2/6

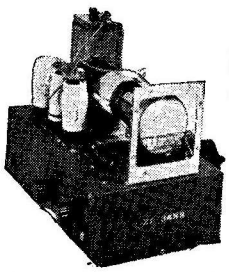
# The SHORT WAVE Magazine

VOL. XV JULY, 1957 NUMBER 5


FOR THE RADIO AMATEUR AND AMATEUR RADIO

# INDICATOR UNIT

## SLC No. 5

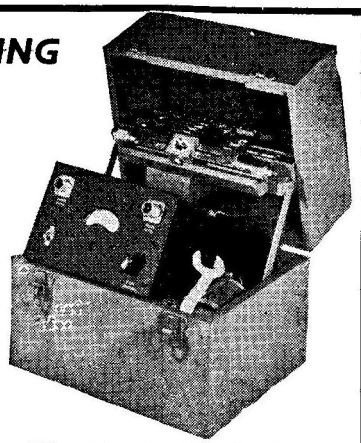


*Illustrated with cover removed*

Consisting of VCR139A with mu-metal H.T. band. Time base with 2-SP61, 1-VR66. Electrolytic condenser 24 MfD 550V, PK WKG. Test point for each stage. Completely enclosed in steel cabinet with lift up front window. Chassis dimensions 11ins. x 6ins. x 3ins. cover dimensions 11ins. x 6ins. x 5¼ins. total height 8¼ins. This unit is easily converted at a cost of a few shillings to an oscilloscope for modulation monitoring, linear sweep generator and horizontal amplifier. Brand new in original cartons. Price, complete with suggested modification circuit, only 65/- plus carriage 7/6.

# *WHY SUFFER STANDING WAVES?*

## COMPLETE STANDING WAVE RATIO METER



110V. a.c. operated. From 60 c/s-1000 c/s with all co/ax couplings and probe finders. To match all feeder line impedances and lengths. Calibrated matching bar. Direct standing wave ratio readings are shown on meter **50 micro-amp movement.** This magnificent instrument is precision built, complete with all spares and housed in oak carrying case. Brand new in original packing. **£14** each, plus carriage 10/-.

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**HOOVER ROTARY TRANSFORMERS.** 11.5v. input 490v. output at 65 m/a and 6v. input, 300v. output at 75 m/a. Guaranteed and tested, only 27/6, post and packing 2/6.

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**BENDIX 12v. RECEIVER**
Covering 3.4-7 Mc/s, 325-695 Kc/s, 150-325 Kc/s, Valves used 5-6K7, 2-6N7, 2-6J7, 1-6L6, 1-6F6. Complete with switching motor and 12v. Dynamotor. Only 65/-, carriage 8/6.

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**U.S.A. INDICATOR BC 929A** Complete with 3BP1, shield and holder. Aerial switching unit. 7 valves — 2-6H6GT, 1-6X5GT, 1-2X2, 1-6G6, 2-62N7. Brand new original cartons 55/-, carriage 7/6.

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**VIBRATOR POWER PACK.** Input 12V. output 150V. at 100 milliamps. 2 bias packs 50V. each. Complete with screen lead for battery. Completely smoothed. Brand new.

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American 829B valves.

Brand New & Boxed. ONLY **40/-** each. P. P. **1/-.**

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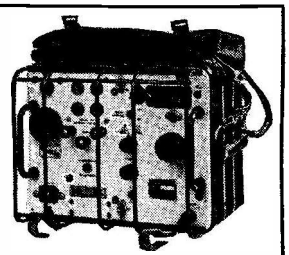

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| 2C26 ... | 3/6 | 6SN7GT | 6/6 | 12SH7 | 5/- | EF39 ... | 5/- |
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| 3A4 ... | 6/- | 6X5GT | 6/- | CV63 | 7/- | EL32 ... | 4/6 |
| 5U4 ... | 7/6 | 7475 ... | 3/- | CV66 ... | 7/- | SP61 ... | 3/- |
| 6AC7 ... | 5/- | 807 ... | 5/6 | CV85 ... | 8/- | VR116 | 3/- |
| 6AG5 ... | 5/6 | 830 ... | 15/- | DET19 | 4/- | VR150/30 | 6/- |
| 6AM6 | 8/6 | 866A ... | 8/6 | E1148 | 1/6 | VT501 | 4/- |
| 6C4 ... | 6/- | 9004 ... | 4/- | EA50 ... | 1/6 | VU111 | 2/- |
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P.P. 3/- each.

**A. F. AMPLIFIER.** An Audio Frequency Amplifier in a sub-chassis 5" x 3" x 3¼" R/C coupled, using 2 — 12SH7 and 1 — 12S17 valves; and can be used for Telephone Intercom., Pre-Amplifiers, etc. PRICE, 12/-. P.P. 2/-.

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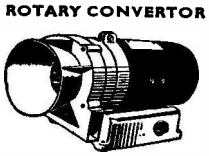

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## INDEX TO ADVERTISERS



# SHORT WAVE MAGAZINE

VOL. XV JULY 1957 No. 167

## CONTENTS



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*Advertisement Manager:* P. H. FALKNER

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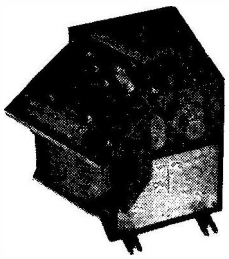
AUTHORS' MSS

*Articles submitted for Editorial consideration must be typed double-spaced with wide margins on one side only of quarto or foolscap sheets, with diagrams shown separately. Photographs should be clearly identified on the back. Payment is made for all material used, and it is a condition of acceptance that full copyright passes to the Short Wave Magazine, Ltd., on publication.*

# The Walk-around Shop for fine equipment

## MAINS CHANGING TRANSFORMER



(Admiralty Pattern) 230/100-110-130V. Separate primary and secondary with earthed screen winding between. Totally enclosed in 7" x 6" x 8" black steel case with detachable lid exposing terminal block and tapping link. Secondary very conservatively rated at 0·44 amps. (core size 3 sq. in.). Tested to 2,000V. Weight 19 lb. Price **£1** each, packing and postage.

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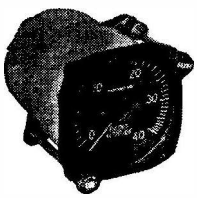
| | s. | d. | | s. | d. | | s. | d. |
|---|---|---|---|---|---|---|---|---|
| 6SH7 ... | 3 | 3 | 12SC7 ... | 6 | 0 | 6G6 ... | 3 | 0 |
| 3A5 ... | 5 | 6 | 0Z4 ... | 5 | 0 | 6SN7 ... | 6 | 6 |
| 6V6M ... | 8 | 6 | 6AC7 ... | 6 | 0 | 954 ... | 1 | 9 |
| VR56 ... | 5 | 0 | VR54 ... | 2 | 0 | 12Y4 ... | 1 | 0 |
| VT501 ... | 2 | 6 | 6H6 ... | 2 | 0 | VR91 ... | 5 | 0 |
| 12H6 ... | 2 | 0 | 12SH7 ... | 2 | 9 | (EF50) | | |
| 6L7 ... | 5 | 6 | VT52 ... | 2 | 6 | VR136 ... | 5 | 0 |
| 12A6 ... | 5 | 0 | 6J6 ... | 3 | 6 | | | |

*On orders up to 4 please allow 3d. postage on each. On quantities of 5 or over 1/- up to 12.*

## RADIO ALTIMETER



5mA panel mounting meter, 3" dia., 8" circular scale. Large magnet. Scale easily removable, leaving finished face-plate for re-calibration. Basis for sensitive portable multimeter. Brand New, Boxed. **7/6** post free.

## ARR 2 RECEIVERS

Covering 235 to 358 Mc/s. Containing 3 6AK5's, 7 9001's, 1 12A6. Good condition. Price **25/-**, plus 3/- post and packing. Circuit supplied. Size 10½" x 4½" x 5½". Black crackle finish.

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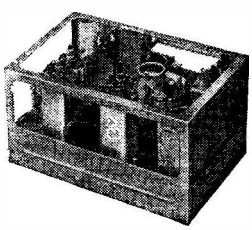
Double pole on-off 230V. 6 amp. Panel fitting. Size 2" x ½" x ½" depth behind panel REF 64/14. Price **2/6** each, post paid. New in packets.



## RECEIVER UNIT Ex 1143A

**Suitable for conversion to 2 metres or F.M. Wrotham transmissions.** Valve line-up: (4) EF50. (1) EL32. (2) EF39. (1) EBC33. (1) EA50. Supplied with circuit diagrams. Fully valved. **25/-** each, plus 3/- p.p.

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Type A1368 A.M. REF. 10U/13025. Using 1 VR35 and 1 VR21. Power Req. 120V. H.T. 2V. L.T. Size 7" x 4½" x 4". Fully valved. In good condition, **£1** each, post paid.

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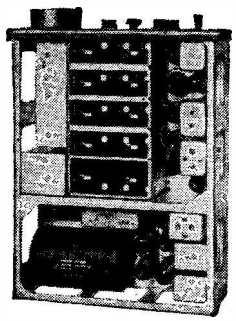

## BENDIX COMMUNICATION RECEIVER M.N.26C

A superb 12 valve receiver covering 150-1500 kc/s in 3 bands, 150-325, 325-695, 695-1500 kc/s. I.F. frequency 112·6 kc/s.
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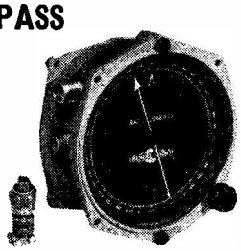
12V. Dynamotors available (U.S.A.) at **30/-** each.

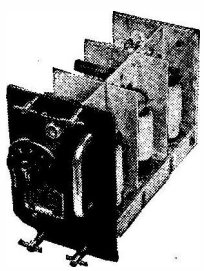
## BENDIX RADIO COMPASS



Azimuth indicator, for use with D.F. loop on manual operation. Flexible cable entries on both sides of unit. Dial face calibrated in degrees and adjustable for corrections. Small dial lamps are fitted for night use and unit is supplied with plug for input. Size 6" dia., 2½" deep. Grey crackle finish. Brand new and boxed. Price **15/-**, plus 2/6 p.p.

## REMOTE CONTACTOR

Type 4. 24 volt. Solenoid Ratchet action giving 120 pulses to 1 complete rotation of indicator arm. Contacts are cam operated and in its present state make for 270 degrees and open for 90 degrees. These could be altered to suit any sequence in the 360 degree sweep by changing cam. On and off switch; dial is re-setable. In metal case 4" dia. x 2" deep. New and boxed **6/-** each, post paid.



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R.F.25 40-50 Mc/s. Switched Tuning.
Valved ... ... ... ... **9/6** each
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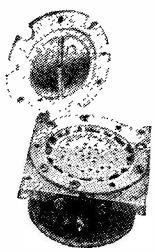
Valved ... Damaged dials **20/-** each
Perfect dials **25/-** each
Packing and postage 3/- each type.

## AN/APN.1 TRANSDUCER



This unit consists of Magnet, and Coil which is attached to an aluminium diaphragm suspended freely and perforated to prevent air damping. Mounted on a Ceramic cover which sits over the diaphragm is a form of 2-Gang capacitor which has a swing from 10-50 pF. The above unit is used as part of Wobbulator described on page 252 of the June *Wireless World*. Price **7/6** p.p.

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FOR THE RADIO AMATEUR AND AMATEUR RADIO

The SHORT WAVE Magazine

## EDITORIAL

### Awards

*It is just over five years since we announced the* SHORT WAVE MAGAZINE *range of DX operating certificates, covering activity on the HF communication bands.*

*Since then, we have had the privilege and pleasure of issuing nearly 500 of these Awards, under six different DX headings, to amateurs in some 45 different countries. This proves several things: That the categories in which the Awards are offered are of practical interest to DX operators generally; that while not being easy, they are attainable without being in any way "cheap"; that they come within the reach of operators at all stages of DX-ability; and that* SHORT WAVE MAGAZINE *itself has a considerable following in countries outside the United Kingdom.*

*It has sometimes been said that DX awards (whether ours or anyone else's) are a bad thing for Amateur Radio, because they encourage "pot-hunting" and so stimulate the baser instincts. This will always be true in the case of a few individuals, to whom the game is a means to an end and not an end in itself. But it is also true to say that in most fields of human endeavour it is competition that inspires progress, and so helps to make it all worth while.*

*As we remarked in this space at the time when these Certificates were announced, they not only give DX operators something at which to aim, but in the long run help those who aspire to them to attain a higher standard of operating ability. This in itself must be a good thing.*

*Indeed, one of our objects in initiating these Awards was to encourage the modest DX operator by giving him something to show for his progress towards the top flight of DX achievement.*

Austin Forbes G6FO.

# Portable/Mobile Station for Five Bands

## CW AND PHONE OVER 10-80 METRES, FIXED OR MOBILE WORKING

C. R. PLANT (G5CP)

*Our contributor will already be known as an exponent of /M working on Top Band, and his ZC1 Mk. II installation was described in our February 1956 issue. It has since been replaced by new equipment. This interesting installation was designed with several objects in view: Operation while mobile, or from the driving seat when at a fixed site outdoors, with reasonable power input on the HF bands, and the use of standard equipment items. The transmitter, using a Geloso VFO, is band-switched to cover 3.5 to 28 mc, with inputs up to 35 watts on phone, a Minimitter Rx converter is used on the receiving side, the radiated signal can be monitored from the operating position, and at the aerial termination on the car provision is made for feeding either the whip as mounted, or an external aerial when working from a fixed site.—Editor.*

THE writer had for some considerable time been operating a mobile/portable rig covering 3.5 mc and Top Band with some degree of success. Improving conditions on the high frequency bands, however, prompted the decision to build a unit which would embrace *all* the amateur bands from 28 to 3.5 mc. The main requirements were ease of band-switching and a simple aerial matching arrangement.

Size was not a primary consideration, because of the capacity available underneath the Vanguard dashboard. Power requirements, too, did not present much difficulty, there being ample room at either side of the boot for two 12-volt 75 AH batteries—*see* Fig. 1.

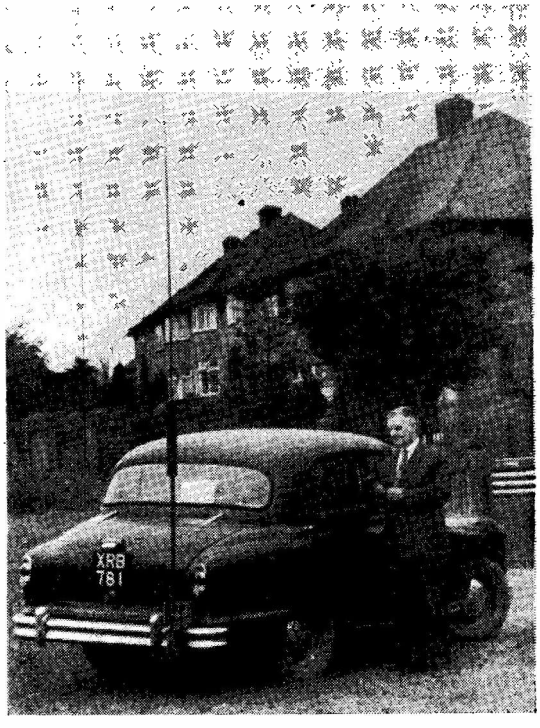
The basic idea for the installation was that it should operate, phone or CW, as a mobile *or* a portable/fixed station away from man-made static, and TV receivers, and run reasonable power input; in short, that one could hop in the car, drive out to high ground, run up an aerial, and be on the air from the driving seat.

### General Arrangement

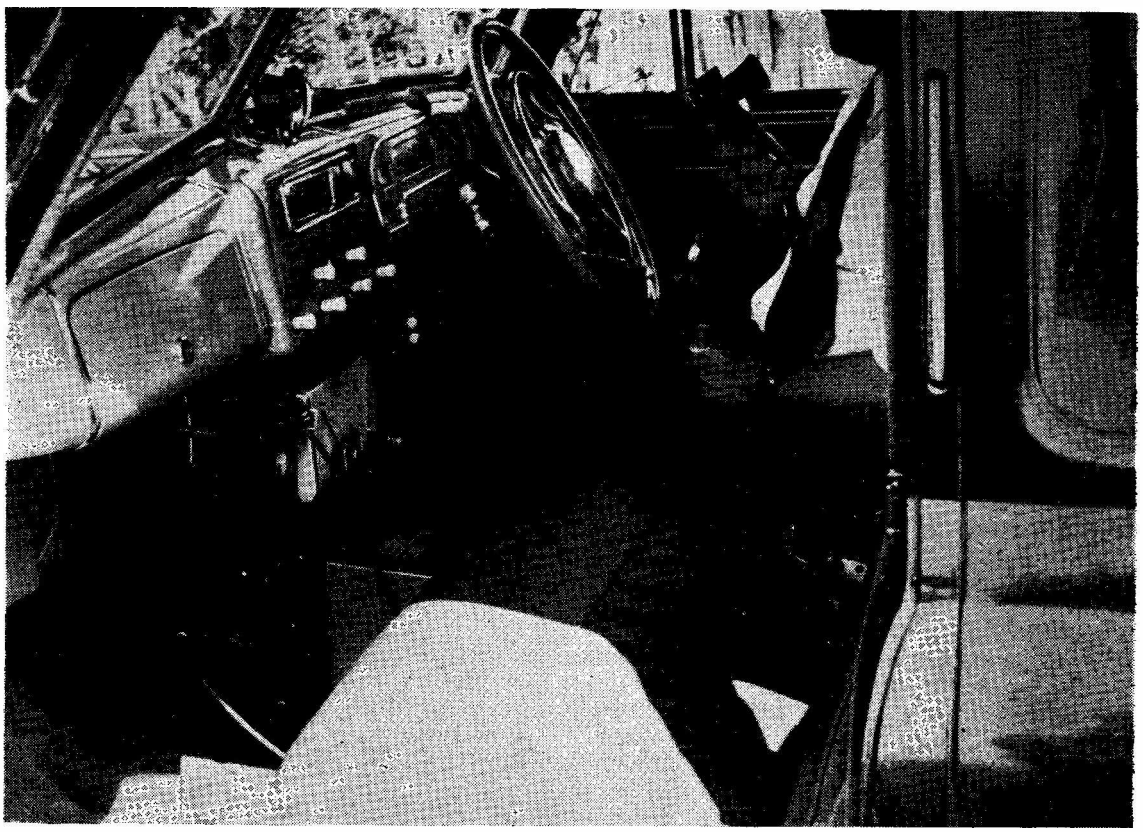
The transmitter to be described embodies a "Geloso" VFO unit followed by an 807 as power amplifier, modulated plate-and-screen from a conventional audio frequency line-up. Reception is satisfactorily covered by a Minimitter converter feeding at 6 mc into an R.103 receiver.

The whole of the Tx and Rx equipment is located centrally under the Vanguard dashboard. The RF section, which also includes the output stage of the modulator, is housed in one cabinet which sits in a mild steel framework of T-section, bolted to the car structure. The remainder of the equipment, consisting of converter, receiver and vibrator power pack stand on a platform immediately below, as shown in Fig. 1. When operating phone with an input to the 807 of 35 watts, the battery drain is 29 amps.; on CW, it is 18 amps.

A plan of the car is given in Fig. 2 and shows the power layout. From this it will be seen that while the engine is running and with switch "A" closed, the batteries in the car boot will be on charge. In effect, this will only be a trickle charge, but it was considered well worth while to take advantage of the "free"




**General appearance of Vanguard XRB-781 ready for the road, with G5CP at right. The car carries a complete 5-band CW/Phone station.**



General arrangement of the G5CP/M/P installation, capable of five-band operation, CW or phone, fixed or mobile, with inputs up to 35 watts. There being plenty of space under the facia board of the Vanguard, there is no cramping of the front-seat passengers. The meter above the central panel of the dash is the remote RF monitor-indicator device. Main control switches are to the right of the steering column — see layout plan Fig. 1.

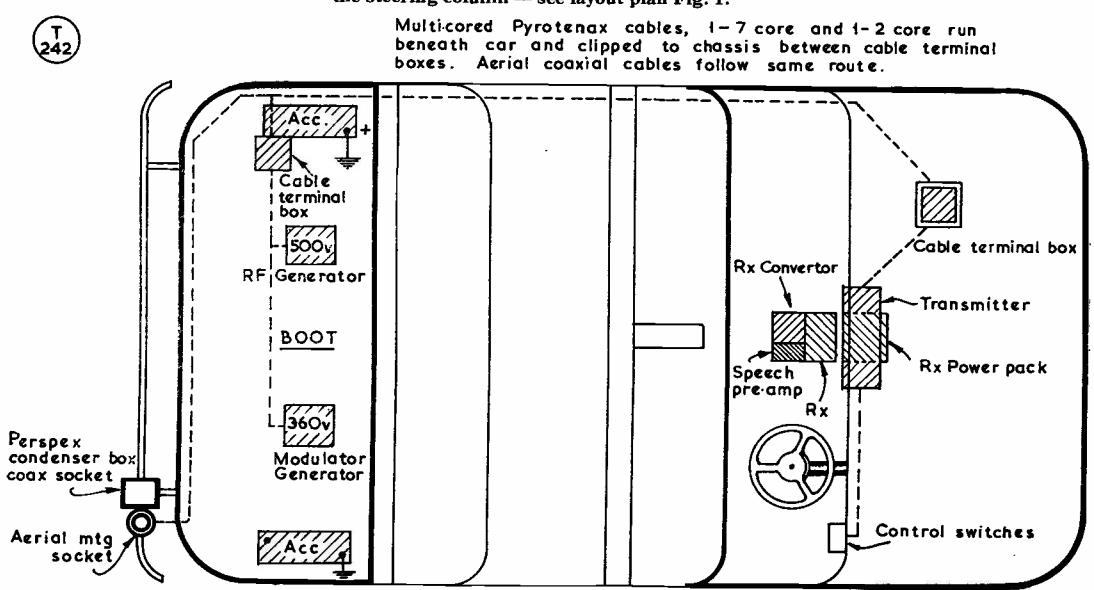



Fig. 1. Layout plan of the equipment on the car. All power supplies are carried in the boot. The two accumulators shown are additional batteries for the motor-generators and are arranged for charging from the car dynamo — see text.

charge whilst on journeys. A 5-amp. charger is used at nights when the car is at the home garage and this keeps the batteries well topped-up.

When away from home and a charger is not available, the car main battery will periodically be disconnected (after the engine has been started) by the simple expedient of removing the negative connection from the battery. This will then permit the full charging current, less the small load required for ignition and other car services, to pass through the remote batteries; based on previous experience, this arrangement should prove a satisfactory solution, particularly if an occasional boost charge can be given.

### The Transmitter Section

Fig. 3 shows the complete transmitter excluding power supplies. The circuit is closely related to the Geloso recommendations and incorporates their pi-section tuner and RF choke in the PA circuit. A keying relay Ry3 having "normally-open" contacts is inserted in the PA cathode lead. The operating coil negative connection is taken to a close-circuit jack socket on the front of the panel, so that when the jack is withdrawn the operating coil is energised, thus connecting the cathode solidly to earth, ready for phone operation.

The valve heater circuits are wired in pairs and connected across the 12-volt supply, as follows: 6J5 — 6AU6; 6L6 — 807; 6SJ7 — 6SL7; 6L6 — 6L6. All the valve heaters are controlled by the main on/off switch, but an additional switch in the main feed to the modulator valves allows these to be switched off when operating CW.

The PA circuit follows a conventional pattern and little comment is necessary. It is important to keep to the maker's recommended HT voltage on the VFO, or a rapid fall-off in the drive obtainable on 21 and 28 mc will result; in the writer's case not less than 4 mA is obtained on all bands.

In order to allow the transmitter to be netted on a received signal without having to switch up the HT generator, an auxiliary supply, obtained from the receiver power pack, is taken to a single-pole CO switch, thus allowing HT to be applied to the 6J5 oscillator valve. The beat is readily located on the receiver, thus making netting a simple process.

