Clubs with call "CQ MCC," using the "three times three" technique. Infringement of this rule by the use of long CQ calls may entail disqualification.
- Scoring** : Other Club stations may be worked on each of the two days, and these contacts will count for three points each time. Non-Club stations may be worked once only, and will count for one point only. Inter-Club contacts will take the form of an exchange of five-character groups comprising RST and Club identification letters.
- Non-Club Contacts** : Contacts with non-Club stations, counting for one point, will take the form of logging the RST and the other station's QTH. The Club's own QTH, not the identification letters, should be sent to complete the QSO.
- Logs** : Contest logs are to be neatly set out as follows: One side only of quarto or foolscap sheets should be ruled into eight columns, with *name and callsign of Club station on each sheet*, headed thus: Col. 1, *Date and Time*. Col. 2, *Callsign of station worked*. Col. 3, *Outgoing five-character group*. Col. 4, *Incoming five-character group*. Col. 5, *RST out-going* (to a Non-Club station). Col. 6, *RST incoming* (from a Non-Club station). Col. 7, *QTH of Non-Club station*. Col. 8, *Points claimed for contact*. Col. 8 is to be totalled at the foot of each page, and the running totals brought forward. The last page of the log should contain the following summary:  
Total score for Club contacts, at three points per contact; this figure then to be multiplied by the Zone multiplier (*see opposite*), e.g. a station in the GW Zone making 150 Club contacts would give the figure of 450, and then apply the multiplier of 1.1, giving a Club score of 495; total number of non-Club contacts; total score. Comments on the equipment used, number of operators employed, general impressions and experiences are also invited, and should be added at the end of the log.
- Any Club station radiating a note consistently worse than T9 will be liable to disqualification.
- Logs, addressed to "Club Secretary," **SHORT WAVE MAGAZINE**, Buckingham, must be posted to reach us not later than Friday, November 26, 1965. The Editor's decision on the results will be final, and will be published in the January, 1966 issue of **SHORT WAVE MAGAZINE**.

## THE MCC ZONES

Although, under the new rules, all Club contacts count for the same score of three points, and there is thus no need to know the Zone in which the station worked is located, it is necessary for each Club to know the Zone in which it is itself situated, for the purpose of applying the multiplier to its own final score of Club contacts. The Zones are as follows:

- GM Zone:** All Scottish counties.
- Northern Zone:** Northumberland, Durham, Cumberland, Westmorland, Lancashire and Yorkshire.
- Midland Zone:** Cheshire, Derby, Shropshire, Stafford, Hereford, Worcester, Warwick, Nottingham, Lincoln, Leicester, Rutland, Northampton, Bedford, Huntingdon, Cambridge, Norfolk, Suffolk.
- Southern Zone:** Somerset, Dorset, Gloucester, Wilts., Berks., Hants., Oxford, Bucks., Herts., Middlesex, Surrey, Sussex, Kent, Essex, London.
- South-Western Zone:** Cornwall and Devon.

- GW Zone:** All Welsh counties.
- GI/GD Zone:** All GI counties and the Isle of Man.
- GC Zone:** Channel Islands.

**Scoring**

The score for Club contacts only will be arrived at by counting three points per contact (irrespective of Zones) and then applying to the total the following multiplier:

- GM Zone:** 2.0  
**Northern Zone:** 1.25  
**Midland and GW Zones:** 1.1  
**South-Western Zone:** 1.5  
**GI/GD Zone:** 1.6  
**GC Zone:** 1.3  
**Southern Zone:** 1.0

It is emphasised once again that all Club contacts count three points: but that the total of such points (not including non-Club contacts) is multiplied, at the end, by the appropriate factor shown here.