Improved efficiency was obtained by removing the 21 and 28 mc sections from the Geloso PA pi-network coil and replacing them with a tapped coil mounted at right-angles; this consists of four turns, ¾in. internal

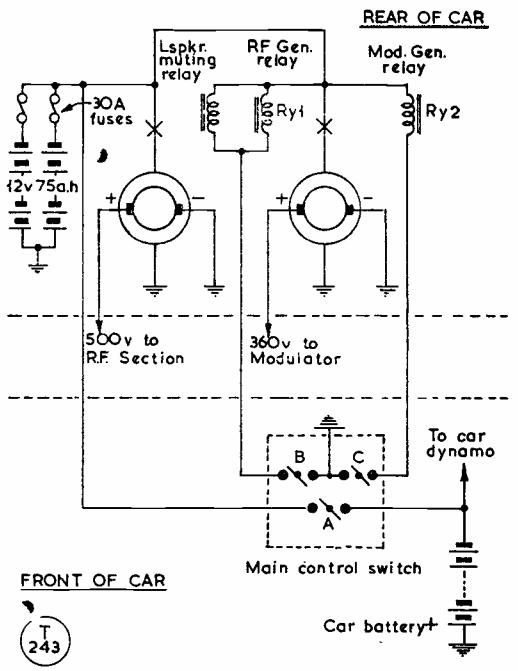



**Fig. 2. Arrangement of the control switching, relays and charging circuit in the G5CP/M/P five-band installation. The main control switch is immediately to hand near the steering column. The additional accumulators in the boot can also be trickle-charged in the garage.**

diameter, 18g. enamelled wire spread over 1½in. After carrying out this change, the improved dip in PA anode current when tuning through resonance was very evident.

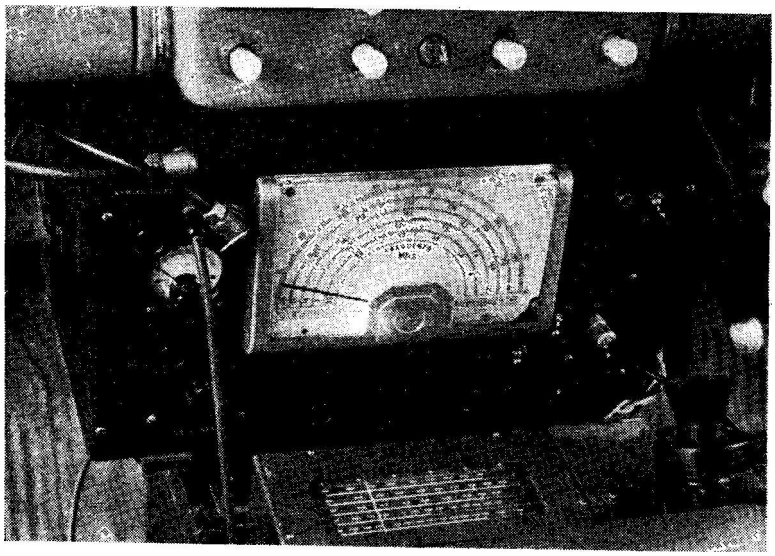
### Modulation Section

When first considering the modulator layout, the possibility of using valves in Class-B was considered. This idea was rejected primarily because it was felt that current surges on modulation peaks would lead to serious voltage drop, and secondly because of the special drive facilities which would be necessary.

The final layout shown in Fig. 3 consists of a conventional resistance coupled pre-amplifier, transformer coupled to the 6L6's in Class-AB1. The output of this unit, when correctly matched by the UM1 modulation transformer, is in the region of 25 watts, more than sufficient fully to modulate the PA when run at 40 watts DC input.

A moving-coil microphone is used, and the speech amplifier is designed to give a marked low-frequency cut-off by using low capacity coupling between stages, and a high cut by the use of condenser C14 connected across the primary of the modulation transformer. This increases the "communication value" of the

transmission, particularly when heavy QRM is present. It was thought at first that the whole of the modulator could be housed in the same cabinet as the RF section. The decision to use a UM1 multi-ratio modulation transformer, however, made this impossible, due to lack of available space. A copper box 8in. x 6in. x 4in. was made to hold the first two stages in the modulator chain, and this can be seen located to the right of the converter.

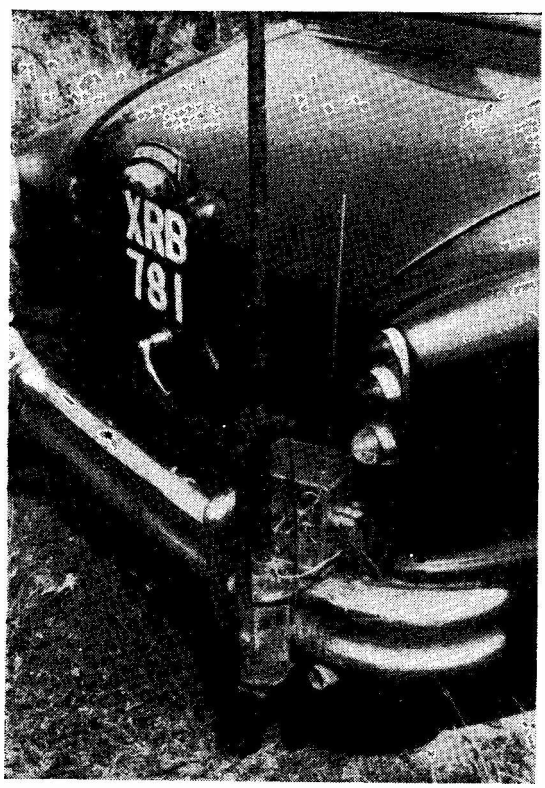


The VFO/PA unit in the G5CP/M layout is immediately above the Minimitter five-band converter. The transmitter runs up to 35w. input and power supply is from motor-generators in the boot.

### Aerial Arrangement

The aerial systems in use consist of plain quarter-wave whips on 28 and 21 mc and loaded quarter-wave whips on 14, 7 and 3·5 mc.

Two separate coaxial cables are run from the transmitter to the base of the aerial, these having an impedance of 72 and 39 ohms respectively. The 39-ohm cable provides a satisfactory match for the quarter-wave end-fed aerials, and the 72-ohm line for other types of aerials which may be run out when based on a portable (fixed) site. At the lower end of the aerial a 6-in. cube perspex box houses a 500 $\mu\mu$F variable condenser, and on one side coaxial sockets are mounted so that the feeder can be plugged into a series tuning arrangement, or alternatively directly connected to the aerial base.




Detail of the aerial termination on G5CP's Vanguard. The perspex box houses a tuning condenser and carries the coax cable plugs. The short rod aerial is for the monitor pick-up, giving RF and modulation check at the driving position.

During initial tests it was noted that abnormal heating occurred in the converter, due to RF getting into the tuned circuits. This trouble was completely cured by providing a pair of contacts on the aerial CO relay which earth down the receiver aerial during transmission.

A further refinement is the "killing" of the loud speaker circuit during transmission; this is effected by a relay wired in parallel with the Ry1 HT generator relay, which opens the speaker circuit.

Due to car vibration, frequency modulation is often reported when operating /M. In order to overcome this, the writer intends to introduce fixed frequency working by switching a crystal into the VFO circuit for mobile use. Previous experience has proved that this will completely cure vibration troubles.

### Output Indicating Device

A recent innovation has been the inclusion of a radiation and modulation indicator

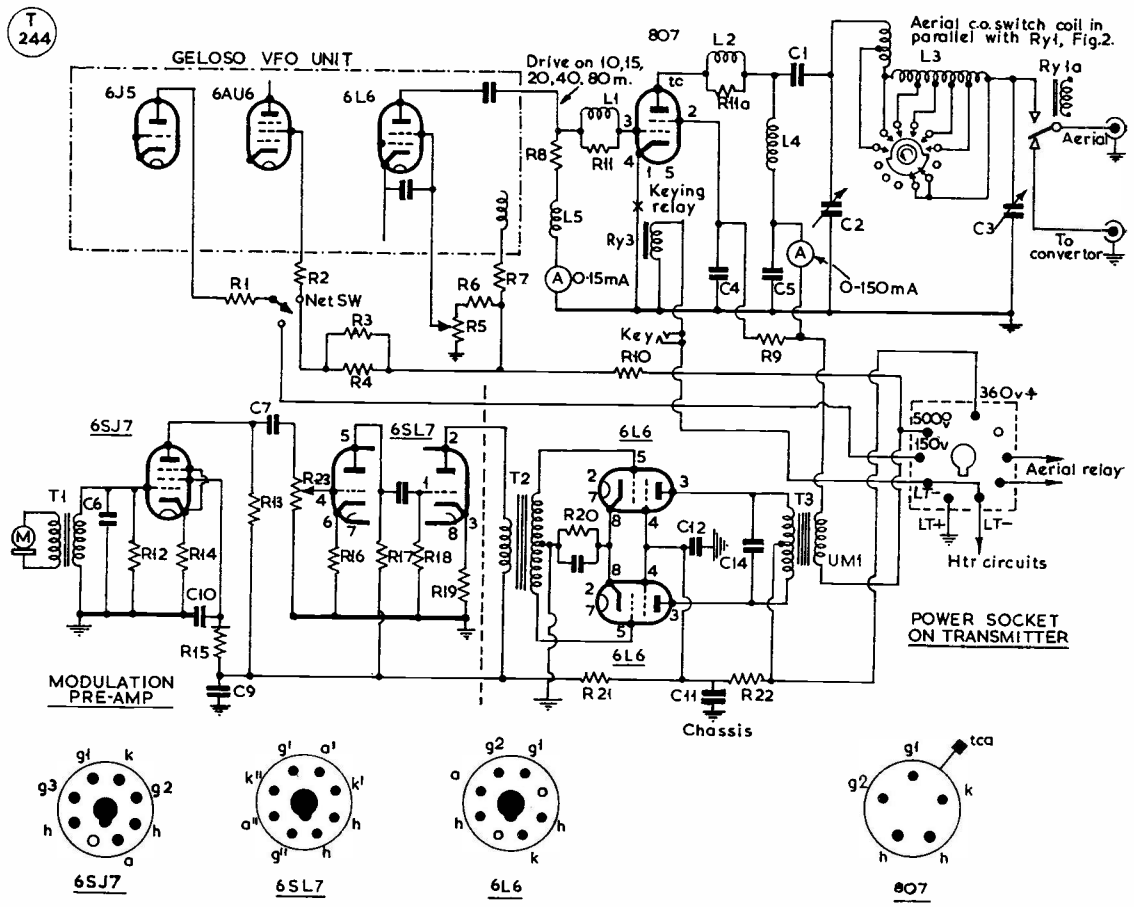



**Fig. 3. Transmitter-modulator circuitry in the G5CP/M/P installation. The driver unit is the Geloso VFO, as described in our March 1957 issue; this gives output on all bands 3.5-28 mc for the 807 PA. The transmitter can be run at 35w. input on phone; on CW, the total battery load is 18 amps. The slight circuit modification shown as R1, R2, Sw. allows for VFO netting in the usual way.**

mounted centrally above the Vanguard instrument panel. From this point the spare coaxial cable is used to connect back to a short vertical aerial fitted to the perspex terminal box at the base of the aerial (*see* photograph). A miniature variable condenser, connected in series with the feeder, adjacent to the indicator, controls the RF passing to the indicator assembly.

The circuit, shown in Fig. 4, consists simply of a crystal diode, a 0-100 micro-ammeter, an RF choke and a fixed condenser. It is thus possible while operating to note that RF is reaching the aerial and also to observe, by the movement of the needle on voice peaks, that modulation is taking place.

This system is a great improvement on the flashlamp bulb method originally used, and will later be developed to include frequency and aural phone check points.

## Table of Values

**Fig. 3. The G5CP/M/P Transmitter-Modulator**

C1 = .002 μF, 1500v.
C2 = 500 μμF
C3 = 2 x 500 μμF
C4, C5 = .005 μF, 1500v.
C6 = .002 μF, mica
C7, C12, C13 = .001 μF, mica
C8 = 50 μF, 50v. elect.
C9 = 8 μF 450v. elect.
C10, C14 = .01 μF, (2000v. for C14)
C11 = 16 μF, 450v. elect.

R1 = 15,000 ohms, 1-w
R2 = 2,500 ohms, 1-w
R3, R4 = 15,000 ohms, 2-w
R5 = 35,000-ohm 2-w pot'meter
R6 = 20,000 ohms, 2-w
R7 = 500,000 ohms, 1-w
R8, R21 = 22,000 ohms, 1-w
R9 = 22,000 ohms, 2-w
R10 = 2,500 ohms, 5-w
R11, R11A = 33-ohm resistor bodies
R12 = 1 megohm, ½-w
R13, R17, R18 = 500,000 ohms, ½-w
R14 = 1,000 ohms, 1-w
R15 = 3 megohms, ½-w
R16 = 4,500 ohms, 1-w
R19 = 2,000 ohms, 1-w
R20 = 250 ohms, 5-w
R22 = 10,000 ohms, 1-w
R23 = 500,000-ohm pot'meter, gain control

L1, L2 = APC windings on R11, R11A: 5t. 16g. on R11, 6t. 16g. on R11A
L3 = Geloso Pi-Network (*see text*)
L4 = Geloso RF choke
L5 = Eddystone RF choke

The transmitter was installed in the car in early February this year, and in the first three months two-way phone contacts were made with thirty countries, including all W districts, VE1 - 3 and 6, VO2, VQ2, CR9, PY7, DL7, ZS1, CR6, ZD6, 4S7, 4X4, and others. On May 31, VK3AZY and VK3BY/M were worked on 21 mc phone and CW to complete the WAC/M; this was with the 11ft. whip aerial and 35 watts input.

In connection with another mobile/mobile contact, between W3CT/M and G5CP/M—when near Washington, D.C. and Chesterfield respectively—a special certificate was recently produced; it is signed by the two operators, each having a copy to display.

The results obtained with G5CP/M/P, as described and illustrated here, have far exceeded the writer's expectations. It is hoped that this article will stimulate the interest of many more amateurs in mobile operation.

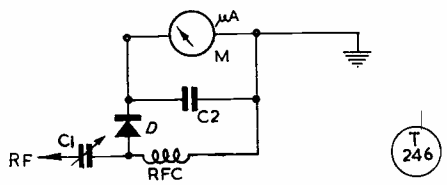
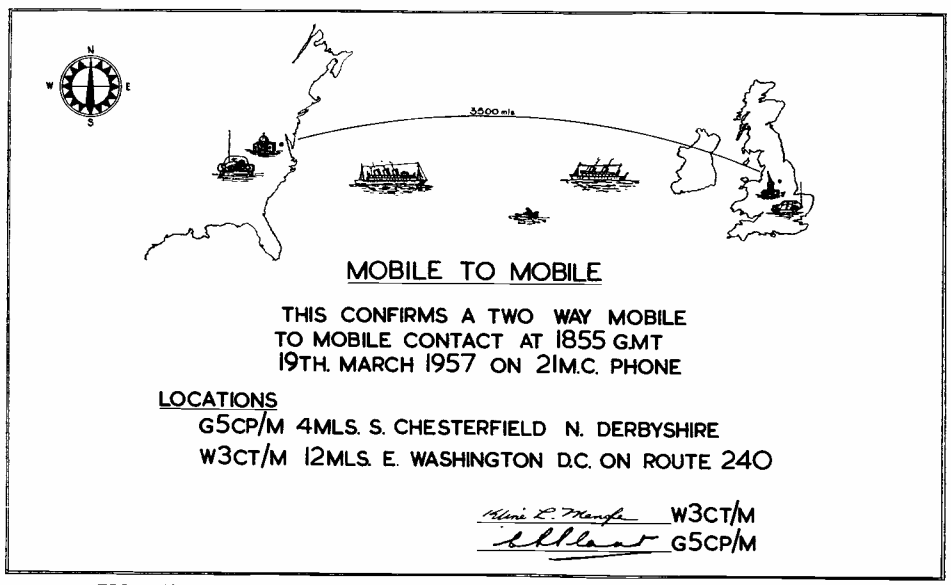



**Fig. 4. Circuit of the monitor used by G5CP for his /M/P transmitter. C1 is a small variable capacity, C2 .0002 μF, the meter is 0-100 μA, D is a diode rectifier, and RFC an ordinary RF choke. The RF side of C1 is connected back (by coax) to the short aerial shown in the rear-view photograph, and adjusted for adequate deflection on the band being operated.**




**G5CP/W3CT have one copy each of this certificate, to commemorate their Trans-Atlantic mobile QSO last March.**

## N.P.L. WORLD TIME CLOCK

Those privileged to visit the National Physical Laboratory on the Open Days in May saw, among many other extremely interesting exhibits and demonstrations covering a wide field in science and engineering, the Cæsium Atomic Standard of Frequency and Time Interval, known as the "Atomic Clock." This, an N.P.L. development, continues to serve as the world's standard of time and frequency for measurements requiring the highest accuracy. The N.P.L. clock has been used to check the drift rates of precision quartz-controlled clocks, and the variation in the rate of the earth's rotation. Compared with the N.P.L. clock, the earth gains in our summer and loses in the winter! The electronics associated with the clock have now been improved to enable it to determine frequency with an accuracy of one in 10,000-million—which would be near enough for most people! However, the N.P.L. has in hand a new model, designed to give still greater accuracy and reliability, with simpler operation. At present, it takes a few minutes for the experimental clock to give an answer to the highest order of accuracy of which it is capable.

## NOTIFYING CHANGE OF QTH

Readers are especially asked to state whether or not they are direct subscribers when notifying a change of address, or a newly-issued call for our "New QTH" feature. If we get this information in the letter, it saves a good deal of office time in checking the card index. It also helps a lot if direct subscribers can quote their reference (receipt) number when sending in changes of address.

# Crystal Controlled Converter for DX Working

## COVERING TEN, FIFTEEN AND TWENTY METRES, WITH TUNED RF

G. SASSOON (G3JZK)

*The unit described here is the logical approach to improved receiver performance on the DX bands. It will be of particular interest to those who use one of the older types of "surplus" receiver, lacking bandspread and inclined to be insensitive on the HF ranges.—Editor.*

THE majority of the range of "surplus" communications receivers available to the amateur today are not really satisfactory on the DX bands. Some, such as the ubiquitous R1155, suffer from lack of bandspread and restricted frequency coverage, and most of them drift. Images are unavoidable if the first IF is less than 500 kc and a noisy RF stage can obliterate weak signals. On the lower frequencies, however, such receivers are generally excellent in performance.

This converter is designed to enable such receivers to be used effectively on the DX bands; its cost will be considerably less than the difference between that of a complete receiver of the same or inferior performance, and one of the simpler "surplus" models. The converter transfers signals on 14, 21 and 28 mc to the range 3·5 to 5·5 mc; they are tuned in on the receiver in the normal manner, all the bands starting at 3·5 and tuning upwards. Bandspread and stability are the same as that normally obtained with the receiver on Eighty, and the image rejection is improved considerably. Band-changing requires only two operations, occupying less than five seconds. This is an invaluable facility for contest work, and chasing DX generally.

### Circuit

The RF section is designed on VHF lines. An EC91 grounded - grid triode is followed by a pentode - connected 6AK5. Untuned input to the EC91 cathode is employed, so it is necessary to use a simple aerial tuning unit, such as that shown in Fig. 1, if aerials other than 75-ohm coax fed are used. Should EC91's prove unobtainable, a triode-connected 6AM6 or EF91 could be used, possibly with some loss of gain. Bandpass-coupled RF tuned circuits were considered, but they offer no advantage except single-control band-changing. An expensive multi-wafer switch and a complicated alignment procedure would be required; further, there would be no discrimination against receiver images, and coverage would be restricted to the amateur bands. The arrangement used has proved more satisfactory in every respect.

The mixer circuit finally adopted is an ECH81 triode-heptode. This may provoke criticism in VHF circles, but it is necessary to avoid pulling of the oscillator, which can be troublesome with crystals not designed for overtone operation; triode mixers are very critical in this respect, due to the coupling between oscillator and RF circuitry; their low-noise characteristics are of no advantage whatever,

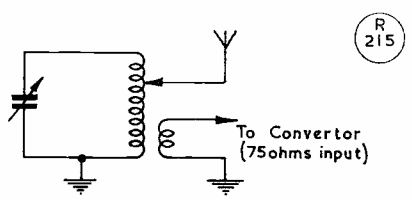
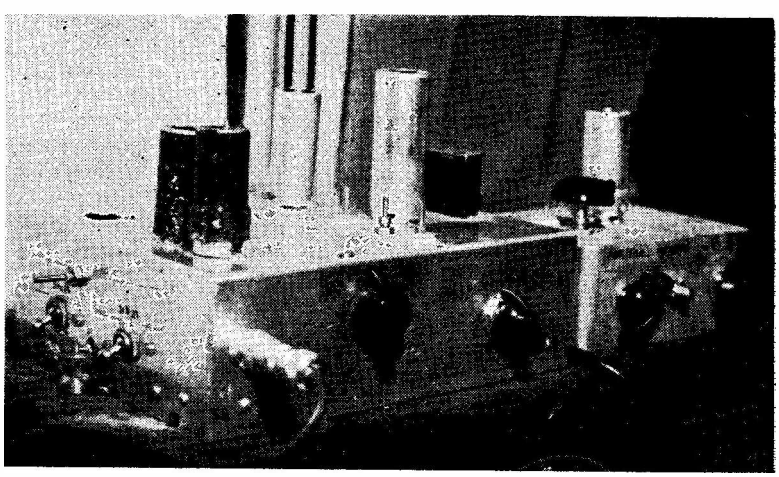



**Fig. 1. Simple receiver aerial tuning unit, to give 75-ohm input into the converter, when using any end-on or high impedance aerial. The coil-condenser combination should tune 14-28 mc.**



**General arrangement of the CC converter for the DX bands, described by G3JZK, covering 14-21-28 mc, with tuned RF-mixer stages and main tuning on the IF side. The station receiver (an S.740 in this case) is used as IF/AF amplifier.**

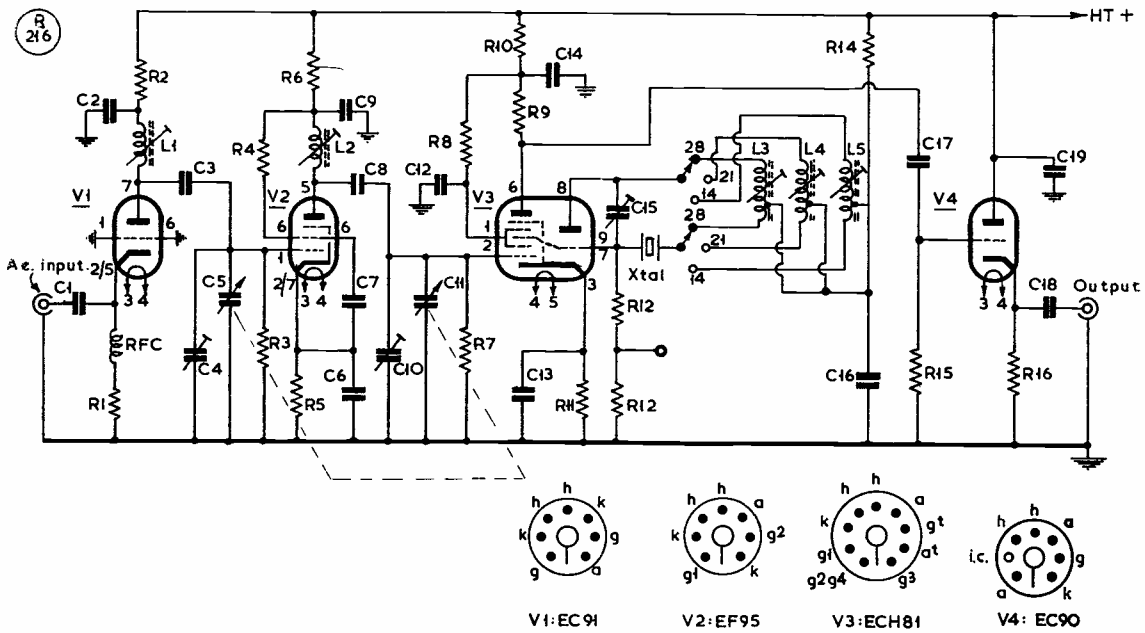



**Fig. 2. Circuit of the 14-21-28 mc crystal-controlled converter described by G3JZK. The IF given in his version is in the range 3.5-5.5 mc on the main receiver, used as an IF/AF amplifier. The front end of the converter is tuned by the two-section condenser C5, C11, and the aerial input arranged for 75-ohm feed — see Fig. 1.** (*Note: Lower resistor R12 should be marked R13*).

as the amplified aerial noise swamps any mixer noise completely. This is also true of the triode-heptode; in the absence of an aerial, all the noise in the output is generated in the first RF stage.

The oscillator takes an 80-metre CW band crystal of nominal frequency 3505 kc, in the writer's case. If a number are available, that nearest to the band edge should be selected. It is made to oscillate on its third, fifth and seventh overtones, giving injection frequencies of 10·5, 17·5 and 24·5 mc, for reception on 14, 21 and 28 mc respectively. No difficulty was experienced in getting the crystal to go, in spite of the fact that it had been subjected to serious overheating (and rubbing with solder in attempts to lower the frequency !).

The output circuit from the frequency-changer is untuned; various band-pass arrangements were tried, but the complication seemed valueless. Using the circuit shown in Fig. 2, a wide choice of IF's, up to about 10 mc, is possible for use outside the amateur bands, and the cathode follower gives useful gain when a receiver with low impedance input is used.

## Construction

The photographs here might be said to have been included mainly to illustrate *bad* construction practice ! They also show, however, that poor layouts will work. The unit pictured is that on which all the experimental modifications were carried out, and it goes so well that the intention to build a "fair copy" has been abandoned for the moment. A good quality tuning condenser should be used for C5, C11, with individual wiping contacts for earthing the rotor of each gang. That used at G3JZK actually has insufficient capacity-swing to tune all the bands, hence the toggle switches to bring in extra capacity on 14 mc. With the specified 350 $\mu\mu$F type, however, it should be quite pos-

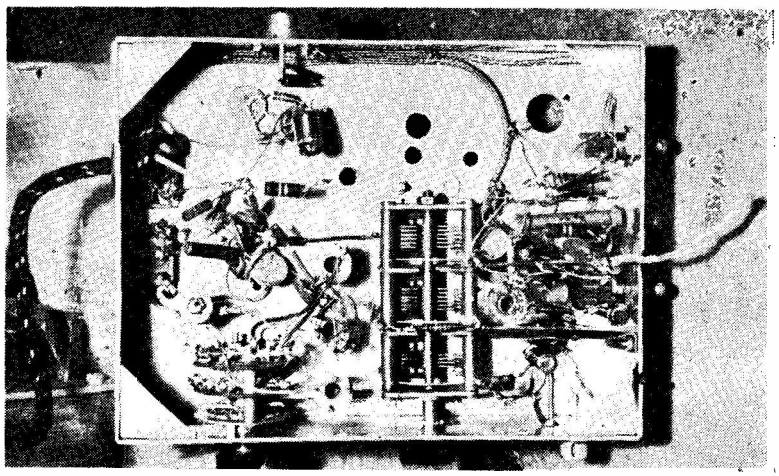
## Table of Values

**Fig. 2. Circuit of the 14-21-28 mc CC Converter**

| | | | |
|---|---|---|---|
| C1, C2, C3, C6, C7, C8, C9, C12, C13, C14, C16, C17, C18, C19 | = .005 $\mu$F disc ceramics | R5, R11 | = 200 ohms, ½-w. |
| C5, C11 | = 350 $\mu\mu$F twin-gang (*see text*) | R6 | = 8,200 ohms, 1-w. |
| C4, C10 | = 3-30 $\mu\mu$F Philips trimmers, if not on C5, C11 | R8 | = 33,000 ohms, ½-w. |
| C15 | = 3-30 $\mu\mu$F Philips trimmer | R10 | = 3,300 ohms, 1-w. |
| R1 | = 120 ohms, ½-w. | R13 | = 1,000 ohms, ½-w. |
| R2, R9 | = 10,000 ohms, 1-w. | R14 | = 18,000 ohms, 1-w. |
| R3, R7, R12, R15 | = 220,000 ohms, ½-w. | R16 | = 3,300 ohms, ½-w. pot'meter (*see text*) |
| R4 | = 27,000 ohms, ½-w. | V1 | = EC91/6AQ4 |
| | | V2 | = EF95/6AK5 |
| | | V3 | = ECH81/6AJ8 |
| | | V4 | = EC90/6C4 |
| | | L1, L2 | = 11t. 24g. over ¾-in. |
| | | L3 | = (28 mc) 15t 24g. over ¾-in. tap 4t. |
| | | L4 | = (21 mc) 20t. 24g., over ¾-in. tap 5t. |
| | | L5 | = (14 mc) 40t. 28g., over ¾-in., tap 6t. |

(*Note: All coils wound on 3/8-in. dia. slug-tuned formers; taps counted from grid end*).

sible to cover 10 to 30 mc in one band. Great care should be taken in screening the RF strip as the gain is so high, and the possibility of oscillation is increased. A convenient arrangement was found to be pieces of copper sheet soldered to the tuning condenser, and the central screen of the valveholder, bolted to the chassis all round. All leads entering the compartments should be screened and decoupled, and the coils should be placed with their axes at right angles. No particular precautions were taken to isolate the EC91 heater, and it is doubtful if there is anything to be gained by doing so, at these frequencies. The live side of the heater supply should be decoupled to earth at the valveholder. The braid pigtail in the underside view is for strapping the converter chassis to the receiver. If the unit is used near a transmitter, considerable currents can be induced on the outside of the coax from converter to receiver; when the G3JZK transmitter was switched on for the first time on Ten with the converter in use, an arc formed, the scar of which is plainly visible. Installing the connection also cleared up some sporadic audio feedback which occurred on phone, so it is worthwhile.



**G3JZK says that his experimental DX band converter as illustrated here works so well that he has given up the idea of building a cleaned-up version. The tuning capacity actually specified is a 350 $\mu\mu$F two-section condenser.**

### Alignment and Operation

All that is required for alignment is a multimeter and a receiver covering the oscillator frequencies. First switch on, keeping a hand on the switch in case the unit shows signs of distress. A separate power supply is recommended for the purpose. Then tune the receiver to 24·5 mc, and connect the multimeter across R13 to read oscillator grid current. Then, with the slug of L3 half-way in and the switch in the 28 mc position, tune C15 for a sharp change in grid current. This indicates that the oscillator is locked in to the crystal overtone. Next, locate the oscillator beat in the receiver, and adjust C15 to the point where the frequency change when the crystal is touched is minimal. Flick the bandswitch on and off the 28 mc position, and ensure that C15 is in the position where the crystal starts best. Some compromise may be necessary here, depending on the characteristics of the crystal. This procedure is then repeated for 10·5 and 12·5 mc, using the slugs of L4 and L5 only for tuning purposes. When the crystal is stable on all three overtones, lock C15 with a drop of some sticky substance; any subsequent minor adjustments may then be carried out with the slugs only. If the slugs are loose, they may be locked by running 6 BA nuts down the spindles and tightening them. The oscillator grid current should be between 150 and 300 microamps on each band. If it departs widely from this value, the appropriate coil tap should be altered. Moving it towards the anode end increases grid current, and *vice versa.*

To align the RF section, the main receiver should be tuned to 3·5 mc and connected to the converter. With the converter switch at 14 mc, tune the variable condenser until a noise peak is heard near the fully-meshed position. The trimmers C4 and C10 should be at minimum capacity. Adjust one or both of the slugs in L1 and L2 to peak the noise. Then repeat on 28 mc, only peaking with the trimmers. The correct noise peak is that nearest to the minimum capacity position. The image frequency is 21 mc.

This procedure should be repeated, adjusting slugs on 14 mc and trimmers on 28 mc till no further alterations are necessary. The 21 mc band should then be found somewhere in between, and if a good tuning condenser is used it should be perfectly peaked. If amateur signals are heard below 3·5 mc, the image has been selected, and if they QSY when the crystal is touched, the oscillator is incorrectly adjusted. Squeezing the crystal, may, however, cause a slight frequency change, but this is not likely to occur in the course of normal usage. To check the sensitivity, connect the converter to

a correctly matched aerial and tune to a clear spot. Disconnecting the aerial should cause a considerable drop in noise level; the same should occur if a 75-ohm resistance is used.

If the gain proves to be too great, even with the RF gain right down, an output control could be fitted by substituting a 5,000-ohm potentiometer for R16. Introducing AGC voltage from the receiver and using variable-*mu* valves had no appreciable effect, though this may not be so if receivers in which the AGC voltages are high are used. With the converter, the writer's S740 is generally operated with the RF gain full down, otherwise overloading, intermodulation and distortion occur. The output is quite sufficient for use with RF stage-less receivers. Any drift which occurs is attributable to the receiver only, so the converter is ideal for use where maximum stability is of importance, such as in SSB reception.

In conclusion, the unit causes no TVI, despite the fact that no precautions were taken to prevent oscillator radiation.

# THE NOROTON FM/VHF TUNER

## CHASSIS-MOUNTING UNIT COVERING BAND II

This is a very neat FM front end, of Continental origin, covering a frequency range of 85 to 105 mc, the circuit of which is shown in the diagram, p.242.

Outstanding features of this FM Tuner are the high RF gain obtained from the cascoded PCC84 stage, and the stability of the unit when on tune. The EC92 is connected as a mixer-oscillator and there are two IF stages, EF80 and EF89, the latter also functioning as a limiter into the RL231 ratio detector. A magic-eye tuning indicator, or an S-meter, can be connected if required.

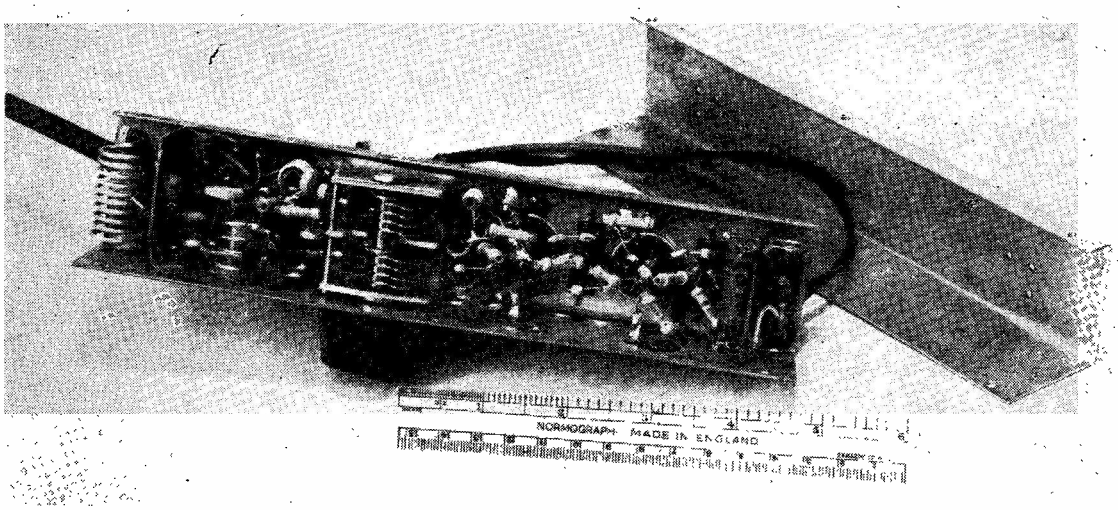
The balanced aerial taps are adjusted for 240-ohm feed impedance and the unit therefore works quite well using 300-ohm ribbon—in fact, in the test set-up, the aerial (consisting of a single folded dipole, without any parasitic elements) and its feeder line were made up of 300-ohm ribbon throughout.

High performance figures are claimed for selectivity, sensitivity, signal-to-noise ratio and bandwidth—all fully justified by the results the unit is capable of giving with a simple aerial system at critical distances from the BBC FM transmitters.

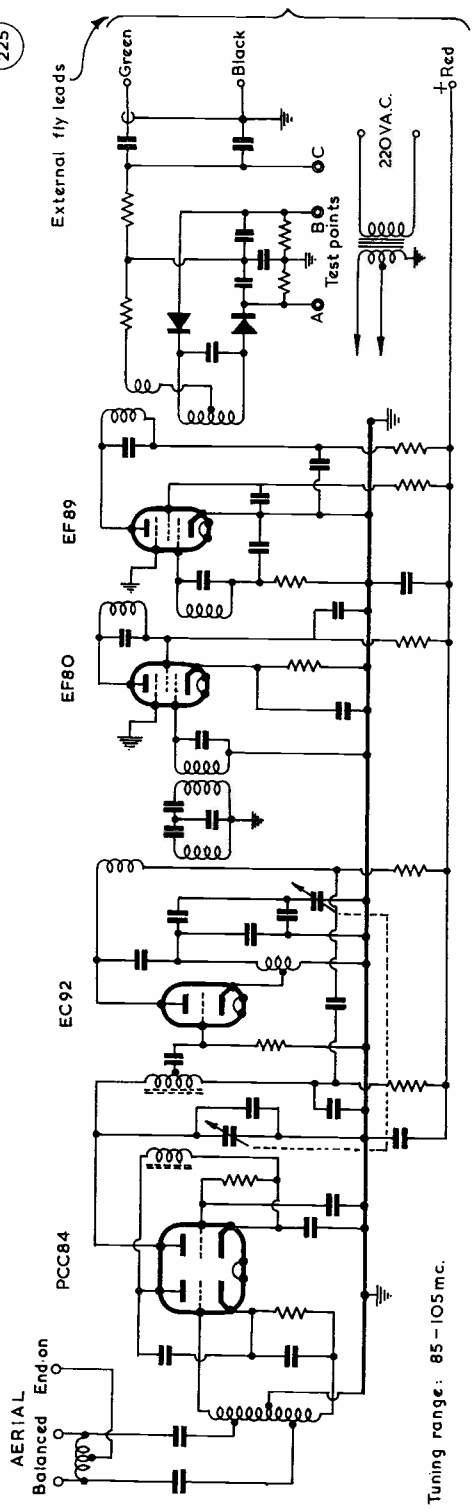
As suggested by the photograph, the Noroton FM/VHF Tuner is of exceptionally neat construction and layout; the mechanical arrangement is such that all circuit elements are exposed when the half-section of the chassis is removed.

### Power Supply and Installation

The unit is designed to work into any audio amplifier, such as the Osram 912-Plus, or the LF side of an ordinary AM broadcast receiver. The necessary mounting accessories are provided, together with cord-drive parts, to enable the tuning of the FM unit to be coupled to the dial mechanism of the main receiver. Alternatively, if used with an amplifier alone, the control shaft can be coupled directly to a slow-motion drive mechanism, calibrated as required.




**Construction under-chassis of the Noroton FM/VHF Tuner, RF side to the left. This a high-grade Continental design, very neatly assembled, and the tuning range is 85-105 mc, amply covering Band II. The general circuit arrangement is shown in the diagram. The L-plate at right bolts on to the main assembly, making a box chassis 8-3/4 ins. long by 1-3/4 ins. square end section.**




**Circuit of the Noroton FM/VHF Tuner, covering Band II channels with a frequency range of 85-105 mc. This circuit, using a double-triode RF stage in cascode, gives unusually high front-end gain for a commercial design of this kind. The output of the Tuner is sufficient to load fully any usual audio amplifier, or the LF side of a normal AM broadcast receiver. The Noroton Tuner is of Continental design, using Philips valves.**

In practice, the capacity swing over the 20 mc of tuning from 85 mc is such that stations can quite easily be tuned in simply with a knob on the condenser shaft.

As regards HT/LT, the Noroton FM/VHF Tuner is self-powered for LT only; the HT supply required is 200v. at about 30 mA. Most amplifiers and many receivers would give this from their existing HT power sections.

To put the Tuner into operation, the external connections needed are: 220v. AC for the heater transformer; HT at 200v., 28 mA; and a coax feed lead into the first stage of the audio amplifier to be used—this should, of course, have volume and tone controls of its own, in the usual way. With any such amplifier, it will be found that the output from the Tuner will be more than sufficient to load the audio side fully with the gain control well back.

## BLIND AMATEUR REGISTER

Following the note on this topic on p. 190 of the June issue of SHORT WAVE MAGAZINE, a Register of Blind U.K. Amateurs is being compiled, in collaboration with G6KJ. So far, the number of known callsigns is about twenty, but it is felt that there might be more, so we urge any readers who may know, or know of, a blind amateur to bring this note to his or her attention. It is *not* intended to publish the Register—nor, indeed, to print any information concerning a blind person without his agreement. The whole intention is simply to keep blind operators in touch among themselves. It should also be explained that G6KJ can correspond both in Braille and by ordinary typewriter, and is in contact with the American sponsors of an Amateur Radio magazine produced in Braille specially for the blind; it includes technical articles and recent issues have described various items of equipment designed for operation by touch alone.

## FREQUENCY SHIFT KEYING

It is reported in the April issue of *Break-In*, of the New Zealand Association of Radio Transmitters, that FSK is now permitted to ZL's in parts of the 80-40-11-10 metre bands. We are not quite sure whether this is a good thing or not. There are those who hold that, on the amateur bands, FSK is a pernicious form of CW interference, particularly when it is associated with radio-teletype (RTTY). On a narrow interpretation of Clause 16(1) of our Licence, RTTY is not permitted to U.K. amateurs—on the other hand, so far as we know, the matter has not been tested. The argument could be that since RTTY gives the answer in plain language (on a teleprinter) it is no more a code than is Morse.

# Simplified General-Purpose Signal Generator

## WIDE COVERAGE MODULATED OSCILLATOR

**M. W. KIRBY**

*The circuit and notes on a cathode-coupled oscillator used as a modulated, wide-range signal generator of simple type for general bench work. This design is particularly suitable for the experimenter who wants something to cover all bands from LW to VHF without involving a great deal of time and cost in construction.—Editor.*

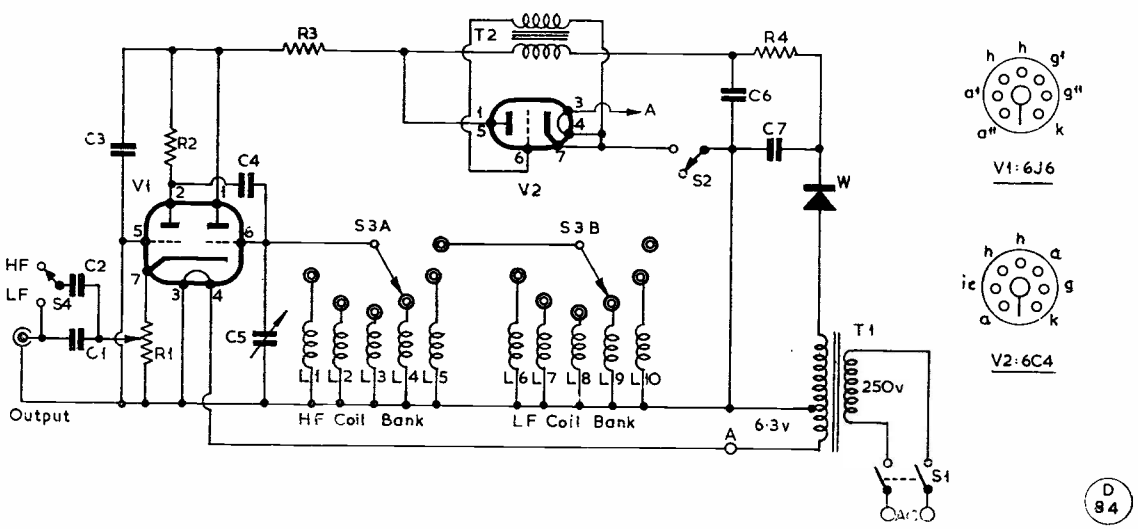
SEVERAL circuits have been published for use in signal generators, all claiming some particular advantage, and it would appear that not much improvement would be possible on those that have already appeared in *Short Wave Magazine*. It was with some surprise, therefore, that while experimenting with a version of a cathode-coupled oscillator the wide range of frequencies at which the oscillator would work was noted ; the simplicity of the switching prompted the design of a simple generator using the adapted circuit.

The arrangement as finally evolved is shown in Fig. 1 and follows the conventional lines of the cathode-coupled oscillator. On the prototype it was found possible to vary the frequency range from 20 cycles to 250 megacycles by using the appropriate value of inductance in the grid circuit. A 6J6 valve was tried and found to oscillate well into Band IV. Stability was excellent, the drift being only 150 c.p.s. after three hours at 10 mc. Two range-switches, S3A, S3B, were fitted to the original to provide 16 positions—but this will depend upon the range of frequencies and the degree of bandspread required by the constructor. If the oscillator is wanted for use with an oscilloscope, the cathode bias resistor R1 can be made variable as this affects the waveform ; it is not decoupled as this provides some degree of feedback and improves the waveform. If the frequency range is below 9 kc, the value

### Table of Values

Circuit of the Signal Generator

| | | | |
|---|---|---|---|
| C1 | = 47 $\mu\mu$F | S2, S4 | = Toggle on-off |
| C2 | = .01 $\mu$F | S3A, S3B | = Range selection (*see text*) |
| C3 | = 100 $\mu\mu$F | T1 | = 150v. 30 mA, with 6.3v. heater winding |
| C4 | = 50 $\mu\mu$F | T2 | = 3:1 or 5:1 audio xformer, for MCW tone |
| C5 | = 500 $\mu\mu$F, or larger | W | = RM1 metal rectifier |
| C6, C7 | = 16 $\mu$F | L1-L10 | = Coils as required for coverage |
| R1 | = 2,000-ohm pot'meter | | |
| R2 | = 20,000 ohms | | |
| R3 | = 15,000 ohms | | |
| R4 | = 3,000 ohms, smoothing | | |
| S1 | = DPST, mains on-off | | |




**Circuit arrangement of the wide-range signal generator discussed in the text. The oscillator gives output which in practice is stable enough for ordinary bench test purposes over a very wide frequency range, from LF to VHF. The actual coverage required is a matter of choice, as commercial coils can be used for the HF and LF switched ranges. The MCW tone is generated by the audio feed-back given by T2 in the 6C4 section. If an audio tone is not at first obtained, reverse the connections to one side of this transformer ; the pitch of the tone can be varied by putting condensers of different capacities across the T2 secondary.**

shown will provide good waveform.

A buffer stage was added to the original, but was later discarded as the frequency pull was found to be negligible under working conditions.

It should be noted that this signal generator was not designed to be a high precision instrument, but was intended to provide a suitable generator for radio and television servicing. Simplicity and cost were thought to be more important than laboratory standards. It will, however, if well constructed, compare very favourably with signal generators many times the cost of its construction.

On the LF side the frequencies were not made variable as spot frequencies are all that is generally required to test the performance of amplifiers and output stages in routine service work. If required, a suitable resistance-condenser combination can be placed across the LF inductance, and by making the resistor variable a continuous coverage can be obtained.

**Some General Points**

The great advantage of the circuit becomes apparent when the HF side is considered. As only two connections are required for each coil, either band or incremental switching can be used. There was an improvement in Band III stability when a ceramic wafer was used in position S3—although this appeared to be due more to its much better mechanical construction than to the higher dielectric efficiency. The coils L1, L2, L3 were mounted directly on the switch as they were self-supporting and L4-L8 inclusive are wound upon $\frac{5}{8}$ in. diameter formers mounted close to the switch. The other inductances should be mounted as close to these as possible, although this is more important at the higher frequencies.

MCW is obtained by using a 6C4 valve as shown; 25% modulation depth is given, but if required a greater modulation depth can be achieved by using a 6J6 with its sections paralleled.

Very little FM is found in the MCW position and a frequency shift of only 750 c.p.s. at 2 mc occurs when the anode voltage is dropped to 30v. For this reason, only a simple power supply was used as voltage stabilisation was found to be unnecessary.

The coils, variable condenser C5 and switch mechanism should be mounted as rigidly as possible and all wiring in the oscillator circuit should be short and of heavy gauge wire.

Output control is by a continuously variable potentiometer R1, although if desired a stepped attenuator could be fitted; however, this will be difficult to calibrate accurately as if good waveform is to be retained at HF there will be a slight falling off in the output at the LF end of the bands.

The cabinet should have ample ventilation; if the internal temperature is allowed to go too high it will cause frequency drift and will extend the warming up period. Many good coils are available commercially, and it is not therefore proposed to elaborate on these as those used will depend chiefly upon the constructor's requirements. The LF inductances will usually be lurking in the junk box.

It was found that the unit answered very satisfactorily to all the demands that were made upon it in a busy commercial service department, during a two weeks trial; even after several months of rather arduous outside service work the unit required no attention and the calibration was still correct.

The most convenient method of calibration is by the use of a heterodyne frequency meter, but if one is not available the signal can be heterodyned against stations of known frequency, a graph drawn, and the scales marked off from the graph.

**NATIONAL RADIO EXHIBITION**

This year's Radio and Television Show is to be held at Earl's Court, London, during the ten days August 28 to September 7.