### IDENTIFICATION LETTERS FOR CLUBS IN "MCC"

*First Alphabetical List*

<p><i>AC</i> Acton, Brentford &amp; Chiswick</p> <p><i>AG</i> Ash Green (Surrey)</p> <p><i>AI</i> Ainsdale (Lancs.)</p> <p><i>BB</i> BBC, Lime Grove</p> <p><i>BH</i> BBC, Bush House</p> <p><i>BI</i> Bristol</p> <p><i>BJ</i> Bath</p> <p><i>BL</i> BBC, Langham Place</p> <p><i>BM</i> Blackwood, Mon.</p> <p><i>BQ</i> Burnham Beeches, Bucks.</p> <p><i>BS</i> Burnham-on-Sea, "A"</p> <p><i>BV</i> Burnham-on-Sea, "B"</p> <p><i>BX</i> Burslem, Staffs.</p> <p><i>CA</i> Cheltenham</p> <p><i>CB</i> City of Belfast</p> <p><i>CC</i> Cannock Chase</p> <p><i>CL</i> Clifton (London), "A"</p> <p><i>CN</i> Conway Valley</p> <p><i>CR</i> Crawley, "A"</p> <p><i>CT</i> Crawley, "C"</p> <p><i>CU</i> 65th Sig. Regt. (Scotland)</p> <p><i>CV</i> Coventry</p> <p><i>CW</i> Cotswold RCC</p> <p><i>CX</i> Crawley, "B"</p> <p><i>CY</i> Chorley &amp; Leyland, Lancs.</p> <p><i>DH</i> Dollis Hill, GPO</p> <p><i>DR</i> Derby</p> <p><i>DS</i> Dursley</p> <p><i>ED</i> Edgware</p> <p><i>EL</i> East Worcs.</p> <p><i>ER</i> Echelford</p> <p><i>EW</i> East Cheam</p> <p><i>GD</i> Guildford</p> <p><i>GF</i> Greenford</p> <p><i>GN</i> Grafton</p> <p><i>GR</i> Gravesend</p>	<p><i>GS</i> GEC Apprentices, Coventry</p> <p><i>GY</i> Grimsby</p> <p><i>HA</i> Halifax</p> <p><i>HR</i> Harlow</p> <p><i>HS</i> Hounslow</p> <p><i>HW</i> Harrow</p> <p><i>HX</i> Harwell (AERE), "A"</p> <p><i>HY</i> Harwell (AERE), "B"</p> <p><i>IL</i> Isle of Man</p> <p><i>IW</i> Isle of Wight</p> <p><i>KC</i> Kings Norton RCC</p> <p><i>LC</i> Leicester</p> <p><i>LD</i> Loughton</p> <p><i>LF</i> Leven (Fife)</p> <p><i>LH</i> Loughborough</p> <p><i>LM</i> Lymington</p> <p><i>LN</i> Loddon Valley</p> <p><i>LP</i> 42nd Sig. Regt. (Liverpool)</p> <p><i>LV</i> Liverpool</p> <p><i>LY</i> Leeswood</p> <p><i>MA</i> Macclesfield</p> <p><i>MD</i> Medway</p> <p><i>MF</i> Moray Firth</p> <p><i>MG</i> Magnus G.S. (Newark)</p> <p><i>MO</i> Morecambe</p> <p><i>MP</i> Marconi Apprentices (Chelmsford)</p> <p><i>MS</i> Midland</p> <p><i>MY</i> Maidstone YMCA</p> <p><i>MZ</i> Manchester</p> <p><i>NH</i> Northern Heights</p> <p><i>NK</i> Newark</p> <p><i>NL</i> Northampton College, London</p> <p><i>NM</i> Newport, Mon.</p> <p><i>NN</i> North Notts.</p>	<p><i>NP</i> Northern Poly-technic, London</p> <p><i>NT</i> Nottingham</p> <p><i>NU</i> Newcastle University</p> <p><i>NY</i> Newbury</p> <p><i>OX</i> Oxford</p> <p><i>PD</i> Paddington</p> <p><i>PL</i> Plymouth</p> <p><i>PY</i> Purley</p> <p><i>RA</i> Reigate "A"</p> <p><i>RB</i> Reigate "B"</p> <p><i>RC</i> Reigate "C"</p> <p><i>RF</i> 92nd Sig. Regt., Forfar</p> <p><i>RG</i> No. 1 MHU, Middx.</p> <p><i>RM</i> RAF Kinloss</p> <p><i>RN</i> Royal Naval ARS</p> <p><i>RP</i> R. Sigs., Catterick</p> <p><i>RS</i> Radio Club of Scotland</p> <p><i>RV</i> Ravensbourne</p> <p><i>RY</i> Rugby</p> <p><i>RZ</i> RAF Sealand</p> <p><i>SC</i> Scunthorpe</p>	<p><i>SD</i> Sheffield "A"</p> <p><i>SF</i> Sunderland Tech. College</p> <p><i>SJ</i> Sheffield "B"</p> <p><i>SK</i> Sole Bay</p> <p><i>SL</i> South London Mobile</p> <p><i>SM</i> South Manchester</p> <p><i>SQ</i> Silverthorn</p> <p><i>SR</i> Scarborough</p> <p><i>SS</i> South Shields</p> <p><i>SV</i> Stevenage</p> <p><i>SW</i> South-West Essex Tech. College</p> <p><i>SX</i> Stoke-on-Trent</p> <p><i>SY</i> Surrey (Croydon)</p> <p><i>SZ</i> Sutton &amp; Cheam</p> <p><i>UK</i> University of Keele</p> <p><i>VR</i> Verulam</p> <p><i>VS</i> BAC, Hurn</p> <p><i>WO</i> Wolverhampton</p> <p><i>WS</i> Wimbledon</p> <p><i>WT</i> Worcester</p> <p><i>WV</i> Wolverton</p> <p><i>YV</i> Yeovil</p>
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(NOTE: This list includes all Clubs recently taking part in "MCC." Other Clubs desiring to enter for this year's event should write in for identification letters, enclosing a stamped addressed envelope, before October 16, for publication next month. Letters should be addressed "MCC," Short Wave Magazine, Buckingham.)

**EXAMPLES FOR OPERATING**

Coventry works Derby, sends 579CV; Derby replies 589DR. Or Oxford works Paddington, receiving 589PD and sending 569OX, etc.

**EXAMPLES FOR SCORING**

Blackwood (BM) in GW Zone makes 75 Club contacts and 10 single-point (non-Club) QSO's. The score for Club contacts is  $75 \times 3$  (225) and the multiplier allowed is 1.1, bringing this up to 247. Total score is thus  $247 + 10 = 257$ .

Radio Club of Scotland (RS), in GM Zone, makes 45 Club contacts and 10 single-pointers. The score for Club contacts is  $45 \times 3$  (135) and subject to a multiplier of 2, bringing it up to 270. Total score is  $270 + 10 = 280$ .

Top Band net is at 2030 GMT on Sundays, and they will shortly start a CW net. Recent talks, demonstrations and visits have been well attended, and the club newsletter is reported to be going along well.

**Oxford University** have arranged a full programme for October, with the Freshmen's Fair on the 8th, a talk on Hi-Fi (by local experts) on the 20th, and a discussion on Amateur Radio, opened by G3RKK, on the 27th. Radio Control of Models will be dealt with on November 3. All meetings are held in the Scout and Guide Hut, St. Ebbe's Car Park, Oxford, and the secretary would be glad to hear from interested amateurs and also from other University Clubs who wish to arrange skeds.

**Baden-Powell House** are naturally more concerned with the Jamboree-on-the-Air than most clubs, and they hope that GB3BPH will work more stations than ever this year, on October 16-17. They are giving a talk and demonstration to the International Scout Club (at Baden-Powell House) on October 12, and their next normal meeting will be on the 21st. The club station G3TGS is now well established, and on the air with a KW-2000 on Tuesday and Saturday evenings.