**SCOUT JAMBOREE — CHATHAM**

We are asked to announce that in connection with the Scout Jamboree for those of the Catholic persuasion—to be held at Buckmore Park, Chatham, during August 12-24—the callsign GB2BP has been issued. The Medway Amateur Receiving and Transmitting Society will provide and operate the station, and it is hoped that the 3.5, 7, 14 and 28 mc bands will be covered during the whole Jamboree session. As it is expected that about 15 different nations will be represented, DX working will be of considerable interest. Offers for the loan of equipment have generously been made by Panda, the G.E.C., and K.W. Electronics. M.A.R.T.S. aim to keep GB2BP on the air at least ten hours a day, and continuously over week-ends, but this will naturally depend upon the roster of licensed operators available; offers of operating assistance should be made to: L. J. N. Kirby, G3BRJ, 6 The Terrace, H.M. Dockyard, Chatham, Kent. A special QSL card (designed by the Medway College of Art) is being produced to commemorate the activities of GB2BP.

**MULLARD FACTORY VISIT**

One of the visits organised recently to the Mitcham valve and cathode-ray tube factory of Mullard Limited included representatives of no less than seven Amateur Radio societies. They were: East Kent, Edgware, Gravesend, Harrow, Kingston, Mitcham and Worthing.

# One Hundred Watts of Audio

## SPEECH AMPLIFIER / MODULATOR UNIT USING 807's IN CLASS-B, ZERO BIAS—SPEECH LEVEL INDICATOR

THERE are probably many readers who will be interested in a modulator which, although capable of putting out 120 watts of audio, is by no means hard on the pocket.

The modulator and speech amplifier to be described fits these requirements as it makes use of a pair of 807's in the zero-bias Class-B circuit.

Good work can, of course, be done by running the 807's in Class AB2. Unless, however, a highly stable source of voltage for the 807 screens (and an equally stable source of bias suppy, usually batteries) is available, the full audio output of which the valves are capable will not be realised.

### 807's in Class-B

The design which follows does away with both these requirements by running the 807's in Class-B with zero bias.

Normally, this mode of operation is confined to triodes specially designed for zero bias application, but it has been found possible to adopt 807's to zero-bias Class-B working by means of an easy modification, now well known.

The secret is to drive the 807's on the *screen grid*, connecting the control grid to the screen grid *via* a resistor. The data published by R.C.A. shows the optimum value of this resistor to be 20,000 ohms. A discussion as to how the value of this resistor affects the valve characteristics, or the effect of connecting the 807 as a triode, is outside the scope of this article, but the figures quoted for operation of the valves in Class-B are quite impressive, and it is interesting to note that the R.C.A. specify Class-B operation as the method of realising the full audio output of 120 watts, with but 5·3 watts driving power and an anode voltage of 750.

### Driver Requirements

Another interesting and important point which emerges when comparing zero-bias 807's with normal zero-bias Class-B triodes, is that whereas the latter valves require a low-voltage high-current source of drive, the 807's require high *voltage* excitation with low current.

Thus, unlike 807's run in Class-AB2, operating the valves in Class-B means that a comparatively constant load is presented to the driver stage, the actual grid impedance of a pair of valves being given as 14,200 ohms. The driver requirement for 120 watts output, according to the published characteristics, is 555 peak grid-to-grid volts at 5·3 watts, which is somewhat more than required to drive the same valves in Class-AB2. This is no disadvantage, however, as the power can easily be obtained, and it has been found that a 6L6 connected as a tetrode, with 350 to 400 volts on its anode, will drive the 807's to approximately 100 watts output, with negligible distortion on speech input.

### Speech Amplifier

Using the preceding data as a basis, a straightforward three-stage speech amplifier was built up, and as will be seen from the circuit diagram, it is quite conventional and free from frills. A " speech level indicator " was incorporated in the amplifier, using a magic-eye valve and double-diode triode amplifier, for reasons explained later, but this can be omitted with no detriment to performance.

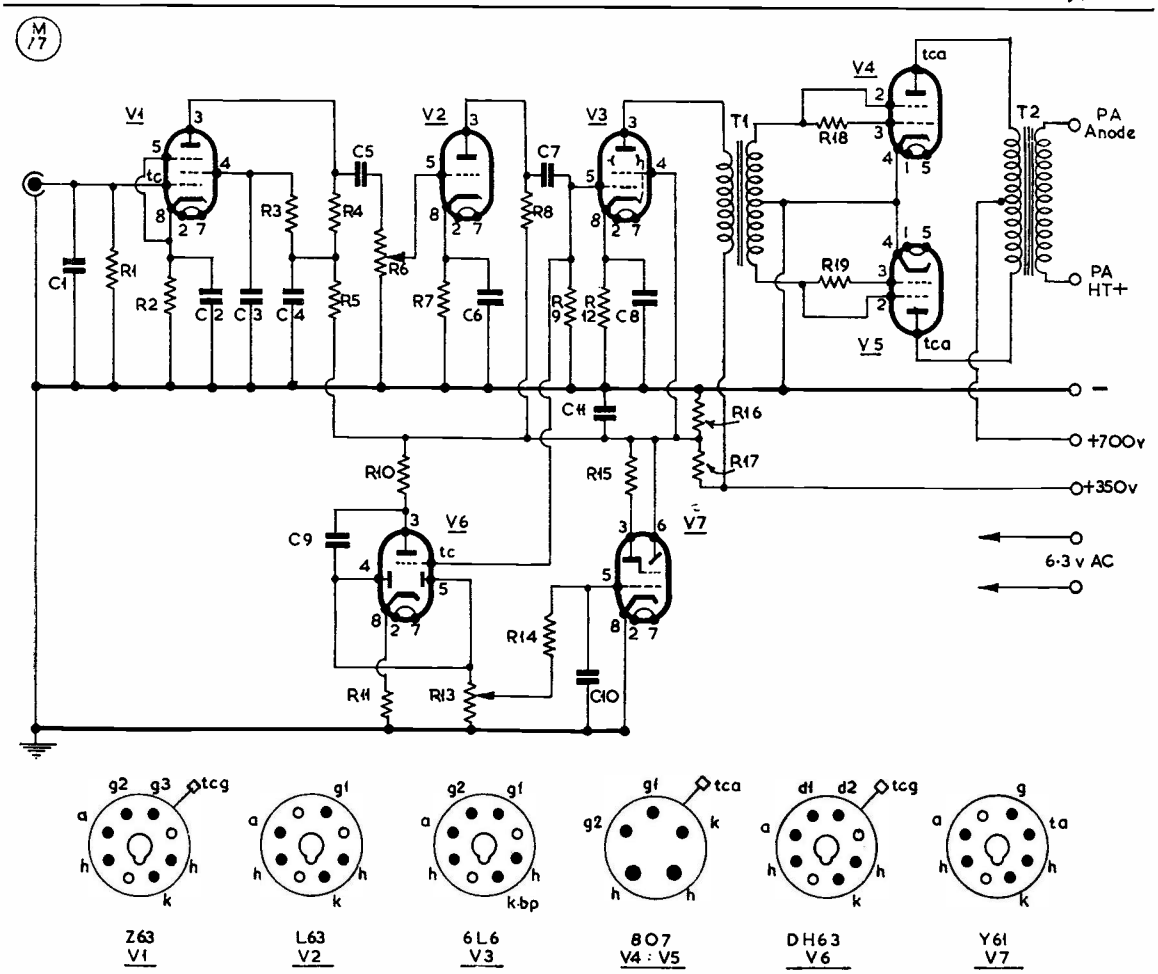
The first valve, a Z63, is a normal high-gain voltage amplifier with provision for crystal microphone input, resistance-capacity coupled to a L63 which drives a 6L6 in Class A as a modulator driver. With the voltages indicated, and correct matching to the 807 grids, the 6L6 can be driven to give an output of 6 watts, which will be ample to obtain up to 100 watts from the 807's.

### Construction of Speech Amplifier

Work on the speech amplifier can commence by building the Z63 and L63 stages into a metal screening box. Incidentally, the complete screening of the first two amplifier stages is to be recommended whatever form of construction is adopted ; the trouble involved is well worth it to ensure freedom from feedback later on.

The microphone input jack is fitted to the panel side of the screening box. The usual precautions in wiring up the speech amplifier should be taken. Heater wiring should be put in first, the wires being pressed flat into the corners of the chassis.

A Z63 is preferable as the first valve, as the use of the single-ended type, such as a 6S17, incurs the risk of bringing the grid in close proximity to the heater wiring, and in a high




**Circuit of the speech-amplifier/modulator, using 807's in Class-B zero-bias, and capable of giving 100 watts of audio from a crystal microphone. Stages V6, V7 are for the speech level indicator device; this part of the circuit, the operation of which is explained in the text, may be omitted without affecting the modulator output in any way. For the full audio power to be developed, the HT unit must give 700v. at 450 mA, with good regulation.**

gain amplifier this can give rise to hum. The lead to the top cap of the Z63 must be shielded and a metal shielding cap placed over the top grid.

### Speech Level Indicator

Audio voltage is taken from the 6L6 grid to the grid of a double-diode triode, DH63, the diodes of which are connected together. The amplified audio is then rectified by the diodes, the exciting voltage for the magic-eye assembly V7 (Y61) being developed across a 1 megohm variable resistor R13, which forms a sensitivity control.

Thus, on speaking into the microphone the magic-eye on the Y61 will close to an extent dependent upon the distance of the speaker from the microphone, the setting of R13, and the setting of the audio gain control R6.

In practice, after speech amplifier and modulator are connected to the transmitter, the

### Table of Values

**One Hundred Watts of Audio**

| | | | |
|---|---|---|---|
| C1 | = 50μμF | R12 | = 220 ohms, 1 watt |
| C2, C6 | = 10 μF, 25 volt working | R14 | = 3 megohms |
| | | R15 | = 2 megohms |
| C3, C10 | = 0.1 μF | R16 | = 20,000 ohms, 10 watt |
| C4, C11 | = 8 μF, 400 volt working | R17 | = 3,500 ohms, 5 watt |
| C5, C7, C9 | = .01 μF | R18,R19 | = 20,000 ohms, 1 watt |
| C8 | = 25 μF, 50 volt working | V1 | = Z63, G.E.C. |
| | | V2 | = L63, G.E.C. |
| R1 | = 5 megohms | V3 | = 6L6 |
| R2, R7 | = 1,500 ohms, 1 watt | V4, V5 | = 807 |
| R3 | = 1 megohm | V6 | = DH63, G.E.C. |
| R4, R9, R10 | = 250,000 ohms, ½ watt | V7 | = Y61, G.E.C. |
| | | T1 | = Class B driver transformer (*see text*) |
| R5, R8 | = 50,000 ohms, ½ watt | | |
| R6, R13 | = 1 megohm volume control | TS | = Woden modulation transformer, Type UM3 |
| R11 | = 2,000 ohms, 1 watt | | |

sensitivity control is set so that when 100 per cent. modulation is taking place, the magic-eye just closes.

Whilst this device is in no sense a depth of modulation indicator, it does serve as an indicator of the level of speech *input*, and has been found extremely useful in practice. It indicates, for instance, how much background noise is getting on to the carrier, and shows readily whether the operator is speaking the correct distance from the microphone.

### Modulator Construction

There is a little to say regarding construction of the 807 modulator. In the test set-up, speech amplifier and modulator are separate units, the 807 driver transformer being placed on the modulator chassis, and a short length of screened cable connects the output of the 6L6 with the driver transformer primary. With this arrangement the speech amplifier can be placed on the operating desk with all controls at one's finger tips, and no noticeable distortion results even when the length of interconnecting cable is 10 feet. Another advantage is that the chances of RF feedback are minimised when the speech amplifier is placed at a distance from the RF stages.

A driver transformer having a *step-up* ratio is required for the modulator, the correct ratio being easily calculated if the optimum load for the driver valve or valves is known, the required turns ratio being the square root of the ratio of driver load impedance to the grid impedance of the 807's. With a 6L6 as driver stage, having cathode bias, 300 volts on the plate and 250 volts on the screen, a load of 4,500 ohms is required to realise the full output of 6·5 watts. This latter figure is taken from the published characteristics, and does not, of course, take into account transformer and other losses. In choosing a driver valve or valves these losses should be borne in mind, and it is as well to budget for a driver stage which will deliver 15 or 20 per cent. more audio than is theoretically required for any given output.

A single 6L6 with cathode bias will not drive the 807's up to the full 120-watts audio output. But to modulate a 150-watt carrier, only 75 watts of audio is theoretically required ; assuming a correct match between 6L6 plate and 807 grids, and making due allowance for losses, there will be no difficulty in realising approximately 100 watts audio output.

Here again modulation transformer and other losses must be taken into account when estimating modulator output, especially when plate and screen modulating a pair of Class-C tetrodes, where the screen dropping resistor will account for some loss of audio power, and it is as well to have some audio in hand.

OPERATING CONDITIONS FOR 807's IN CLASS-B

| | | | |
|---|---|---|---|
| Plate Supply Voltage | = 750 volts | 600 volts | 500 volts |
| Grid Driving Power | = 5.3 watts | 5.3 watts | 5.3 watts |
| Grid Impedence per Valve | = 7,100 ohms | 7,100 ohms | 7,100 ohms |
| Grid Bias | = *Nil* | *Nil* | *Nil* |
| Plate-to-Plate Load | = 6,650 ohms | 5,050 ohms | 4,000 ohms |
| Anode Current (2 valves) No Signal | = 12 mA | 10 mA | 8 mA |
| Max. signal | = 450 mA | 450 mA | 450 mA |
| Audio Output (Approx.) | = 120 watts | 90 watts | 72 watts |

### The Driver Transformer

We will assume, therefore, that the speech amplifier described above is to be used, with a 6L6 as driver.

A driver transformer is thus required which will match a 4,500-ohm impedance into 14,000 ohms. The impedance ratio of the transformer will therefore have to be 1 : 3·2, making the required turns ratio 1 : 1·8, *i.e.*, the square root of the impedance ratio. A normal Class-B driver transformer will serve the purpose with primary and secondary reversed, assuming the transformer has a centre-tapped primary.

Such transformers seem difficult to come by, as the usual driver transformer for Class-B and AB2 amplifiers, although having a step down from primary to secondary, invariably has an untapped primary. If any difficulty is experienced in obtaining a transformer of the correct step-up ratio, two 5 or 6-watt " universal output transformers " offer an alternative arrangement ; the low-impedance winding of one, carrying the output of the driver valve, being connected to the low-impedance winding on the other transformer, the secondary of which is connected between the 807 screens.

By experimenting with the adjustable primary taps it will thus be possible to arrive at a correct match between driver and modulator.

The modulation transformer is a Woden UM3 which will match the modulator into a variety of PA impedances. If a degree of top-cut is felt desirable a ·002 $\mu$F mica condenser with high voltage rating may be connected across the secondary of the modulation output.

### Testing

The speech amplifier should first be tested by applying heater and HT voltages and connecting a speaker or headphones *via* a suitable

transformer across the secondary side of the driver.

Assuming everything proves to be in order, voltage can then be applied to the 807's, a 75-watt lamp being connected across the secondary of the modulator as a load. The lamp load will not of course be a correct match for the modulator, but will afford sufficient indication that the 807's are functioning properly.

The plate-to-plate load of a pair of 807's in Class-B is given as 6,600 ohms, and if desired a 100-watt resistor with a value of from 4,000 to 10,000 ohms may be connected across the appropriate tappings of the UM3 secondary, to simulate the impedance of the Class-C amplifier which it is proposed to modulate. The lamp is, however, quite a good method of judging the modulator output.

A 0-500 milliammeter should be connected in the HT positive lead to the primary centre tap of the modulation transformer, and the standing current of the two 807's noted. With a plate supply of 700-750 volts the standing current should be in the region of 10 mA.

A sustained whistle into the microphone should now result in an upward kick of the plate current to 450 mA, with the lamp as load, and the 75-watt bulb should light up to full brilliance.

With a resistive load on the modulation transformer secondary, and the matching taps correctly adjusted, the anode current should reach a slightly higher value.

Putting the meter in each 807 anode lead should result in upward plate current kicks of equal magnitude, and if possible a pair of valves should be selected which are balanced, otherwise distortion and loss of output will result.

It will be evident that with such a large current swing, the high voltage supply to the 807's *must have good regulation* if the full output is to be realised. Swinging choke input should be used with a mercury vapour rectifier or rectifiers, and a fairly generous mains transformer. Smoothing chokes should have as low a DC resistance as possible to avoid excessive voltage drop across them on surges of current.

**Results**

If correct matching between the driver stage and the 807 grids is obtained, and if the 807's are correctly matched to the Class-C stage, no trouble will be experienced in obtaining audio outputs of up to 100 watts using a 6L6 driver. This is of course more than ample for 100 per cent. modulation of a 150-watt carrier.

**Alternative HT Supply**

Perhaps the constructor has by him a 500 or 600-volt transformer which could be used with the 807 modulator. A power supply incorporating such a transformer will enable the 807's to deliver an audio output of from 70 to 90 watts—but the same requirement as previously applies in the matter of regulation.

A set of operating conditions is therefore appended for anode voltages of 500 and 600. As the average plate current in each case works out at about 286 mA the secondaries should be rated for at least 300 mA working current, otherwise, apart from the risk of a burnt-out secondary, the voltage regulation will be inadequate to cope with the large anode swing.

It should be noted that for each set of operating conditions, grid driver requirements remain the same.

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**HONOURS AND AWARDS**

The Honours List published for the Official Birthday of Her Majesty on June 13 contained the names of the following, honoured for their work in radio, telecommunications or electronics. The dignity of *K.B.E.* is conferred upon Air Marshal R. G. Hart, the distinguished R.A.F. Signals Officer, who is now Controller of Engineering and Equipment at the Air Ministry; and upon Brigadier L. H. Harris, Engineer-in-Chief, G.P.O. The honour of *C.B.* goes to A/Cdre. A. T. Monks, Controller of Telecommunications, Hq. 90 Group, which supplies Signals services for the whole of the R.A.F.

Among those made *C.B.E.* are A. T. Black, Esq., Director of Electronics Production, Ministry of Supply; A. W. Bonsall, Esq., Govt. Communications Hq.; and Gp/Capt. E. Fennessey, now of Decca Radar. The distinction of *O.B.E.* goes to H. L. N. Ascough, Esq., Cable & Wireless; and to Capt. K. W. James, Govt. Communications Hq.

Appointed *M.B.E.* are E. A. Brooks, Govt. Communications Hq.; W. A. Coslett, Cable & Wireless; J. A. Dunkley, R. B. Pullin & Co., Ltd.; G. M. Gapp, Govt. Communications Hq.; S. J. G. Knight, Govt. Communications Hq.; W. J. Quill, Marconi's Wireless Telegraph Co., Ltd.; F. W. Townsend, Plessey Co., Ltd.; and A. R. Turnbull, C/R/O *Southern Harvester*. The *B.E.M.* goes to A. Monck, Govt. Communications Hq.; and to F. J. Robinson, R/O 1st Class, G.P.O. Radio Station, Highbridge, Somerset, which is the receiving and control centre for the big Post Office long-distance station at Portishead.

It is very probable that there are a number of holders of U.K. amateur callsigns in the list, who have been honoured for their work in spheres other than radio. But as the holding of a callsign is not mentioned in any citation, it is not possible to list radio amateurs who may have been honoured unless they let us know—and, naturally, we should like to hear.

# DX COMMENTARY

**L. H. THOMAS, M.B.E. (G6QB)**

WØCVU

THE chief item of interest about this month's mail is that activity on *Ten* is conspicuous by its absence; that band has been very dull throughout the period. There is no doubt that *Fifteen* has achieved the status of the premier DX band, and it has been amazingly good, considering the summer conditions with which we are still contending. It is unfortunate that this band should also be the target for all the creepy-crawly things that seem inseparable from modern civilisation, with its doctrine of "jam yesterday, jam to-day *and* jam to-morrow."

Notwithstanding all these loathsome intruders, one can always find some sort of DX on Fifteen; on one or two occasions, at least, it has been open for twenty-four hours and quite unusually interesting around 0300, when it should by rights be stone dead.

As mentioned, *Ten* has yielded very little other than some occasional patches to South Africa and South America, with short-skip Europeans available at times for those who have not yet worked them on this band.

The choice between the three DX bands now lies before us, according to whether we prefer peace and quiet and occasional unspoilt QSO's *(Ten)*; real DX, but under extreme difficulties of QRM *(Twenty)*; or DX of almost any kind, plus jellyfish *(Fifteen)*. One point in favour of Fifteen is that the said jellyfish usually disappear late in the day and leave us an hour or two to see what the band *ought* to be like *all* the time.

What with the weather and the short notice for this issue, reports are slightly scant this month . . . may we hope for more next time? Meanwhile, we resume our tour of the DX bands.

## CALLS HEARD, WORKED and QSL'd

### The DX Bands

G3FXB (Southwick) had a pretty good week, during which he raised ZK1BS and VR2DA on Fifteen Phone, FO8AC on Fifteen CW, and heard ZK2AD on Twenty CW. (And now his beam is out of action with a break in the feeder.) Other stations worked were KL7PIV, OA4M, VK9HO, VP2AD, VP7NF on Fifteen phone; XE2FL and 2KW on Twenty phone; and UL7GL on Twenty CW.

G3FXB had never worked XE on phone before, but at 0530 one morning he heard XE2KW and raised him; then XE2FL called in shortly after! Other news is that ZM7AC is active on Twenty CW, around 1400 (which wouldn't be much good for us in this country).

G2BLA (Morden) spent part of the period with his distant aerial mast missing (on loan for NFD!); but with the far end of the aerial tethered 8 feet from the ground he got 589 from W9, worked two new countries (HC and HK) and raised plenty of other DX—all on Twenty. The HC was HC7WK, who describes himself as "the only HC7 in the world." On Fifteen, G2BLA worked CE3ZO twice, KZ5KA, W's and VE's; on Forty he raked in LZ, UB5 and ON.

The foregoing reminds us that our own long wire parted company with its halyard at the top of a tree, and we re-installed it, as a temporary measure, half-way up, losing about 25 feet of height in the process. Results since then have been so good that we shan't bother to hire the monkey again,

neither shall we go in for pyrotechnics or toxophily. (We don't know the highbrow word for "whirling a half-brick round on a piece of cord"—the usual method in these parts.)

**Early-Bird Stuff**

Those of us who find the call of DX more than balanced by that of a comfortable bed are put to shame by G3JCQ (Barrow-in-Furness). He says that Twenty-metre phone from the Pacific areas was excellent during December, January and February from 0500 to 0700 GMT. He has heard VR3F and VR2AG many times, and has worked ZK1BS frequently. Other stuff coming across the North Pole has included 20 KL7's worked, 50 VE 5 to 8, W7's *ad lib*, ZK, ZL, KH6 and VK. KA's have also been prolific, but difficult to work because of their Stateside affiliations.

Other news from G3JCQ—ZL5AA is rockbound on 14156 kc, and would like to work more G's. . . . TI1WS/MM is OK; in fact, he paid a personal call when his ship docked at Barrow. His /MM outfit runs 200 watts phone and CW on Forty, and QRP (10 watts or so) on Twenty . . . The attractive thing about Twenty-metre phone during early mornings, particularly in the winter, is the complete absence of Europeans. Whether is is due to skip or to the prevalence of too-comfortable beds we are not sure.

G5FA (London, N.11) raised four new Zones during the month with KZ5LB, VS1BB and ZD4CM on Twenty, and a ZL on Fifteen. His best DX was VKØAS at Mawson Base, Antarctica, but we don't yet know which Zone he is in. G5FA hopes it is 39! Referring back to the sheepskin note last month ("The Wolverine Award of Michigan"), G5FA tells us that he was the first station outside the U.S.A. to qualify. He also holds that other one from the Michigan "Interclesial Society for the Preservation and Study of the Pure Science of Paddle-Slapping" and is entitled to sign /ISPSPSPS after his call!

G3HQX (Mitcham) was presented with another junior op. (YL) during the month, but is getting back to normal procedure once more. New ones include KG1JA, UL7AB, ZB2, UC2, KL7 on Twenty, and ZC4, KH6 and VR2 on Fifteen.

G3LET (Westcliff-on-Sea) started up just after Christmas and has worked 72 countries in 29 Zones, all on Forty and Twenty CW with 70 watts. But he laments that he never even hears the prefixes that some people seem to work! Latest DX is 3W8AA, KZ5GO, KG1DL, LU, VK, KL7, and he confirms our remarks about the consistency of ZL4CK in the evenings. A recent contact was VP9BU/P on June 9, when several VP9 portables were heard, and there was apparently a contest in progress. G3LET mentions, by the way, that RAEM's QSL gives his full postal address—he is certainly a "favourite son"!