**Roding Boys' Society** ran a stand at the Harlow Town Show on the Bank Holiday weekend, and moved on thence to their annual week's camp at Nazeing. More time was spent on nature study and astronomy than on QSO's, but at least they will have an interesting series of talks for the months to come.

**South Shields** re-elected most of their officers at

the AGM, and will be meeting on Friday evenings in the Trinity House Social Centre. On October 1 they will have a talk on techniques with metal-work, by G3SFL, and on November 5 G6VG will be introducing his new SSB transmitter. The chairman for these and future meetings will be G2BCY.

On October 10 the **Northern Radio Societies' Association** will be holding their Convention at Belle Vue, Manchester. This event was covered on p.398 of the September issue, but this paragraph may serve to bring it to the notice of readers who would like to attend. Talk-in stations will be operating; the main stations will be on the air from 1100 hrs. on five bands, signing GB2BVC, and there is no charge, other than the standard one of 2s. 6d., to enter Belle Vue.

#### Overseas Clubs

Each month we receive various publications from overseas clubs, which are, in most cases, national radio societies rather than local groups. This month we acknowledge the following, with thanks:

*Auto-Call* (Washington, D.C.) is published by the Foundation for Amateur Radio, and serves more than twenty clubs in the Washington area. It is written in a racy style and pulls no punches.

*Collector and Emitter* is a similar publication, and comes from the Aeronautical Center Amateur Radio Club, Oklahoma. We never fail to find something of unusual interest in it.

The *MARTS Newsletter*, coming from the Malaysian Amateur Radio Society, belies its modest title by running to 30 pages and including much

#### Names and Addresses of Club Secretaries reporting in this issue :

ACTON, BRENTFORD & CHISWICK: W. G. Dyer, G3GEH, 188 Gunnersbury Avenue, London, W.3.  
 BADEN-POWELL HOUSE: A. Watts, G3FXC, 8 Thornycroft Court, Kew Road, Richmond.  
 BLACKPOOL & FLYDE: J. Boulter, G3OCX, 175 West Drive, Cleveleys, Blackpool.  
 BRADFORD: J. D. Midgley, G3SAO, 77 Brantwood Road, Bradford 9.  
 BROMSGROVE: J. K. Harvey, 22 Elm Grove, Bromsgrove, Wores.  
 CHESHAM: D. Kind, 19 Hollybush Road, Chesham.  
 COPPULL: R. Calderbank, 165 Preston Road, Coppull, Chorley.  
 CORNISH: M. J. Harvey, Oak Farm, Carnon Downs, Truro.  
 COVENTRY: A. J. Wilkes, G3PQQ, 141 Overslade Crescent, Coundon, Coventry.  
 CRAWLEY: R. G. B. Vaughan, G3FRV, 5 Filbert Crescent, Gossops Green, Crawley.  
 CRAY VALLEY: S. W. H. Harrison, G3KYV, 30 Plaistow Grove, Bromley.  
 CRYSTAL PALACE: G. M. C. Stone, G3FZL, 10 Liphook Crescent, London, S.E.23.  
 DERBY: F. C. Ward, G2CVV, 5 Uplands Avenue, Littleover, Derby.  
 ECHELFORD: A. G. Wheeler, G3RHF, 88 Village Way, Ashford, Middx.  
 GUILDFORD: M. Birch, G3KMO, Sorrento, White Lane, Ash Green, Aldershot.  
 HARROW: C. J. Rees, G3TUX, 17 Colburn Avenue, Hatch End, Pinner.  
 MANCHESTER: K. Kahn, G3RTU, 12 Cliffdale Drive, Manchester 8.  
 MID-WARWICKSHIRE: H. C. Loxley, 51 Guy Street, Warwick.  
 NEWARK: G. Francis, G3TWV, 93 Balderton Gate, Newark.  
 NORTHERN HEIGHTS: A. Robinson, G3MDW, Candy Cabin, Ogden, Halifax.  
 NORTH KENT: P. G. Wells, G3UFR, 25 St. Davids Road, Hextable, Swanley, Kent.  
 OXFORD UNIVERSITY: A. J. Shepherd, G3RKK, 3 Cearn Way, Coulsdon, Surrey.  
 PURLEY: A. Frost, G3FTQ, 62 Gonville Road, Thornton Heath, Surrey.  
 RAIBC: Mrs. F. E. Woolley, G3LWY, 10 Sturton Road, Saxilby, Lincoln.

RADIO CLUB OF SCOTLAND: A. Barnes, GM3LTB, 7 South Park Terrace, Glasgow.  
 READING: N. C. Taylor, G3TOQ, 83 Stoneham Close, Reading.  
 REIGATE: F. D. Thom, G3NKT, 12 Willow Road, Redhill.  
 RODING BOYS' CLUB: R. J. Phipps, G3UAI, 51 James Lane, London, E.11.  
 SALTASH: D. Bowers, 95 Grenfell Avenue, Saltash.  
 SOUTH BIRMINGHAM: J. Rowley, G3TQQ, 195 Castle Lane, Solihull.  
 SOUTHGATE: R. E. Wilkinson, G3TXA, 23 Ashridge Gardens, London, N.13.  
 SOUTH LONDON MOBILE: J. R. Doughty, 17 Hookham Court, Patmore Estate, London, S.W.8.  
 SOUTH SHIELDS: D. Forster, G3KZZ, 41 Marlborough Street, South Shields.  
 SPALDING: L. J. Carter, G3TRO, 53 London Road, Spalding.  
 SPEN VALLEY: N. Pride, 100 Raikes Lane, Birstall, Leeds.  
 STOKE-ON-TRENT: E. Swinerton, G3UBU, 51 Bailey Road, Heron Cross, Stoke-on-Trent.  
 STRATFORD-UPON-AVON: M. Webb, G3OOQ, 14 Townsend Road, Tiddington, Stratford-upon-Avon.  
 SURREY (CROYDON): R. Morrison, G3KGA, 33 Sefton Road, Addiscombe, Croydon.  
 SUTTON COLDFIELD: K. H. Varney, G3DMV, 149 Whitehouse Common Road, Sutton Coldfield.  
 TORBAY: Mrs. G. Western, G3NQD, 118 Salisbury Avenue, Barton, Torquay.  
 UXBRIDGE: F. J. P. Offord, 43 Grays Road, RAF Uxbridge.  
 VERULAM: G. Slaughter, G3PAO, 6 Leggats Wood Avenue, Watford.  
 WAMRAC: Rev. A. Shepherd, G3NGF, 1 North Street, Crewe.  
 WIMBLEDON: E. N. Hurle, G3RZN, 156 Monkleigh Road, Morden, Surrey.  
 YEOVIL: D. L. McLean, 9 Cedar Grove, Yeovil.

#### Overseas

AERONAUTICAL CENTER, OKLAHOMA: Postal Station 18, Oklahoma City, Okla., U.S.A.  
 RADIO SOCIETY OF CEYLON: I. Woller, 457IW, Box 907, Colombo.  
 MALAYSIA: Box 777, Kuala Lumpur and Box 777, Singapore.  
 WASHINGTON, D. C. (Foundation for Amateur Radio): 2509 32nd Street S.E., Washington, D.C., 20020.

technical gen., DX news, and a full and up-to-date list of prefixes.

The *457 Bulletin* is the journal of the Radio Society of Ceylon. This, too, in 20 pages or so, covers the whole field of Amateur Radio.

It strikes us that all these publications have—and must have—one thing in common . . . a willing “work-horse” as editor, prepared to take all the kicks and very little credit. We salute them all!

#### LOOKING THROUGH THE NEWSLETTERS

**South Birmingham** (*QSP*, August and September) report five new members, five R.A.E. passes and some interesting meetings, to say nothing of exhibitions, rallies and an inter-Club contest with Sutton Coldfield. Just before publication date they were to visit the “999 Room” of Birmingham City Police. Their AGM will be on October 21.

**Purley** (*News-Sheet*, September) have an informal meeting (with CW practice) on October 1 and a Junk Sale on the 15th. Their Club Net—Sundays at 10.30 a.m. on 1950 kc—is going well; in fact they were heard by a member on holiday in Cornwall. Meetings are held at the Railwayman’s Hall, Whytecliffe Road, 8 p.m.

**Echelford** (*Newsletter*, June/July) seem to be expanding and improving, and their four entrants for R.A.E. all passed. Members are apparently becoming interested in four metres, and they hope to start a net. Two days before publication date they were due to have a talk on Metropolitan Police radio, with a demonstration of the equipment used.

**Cray Valley** (*Newsletter*, September) announce their Annual Dinner and Dance, on November 19, at the Bull’s Head, Chislehurst. Membership now consists of over 40 licensed amateurs and some 20 SWL’s and students, and the *Newsletter* contains all kinds of useful technical gen., as well as the news service for which it really exists.

**Chesham** present their very first publication, to be known as “*The Voice of G3MDG*.” They, too, report a welcome number of new members, and an R.A.E. pass. Projects for the near future include the building of Top-Band and HF-band rigs; a constructional course; renovation of a couple of receivers; and “cleaning up the premises,” about which they say “One of the chores that everyone talks about, but nothing is ever done.” (Other clubs please take note.) Two Top-Band field days have proved very successful.

**Cornish** (*The Cornish Link*, September) report well-attended meetings, and lots of club activity on VHF. One of their members who has passed his R.A.E. is a lighthouse keeper, formerly on the Scillies but now on the Welsh coast. He hopes to be on the air before long. At their September meeting (in Camborne) they heard a talk on Standing Waves. The October event will be a lecture on Control Circuitry by G3OFN.

**Radio Club of Scotland** publish one of the most substantial efforts to come our way—the *GM Magazine*. Every conceivable subject seems to be covered in the 24 pages or so to which this usually runs, and in addition there is a Tape-Recording section of several pages. Some of this month’s com-

ments cover Transistors, the GPO Tower, the new Radar network, Radio Telescope data and recent operations by the club station GM3RCS/A from Glen Urquhart. There is also a three-page story on GM6TF, a veteran member who remembers the days of “wireless.”

**Southgate** (*Newsletter*, September) have found new premises (at least for their next two meetings) at the Parkwood Girls’ School, Wood Green, N.22 (behind the new Town Hall). On October 3 they will hold their second Mobile Treasure Hunt, and on the 14th G3LTF will be talking about Moonbounce techniques and similar topics. And they report that they “made a good impression on the public” at the recent Southgate Show.

**Surrey (Croydon)** report in their *SRCC Monthly News* that their August Film Show attracted a fair number of members (but not enough ladies!) and that their September meeting took the form of a Junk Sale. And a few outspoken words from the secretary suggest that it is pretty hard in Croydon (as in so many other places) to shake members out of their apathy. Recent appeals for talks, help of various kinds, subscription renewals, slides or films, and a “club motto” have all met with the same response—little or none. Other secretaries will no doubt sympathise—but what’s the remedy?

**North Kent** (*Newsletter No. 92*) report new call-signs in their midst, and a corresponding swelling of the club net. Their secretary is appealing for lecturers to fill the many vacancies in their future programme, but reports several interesting evenings with talks from members. A Dinner and Dance has been arranged for February 26, 1966, and meetings continue on alternate Thursdays, at the Congregational Church Hall, Bexleyheath, 8 p.m.