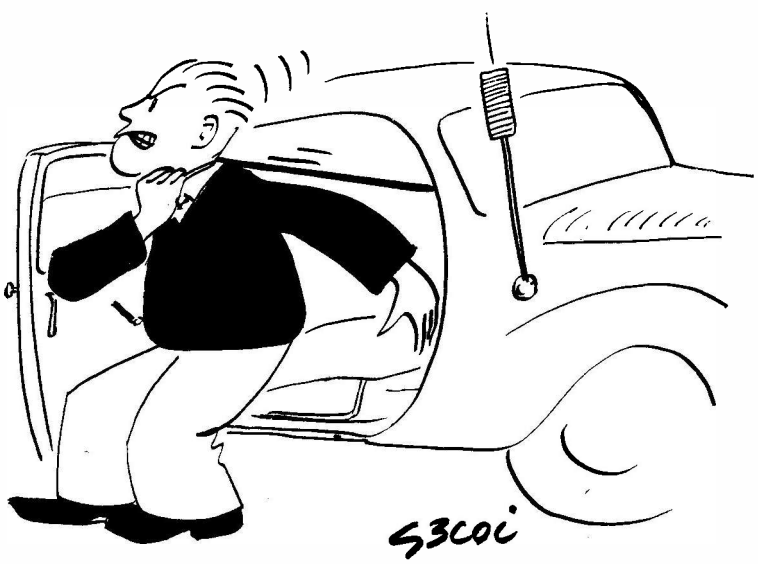
G3LKZ (Cleadon) stuck to Twenty CW and raised CX1DZ, 4X4JM and VP9DJ/P for new ones. Others were CE3, KL7, LU, ZB2, OY and the like. VR3G was heard on June 9, and at 2200 VR6TC (inaudible) was being called by W's.

G3JZK (Cambridge) modified his exciter for use as a separate transmitter. He found that if he dropped from 150 watts to 20 watts during a QSO (between overs, of course), there was rarely any comment from the other end. If the DX station was told of the change, though, he usually reported the drop of an S-point or so. If there is QSB around, the change is not noticeable.

CE3ZO was raised on Twenty and Fifteen, also HC7WK on Twenty and FO8AC on Fifteen. G3JZK will be home from Cambridge and operating as GM3JZK for a while, on all bands, including One-Sixty.

G3ABG's recent report of a QSO with LA8FZ/P on Hopen Island, Svalbard, has brought us a ship letter telegram from G3JXE, who is R/O of the trawler *St. Leger* and spends much time up in those regions. It is worded "Confirmed nil activity Hopen Spitzbergen and Bear so ABG worked phoney. Regards. Ron, JXE." Sorry to break it to G3ABG in this way, but there it is.

GW3DNF (Chirk) wielded his 12 watts on Fifteen and raised CE3ZO, JA's, CN2, IT and his first W6. CT1NT was a new one on Ten. 'DNF is now building a Top Band rig, chiefly so that when conditions make it impossible for his QRP on the other bands, he will at least "pick up a contact or two."




*". . . . These dratted throat microphones . . . ."*

G6VC (Northfleet) covered most bands, working UA1 and HA on Eighty, UA9 on Forty, KH6 on Fifteen and an LU on Ten. The latter band, as he says, has folded up somewhat, but it won't be long before it is back in full swing.

**Sheepskin Department**

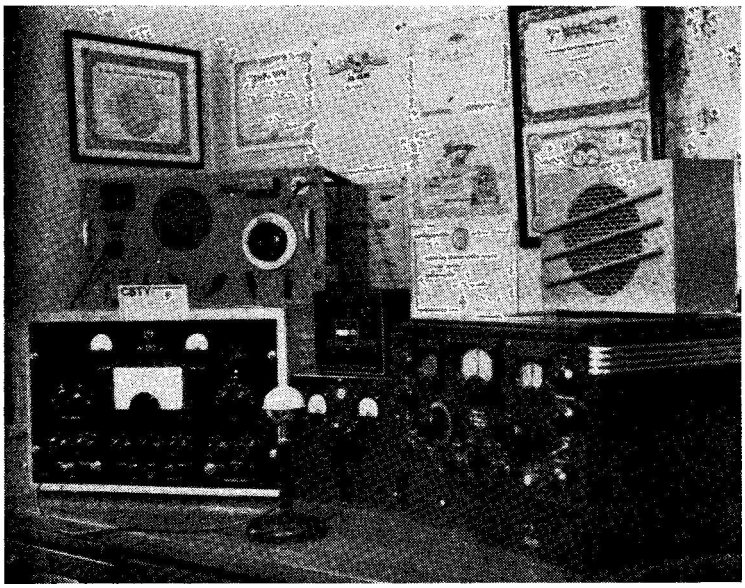
Each month, it seems, there is another of these things to announce. This time it is the Kroonstad Radio Club Award, for which, if you are not in Africa, you have to work two ZS4's in Kroonstad. No need to send QSL's, but (a crafty one, this!) the two stations you claim must have received *your* card. Send 1s. or three IRC's to ZS4MG, Box 325, Kroonstad, South Africa.

(This gives us the idea that we might originate a "G6QB Award," to be sent free of charge to all stations in (say) VR5, VR6, ZM7 and the like whose cards have been received by us. The award would, of course, take the form of a QSL card—a duplicate of the one we have already sent.)

**TOP BAND COUNTIES LADDER**

***(Starting Jan. 1, 1952)***

| Station | Confirmed | Worked |
|---|---|---|
| G2NJ | 98 | 98 |
| GM3EFS | 97 | 97 |
| G3JEQ | 95 | 96 |
| G6VC | 95 | 95 |
| G3HEK | 92 | 94 |
| G3JHH | 89 | 89 |
| G3FNV | 88 | 91 |
| G2AYG | 88 | 88 |
| G3AKX | 85 | 87 |
| G3KEP | 83 | 83 |
| G3ABG | 79 | 81 |
| G3DO | 75 | 75 |
| G2CZU | 73 | 73 |
| GM3KHH | 66 | 72 |
| GM3KLA | 66 | 68 |
| G2HDR | 65 | 67 |
| G3KYU | 62 | 62 |
| G3EJF | 60 | 65 |
| G5JM (Phone) | 55 | 58 |
| G2CZU (Phone) | 53 | 54 |
| GM3COV | 49 | 62 |
| G3HKF | 47 | 61 |
| GW3HFG | 46 | 63 |
| G3KXT | 39 | 43 |
| G3JSN | 35 | 52 |
| G3JZP | 35 | 45 |
| G3LEV (Phone) | 26 | 35 |
| G3LBQ | 16 | 41 |
| G3IUW (Phone) | 12 | 25 |



**Station of G8TY, Southgate, London, who runs a Panda PR-120-V transmitter (left) and an SX-28 as main receiver (right). Above the transmitter is an R.208, the useful "surplus" item with a wide HF coverage, right up to 60 mc. Other apparatus includes a Millen R9'er, and among the awards held by G8TY is the DXCC certificate. Aerials are a 3-ele beam for Ten and a dipole for the 14 mc band.**

**Pacific DX**

Those who spend a lot of time chasing some of the Pacific DX will envy G3FKM (Birmingham), who collected VR2AZ and FO8AM on Fifteen phone; FO8AC and FK8AS on Fifteen CW; and VKØCJ on Twenty phone. He has also received an airmail card from FW8AA, who was XW8AA before he moved to Wallis Island. G3FKM has heard VR6TC around 0700 on 14020, but says there was no hope for Europeans on account of the W QRM. Finally, he tells us of a possible expedition to Albania in August; also that DM2ACB might have been signing ZA2ACB during June.

G3BDQ (St. Leonards) has found conditions really grim at times, especially during the afternoons, when there has often been no DX at all, and one could imagine it was 1953 again. Despite all this, he had a good scratch round the bands and collected the following: — Fifteen CW: KH6AYG (1940), ZP5AY (0042), FF8BZ (1850), HB1MX/FL (2300), JA, MP4, VK and VS1. Fifteen phone: VP5CM (0015), 3A2BG (1800), and 4S7YL. Twenty CW: CE, UA9, CR6, VS1, JA, KP4, CO, HK and VEØNE. Twenty phone: EA8, 5A3 and Europeans.

On the old subject of gotaways, G3BDQ now says "The man with a super Rx and a transistor Tx would surely be the world's top scorer in the Near Miss Stakes."

GC6FQ (Jersey) tells us that he used to work Twenty phone, but it got full up with DL's and I's, and also the high winds to which he is exposed make short work of so large a beam. So now he sticks to Fifteen and Ten (phone only), but is finding them pretty scratchy. In the *CQ* DX Contest he came second in Europe, and twelfth in the world on Fifteen phone . . . but he lost his voice at mid-day on the second day and had to

QRT! For the first fourteen hours of this contest, GC6FQ averaged one contact every three minutes.

G3DO (Sutton Coldfield) added to his Marathon score with VQ3AC and VQ6ST on Fifteen, and HI7LMQ on Twenty. He has not much hope in AC4A, and is disappointed about the very rare appearances of FW8AA, but he did manage a nice phone QSO with VR2AZ.

**SWL Column**

Listeners are asked to note that VP7NF now finds it impossible to acknowledge SWL cards, and has requested BCM/QSL not to forward him any more. He says "I like Amateur Radio, not writing out QSL's for hours on end as I do now." This substantiates the point we have made so often—if a chap is putting an outstanding and consistent signal across, SWL reports are of no value to him and he can hardly be expected to cope with a real flood thereof.

On the other hand, DL1TB is *asking* for SWL cards (from British Colonies) on his 21 mc CW, 1700-2200 GMT.

A. R. Dexter (Bedford) found Fifteen most profitable with such stations as VS4JT, VK9BW and 9HO and, in particular, CR5SP, the high spot of the month. Other bands yielded little.

G. Curtis (South Harrow) appeals to all who report to this feature to state times and frequencies for the rarer DX. He tells us that SM8KV/P (Spitzbergen) sent him a nice card; that ZC5JM is by now in VS1; that ZK2AD is on 14005 kc (we can confirm this); that ZC3DU is supposed to be on 14060 kc at 1500 GMT; and that EA9DF may be in Ifni shortly—just as he has threatened to be for the last four years!

B. L. Stedman (Fleet) covered Fifteen and reports ZS9G (1800), KG6AGO (2050) and in the mornings HI7LMQ (0530), VR2BZ and ZK1BS (0730).

M. J. Prestidge (Birmingham) is the 14-year-old junior op. of G2BXP. He heard the "AC4A" who figured in these notes last month and says "it" didn't sound very AC4-ish, but more like a European gentleman playing with his Tx. Genuine ones logged on Fifteen phone were HI7LMQ (1900), HI7LS (1955), ZP5CF (0600), VQ6ST (1900), ZK1BS (0850) and XE1MO (0440).

The SWL's have set a good example by quoting times this month. Will some of our rare DX-chasers please copy?

**FIVE BAND DX TABLE**
**(POST-WAR)**

| Station | Points | 3.5 mc | 7 mc | 14 mc | 21 mc | 28 mc | Countries |
|---|---|---|---|---|---|---|---|
| DL7AA | 808 | 109 | 166 | 224 | 165 | 144 | 236 |
| W8KIA | 704 | 68 | 148 | 265 | 113 | 110 | 265 |
| G5BZ | 699 | 64 | 118 | 239 | 164 | 114 | 245 |
| G3FXB | 694 | 71 | 127 | 203 | 172 | 121 | 224 |
| G3FPQ | 609 | 65 | 86 | 187 | 158 | 113 | 205 |
| G2DC | 595 | 70 | 92 | 193 | 117 | 123 | 205 |
| G3DO | 592 | 24 | 46 | 225 | 145 | 152 | 243 |
| W1VG | 562 | 25 | 117 | 192 | 122 | 106 | 200 |
| K2BZT | 511 | 66 | 71 | 203 | 104 | 67 | 208 |
| W6AM | 502 | 30 | 58 | 271 | 86 | 57 | 271 |
| G2YS | 446 | 65 | 85 | 145 | 97 | 54 | 163 |
| G3WL | 436 | 38 | 75 | 138 | 112 | 73 | 171 |
| G3ABG | 416 | 45 | 83 | 159 | 67 | 62 | 173 |
| GM2DBX (Phone) | 411 | 34 | 31 | 158 | 97 | 91 | 172 |
| G3BHW | 373 | 15 | 32 | 139 | 102 | 85 | 176 |
| W6AM (Phone) | 343 | 13 | 32 | 238 | 39 | 21 | 238 |
| G6VC | 333 | 33 | 44 | 136 | 65 | 55 | 145 |
| G3INR | 330 | 46 | 57 | 124 | 60 | 33 | 135 |
| G3GZJ | 264 | 18 | 52 | 72 | 80 | 42 | 114 |
| G3JWZ | 252 | 49 | 61 | 68 | 41 | 33 | 97 |
| G3IUW | 245 | 31 | 38 | 67 | 60 | 49 | 114 |
| G3JZK | 221 | 15 | 46 | 47 | 77 | 36 | 115 |
| G3HQX | 184 | 9 | 37 | 52 | 40 | 46 | 88 |
| G3DNR | 168 | 10 | 21 | 69 | 35 | 33 | 85 |
| G2BLA | 158 | 18 | 39 | 48 | 44 | 9 | 75 |
| GW3DNF | 141 | 21 | 30 | 50 | 31 | 7 | 58 |
| G3JSN | 75 | 16 | 17 | 22 | 13 | 7 | 33 |
| G3IDG | 75 | 11 | 14 | 12 | 12 | 26 | 39 |

*(Failure to report for three months entails removal from this Table. New claims can be made at any time).*

**From Overseas**

GW3LFM writes from s.s. *Tyndareus* at Singapore with a word of admiration for G2CDI and G3HCU, whose phone often appeared on Fifteen when the band was apparently dead. Other DX often heard on that band includes 3W8AA, JZØPC (now closed), 4X4JC and XE1PJ. HS1A is, of course, frequently logged out there—he uses 100 watts to a 3-element beam and is a W2 from New York. ZC5RF operates on Forty and has been heard working JA's. GW3LFM himself is finishing off a 150-watt Tx, and will be active again in late November when the ship returns to the U.K. *(Late note:* He heard HS1D on Twenty phone at 1600 GMT; apparently another W operator.)

W6ZZ (Menlo Park) has put up a new beam and now boasts a really good signal on Twenty, Fifteen and Ten. With this, he hopes to add to his present score of 1403 G's worked. The new aerial is a three-trap W3DZZ beam with Telrex rotator and a 40-foot "crank-up" tower.

ON4QX (Antwerp) sends some nice photographs of his new station, and reports that he now stands at 165C worked, 156 confirmed, with 39 Zones for WAZ—the missing one being Zone 23, as always! Though ON4QX is, of course, a Belgian national, it is interesting to note that he served with our RNVR during the war, and was at Dunkirk. Among the many operating awards he holds is our WNACA.

**Top Band Topics**

No reports of DX this month, but we should mention that Stew of W1BB has been visiting Europe, and stayed with G2PL for a while. Unfortunately, we missed the gathering that took place, owing to be in the rare county of Cumberland at the time, but one very much hopes that Stew enjoyed his visit and that he will continue to preside over the other end of the Top Band Trans-Atlantics for many years to come.

G3EFZ (Chester) was formerly

GW2EFZ, not many miles away. In claiming his WABC (successfully), he urges all GW's to "look after that second letter in the prefix" . . . when you move to G-land you certainly feel a draught!

GM3KHH/P will be operating from **Nairn** on the night of July 27. He will start up as early as possible, using CW at first, but phone will also be tried when conditions permit. Operation will continue until no signals can be heard on the band (this sounds to us like a rather rash promise!) GM3KHH, whose home QTH is in Elgin, Morayshire, joins the Top Band Ladder and collects his WABC.

Another one for the expeditionaries is reported from G3AJP (Fritton, Suffolk), who will be operating in GW-land, CW and phone, during the last week of July and the first week in August. GW3AJP/P hopes to be on from **Radnor, Brecknock** and **Merioneth** and to visit many amateurs in South-West England and Wales. Look out for a Bedford shooting brake (VMK 195) with centre-loaded Top-Band whip! Some QRP DX-chasing with a B.2 will also take place.

G2CZU (Bath) would welcome more activity from Scotland, especially on phone. With his phone score of 53/54 he is well on the way to his second WABC, but being down South makes it hard going. However, he hopes to make it on phone before the rig and the operator wear out! G2CZU finds that he has worked fellow TOPS members in 25 counties and wonders whether to try for an all-TOPS WABC as well . . .

G3LNS (Birmingham), despite what he calls "a building spree," has spent enough time on the band to raise HB9IN (569 both ways), GI3JEX, GM3LGM (Lanarks) and four other new counties. His input is still 3 watts, although he is working on a 150-watt band-switched job which, he says, still won't spoil his appetite for One-Sixty.

G6VC (Northfleet) settles for 95/95, having received his card from Alderney . . . Likewise GM3EFS (now in London and off the air except for occasional holidays) scores 97/97 and occupies the second rung. G5JM has vacated his position at the top and has now started the climb all over again with a Phone-only label to his call—it would certainly be a great achievement to work all U.K. counties on both CW and phone, on Top Band!

**Personal Touch**

Last month's note about the rumoured closing of Iron Curtain stations has brought in an interesting letter from G3FAS (High Wycombe) which discloses a nice gesture from behind that mysterious piece of screening. He worked a UA station and was asked *not* to QSL *via* Box 88, but to wait for the UA's card. This duly arrived, by airmail; meanwhile, very shortly after the QSO, G3FAS was presented by his XYL with a third junior op. He mentioned this on his return QSL card, and received (again by airmail) a special greetings card with congratulations on the new arrival. The wording on this card ends with "I wish you to have possibility to be glad by means of new

## SHORT WAVE MAGAZINE DX CERTIFICATES

**WNACA (Worked North American Call Areas)**

Twenty-two cards to be submitted, for contacts with stations in ten U.S. Districts (W1-Ø); nine Canadian (VE1-8 with one 8 in Yukon, one in North-West Territories); Alaska (KL7), Newfoundland (VO) and Labrador (VO). Contacts may have been on any bands, phone or CW. Operators in W, VE, VO or KL7 are *not* eligible for this Award. (147 *WNACA Certificates issued to June*, 1957).

**FBA (Four Band Award)**

Cards to be submitted with confirmation of contacts with 20 different countries, *each* country to have been worked on four different bands. Any bands will qualify *e.g.* 160-80-40-20, or 80-40-20-10, or 160-40-20-15 — and so on. Entrant's own country may count as one of the 20 countries. (86 *FBA Certificates issued to June*, 1957).

**WFE (Worked Far East)**

Eighteen cards to be submitted, for 18 different countries selected from among the following: C (China), C3 (Formosa), C9 (Manchuria), CR9 (Macao), CR10 (Timor), DU (Philippines), FI (French Indo-China), HL (Korea), HS (Siam), JA/KA (Japan), KR6 (Ryukyu Is.), PK1-2-3 (Java), PK4 (Sumatra), PK5 (Dutch Borneo), PK6 (Moluccas), UAØ (USSR in Zone 19), VS1 (Singapore), VS2 (Malaya), VS4 (British North Borneo), VS5 (Brunei), VS5 (Sarawak), VS6 (Hong Kong) and XZ (Burma). All or any bands count. (28 *WFE Certificates issued to June*, 1957).

**WABC (Worked All British Counties)***

Sixty cards required, from sixty counties of the British Isles, all to have been worked on the 160-metre band since January 1, 1952. Counties to be as shown in any standard atlas, *not* "administrative counties" such as the three Ridings of Yorkshire, East and West Sussex, County of Bristol, and so on. Isle of Wight counts as Hampshire — not separately. Isle of Man does score separately, as do all the Channel Islands. Scilly Isles also count separately. For London, the L.C.C. area scores as one County. (151 *WABC Certificates issued to June*, 1957).

**WBC (Worked British Counties)***

Open only to claimants *outside* the United Kingdom and Eire. Cards required from 50 different counties of the British Isles, worked on any band 3.5 to 28 mc inclusive, phone or CW. Stickers will be issued to claimants showing proof of contact with 60, 70, 80 or 90 counties. The definition of U.K. counties is the same as for the WABC Certificate above. (72 *WBC Certificates issued to June*, 1957).

**MDXA (Magazine DX Award)**

To qualify for this Award it is necessary to have worked 3 continents, 15 countries on 160 metres; 5 continents, 40 countries on 80 metres; 6 continents, 80 countries on 40 metres; 6 continents, 180 countries on 20 metres; and 6 continents, 90 countries on 10 metres. (*Four Awards issued*).

NOTE: Claimants in the U.K. are required to send all cards in support, by registered post with a check list, when making their claims. Overseas claimants (only) may send either (*a*) A check list, without cards, duly certified by the Hq. of their national Amateur Radio society, or (*b*) An uncertified check list, from which all or any cards may be called in for scrutiny by us. In no case will any Award be issued without proofs we consider to be good and satisfactory.

**A full List of U.K. Counties appeared on p.20 of the March, 1956 issue of* SHORT WAVE MAGAZINE.

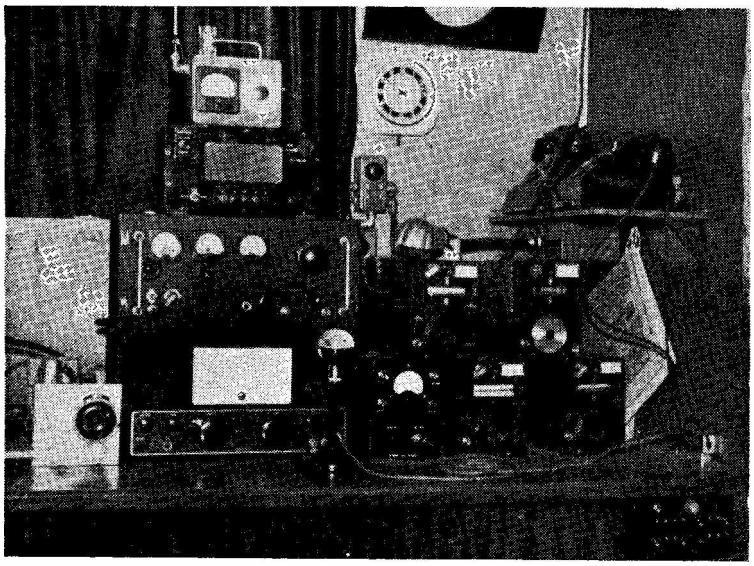
**Claims, enclosing return postage (five IRC's in the case of overseas claimants) for all the above-mentioned Certificates should be addressed "DX Commentary," *Short Wave Magazine*, 55 Victoria Street, London, S.W.1.**

(*Overseas Amateur Radio periodicals please copy*)

baby again. Good health to your XYL! "

We mention this as proof that there *can* be more in any QSO (even with stations that we regard as automatons) than an exchange of RST and call-sign. G3FAS and others are very concerned at last month's remarks, which intimated that unguarded statements over the air or by post might result in the closing down of some of the very stations whose operators are showing the genuine Ham Spirit and (who knows?) perhaps spreading it a little.

Incidentally, the UA station says on his card: " If you will QSL *via* Bureau, I shall not obtain it." This should be sufficient to stop all traffic *via* Box 88, whose real purpose has always remained a mystery.



**G3ATL, Hugglescote, Leics. is housed in a building separate from the house, actually in the middle of a field about 200yards away (inter-com. by telephone, top right). Operation is on all bands, with a very complete aerial installation: The main 160-80-40 metre system is 618 ft. long and 100 ft. high, centre-fed through 136 ft. of 600-ohm open-wire line supported on short masts. Aerials for 10-15-20 metres are individual switched dipoles, in each plane. The receiver is an Eddystone S.640, and the transmitters are modified Command sets running 80w. input, CW and phone. G3ATL is also very active in the mobile way.**

### Magic Beam

GM3EST (Motherwell) chased VQ6LQ on Twenty for years without success. He recently heard him again on the band, and had nothing but a Fifteen-metre beam up. So he took some time off and erected a Twenty-metre dipole facing the right way. While finishing this off with a co-ax plug and so on, he switched on the receiver (on Fifteen) and heard VQ6ST signing with a G. He came back to the first call . . . so if you know anyone who wants a Twenty-metre dipole, unused, which brings in new ones like magic, write to GM3EST.

### Operating Note

G3ISX (Welling) noted last month's strictures on " CQ DX " and so on, and presents the other point of view. He has called stations who have been CQ DX-ing, and they have come back with " Not you, QRZ DX," and so forth. What, he asks, *is* DX? Now that is a very old Quiz Question, and G3ISX himself gets nearer the answer than most when he says DX means " Any country I haven't worked."