**RAIBC** (*Radial*, August) report a very sad event—the death of Mrs. Odell, mother of Peter, G3MUM, who is well-known for his astonishing achievements under great disability (with enormous help and encouragement from his mother). As always, *Radial* is full of members’ news, together with some interesting articles which prove that our chairborne and bedfast amateurs are never beaten by the difficulties under which they work.

**Saltash** (*Tamar Pegasus*, September) had a mobile evening ruined by weather, but visited the ITA transmitter at Caradon Hill instead. On October 8 they will hear a tape lecture on Aerials and also see a show of colour slides (This meeting will be at Burraton Community Hall, Grenfell Avenue, Saltash.) On October 22, Barry Curnow, G3UKI, from the Plymouth club, will talk about DX, and November 5 is the date for the AGM.

**Reigate** (*Feedback*, August) will be hearing a talk by Mrs. S. W. Smith of the London Telecommunications Region at their meeting on October 16. This will be at the George and Dragon, Redhill. For the recent VHF Field Day, no fewer than sixteen of their members spent the weekend under canvas at Willington Hill, near Eastbourne.

**Spalding**, now in their fifth month, have enrolled five R.A.E. applicants at Peterborough, and members who have already passed are being “bullied into the Morse Test.” They meet on Fridays, 7 p.m. in the

Senior Physics Lab. of Spalding Grammar School, and although attendances have fallen off a little during the summer, things should now be improving. A Junk Sale and a Spring Mobile Rally are being considered.

**Manchester** will celebrate the J.O.T.A. by operating GB3SBS, for the Salford Boy Scouts. In September they visited the Northern Heights club, and also had a short but humorous lecture by their own member G3IOA. During October the usual meetings will be held every Wednesday.

**WAMRAC**, despite a temporary stoppage of their Circular Letters, and absence of reports, is going strong. The usual get-together will be held at the Exhibition—2.15 p.m. on Saturday, October 30. The net, on 3665 kc, continues on Saturdays at 0800 and Sundays at 1300, and the Hq. station is now set up at 1 North Street, Crewe, where visitors will be welcome.

At their September meeting, **Crystal Palace** heard

a talk from G3SYY/T on SHF Technique (1296 mc. and above). The promised talk on Amateur TV (by the same speaker) will come later in the season. Next meeting, on October 16, will be a Hi-Fi evening.

**Sutton Coldfield** will have a talk on VHF Operation on October 6, and a "General Natter Night" on the 20th. They are all teed up for J.O.T.A., which originated at the International Jamboree held in their local park in 1957. GB3SP was the special call allocated for the Sutton Park operation then, and it will be back on the air this year, mainly on Twenty with a KW-2000, but also with low-power rigs for local work on 160 and 80 metres.

**Verulam**, who are collecting new members apace, will meet on October 20 (8 p.m. at Hedley Road, St. Albans), to discuss MCC arrangements and also for a talk. At their September meeting they were shown the American film "Friendship 7"—about the first American manned space flight. November 17 will be a Natter Night.

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**FOR SALE:** Receiver HRO-MX, four coils, complete with stab. PSU, £15. Geloso converter, incl. 160m., £12. CR-100 coil pack and gang, with circuit, 10s. B.R.S. Morse record, £1.—G3RFC, QTHR.

**SALE:** DX-100U Tx, just over 12 months old, first-class condition, £60 o.n.o.? HRO-MX, new condition, with PSU and two coil sets, £20. Command Rx, BC-454, 3-6 mc, £3. Q5'er, unmodified, £5. Buyer collects.—G3NSG, QTHR.

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**SELLING:** An Eddystone 888A, with mounting blocks and S-meter, £65 o.n.o.? — G3MZA, 5B Ravensbourne Road, Bromley, Kent.

**SALE:** CR-100 Rx, excellent working condition, with bandspread and S-meter, £13.—Dillon, 140 Mount Road, Southdown, Bath, Somerset.

**FOR SALE:** Heathkit DX-40U with VF-1U, modified for high-level modulation, £25. Balun unit for same Tx, £3.—G3EKP, 59 Belthorn Road, Belthorn, Blackburn, Lancs.

**SALE:** Marconi VHF Tx/Rx Type HP-16B, with 12v. power pack, speaker and crystals; requires connecting cables, price £5, carriage paid.—Box No. 4173, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

**FOR SALE:** G2DAF-type receiver, incomplete, but for all parts excluding filter, £15. Top Band Tx: EL34-UM1-6146, £10. Partially stripped 150w. Tx. includes UM3, KT88's, TT21, Geloso VFO, and PSU's, £15. 700-0-700v. 650-0-650v. PSU, £5. 19in. cabinets, £1 each.—107 Franklin Avenue, Tadley, Hants.

**WANTED:** Urgently, June and July 1963 issues of "Practical Television." Buy or borrow.—C. Jordan, 90 West Street, Farnham, Surrey.

**SELLING:** Hallicrafters SX-71U communications receiver, 0.56-56 mc, bandspread 10-15-20-40-80 metres. S-meter, crystal phasing, etc., £45 o.n.o.? Lustraphone Hi-Z mikes, several, new, 50s. each. RS100v. line-matching xformers, several, new, 12s. 6d. E.M.I. speakers, 11in. by 6in., new, in utility cabinets, several, 28s. each. Carriage paid all items.—Harrington, 30 Heathwood Gardens, Swanley (3912), Kent.

**FOR SALE:** DX-100U Tx, 10-160m., AM/CW, good condition, bargain for quick sale, £35, buyer collects.—Ring Tonbridge (Kent) 2403.