One thing is certain—the " D " in DX does *not* mean " distance " any more. Otherwise, we shouldn't be passing over those ZL's and working ZD8 with such glee. But is PX or ZA legitimate DX to a European? If PX1ZZ called CQ DX and G3ISX replied, he would probably be ignored or reprimanded ; but if his own call were GD3ISX, the whole thing would be different—the PX would want *him*. Perhaps the DX-ness of DX is now measured by the number of stations operating under any particular prefix?

We don't intend to open up this vexed subject again, because there is obviously no answer to it. DX is what you make it, and where you find it—rather like traditional jazz!

### DX Strays

AC4A continues to make his sporadic appearances, producing a few laughs but, by now, deluding hardly anyone . . . JZØPC has closed down and ØPB is closing, leaving the field to JZØPA for the time being. Some new calls may show up later as replacements arrive.

CR8AB, or W5LAK/CR8, was due to be on from Goa during June. No reports of QSO's . . . Two more phonies are ZD7AB and 7AH . . . ZK2AD, heard working ZK1BS on Twenty (June 14) seems to be genuine and a new station on the island ; he was a 549 signal on 14005 kc.

A bunch of W2's were due to operate /KC4 from Navassa during early June . . . No reports to hand of QSO's with them . . . PJ2CE is temporarily off the air after having a fire . . . FW8AA has been on phone . . . VR3G was very active at the beginning of the period, but seems to have vanished.

New licences recently issued down ZC5 way include ZC5AL, 5CZ, 5DA, 5RF and 5WT. The first mentioned has been heard hard at it on 21 mc CW.

KC6JC (Truk) is on 14020 kc . . . KG6IG (Bonin Is.) has gone on phone . . . AC4AY has been worked by JA8AQ, who treats him with a large query . . . VR7S (same category) was worked by JA1CJ . . . JA1EF, the 7 mc specialist, reports contacts with XF1A, KH6, UAØ, VE7, W6 and 7 . . . YI2OT is phoney, or at any rate unknown out there.

Selection of nice DX phone on Twenty includes KM6AX, BV1US, HL2AJ, KC6SP, VKØCJ, FO8AD, KC4USK and several HS stations, all worked by W's. Some of the

best CW DX for the same lucky chaps includes VP2AD and 3VG, FO8AQ, VR3F and 3G, ZM7AC (worked in W7 at 1400), ZS7C and all the "rare" Russians.

No lack of activity on Wake Island, but it's nice work if you can get it from here. On the air are KW6BS, 6CA, 6CB, 6CC, 6CE, 6CJ, 6CM and also KH6CV/KW6 . . . CEØAC crops up from time to time, usually on phone (14200 kc) . . . KH6BZZ/KJ6 (14250 kc) is another who should keep the mike brigade busy . . . KX6AF, FW8AA and ZM7AC have all been worked by W5's on Twenty CW.

### DX on Eighty

We always have a feeling that something really good is lurking around the Eighty-metre band in the early mornings and late evenings, but the QRM (and recently the QRN) situation is such that it takes a superman to find it.

**W A Z MARATHON, 1957**

***All Bands***

| Station | Zones | Countries |
|---|---|---|
| G3FKM | 39 | 151 |
| G3DO | 39 | 149 |
| G5BZ | 39 | 140 |
| G3FXB | 39 | 131 |
| G3BDQ | 39 | 128 |
| G3BHW | 39 | 128 |
| G3HLY | 38 | 134 |
| G3HCU | 36 | 98 |
| G3JKF | 36 | 94 |
| G2DC | 35 | 102 |
| GM3EOJ | 33 | 93 |
| G3GGS | 31 | 83 |
| G5FA | 31 | 78 |
| G3GZJ | 31 | 73 |
| G6PJ | 30 | 72 |
| G3HQX | 28 | 77 |
| G2BLA | 28 | 64 |
| GM3BCL | 28 | 60 |
| G3JWZ | 26 | 61 |
| G3DNR | 25 | 57 |
| ZL3CP | 22 | 34 |
| G3KMA | 21 | 55 |
| GM2DBX | 21 | 52 |

G3AJP recently received a listener report from UA3-354/UJ8 on his CW signals (2125 GMT last February). This type gave his Lat. and Long., which put him only a very short distance from VU (or, for that matter, from AC4!) Wanted—a bold spirit who will set up house in Zone 23 and operate consistently on all bands, Phone and CW; all QSO's to be QSL'd direct by airmail the same day. (And then we woke up!)

### Rarities

Among the "rare" Russians who have been worked very frequently are UJ8KAA, UH8KAA, UM8KAA, UI8KAA and 8KBA, UAØKQB, and a few sporadic UL7's. No one seems to be firmly holding the fort in the latter country.

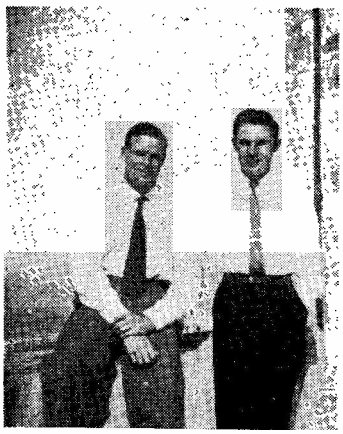
Some good phone DX recently worked by members of the WGDXC includes the following: — *Twenty*: I5FL (0500), VR2BC (0550), KH6BZZ/KJ6 (1255), KC6SP (1235), KX6AF (1130), VK7KM/VK9 (1900). *Fifteen*: VR2BC (0550), VK9HS (1245), CR5SP (2105), ZD8BC (1930), VK9AJ (1415) and FB8BX (1640).

### Last-Minute Arrivals

G3ABG (Cannock) stuck to CW, and got in CE3ZO and VQ2RG on Fifteen; on Twenty the bag was UD6, UF6, CR6, ZB2A, KL7, PY, LU and the like.

G3JKF (London, W.5) added five Zones to his Marathon score, with OA4EP (Ten phone) and 4S7LJ, VS6AE, FB8CC and K5BLK/KG6 (all Twenty CW). Other new countries for the Marathon included CT2, EL, MP4K, OD, UJ8, VP5, VP3, VQ5, ZD9AE, ZD1BZ, ZC5AL and ZD4BV. He tells us that ZD9AE is now back in South Africa, leaving ZD9-land unpopulated for the present. G3JKF finds Ten quite lively towards South Africa until 1930 BST or thereabouts, but pretty well dead for the other continents.

Incidentally, all readers are invited to contribute their facts to "Vital Statistics"—details of this kind are always of interest to the really keen DX types.



**ZB1CP, Malta, G.C., on the left, with 5A2TW, visiting recently. Only licensed since February, ZB1CP is on 40-metre CW every Saturday evening, looking for G's.**

### Results, 1956 VK/ZL Contest

From the May issue of *Amateur Radio*, of the Wireless Institute of Australia, we take the results of the VK/ZL Contest held in October last. There were 44 "native" entries for the CW section, with ZL1AH (5518 pts.) and VK9DB (4600 pts.), the leaders for their countries. The phone section attracted entries from only 21 VK/ZL's, with VK9DB (3083 pts.) the leading operator.

The European CW entry for the Contest totalled 58 stations from 18C, the first ten EU's being: G5RI (2890 pts.), DL1DX (2400), G6XL (1590), DJ1BZ (1560), ON4PA (1350), G2DC (1296), OZ3FL (1200), DL1QT (897), OH4NT (874), and ON4AU (800).

In the phone section, Europeans totalled 16S from 10C, the first three being OH5PE (1159 pts.), DL1UX (860), and OH2OV (722). The sole U.K. phone entry was G3TR, who made 546 points.

Looking for the first five world-high CW scores, we find: ZL1AH (5518 pts.), W7FSA (5421), W8JIN (5031), VK9DB (4600), and W6LDD (4446). A very fine performance on the part of ZL1AH, particularly as there have been occasions in the past when the outright winner of this Contest was a station outside the VK/ZL area. Congratulations, too, to G5RI on leading the European entry.

[Over

For both sections from all countries, the total SWL entry was only 22, of whom four were U.K. listeners. As BERS-195 says in his article elsewhere in this issue, it is a matter for regret that more SWL's do not go in for these events, particularly on the CW side.

Thanks and acknowledgments, as ever, to all our regular reporters and to the Bulletin of the *West Gulf DX Club* for DX information quoted in this issue. Correspondence has been sparse on account of weather, holidays and the early deadline; we hope for the usual volume to be resumed next month, when you have more time to get your stories together.

Note that the next deadline will be **first post on Friday, July 19.** For the benefit of overseas readers, the following one will be *Friday, August 16.* Address everything to "DX Commentary," *Short Wave Magazine,* 55 Victoria Street, London, S.W.1. Until we hear from you again, 73, Good Hunting, and — BCNU.

# FUTURE OF THE U.K. COMMUNICATIONS NETWORK

## MULTI-CHANNEL COAXIAL SYSTEMS — RADIO RELAY LINKS —LONG - DISTANCE DIALLING— ELECTRONIC EXCHANGES

From a Lecture By

**Sir Gordon Radley, C.B.E., Ph.D.(Eng.)**
*(Director-General of The Post Office)*

*We think readers will agree that the developments in Post Office telephone engineering discussed here merit a place in our series of general-interest articles on subjects not directly connected with Amateur Radio, but having a communications aspect. This article has been composed from an important lecture given by Sir Gordon Radley at the Conference held in conjunction with the recent Instruments, Electronics and Automation Exhibition at Olympia, London.*—EDITOR.

CONSIDERABLE progress has been made in overtaking the backlog of demand for telephone service. When the seven-millionth telephone was connected last summer the size of the U.K. system had been practically doubled since the war. As the telephone is made more readily available to the marginal user the problem of the investment required to give service to each new subscriber still requires a separate pair of wires back to the local exchange, or divides the use of this pair of wires with another subscriber if the service is shared. Even so the load-factor is extremely low, the wires often not being in use for more than a few minutes' conversation in each 24 hours. This is the great argument for shared service. It is one which meets all the requirements of the occasional user and which is accepted without question by such highly developed countries, telephonically, as the United States. In that country two-thirds of residential subscribers are sharing, half of them with one other party. In the United Kingdom only about one-third of residential subscribers are sharing lines, none of them with more than one partner. Nevertheless, there is a new emphasis throughout the Post Office on providing customers with the kind of service they want at an economic price. Any method of multiplying local voice pairs on existing lines, as we now multiply long-distance pairs over high-frequency cables and on radio links, would hold tremendous promise for the future. But it must be done without the necessity for outstationing elaborate apparatus away from the exchange.

### The "Coaxial Tube"

During the past 25 years the results of scientific research have become more apparent in building up the facilities for long-distance communication. Cables transmitting 600 speech channels *within a single coaxial tube* have been installed between the main centres of population. This form of cable was first proposed by the Bell Telephone Laboratories in America, but the mathematics of transmission over the coaxial line were largely due to Dr. Alexander Russell, and the first coaxial cable in the world actually to be brought into service was that between London and Birmingham in 1938. The same line plant, with appropriate repeaters to transmit a slightly wider band of frequencies, is used to provide television links rented to the broadcasting authorities. With little modification the coaxial cable with repeaters at six-mile intervals could cater for 1,000 telephone channels on each tube.

As traffic demands and opportunity offers, it is proposed to reduce the spacing between repeater stations on some routes to three miles. Modified in this way existing cables will cater for about 1,000 telephone channels, plus a 405-line television channel on each tube.

Alternatively, the tube can carry 2,000 telephone channels, but it is doubtful whether the risk of losing such a large number due to a single fault would make this arrangement attractive. The ability to transmit telephony means that the repeaters must meet stringent requirements in respect of low intermodulation in order to prevent interference and cross-talk between channels. If television is to be transmitted the governing requirement is in respect of minimum phase distortion, and may be more difficult for colour than for black and white. Nevertheless, no insuperable problem is likely to be encountered in the transmission of colour by line. To design an amplifier meeting both requirements simultaneously

or alternatively is not easy. Development, in any case, depends on the use of valves with a performance superior to that of any at present in use in this country.

**UHF Radio Relay**

During the next decade, radio relay systems of very large communication capacity are likely to be constructed in this country. The period since the war has seen notable developments in the 1,000 to 10,000 mc band, which is as yet comparatively unexploited. Microwave radio has characteristics which make it attractive for use in an inland network. It offers the possibility of transmitting a very wide band of frequencies. A radio relay system of this kind has stations at intervals of between 20 and 50 miles, each having a line-of-sight to its neighbours.

The first use of the microwave system by the Post Office was for the transmission of television programmes to the Sutton Coldfield station of the B.B.C. in 1949. The Kirk O'Shotts station has been served by such a system, from Manchester, since 1952. This last system operates on a frequency of about 4,000 mc. These frequencies are beyond the limits of ordinary valves, and the system is noteworthy because it makes use of the travelling-wave amplifier developed in the Clarendon Laboratory at Oxford. This was the first large-scale commercial application of this amplifier. anywhere in the world.

**Radio *v.* Cable Links**

It is commonly thought that a system of this kind must have considerable economies over buried coaxial cable. That is not always the case in the United Kingdom, because comparative costings of cable and radio systems frequently show an advantage in favour of the former, particularly if a duct line already exists into which the new cable can be drawn. In addition, it is not now easy to find sites for new radio stations on the hilltops of rural England. Nevertheless, radio transmission systems have been developed capable of carrying several 100 telephone channels, and three such systems have recently been installed. It is in the interest of the British communications industry that we should use systems of this kind, which are the undoubted answer to the communication problems of undeveloped countries abroad.

A larger radio link system is planned, extending from south to north through the United Kingdom. When fully loaded this system will carry six independent radio transmissions in each direction, and each transmission will be capable of bearing up to 500 channels of telephony, or one television channel. At terminal and intermediate stations the separate transmissions will be handled in independent amplifying equipment. This will make it convenient to lead off transmissions as required by spurs to cities on either side of the route. Valuable economies can, however, be achieved by the use of common aerial and wave-guide systems, and by engineering the project so that spare plant and test facilities are shared.

It will be a definite policy for future development that all broad-band channels should be interchangeable between cable and radio, and usable for telephony or television.

**Long-Distance Dialling**

Large numbers of circuits will be required on main trunk routes to cater for the anticipated growth in traffic when subscribers are enabled to dial long-distance calls. The first installation of a new system enabling subscribers to do this will be brought into use in Bristol early in 1959. From the outset, subscribers there will be able to dial to most of the large cities in the United Kingdom. Similar facilities will then be provided at other towns, and later they will be extended to calls routed indirectly. Coin boxes of new types are to be introduced by means of which call office users will also be enabled to dial trunk calls.

This development, extending the subscribers' dialling range from a few thousand subscribers in local exchanges to a nation-wide system with many millions of subscribers, will be one of the biggest forward steps taken in the telephone system for the U.K.

In order to make nation-wide dialling by subscribers practicable it will be necessary to set up a national numbering scheme which will enable the called number to be obtained by dialling a code which is independent of the place of origin of the call. Thus, if the called subscriber is in Glasgow, the same code must be dialled whether the call originates in Aberdeen or Brighton. The equipment must " do the thinking " to determine the routeing of the call from Aberdeen or Brighton—or anywhere else—to Glasgow, and sometimes it will be very complicated. The national number will not be used for local calls, but in designing the system the Post Office is anticipating 20 million subscribers connected to 8,000 exchanges.

Long-distance switching will be done initially by electronic mechanical equipments of conventional type. Electronic register translators should, however, prove useful for converting the dialled national number into the digits actually required to route the call to the exchange of destination, and to determine the charging according to the duration and distance of the call.

**Electronic Exchanges**

Electronic techniques are likely to revolutionise the art of telephone switching within the foreseeable future. In America it has been announced that a fully electronic exchange will be in public service in 1958. Many telecommunication laboratories are pressing on with the development of systems which will render the present mechanical equipments—cross-bar as well as Strowger—obsolescent, although mechanical systems with an electronic control may be used as an interim measure. So far as can be seen, fully electronic systems are beginning to fall into two broad types. (The distinction depends on how the speech paths are actually connected). In one type gas diodes, or some other device, are used in a space

arrangement. In the other the appropriate channel is picked out of a time division multiplex system.

The second of these is favoured by the Post Office, and a good deal of experimental research at Dollis Hill has resulted in the filing of 50 or 60 patents. These, it is hoped, will form the basis for a useful exchange. One incidental advantage of this type is that it may be possible to extend the time division multiplex system into the local network. Use of a single pair of wires between the exchange and some such outstationed switching unit would effect the economies in local cabling mentioned earlier.

During the past year or so agreement has been reached between the Post Office and the principal manufacturers of telecommunications equipment to pool all their research and development resources with the objective of constructing an all-electronic exchange of this type as early as possible. A design has been agreed which exploits time division multiplex techniques to the utmost, is the most promising economically and requires the minimum development time due to the fact that it has already been the subject of prolonged research. It also makes use of components and techniques which are readily available. The objective is to have the electronic equipment made and ready for installation as an exchange forming part of the public network by the end of 1958.

# THE NEW FOREST MOBILE RALLY

## STONEY CROSS, JUNE 16, 1957

L. J. J. MORGAN (G2HNO)

RECORD temperature — record attendance. Those are the outstanding facts about the second Annual Mobile Rally organised by the Bournemouth and District Amateur Radio Society on Sunday, June 16th, at Stoney Cross Airfield, near Southampton.

As before, control stations were established by the host Society, G2HIF/P on two metres and G3GYK/P on 160 metres; on last year's experience no 80-metre control was established. Both stations were active from about 10 a.m., and trade was soon very brisk. Visiting mobiles were talked in, and by early afternoon a very large gathering was enjoying an informal get-together.

The weather was perfect and the temperature rose to well over 80 in the shade — there was, however, no shade to be found!

The excellent total of 36 mobile or portable-mobile stations checked in, nine of them operating on two metres. A table showing details of these stations follows, with apologies to anyone who in the heat and bustle of the day was overlooked. It is an interesting and, perhaps, significant fact that of the thirty-six visiting mobileers, only seven had held a radiating licence pre-war. It is certain that more than sixty licensed amateurs were present, and the total gathering of well over a hundred included many XYL's and children. There were numerous picnic parties and "tours of inspection."

The day was not without incident. G3IRA ran out of petrol about two miles from Stoney Cross, but called up the control station and G2AHL went out to his rescue. When G3IRA did arrive, the fine skeleton slot arrangement fastened to the back of his motor-cycle attracted much attention. G3CGE had the misfortune to run over his own transmitter before mounting it in his miniature BMW car, and arrived with his gear bent but in working order.

Much of the equipment on show was of first-class design and construction. Outstanding was the fine installation of G3GMN, who came over from Gloucester. G3KAS had a well-thought-out adaptation of the Collins TCS equipment. G3CIM was showing a remarkable gadget combining F/S meter, phone monitor, S-meter, modulation depth indicator and accumulator voltmeter.

**Mobiles present at Stoney Cross, June 16, 1957**

| CALL | HOME QTH | BAND OPERATED | EQUIPMENT |
|---|---|---|---|
| G2AHL | Guildford | 2m. | QQVO3/10 PA |
| G2BCX | South Woodford | 160m. | VFO BA, 5763 PA |
| G2BRR | Wootton Bassett | 160m. | VFO 12A6 PA, Transistor Rx |
| G2CAJ | Kensington | 80, 40, 20m. | 807 PA, 1155 Rx |
| G2CDN | London | All | Elmac AF67 |
| G2DSW | Southampton | 2m. | QVO4/7 PA |
| G2FIX | Wilton | 160m. | Motor cycle miniature |
| G2FK | Bournemouth | 160m. | ZC1 |
| G3BHS | Southampton | 2m. | Hamobile |
| G3CGE | Southampton | 2m. | 6J6 PA |
| G3CIM | Romford | 160m. | QVO4/7 PA |
| G3COJ | Maidenhead | 160m. | EL91 PA |
| G3ENG | Putney | All | CO, 705-PA |
| G3ERN | Harlow | 160m. | ZC1 |
| G3EVV | Peckham | 160, 10, 2m. | 807 PA p/p 6BW6 mod. (160m.) |
| G3FKO | Bristol | 160m. | VFO, par EL91 PA |
| G3GMN | Gloucester | All | MO, PA TT11, 7v. super Rx |
| G3HCK | Hurst Green | 160, 80 m. | 807 PA, B2 Rx |
| G3IES | Hampstead | 160, 80, 40m. | ZC1 |
| G3ION | Southampton | 2m. | p/p 6AK5 PA |
| G3IRA | Swindon | 2m. | Motor cycle miniature rig. Skeleton slot |
| G3ISZ | Hounslow | 160m. | 5763 PA, 109 Rx |
| G3IVP | Salisbury | 160, 80m. | Rx 6v. super |
| G3JSJ | Enfield | 160m. | 5763 PA, Command Rx |
| G3JTQ | Feltham | 2m. | QQVO3/10 PA |
| G3JUC | Richmond | 160m. | VFO-BA, 5763 PA |
| G3JXA | Tolworth | 160m. | TT 11 PA, 7v. super Rx |
| G3KAS | Osterley | 160m. | Mod. TCS 12 |
| G3LHH | Shepperton | 160m. | 5763 PA, 6BW6 Mod. |
| G3LOO | Stockwell | 20m. | CO, 1625 PA, 25 watts |
| G3WW | March | 160m. | VFO, 5763 PA, Command Rx |
| G3XC | Farnham, Bucks. | 2m. | QQVO3/10 PA, CC converter |
| G4AP | Wootton Bassett | 160 m. | CO, 5763 PA, home built super Rx |
| G5PP | Coventry | 160m. | 12A6 PA, 12A6 Mod. |
| G5SN | Leigh-on-Sea | 160, 80m. | VFO, PA 6V6, Command Rx |
| G6OX | Hampton Court | 2m. | Hamobile, Yagi beam |

A general observation was the obvious popularity of the 5763 as a PA and the value of the Command Set as a mobile Top Band receiver.

Undoubtedly the technical high spot was the centre-loaded whip devised by G3JUC. The capacity top comprises two flexible sections ; these are bowed out to increase capacity and thus lower the resonant frequency. At present the movement is arranged by lever mechanism, but G3JUC intends to add a motor shortly for this purpose.

The aerial system evolved by G3ERN/M was also of great interest—a loading coil of 2 in. diameter, wound with heavy-gauge wire, mounted along the whole roof-length of his van, carried on porcelain insulators about 4 in. long, and feeding a 4 ft. whip at the back.

G3ENG/M had a coil wound on 1 in. diameter fibre-glass, 20 in. long, and wound with 700 turns of 22g.; this gives a very high Q, and his results /M compare with those when using an open aerial. Nearly every Top Band whip to be seen was centre-loaded, but very few were fitted with capacity hats.

The longest trip to the Rally was made by G5PP/M, of Coventry. G3WW/M, of Cambridgeshire, was on holiday in the district and made a welcome appearance. G2DC, the well-known DX operator, who is establishing himself in retirement at a new QTH at Ringwood, took a day off from garden toil, and there were large contingents from Southampton and Bournemouth.

The gathering broke up at about 6 p.m. Many of the visiting mobiles then headed for Bournemouth and could be heard talking themselves into traffic confusion as they attempted to find the sea and some parking space.

There was general regret that the popular and hard-working Bournemouth secretary, John Ashford, G3KYU, was unable to be present, having injured a leg in a heavy fall the previous week-end. G3KYU had shouldered all the work of organisation and his efforts were rewarded by complete success.

The Bournemouth Society's Rally is here to stay, and should occupy a high place in the Amateur Summer Calendar at the years go by.

## ARTICLES FOR PUBLICATION

We are always glad to see the offerings of potential contributors for possible publication in SHORT WAVE MAGAZINE—all such material used is paid for at good rates, and particularly generously for well-produced articles covering new fields. A well-presented article would be typed double-spaced with wide margins, on one side of the paper only, using the *Magazine* sign convention throughout, be fully illustrated with diagrams shown separately, use the C1, L1, R1 notation for circuit elements, and have tables of values (where required) for each circuit. Moreover, such an article would be checked and carefully re-checked on all details before being sent in. We see a good deal of material which, though containing the germs of good and useful ideas, is so sloppily or carelessly put together that it has either to be entirely re-cast and re-written, or cannot be used at all. The aim of any contributor should be to produce work as finished as it would appear in print This is quite easy, and to many who write is a satisfaction in itself. It also helps to ensure accuracy and clarity!

## NOTE OF APOLOGY

In G3ATL'S article on his mobile installation, in our June issue, the stabiliser valve should, of course, have read VR150/30, and not as given. He also points out that for Top Band working, power is duly reduced to 10 watts. And with reference to that photograph of GM2DBX's station on p. 193 of the June issue, and having regard to the suggestion made in the caption, it is very unfortunate that the reproduction was not better. We could hardly make out any of those cards in *our* copy. Needless to say, this was in no way intentional, either on GM2DBX's part or ours!

## OPPORTUNITY IN VP8

In "Situations Vacant" is this issue there is an advertisement which will stir the blood of all who long for distant places. An acceptable youngster holding a radio qualification approximating to a U.K. amateur licence can have 2½ years of adventure in Polar regions — and come home at the end of it to find himself in credit to the tune of about £1,000. We wish there had been such opportunities 30 years ago ! (Many of the VP8's now on the air are in the service of the Falkland Islands Dependencies Survey, working in the Antarctic.)

## GUN THAT SHOOTS THE LINE

There are at least four known, and practised, ways of getting the far end of an aerial up a tree : Climbing the tree ; swinging a cord over the tree ; flying a kite across the tree ; and shooting an arrow up the tree — but the most original and ingenious of which we have yet heard (making the fifth, and most dangerous, method) is to take the bullet out of a .22 cartridge and use the charge to fire a rod, towing a length of string, over the tree. According to G3HMO, with practice you can even select the required limb of the tree — he has done it, so he should know !

## BACK NUMBER SITUATION

We are now very short of back numbers of almost all issues before 1954, and many issues since then are sold out. Particular issues urgently required can, however, nearly always be obtained, for loan or by purchase, by advertising for them in our Readers' Small Advertisement section.

## ALWAYS WANTED

Photographs of Amateur Radio interest for reproduction in SHORT WAVE MAGAZINE. Prints can be of any size, but should be clear and sharp, with explanatory notes on a separate slip. Payment is made for all photographs used.

# VHF BANDS

A. J. DEVON

**Good Openings, High European Activity—June 19/20 the Big Night—FA/G "First" on Four Metres, June 16—EU Contacts on 70 Centimetres—Station Reports, and the Scores—**

AT last, our VHF bands have been "giving" in a big way, and the news this time is entirely of those exciting experiences which make it all so much worth while for the keen DX operator—and even the dedicated VHF types, who have known EDX openings before, and whose interest is in the technical aspects of VHF rather than the operating side, have been greatly stimulated by the results they have been getting since last we wrote.

Things really began to move on Two about June 12, and by Friday, 14th, DL's and PA's were being called from the North Midlands and the N/E Coast. On the previous evening, GI3GXP had been heard and worked from the London area. By the 15th, North Country stations were working into GM again (breaking many months of silence from Scotland), and after midnight on the 15th/16th, G5MA was receiving GM2FHH (Aberdeen). On the evening of June 18, DL1LB was audible in the South Midlands, and the GM's were being heard in the Home Counties.

However, up until the 18th, it was mainly the better-placed G's who were actually getting the QSO's, and then only with the more DX-worthy stations. The correlation with the weather was fairly good, but no very strong temperature inversions were developing because it was not getting cool enough in the late evening—probably, the best conditions for propagation were not occurring until the early hours of the morning. The glass was keeping fairly high, but the inland pressure variations were quite considerable. Across the North Sea, however, a static condition ideal for EDX did develop—so much so, that on the evening of June 18 G2FJR (Sutton Bridge) worked no less than seven OZ's and three DL's in the space of a couple of hours after 2200 BST; he reports "conditions for OZ never better."

Until the 18th, activity was not as high as it often is when the news gets about that EDX is coming through, and in listening round the two-metre band one felt that perhaps full advantage was not being taken of the opportunities.

### The Big Night

By the evening of June 19, all this had changed! Both two metres and 70 centimetres opened wide, the grape-vine had been well shaken, and from about 8.00 p.m. onwards the EDX was S9+ just about all over the U.K. Many Europeans were on, and numerous G's were beginning to queue for their contacts—for many of them, it was a first-ever EU experience.

So much happened on that evening, that it is impossible to chronicle it all in full detail—in any event, we have not yet seen many of the reports, as June 19 happened also to be the dead-line for this piece; it always seems to work out that way! However, your A.J.D. was on the *qui vive*, and the notes following are based largely upon his own observations. They must necessarily be incomplete, as one couldn't know what was happening to everybody at once.

Early in the evening, the ON's and PA's were getting into the South Midlands, with noticeably strong signals. It was not long before the DJ/DL's appeared, with DL3VJ the outstanding station; Fritz is at Horn/Lippe, 50 miles S/W of Hanover, and was using 20 watts to a 20-ele stack. Whenever we ran into him, the DL3VJ signal was coming in like the side of a house; before the evening was out, Fritz had worked GI3GXP, GM6XW, GW3BOC/M and GW8UH, as well as a large number of G's; he also heard GM2FHH. Other very good signals from Germany were DJ2NW, DL3FO/P, DL3IY (with DL1CK as 2nd op.), DL3YBA, and DLØHH. The most easterly of this group, looked at from the South Midlands, is probably DL3IY.

While the DJ/DL's were hard at it—and, of course, getting the lion's share of the attention from the U.K.—the ON's and PA's were working away. ON4DW, ON4HN, ON4LN, PAØBU, PAØFP, PAØLBS, PAØMAI and PAØPP were all nice signals from where your A.J.D. listens, and were having plenty of G contacts.

Probably, somebody will now be thinking: "But where were the LA's and the SM's?" Of SM contacts we have no news, but as regards LA, we did overhear a very nice QSO between LA9OD and G6XM at 2325 GMT on June 19; starting up on CW both ways, G6XM gave the LA RST-569, and got over on phone before signing off on CW. Then, by about midnight, there was quite a lot of CW activity, because the GM's were coming through. Having worked all the Europeans they could, G beams were swung to the north and north-east for GM and Scandinavia. G3KEQ was getting GM3HLH and about 45 minutes later he worked GM3EGW.

The foregoing represents some of the gleanings on two metres. On 70 centimetres, the going was just as good, even if the *tempo* was a little slower. G6NB worked DL3YBA and PAØWAR; G3HAZ raised DL3YBA, and this *may* be a new distance record for the 430 mc band (at the moment of writing, there has not been time to get down to working out the kilometres). DL3YBA himself

confirms that, in addition to G3HAZ and G6NB, he also worked G2FNW, G2XV and G5YV on 70 centimetres.

Out on the East Coast, G5BD scored on 430 mc with DL, ON and PA, with PAØFP also heard; but probably Arthur's most remarkable experience (and achievement) was to copy the *third harmonic*, on 436.2 mc, of DL3FO/P's *two-metre* transmission—at S9+, too!

This is big stuff, and there will probably be more to add on the Seventycem front when we get all the reports in.

We move now on to the evenings of June 20-21, with things still happening, but conditions tailing off. By the 21st, though the EU's were coming in, they gave the impression of being less numerous on the band, and were a good deal weaker than they had been on the 19th, while QSB was troublesome. On the Big Night, on the other hand, an outstanding characteristic of the EDX was the almost complete absence of fading; all signals were not only very loud but also quite steady.

On June 20, G2BVW (Rearsby, Leics.) succeeded with ON4ZK, and at 2305 G5MA worked GI3GXP on CW; he also worked GD3UB, who had previously been in QSO with GM2FHH. G6NB was in contact with OZ2KH at 2330, and PAØHRX was also being worked at GDX. On June 21, G2FJR on the East Coast had another good session with the OZ's, also raising DL and PA, but all with QSB.

### Impressions

Further detailed results will have to wait until we have had the reports in for our next, but in the meantime here are some random notes (and second thoughts): On the 19th, DL3VJ wanted to know why G2HCJ/P was out portable when conditions were so good for home-QTH contacts! . . . DL3FO/P, at 145.4 mc, was being missed by many G's who did not tune high enough in the band . . . GW3BOC/M, out mobile near Wrexham, was doing as well as anybody . . . G4DC had his wife calling CQ for him; her first attempt brought back ON4DW . . . How fortunate we are that all the Europeans can make themselves understood in English! Not a single G was heard trying to work in any foreign language . . . It was good to note some smooth CW operating amongst all the phone that was going on . . . G3CZY/M was heard "calling CQ GW from near Kings Cross in Central London" . . . On the Big Night, QRM conditions were bad, with much cross-modulation and splatter from the heavily-modulated QRO stations . . . There is nothing that can be done about this, unless *everyone* is prepared to run at about 10w. input. . . . That high power is not necessary when the band is open is proved by OZ5J, who was RS-57 in England with only two watts . . . G3GZM reported DL3VJ as "absolutely terrific, and much stronger than local G stations" . . . On the 19th, G5YV worked an LA who had only just come on the air; he called CQ for the first time, and back came G5YV! Some comments overheard suggested that the EU's did not seem to be conforming to any Zone Plan; they are not required to and, in fact, the more they are spread through the band the better! . . . G5BD's remark just about sums it all up: "After months of nothing, the 144 and 432 mc bands suddenly fly into

## TWO-METRE ACTIVITY REPORT

***(Lists of stations heard and worked are requested for this section, set out in the form shown below, with callsigns in strict alphabetical and numerical order).***

**G2FJR, Sutton Bridge, Lincs.**

*WORKED:* DJ3CA, DL1YY, ØHH, OZ2IZ, 2KH, 3A, 3M, 3XX, 5J, 9EA. (*June* 18 *from* 2200 *BST*).

**SWL Winters, Melton Mowbray, Leics.**

*HEARD:* G2ATK, 2BVW, 2CDB, 2CRL, 2DSF, 2FJR, 2FMO, 2FNW, 2HCJ/M, 2HCJ/P, 2NY, 3BA, 3BU, 3CCH, 3DLU, 3FUR, 3FUW, 3GFW, 3GSO, 3IVF, 3JMA/M, 3JWQ, 3JWQ/A, 3JWQ/P, 3JXN, 3JZG, 3KQF, 3LHW, 4JJ, 5BD, 5KG, 5KW, 5MA, 5YV, 6XM, 8MW. (*May* 12 *to June* 15; *CW and Phone*).

**G3IJB, Burnham-on-Crouch, Essex.**

*WORKED:* DJ1XX, DL1CK, 1LB, F9LD, G2CZS, 3GFN, ON4HN, 4ZK, PAØDEF, ØFB, ØFI, ØHRX, ØRG, ØWAR. (*Evening June* 13).

**G3JWQ, Ripley, Derbys.**

*WORKED:* DL1LB, 1YY, 6SV, ØHH, G2ANT, 2DSF, 2HDY, 2HQ, 2RI, 3BFP/A, 3CZY, 3EHK, 3ELG, 3EOH, 3EVV, 3FPV, 3FUR, 3GDC, 3GGJ, 3GHI, 3GJV, 3GSE, 3HA, 3HAN, 3HRH, 3HXS, 3KQC, 3LHW, 3PV, 4DC, 4HQ, 5BC, 6BX, 6RH, 8BP, 8SK, GM3EGW, OZ2IZ, 2KH, 3XX, 9EA, PAØAFN, ØCMA, ØIH, ØNO, ØWI. (*Period to June* 18).

**SWL Smith, Nr. Diss, N'flk.**

*HEARD:* DL1LB, G2FJR, 2HOP, 2MA, 2XV, 3ALP(?), 3DLU, 3GHI, 3GHO, 3HBW, 3IIT, 3IJB, 3JMA/P, 5BD, 5KW, 5MA, 5YV, 6LI, 6LJ, 6NB, 6OX/P, 6XX, 8KW, 8MA, PAØRG, PE1PL. (*Phone and CW, May* 27-*June* 16).

**G3DLU, Sheffield.**

*WORKED:* DL1LB, G2ATK, 2CVD, 2FJR, 2FO, 2HCJ/P (Grantham), 2NY, 2YB, 3BGW, 3CYY/P (Northumberland), 3DKF, 3EEO, 3EGE, 3EHK, 3FAN, 3FIH, 3GSO, 3HAN, 3HZK/M (Leics.), 3IER, 3IRA, 3IRS, 3JGY/P (Malvern), 3JMA/M, 3JWQ, 3JWQ/A, 3JWQ/P, 3JXN, 3JZW/P (Dunstable), 3KEF, 3KUH, 3LKA, 5DW, 5KG, 5LL, 5MA, 6SN, 8BP, GM2FHH, GW8UH/P (Cardiff), ON4LN, PAØAFN, ØBL, ØBU, ØCGA, ØCMH, ØDEF, ØFB, ØFC, ØHRX, ØKH, ØMF, ØNO, ØQT, ØWAR.

*HEARD:* G2ADZ, 2BM, 2BMZ, 2BVW, 2CIW, 2CRL, 2DDD, 2FAR, 2FNW, 2HOP, 2HQ, 2JF, 2XV, 3ARX, 3BA, 3BLP, 3BU, 3CCH, 3CGQ, 3ELG, 3FFV, 3FUR, 3FVK, 3GFD, 3GGJ, 3GHO, 3HA, 3HBW, 3HII/P, 3HWS, 3IVF, 3IWJ, 3JZG, 3JZN, 3KFD, 3KHA, 3KQF, 3LGE, 3LIM, 3LOK, 3OZ, 3WS, 4DC, 4JJ/A, 4MK, 5BD, 5DS, 5HN, 5ML. 5YV, 6BX, 6LI, 6NB, 6OX/P (Epsom), 6RH, 6UJ, 6XM, 6XX, 8MW, 8VZ, GC3EBK, GW8UH, ON4ZK, PAØFP, ØGER, ØPFW, ØRAD, ØROK, ØWI, ØWO. (*May* 22 *to June* 17).

**SWL Tomlin, Malvern, Worcs.**

*HEARD:* G2ATK, 2BVW, 2CVD/P, 2DCI, 2HGR, 2NV, 2NY, 3ABA, 3BA, 3DLU, 3EJO, 3ENY, 3FTN, 3HAZ, 3IER, 3IOO, 3IUK, 3JGY, 3JGY/M, 3JXN, 3JZG, 3KEF, 3KEQ, 3KFD, 3LAY, 3LDW, 3LHA, 3NL, 4DC, 5BM, 5ML, 5YV, 6AG, 6NB, 6SN, 8BP, 8KW, 8SB/M, GW3GWA/P, 8UH/P. (*May* 1*st to May* 31*st, weekends only*).

**G2CZS, Chelmsford, Essex.**

*WORKED:* G2ANT, 2HDY, 3ANB, 3CZY, 3GHI, 3IJB, 3JGY/M (Herefordshire), 3JMA/M, 3JR, 3LHA, 3LOK, 4DC, 5KW, 6XX.

*HEARD:* G3EJO, 3IRS, 3JNI, 3KFX, 5YV. (*May* 24-*June* 13).

**SWL Woodhouse, Storrington, West Sussex.**

*HEARD:* G2AHP, 2AIH, 2AIW, 2ANT, 2ATK, 2AUD, 2BDP, 2BMZ, 2BVW, 2CPX, 2DDD, 2DSP, 2FM, 2FMJ, 2FNW, 2HCG, 2HDJ, 2JF, 2NY, 2XV, 2YB, 3ABA, 3BA, 3BII, 3BLP, 3CCH, 3C1D, 3DLU, 3DO, 3DOR, 3EJO, 3EOH, 3FAN, 3FCQ, 3FD, 3FEX, 3FIH, 3FQS, 3FUR, 3GDR, 3GFW, 3GHO, 3GNR/P, 3GOZ, 3GSE, 3GTH 3HBW, 3HRH, 3HZJ, 3IAM, 3IIT, 3IJB, 3IJV, 3ION, 3IRA, 3IUL, 3JGY/P, 3JHM, 3JMA/P, 3JTQ, 3JTQ/M, 3JWQ, 3JZG, 3JZN, 3JZW/P, 3KBS/P, 3KEF, 3KEF/P, 3KEQ, 3KHA, 3KQC, 3LHA, 3LOA, 3LOK, 3LSP, 3LTF, 3MI, 3XC, 3XC/M, 4DC, 4JJ/A, 4PS/P, 5BD, 5CM, 5HN, 5KW, 5LK, 5MA, 5MS, 5NF, 5US, 5WW, 5YV, 6AG, 6AG/P, 6NB, 6OX, 6OX/P, 6SN, 6XX, 8VZ, PAØFC. (*May* 16-*June* 16).

**SWL Stokes, Ruislip, Middx.**

*HEARD:* G2AHP, 2AIH, 2AIW, 2ANT, 2BDP, 2BZ, 2CPX, 2FM, 2HDJ, 2JF, 2MV, 2QY, 2QY/P, 2TP, 3ABA, 3AEX, 3BII, 3BFP/A, 3BLP, 3CO, 3CZY, 3DF, 3DOR, 3ECA, 3EVV, 3EYV, 3FCQ, 3FQS, 3FUH, 3GDR, 3GFN, 3GHI, 3GOZ, 3GSE, 3GTH, 3HBW, 3IAM, 3IJB, 3ISA, 3IUL, 3JEP, 3JTQ, 3JQN, 3KBS/P, 3KEF/P, 3KEQ, 3KQC, 3LHA/P, 3LOA, 3LSP/A, 3PV, 4DC, 5KW, 5MA, 5US, 5YH, 6AG, 6AG/P, 6JP, 6LL, 6NB, 6NF, 6OX, 6OX/P, 6YP, 8KW, 8KZ, 8RW, 8SK. (*May* 17 *June* 13).

## TWO METRES

ALL-TIME COUNTIES WORKED LIST

Starting Figure, 14

From Fixed QTH Only

| Worked | Station |
|---|---|
| 75 | G5YV |
| 70 | G6NB, G6XM |
| 68 | G3BW |
| 66 | EI2W (286), G3IUD (302), G5BD |
| 65 | G3CCH |
| 64 | G3GHO, |
| 62 | G3BLP (630) |
| 60 | G2FJR (427), G2OI (402), G3DMU |
| 59 | G3EHY, G4SA |
| 58 | G3FAN (637), G3IOO, G8OU |
| 57 | G5MA, G8SB |
| 56 | G3WW (770), G5DS (654) |
| 55 | G2HDZ (495), G2HIF, G5BM, GW5MQ |
| 53 | G2AJ (519), G4CI |
| 52 | G2NH, G6RH, G6XX, GW2ADZ |
| 50 | G3ABA, G3GSE (518) |
| 49 | G3HAZ (358) |
| 48 | G3FIH, G5ML, G6TA (487) |
| 47 | G3HBW, G5WP |
| 46 | G4HT (476), G5BY, G6YU (205) |
| 45 | G2DVD (362), G2XC, G3BJQ, G3KEQ, G5JU |
| 44 | G2CIW (214)*, G3BK, G8DA |
| 43 | G2AHP (500), G2DDD, G3BA, G3COJ, G3DKF, G3HWJ, G4RO, G5DF |
| 42 | G2HOP, G3BNC, G3DLU*, G6CI (220), GM3EGW (146) |
| 41 | G2CZS (282), G2FQP, G3DQ, G3JWQ (302), G3LHA (225), G3WS (255) |
| 40 | G3CGQ, G3IER, G8KL |
| 39 | G2IQ, G3DVK (208), G3GBO (434), G3VM, G8IL: (325) |
| 38 | G2FCL (234), G3APY, G3CKQ, G3HTY, G5MR (343), G8VN (190) |
| 37 | G2FNW, G2FZU (180), G3DLU, GC3EBK (260) |
| 36 | G2DCI (155), G3CXD, G3IIT, G3KHA (195), G6CB (312), G8IP |
| 35 | G3FZL, G3FYY (235), G3HCU (224) |
| 34 | G3AEP, G3CKQ (162), G8IC |
| 33 | G3HHY (125) |
| 32 | G3DLU*, G3HIL, G8QY, G8VR, GC2FZC |

ridiculous pre-war 40-metre phone chaos" !

### FA3JR/G5KW "First" on Four

In any other month, this would be the big news—the fact that the four-metre band had been broken open for real DX. It has all along been expected that, provided we had the co-operation from the other end, DX comparable with that obtained some years ago on five and six metres would be possible.

To Ken of G5KW falls the distinction of being first actually to prove this. Having spent the Saturday afternoon putting up a 4/4 slot-fed job for the 70 mc band, he was ready for the opening to North Africa on Sunday, June 16, when he made contact with FA3JR (Oran) on 4-metre phone, at 2140 BST. At around mid-day on the Saturday, intense sporadic-E had developed, and G3BLP was receiving Portuguese FM/BC stations Oporto 92.5 mc and Lisbon 94.3 mc on his car radio. However, the indications are that the propagation mode for the G5KW/FA3JR QSO was by normal reflection due to the inordinately high MUF. But whatever the mode, it was a fine contact and unquestionably the first proof of the DX-capability of the 4-metre band, as well as being a new amateur record in several categories.

| Worked | Station |
|---|---|
| 31 | G3HXO, G3KPT (108), G5RP |
| 30 | G3FRY, G3GOP (208), G3GVF (129), G3IRA, G3KEF (110), G5NF, GM3DIQ, GW8UH |
| 29 | G3AGS, G3AKU, G3FIJ (194) |
| 28 | G3ITF, G3KUH, G8DL, GM3BDA |
| 27 | G3CVO (231), G3DAH, G3ISA (160) G6GR, GI3GQB, GW3GWA |
| 26 | G2BRR, G3CFR (125), G3SM (211), G3YH, G4LX, G4MR (189) |
| 25 | G2AHY (139), G3JMA, G3JXN (220), G5SK, G6PJ |
| 24 | G3FD, G3FXG, G3FXR, G3GSO (112), G3JHM |
| 23 | G3CWW (260), G3HSD, G4JJ/A G5PY |
| 22 | G2DRA, G3AGR (135), G3ASG (150), G3BPM, G5AM, G8NM |
| 21 | G2AOL (110), G3DVQ, G3IWJ, G6XY |
| 20 | G3EYV, G3IOE |
| 19 | G3FEX (118), G3GCX, G5LQ (176) |
| 18 | G3DBP, G3JGY, GC2CNC |
| 17 | G3EGG, G3KQF |
| 16 | G3FRE, GM3DIQ* |
| 15 | G3IWA |
| 14 | G2DHV, G3CYY |

*Note: Figures in brackets after call are number of different stations worked on Two Metres. Starting figure for this classification, 100 stations worked. QSL cards are not required to verify for entry into this Table. On working 14C or more, a list showing stations and counties should be sent, and thereafter added to as more counties are worked.*

* New QTH

### Some Individual Reports

It is good to hear Johnny of G3BLP (Selsdon, Sy.) back on the two-metre air again (144.97 mc) after several years' absence, putting out a nicely-keyed CW signal which is being well received in the North. During June 12-14 he worked DL1LB and GI3GXP for good DX. For G5BD (Mablethorpe), the opening brought GM3FGJ/P and GM3KYI for new contacts and additional counties; and Arthur now has four countries worked on 70 cm.

G3HAZ (Birmingham) is still using the HT-less 8012 tripler on 430 mc, and mentions "swarms" of Europeans coming in on two metres on June 19. Though G2CZS (Chelmsford) missed the big openings, he has had some useful and interesting G contacts, including G3JGY/M in Hereford; and when G5BD visited him, they went /P for an evening using the G5BD mobile installation. G3IER (Cheltenham) was in the activity up to the 18th, but not in the main stream, as no Continentals had been heard there at his time of writing. On the other hand, by the 18th G3DKF (Coventry) had logged Continentals at good strength, also GM's, with GM2FHH the best signal. G3DKF remains two metres only, hopes to be /P in Cornwall during July 30 - August 8 — and

now has a check-meter on the Tx/Rx mains feed so that he can work out his hours spent on the air! He runs 22w. only, to a 6/6 at 31 feet, and feels that 42C worked is a satisfactory result with that input (and so do we).

The northern mobileer on Two is G3BOC (Willaston), who, as GD3BOC/M—by any reckoning, a pretty rare and unusual call-sign—has worked G3FAN at 285 miles. Up to the 18th, not many of the Continentals were getting over the barrier of the Pennines, but DL1LB was worked by G2NY, G3HII/P and G3JZN. G3BOC expects to appear as GW3BOC/M " in various parts of North Wales," and in September will be GM3BOC/A again at Brora, in the rare county of Sutherland. G2FJR, who has done so well with the EDX, is still on the prowl for a GD contact—it would be an experience for him even to hear the Isle of Man.

G3DLU (Sheffield) was well in on it all up until the 18th, and reports PA and DL—in fact, he worked no less than eleven PA's on the evening of June 14, when the EU opening seemed particularly to favour that area of England. Other interesting contacts for G3DLU were GM2FHH, G2FO and G3CYY/P, with Devon stations G2ADZ and G2BMZ heard at good strength on June 12, but called in vain; another occurrence on that evening was the brief appearance of GC3EBK in Sheffield. From it all, G3DLU shows lists of 125 calls h/w for the Activity Report.