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**W**ANTED: Admiralty Type-D or Marconi straight Morse key. FOR SALE: Labgear LG.50 Tx, 10-80 metres, 60w. CW and 40w. AM, excellent condition, £25, buyer collects. Japanese paddle for electronic keyer, £3 10s. plus postage.—N. A. T. Hardy, G3TJD, Ballindoney, Bury Ring, Billington, Haughton, Stafford. (Phone: Bradley 366. Please ring or call Saturdays only.)

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**S**ALE: HRO, reconstructed mains, extra IF; HRO, reconstructed to double-superhet, mains. One set of coils for these, working but not completed owing to disability. Also G.73 Signal Generator, 100/1000 kc crystals, £16. Callers only to:—27 Highbury Avenue, Salisbury, Wilts.

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**O**FFERING: Codar CR-66 Rx, with S-meter, also Codar PR-30 preselector, both factory-built and as new, £20 o.n.o.?—Denny, 3 Gateway Close, Thornton (3533). Blackpool, Lancs.

**W**ANTED: Two-metre Tx and Rx, or Transceiver.—Please send details of your surplus VHF equipment to The Pembroke Radio Club, c/o Dodson & Gordon, Pembroke, West Wales.

**W**ANTED: Split-stator variable condensers, 100 to 150 mmF per section, air gap not less than 0-08in. Your price.—G. Reid, Lawrence's Cottage, Abbotsbury, Dorset.

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**S**ALE: R.220 4-metre receiver, conversion into Philpotts cabinet, with loudspeaker and Eddystone dial, price £7. Type 21 Transceiver, 6v. DC, £3. Heavy-duty PSU, £4. Eddystone PSU, 12v. and 175v., 30s. All carriage extra.—Whitty, 59 Longfold, Moughull, Lancs.

**D**ISPOSAL: Codar CR-66 Receiver, in excellent condition, £14.—43 Gerard Road, Kenton, Harrow, Middlesex. (Tel. WORDSWORTH 2986).

**E**XCHANGE: Telefunken 85 de luxe Tape Recorder, 6 watts push-pull output, list £87, genuine brand-new unused, boxed, FOR good amateur-band Rx, such as KW-77, 888A, etc., or offers? SALE: Heathkit DX-40U transmitter, £15. Details from —G3KZC, 25 High Street, Hanham, Bristol.

**F**OR SALE: 19 Set receiver, built-in PSU and speaker, also manual, £2 10s. or nearest offer. G. P. v. Brenkelen, c/o Clark, 165 Loreny Drive, Kilmarnock, Scotland.

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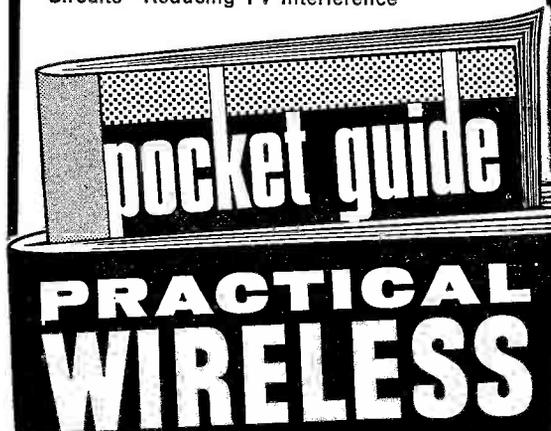
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### SMALL ADVERTISEMENTS, READERS—continued

**SELLING:** Videcon, Videcon scan/focus coils, line/frame output transformers, F 1.9 focusing lens, £15.—G6AAL/T, 127 Horton Road, Datchet, Bucks.

**SALE:** Sonar Bouy Tx Type 86, 3/3A4, 1/1L4, one xtal, output on about 60 mc, can be modified for 4-metre band, 15s. LF Amplifier Type 455, 3/1T4, 2/1L4, 10s. Circuits for either of these units, 2s. 6d. TS.86/AP RF Power Meter, 50s. R.209 Rx, 1.0-20 mc, £12. R.1949 Rx, 28-143 mc, manual or motor tuning (this is aircraft version of S.36), £20; mains power unit, £3. Command Rx, 1.5-3.0 mc, £5. Command Rx, 28-42 mc, 50s. RF-26, new 25s.; RF-24, 12s. 6d. B7G crystals between 10125-10391.6 kc, 3s. 6d. Twin xtals between 19-8875 and 20-4375 mc, 6s. Xtals 28.5 and 315 kc, 4s. (Send s.a.e. for list.) Valves: OZ4, 3s. 6d.; FW4/500, 5s.; 1L4, 1T4, 3A4, 12AT7, EL91, 8D2, ECC35, 1s. 6d. Manuals: ARC5-LF/HF Units; ARC5 VHF units; SCR-522, 50s. each. TCS circuit and details, 10s. Carriage extra on all items. Circuits of many Surplus and ex-Govt. units available, s.a.e. enquiries. WANTED: Manuals for R.209, R.210, i.e., 69/ALAZ, AP.2552L, AP.25384M, and many others; let me know what you have. Also units ARC-12, T.13, R.19, etc.—Clarke, Copper Coin, Old Galgorm Road, Ballymena, Co. Antrim, Northern Ireland.

**FOR SALE:** Olympic T.150 Transmitter, in immaculate condition, 10-160m., 150 watts, variable high/medium/low power, £75. Going VHF.—Box No. 4175, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

**FOR SALE:** New AF186 pre-amplifier for 70 cm., 57s. A.2521 70 cm. pre-amplifier, 20s. 829B, 10s. 4/24G, 8s. each. A.2521, 10s. 15-watt modulation xformer, with LS winding, 10s. Transformers: 230v., 6.35v. 5-25 amp, 10s.; 230v., 7.5v. 5 amp., CT, 5s. All carriage extra. A BC-342N, with PSU, £11, delivered 50 miles.—G3KEF, 86 Halford Lane, Coventry, Warks.

**SELLING:** Command receiver, 160-metre, as new, £6; a 12-volt gene. for it, 20s. Command receiver, 80-metre, £4. Both these Rx's converted for 12v. heaters. VFO, 28 mc FM, own PSU, new components, £5. 805 valves in original cartons, 15s. each. 19in. rack modulator, 6J7/6J5 into 4/6L6 in parallel push-pull, 150-watt mod., multi-ratio transformer, £5. All plus carriage. WANTED: Converter for 430 mc.—Box No. 4176, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

**SALE:** Six 813's, used but perfect, 17s. 6d.; four sockets, 5s. Two 811's, new, 12s. 6d. Two 6AR8, similar 7360, 12s. 6d. 3/6BN6 and 2/6BY6, 5s. Woden de luxe transformer 1500-1250-0-1250-1500v. at 350 mA, 70s., buyer collects. TU5B tuning unit, 20s., buyer collects. Ferranti milliammeters, 2½in. round, 50-100-150 (2); 3½in. round, 5-35-100; RF thermo-couple, 2½in. square, 2.5 amps. (3); 2½in. round, 0.5 amp; 2½in. round, 4 amps., all 7s. 6d. each.—Marshall, G2MA, 57 Godstone Road, Rotherham, Yorkshire.

**FOR SALE:** An AR88D, £40 o.n.o.? Well above average performance, recently aligned; genuine reason for sale.—G3TMI, Coed Bel, Lubbock Road, Chislehurst, Kent.

**RTTY:** T.U. Type AP.66862, with AP.66863 PSU, Type 7B printer, 7TR Repetitor, with switch unit, on stand, complete with all PSU's, etc., £40. 7B printer, 110v., with 80-0-80v. PSU, £12. Buyer collects, or delivery 100 miles.—G3MEW, 17 Testcombe Road, Gosport, Hants.

**WANTED:** Modern Sideband Equipment, Tx/Rx, etc., also AM/CW Transmitter, State age, condition and price.—Box No. 4177, Short Wave Magazine, Ltd. 55 Victoria Street, London, S.W.1.

**EXCHANGE:** For a good receiver, HRO or similar, or BC-221, with cash adjustment, a Hoover Mk. II Washing Machine, with power wringer (no heater), pump, spare wringer, in perfect condition, £20, delivered England.—G3TFS, 58 Grosvenor Road, Epsom Downs, Surrey.

SMALL ADVERTISEMENTS, READERS—continued

**FOR SALE:** AR88D, in perfect condition, no modifications, £42. Also available mobile PSU, carrying case and spare valves, £3 10s.—Taylor, 44 Avondale Avenue, Hinchley Wood, Surrey. (Tel.: Emberbrook 2220 after 6.30 p.m.)

**WANTED:** An SSB receiver in perfect condition; EA-12, SX-100, HQ-180, KW-77, etc., or possibly G2DAF type. Will collect reasonable distance London.—Box No. 4178, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

**SALE:** AR88D, genuine bargain, with S-meter, trimming tools, phones, speaker and manual, £25. Can deliver reasonable distance.—Maddox, 1 Montpellier Road, Sutton, Surrey. (Tel.: MELville 2845.)

**SELLING:** A T.W. Twomobile Rx, as new, £23.—Fir Tree Cottage, Singleborough, Bletchley, Bucks. (Tel.: Winslow 2498.)

**FOR SALE:** Heath Comanche Rx, 10-80m., in perfect condition, excellent SSB reception, including manual, £25. Heathkit Q-Multiplier, with manual, £5 o.n.o.? Codar PR-30X Preselector, in mint condition, £5.—G3TUA, ring CREscent 0012 after 8 p.m.

**SALE:** An old model of the Hammarlund Super-Pro, covering 540 kc to 20 mc, with crystal gate, two Western Electric speakers, all in large walnut cabinet. The lot £25, buyer collects.—28 St. Stephens Avenue, London, W.13. (Tel.: PERivale 0537.)

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**TRANSmitters:** Two-Metre Station, including 6CW4 converter, QQV06-40 transmitter, EL84 modulator, fully metered, in TU case, together with suitable mains PSU, £22 complete. Transmitters for 80 and 160m., separate VFO's, QV04-7 PA's, with common modulator, metered in TU case, £8. An 80/160m. Tx, with VFO, 807 PA, 6L6 modulator using Woden UML, with mains PSU and fully metered, £12. All these o.n.o.? A 50-watt 4-metre Tx, less valves, 20s. All delivered 15 miles or carriage extra. (Below)

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**WANTED:** Eddystone dial, spin-wheel type 898, complete. Must be in new condition.—G. Kellow, Glenvale, St. Dominic, Callington, Cornwall.

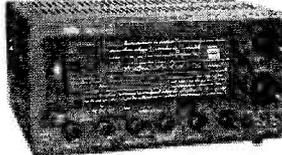
**FOR SALE:** Two Marconi Sets Type W/S B.43/R.220, Tx/Rx, 60-100 mc, xtal controlled, 829B final, supply 200-250v., with manual and full set of spare valves, brand new, £12 each. G.E.C. P.116 (691 series) UHF Tx/Rx, 277-283 mc, ten switched channels, 115/230v. supply, with five QQV06-40A, but less crystals, £12. Collins TCS-6 Tx, with matching AC mains PSU and aerial loading coil, modified as per "Short Wave Magazine" April 1959, with twelve spare 1625's (12v. 807's), £10. Tx Type T.23/ARC-5, £5. Rx Type R.77A/ARC-3, modified, £2.—Box No. 4179, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

**WANTED:** Eddystone S.750 and 840C receivers. **SELL:** A National 1-10. with the C and D coils.—G2VO, Underhill, Glenlyon Drive, Keighley, Yorkshire.



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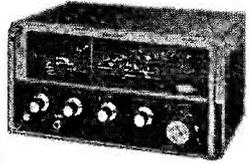
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**LASKY'S 59 Gns. H.P. Terms £12/19/- dep. and 11 mths. at £4/18/- Total H.P.P. £66/17/- Post Free**

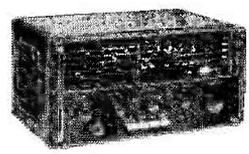
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Low resistance phones, 7/6. High resistance, 15/-, p.p. 2/-.

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<b>EDDYSTONE 840C</b> ... ..	66	0	0
<b>EDDYSTONE 940</b> ... ..	133	0	0
<b>EDDYSTONE EC 10.</b> New transistor receiver ... ..	48	0	0
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Carriage extra on all the above

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### SMALL ADVERTISEMENTS, READERS—continued

**EMIGRATING:** Quick sale for a K.W. Viceroy Mk. III, £40. Also G4ZU Beam with CDR Rotator and Indicator, SX-20, two receivers and lots of Test Gear, too much to list here; must clear the lot. Buyer collects for quick sale (London).—Box No. 4180, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

**SALE:** R.107 receiver, completely overhauled, some new valves, well up to specification, clean and unmodified, about £12 asked. Loewe Opta-416 tape recorder, for operation off mains, battery or five re-chargeable cells, 50-12000 c/s, speeds 1-7/8 and 3-3/4, all modern conveniences, cost over £53 two months ago, little used, £38 10s. fair price? Or **EXCHANGE** both these items for good, unmodified Eddystone communications receiver. **WANTED:** For friend in ZL, gen. on the Canadian Marconi 52 Set and ex-A.M. R.1155.—Falcon, 12 Hillfield Avenue, Morden, Surrey. (Tel. MITcham 2366, evenings only.)

**FOR SALE:** Eddystone 940 general-coverage receiver, complete with plinth speaker, in mint condition. List price £135, going for £85.—Coltman, G3TTH, 22 Willow Poole Lane, Sutton Bonington, Loughborough, Leicestershire. (Tel.: Kegworth 402.)

**TO GET:** "Short Wave Magazine" regularly and in time to catch the Small Adv. bargains offered in these columns every month, either put in a direct subscription order (42s. post free for a year of 12 issues) or send us a 4s. P.O. four days before the first Friday of any month. Remit to: Circulation Dept., Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1. We cannot guarantee that you will get in with all the bargains, but at least you will have given yourself a fair chance.

**WANTED:** An LG.300 Tx without any modifications; RF section only preferred. Please quote price including carriage. — G3NKN, Trebell, St. Mabyn, Bodmin, Cornwall.

**FOR SALE:** AR88D, in good condition, complete with S-meter, £40. If possible, buyer collects.—Wyse, 36 Wilmslow Crescent, Thelwall, Warrington (64178), Lancs.

**WANTED:** Eddystone 888A or KW-77. **FOR SALE:** B.44 Mk. II, unmodified, 50s. AR88D manual, 15s. Brown's Type F headphones, 15s. Philips Projection Unit, 50s. "Hi-Fi News," Feb. '63 to May '65, 30s. All postage extra.—Niall, 4 Ham Road, Worthing, Sussex.

**SALE:** Going SSB, a DX-100U, factory-built 1963, in new condition, with SB-10U socket, coverage 10-160m., including separate aerial c/o relay and delivery within 100 miles, for £60 o.n.o.?—G3SLP, 6 Briar Close, South Green, Billericay, Essex.

**SELLING:** KW-160 Tx for 160m. band (worked all 98 U.K. counties). £20. U.S.A. Eico 723 CW Tx, 60-watt xtal controlled, 10-80m., with provision for VFO and modulator, including coax rel-v, spare valves and handbook, £20. Brand-new electronic bug, £12 10s. RF40 Unit, £2.—Noakes, 359 Chester Road, Little Sutton, Wirral, Cheshire. (Tel.: Hooton 3458.)

**SALE:** Creed 7B Teleprinter, appearance-wise OK, looks good but not checked, price £9 plus 35s. carriage for despatch in strong non-returnable crate.—J. French, Main Street, Groomsport, Co. Down, Northern Ireland.

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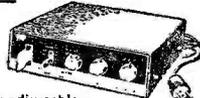
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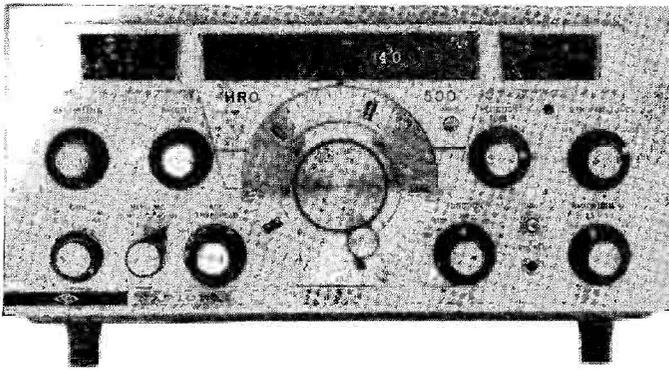
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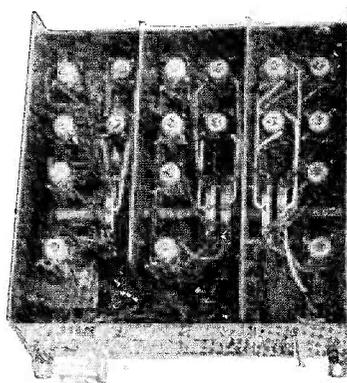
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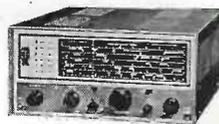
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