Needless to say, G3LHA (Coventry) made the most of the opportunities—he sounded quite hoarse when your A.J.D. was listening to him knocking off the EDX on the evening of June 19! Among his scoring QSO's were DL1LB, GI3GXP and OZ2IZ, taking him to 9C in the Countries table, and 41C in Annual Counties. G3LHA runs 150w. to a 5894 PA, with 805 modulators in Class-B, and has three crystals—all in his Zone, be it noted. G3JWQ (Ripley, Derbys.), very active /A and /P as well from the home station, is now at 10C in Countries, with GM3EGW and four OZ's worked; by June 18, the G3JWQ/G8VZ regular schedule stood at 198 contacts. Besides this, G3JWQ has now worked 302 different stations on two metres. So good progress continues to be made.

G3IJB (Burnham - on - Crouch) particularly enjoyed himself on the evening of June 13—*see* Activity Report. He is well placed there for any EDX opening that may develop. G3AGS (Manchester) was pleased to work GM3EGW on June 11, and reports EI2W and GI3GXP as very strong signals earlier in the period. G2DUS, of ATV fame, is now at Stotfold, Beds., and hopes to be portable/mobile on both 144 and 430 mc later in the year; at home, he has a 5/5 for two metres, and a " crafty 32-ele " for 70 cm. EI2W (Dublin) has been entertaining F8MX and F8NH, and took them down to Killarney to see EI4E, when the latter was able to demonstrate by working G2ADZ and EI4R. Henry's own VHF spots are 70.662 mc, 144.18 mc and 434.7 mc; he would be very glad to open GM schedules on 70 cm. EI2W also reports EI4R and EI6X active, for Co. Kerry and Limerick respectively.

Bob of G5MA (Gt. Bookham, Sy.) expresses himself as " quite pleased with results." At any rate, he has worked GI3GXP, GM2FHH, GM3EGW and GW3BOC/P, as well as G2FO, G3CYY/P and G3EHQ/P for rare counties, to say nothing of DL and PA—so he may well be satisfied!

### The SWL Clip

M. Woodhouse (Storrington) describes his gear as very simple, as indeed it is—a single 12AT7 mixer-osc. into an R.1155 at 6.5 mc, his aerials being a 3-ele Yagi at 22 ft. and a 12-ele stack at 15 ft. Nevertheless, stations at up to 290 miles distant have been heard, and SWL Woodhouse puts in a useful calls-heard list. For SWL Tomlin (Malvern) the even-

**TWO METRES**

COUNTRIES WORKED SINCE

SEPTEMBER 1, 1956

Starting Figure, 14

*From Home QTH only*

| Worked | Station |
|---|---|
| 49 | G5MA |
| 47 | G3GPT |
| 42 | G3DKF |
| 41 | G3KEQ, G3LHA |
| 40 | G3GHO |
| 35 | G5ML |
| 34 | G2CIW, G3JWQ |
| 33 | G3IOO, G3JQN |
| 32 | G2DVD |
| 30 | G3CKQ, GC2EBK |
| 29 | G3DLU |
| 26 | G3KHA |
| 25 | G3KUH |
| 23 | G3FUR, G3KEF, G3IER, G3KPT |
| 22 | G5MR |
| 19 | G3FIH |
| 17 | G2AHY |

***This Annual Counties Worked Table opened on September 1st, 1956, and will run till August 31st, 1957. All operators who work 14 or more Counties on Two Metres in the year are eligible for entry in the Table. The first claim should show a list of counties with stations, which can be added to thereafter as more counties are worked.***

**TWO METRES**

COUNTRIES WORKED

Starting Figure, 8

| | |
|---|---|
| 16 | ON4BZ (DL, EI, F, G, GC, GI, GM, GW, HB, LA, LX, ON, OZ, PA, SM, 9S4) |
| 15 | G3GHO, G4MW, G5YV, G6NB (DL, EI, F, G, GC, GD, GI, GM, GW, HB, LA, ON, OZ, PA, SM) |
| 14 | G2FJR, G2HDZ, G3IOO, G5BD, G8OU |
| 13 | G2XV, G3BLP, G3CCH, G3DMU, G3GPT, G5DS, G5MA, G6XM, G6XX |
| 12 | G2HIF, G3FAN, G3WW, G6LI, G6RH |
| 11 | EI2W, G2AJ, G3ABA, G3DVK, G3HAZ, G4RO, G4SA, G5UD |
| 10 | G2FQP, G2HOP, G3BK, G3BNC, G3EHY, G3GHI, G3GSE, G3JWQ, G3WS, G5MR, G8IC, GM3EGW, GW5MQ, PAØFB |
| 9 | G2AHP, G2CZS, G2DVD, G3FIJ, G3IUD, G3LHA, G5ML, GC3EBK |
| 8 | G2CIW, G2DDD, G2XC, G3AEP, G3AGS, G3DKF, G3GBO, G3HCU, G3HWJ, G3VM, G5BM, G5BY, G8SB, GC2FZC |

ings of June 14-15 were very rewarding, with DL's and PA's coming through in fine style, and PAØWI about the loudest and steadiest EDX signal heard. SWL Stokes (Ruislip) was, we hope, on for the DX break that occurred after he put in his report.

SWL Winters writes us from Melton Mowbray for the first time, and heard much of what was going up until June 15—then he went abroad on holiday, and so missed the Big Night. His main interest is two metres, with a Labgear converter into an AR88 and 4-ele Yagi at 20 feet. His locals are G2FNW, G3FDF, G3JWQ, G6XM and G8CZ—always good, strong signals. Since starting two-metre listening in March last, SWL Winters has logged 3 countries and 21 counties.

### TWO-METRE FIRSTS

| | | |
|---|---|---|
| G/DL | G3DIV/A-DL4XS/3KE | 5/6/50 |
| G/EI | G8SB-EI8G | 23/4/51 |
| G/F | G6DH-F8OL | 10/11/48 |
| G/GC | G8IL-GC2CNC | 24/5/51 |
| G/GD | G3GMX-GD3DA/P | 29/7/51 |
| G/GI | G3DA-GI2HML | 29/6/49 |
| G/GM | G3BW-GM3OL | 13/2/49 |
| G/GW | G5MQ-GW5UO | 22/10/48 |
| G/HB | G6OU-HB1IV | 12/9/53 |
| G/LA | G6NB-LA8RB | 29/6/53 |
| G/LX | G5MR-LX1AS | 23/7/55 |
| G/ON | G6DH-ON4FG | 25/9/48 |
| G/OZ | G3WW-OZ2FR | 1/6/51 |
| G/PA | G6DH-PAØPN | 14/9/48 |
| G/SM | G5YV-SM7BE | 1/6/51 |
| GC/DL | GC3EBK-DL3VJ/P | 22/3/53 |
| GC/EI | GC2CNC-EI2W | 8/10/51 |
| GC/F | GC2CNC-F9OK | 17/11/53 |
| GC/GI | GC3EBK-GI3GXP | 14/9/56 |
| GC/GW | GC2FZC-GW8SU | 16/6/54 |
| GC/ON | GC3EBK-ON4BZ | 4/3/53 |
| GC/OZ | GC3EBK-OZ2FR | 2/3/53 |
| GC/PA | GC3EBK-PAØHA | 16/7/55 |
| GD/EI | GD3DA/P-EI2W | 30/7/51 |
| GD/GM | GD3DA/P-GM3DAP | 29/7/51 |
| GD/GW | GD3DA/P-GW5MQ | 28/7/51 |
| GI/DL | GI3GXP-DL1SE | 5/1/56 |
| GI/EI | GI3GQB-EI2W | 13/6/51 |
| GI/GD | GI2FHN-GD3DA/P | 29/7/51 |
| GI/GM | GI2FHN-GM3OL | 1/7/49 |
| GI/GW | GI2FHN-GW3ELM | 8/7/49 |
| GI/ON | GI3GXP-ON4BZ | 5/1/56 |
| GM/DL | GM2FHH-DJ1XX | 29/5/55 |
| GM/EI | GM3BDA-EI2W | 12/6/51 |
| GM/ON | GM3EGW-ON4BZ | 21/11/53 |
| GM/PA | GM3EGW-PE1PL | 22/4/53 |
| GW/DL | GW5MQ-DL4XS | 22/9/51 |
| GW/EI | GW2ADZ-EI8G | 19/4/51 |
| GW/F | GW2ADZ-F3LQ | 14/5/50 |
| GW/HB | GW2ADZ-HB1IV | 14/9/53 |
| GW/ON | GW2ADZ-ON4YV | 13/5/50 |
| GW/PA | GW2ADZ-PAØHA | 13/5/50 |
| GW/SM | GW2ADZ-SM6QP | 1/7/53 |
| CN2/CN8 | CN2AO-CN8MB | 26/6/55 |
| DL/OZ | DL6SW-OZ2FR | 4/3/51 |
| DL/SM | DL2DV-SM7BE | 10/3/51 |
| EI/DL | EI2W-DL3VJ/P | 29/8/52 |
| EI/F | EI2W-F8MX | 9/8/56 |
| EI/ON | EI2W-ON4BZ | 21/9/51 |
| EI/PA | EI2W-PAØFC | 10/10/53 |
| ON/LA | ON4BZ-LA1KB | 4/7/53 |
| ON/LX | ON4TR-LX1MS | ? ? |
| ON/OZ | ON4BZ-OZ2FR | 3/6/51 |
| ON/SM | ON4BZ-SM7BE | 2/3/53 |
| ON/9S4 | ON4UD-9S4BS | 19/8/56 |

### Obituary — G3GPT

It is with very deep regret, which will be shared by all on the VHF air, that we have to record the passing of B. Barstow, G3GPT, after a long illness. Located near Preston, Lancs., he was a well-known two-metre call all over the U.K., his station not only radiating a good signal, but also being well operated—and there is a distinction. G3GPT joined fully in all VHF activities, and reached a high standing in our achievement tables.

### VHFCC Election

We are glad to add G3AGS (Manchester) to the roll of VHF Century Club members, as No. 211. His contacts, covering six G countries, were all made on two metres.

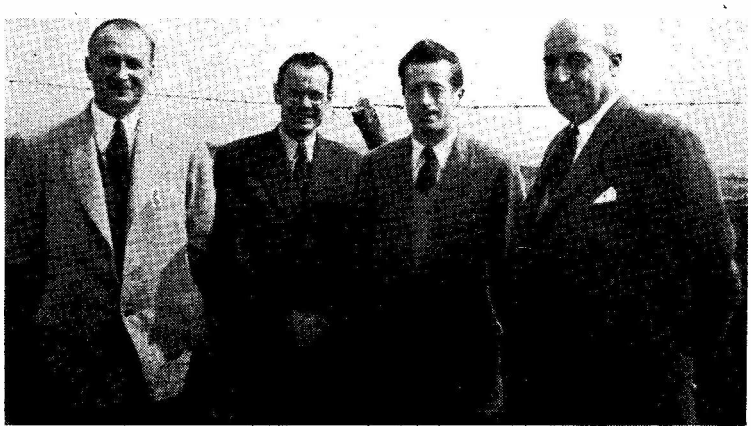
### IGY Plans

The pressure of events and the ground to be covered this time has robbed us of space for the discussion of this topic—regarding which there is a good deal to be said; and not all of it is joyful, either!

One interesting comment, however, is that G3CGQ (Luton) has already provided himself with a rotatable *and tiltable* beam head, controlled from the operating position, for checking on solar noise.

### Dead-Line

This must be **Wednesday, July 24,** for the August issue, which actually gives us all plenty of time (unless there is another EDX break on July 23, extending to the 28th!). However, as in the tail-piece last time, your A.J.D. is always ready to whistle for a wind, whenever it may come. Good luck with the EDX, and let us have all your *gen*, addressed A. J. Devon, "VHF Bands," *Short Wave Magazine*, 55 Victoria Street, London, S.W.1, by the 24th. With you again on August 9, all being well.



**A group of well-known VHF callsigns. Left to right: EI2W, F8MX, EI4E and F8NH, taken during the recent visit of F8MX and F8NH to Eire, when EI2W and EI4E were able not only to give them a convincing demonstration of the two-metre activity at their stations, but also to show them some of the beauties of Ireland, such as the Lakes of Killarney.**

# QRO RF Amplifier for Two Metres

## 150 WATTS IN THE PA, USING AN EIMAC 4-65A OR MULLARD QY3-65

**T. W. BLOXHAM, B.Sc., Ph.D. (GW3LSS)**

SOME VHF operators will probably question the necessity for a 4-65A final on 144 mc, when an 832, combined with a good aerial, provides excellent results. It is nevertheless obvious that, under a given set of circumstances, higher power will improve the signal. An input of 150 watts will represent a power gain of some 7 dB over the average 832 operating at full ratings. *Consistent* long-range VHF communication in the U.S.A. has been possible not only by using high-gain aerials—many of which have reached the practical limit both in size and complexity—but also by the use of high power.

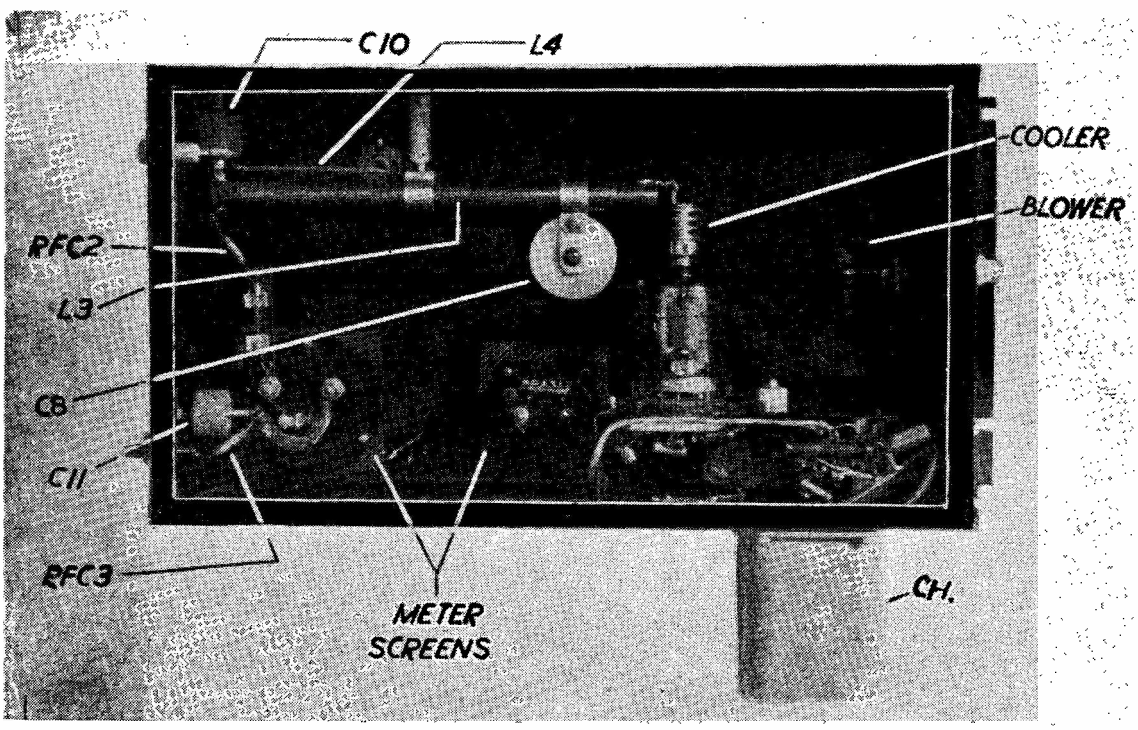
In the writer's case, higher power on 144 mc was desirable from an economic point of view, since the same power supplies and modulator used with an 813 10-80 metre transmitter could be employed without even having to change the taps on the modulation transformer.

Also, and most important, a recent sojourn in the States found the writer in possession of two Eimac 4-65A's. These VHF tetrodes have also been available in this country for some time, as the Mullard QY3-65.

### General Construction

The 4-65A has a spiral filament assembly and must be operated in a vertical position. Screening between the input and output circuits is accomplished by using an L-shaped sub-chassis carrying the 4-65A complete with filament transformer, input tuned circuits, and associated components. This sub-chassis measures 7 in. long, $4\frac{1}{2}$ in. wide and $2\frac{1}{2}$ in. deep. Its mounting in the main cabinet will be evident from the photograph. The main cabinet consists of a rectangular open box, 16 in. x 9 in. x 6 in., with a $\frac{1}{2}$ in. lip all round providing means of attachment to the front panel (19 in. x 9 in.), and a back screen of zinc-mesh to assist in cooling.

Two one-inch holes are drilled in the cabinet —one in a position immediately below the




**Under-view of the two-metre PA unit, running 150 watts input to a Mullard QY3-65 (Eimac 4-65A) designed by GW3LSS, and described in the article. The named items should be cross-referred with the circuit diagram.**

*Most amateur VHF transmitters in the U.K. are under-powered. With types like the 832 and 829B, or their equivalents, it is not possible to realise effective inputs greater than 30-75 watts. If those operators who have provided themselves with a good beam were then to feed it from a PA run at an efficient 150 watts DC input, they would find that their DX-consistency would be greatly improved. Of course, full power is already in use at several established and regularly active VHF stations, and it is plain to all that it is in fact they who get the results! It might well be said that too many stations on two metres running 150-watt carriers under full modulation would be a curse, and not make for the comfort of their neighbours. However this might be, it is evident that more stations using more power on the two-metre band could be a good thing from several other points of view. Hence, we commend this article to the attention of those VHF operators who would like to do a bit better by using a bigger valve than the 829B in the two-metre PA stage.—Editor.*

4-65A socket, and the other on the side of the cabinet in line with the 4-65A anode. The latter hole is the air-intake to the blower, while that beneath the 4-65A provides an air-current round the valve seals. If a blower is not used a 1 in. hole should be drilled through the top of the cabinet immediately above the 4-65A. This arrangement, in conjunction with the air-intake beneath the 4-65A, should provide adequate convective air circulation around the valve. Another one-inch hole drilled through the front panel permits inspection of the 4-65A; this is rather an important point since incorrect operation can be quickly recognised by abnormal anode-colour. All these holes, together with those for the meters, are covered with wire-mesh to assist in screening.

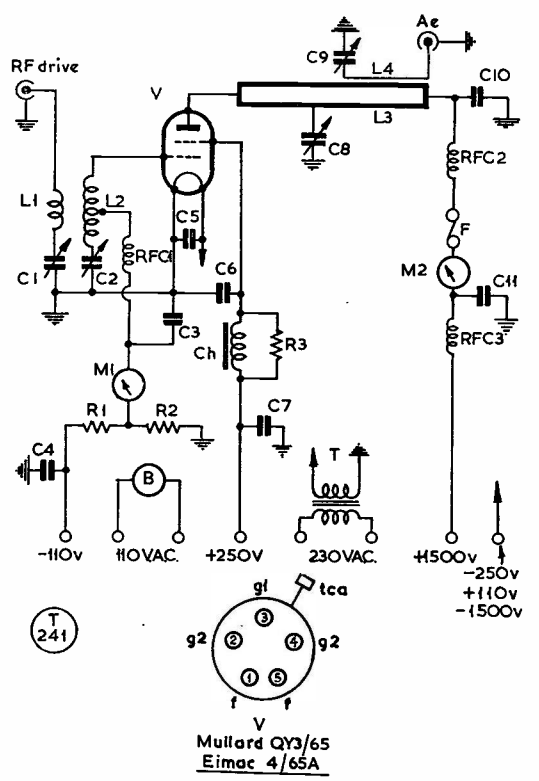
### Circuit Details

The grid coil of the 4-65A is tuned by C2 and a centre-tap provided to facilitate neutralization, should this prove necessary. The driver is coupled to the amplifier by a two-turn link of well-insulated wire wound over the centre of the grid coil; the reactance of the link is tuned out by C1. Grid bias is provided by a combination of fixed voltage (−40) and the grid leak R2. In the writer's case the fixed bias is obtained from a voltage divider (R1 and R2) since the bias supply delivers about −110 volts. However, with a bias supply of −40 volts the value of R2 remains the same and will provide a total operating bias of some −125 volts. The driving power is easily obtained from an 832, or probably a QVO4/7 when properly coupled to the amplifier. At the writer's station the driver (formerly the PA) is an 829 with only 200 volts on the plates, and very loosely coupled to the 4-65A.

### Table of Values

**Circuit of the high-power RF stage for two metres**

C1, C2, C9 = 50 $\mu\mu$F variable
C3, C4, C5, C6, C7 = .002 $\mu$F mica, 600 volts
C8 = *See text*
C10, C11 = 500 $\mu\mu$F ceramic, 6kV.
R1 = 7,500 ohms, 1 watt
R2 = 4,700 ohms, 1 watt
R3 = 24,000 ohms, ½ watt (*See text*)
L1 = 2 turns, 16 SWG wound over centre of L2
L2 = 5 turns, 14 SWG, ½ in. diam., spaced wire diam., CT.
L3, L4 = *See text*
RFC1-3 = 1.8 microhenry, or 1 megohm ½ watt resistor wound full with 24 SWG enam. wire
Ch = 10 Henry, 100 mA choke
T = Filament transformer (Sec: 6.3v., 3.5a.)
F = 250 mA fuse
B = Blower (*See photograph*)
M1 = 20 mA meter
M2 = 250 mA meter
V = Eimac 4-65A (Mullard QY3-65)




**Circuit of the PA for two metres described by GW3LSS. The valve is a Mullard QY3-65 (Eimac 4-65A) and it is advisable to provide air cooling if it is to be mounted in an enclosed cabinet, as in his case. The QY3-65 is rated to give 110 watts RF output at frequencies up to 220 mc, at 65 watts anode dissipation. It has a 6-volt filament.**

Screen voltage is obtained from a fixed supply of 250 volts, which permits keying of the crystal oscillator or driver stages.

The screen voltage is fed *via* a 10 henry choke Ch. to provide a means of plate modulating the valve. In the interests of space and screening, the choke is mounted outside the cabinet with its terminals protruding into the cabinet beneath the sub-chassis assembly (*see* photograph.)

**The Anode Circuit**

The anode circuit is a ¼-wave line, capacity tuned by C8. The line comprises a $^{9}/_{16}$ in. outside diameter copper tube, 8¼ in. long, with the tuning discs 1¾ in. from the anode end of the line. It is supported by the bypass condenser (C10) at the " cold " end and by a 1½ in. stand-off insulator near the centre. A 1 in. length of flexible braid connects the heat dissipating connector of the 4-65A to the line. The tuning discs are of polished aluminium, 1¾ in. in diameter. The movable disc is on a length of 0 BA rod which passes through a piece of threaded brass and out of the front panel. Two locked nuts prevent the discs approaching too closely and shorting the HT. As an extra precaution, and safeguard for the meter, a 250 mA fuse is wired between the meter and RFC2.

The condensers C10 and C11 should be good-quality components, *e.g.*, "Hi-K Ceramic" or similar, and have a DC voltage rating of at least four times the input voltage.

The output link L4 consists of a piece of 16 SWG wire 6½ in. long; 3¼ in. of this is parallel to, and about ¼ in. away from, the line at its " cold " end; the link is tuned by C9.

**Operation**

Initial tests should be made at reduced anode voltage to avoid accidental overloads. It is most important to remember that under no circumstances must screen voltage be applied to the 4-65A in the absence of anode voltage; this is a condition that could occur inadvertently if the screen voltage is obtained from the driver HT supply.

Optimum operating conditions are best determined by observing the RF output to a temporary ½-wave dipole using a lamp and pick-up loop. This indicator will show the correct settings for C8, C9, and optimum coupling between L3 and L4, which is very largely determined by the setting of C9. Tetrodes of the type of the 4-65A and QY3-65, at VHF, operate most efficiently with heavy anode loading and grid drive just sufficient to obtain the desired anode current. Under these conditions the grid current will be considerably less than that given under manufacturers' ratings. In the writer's amplifier, maximum efficiency is obtained with a grid current of 3 mA for an input power of 150 watts. This amount of grid current is considerably less than the value of 16 mA quoted for the valve.

Under normal operating conditions the anode of the 4-65A displays a " cheerful " orange colour. Excessive input or incorrect operation will quickly intensify the colour and strong shadows formed by the screen-grid will appear. In order to achieve the best efficiency with the valve adequate cooling is essential. Although a blower is not absolutely necessary, this level of power in a comparatively small space requires good ventilation.

**General Points**

All wiring is run in screened cable and liberally by-passed. As a final check on stability and neutralization remove the drive, and, with a GDO or neon, test for any signs of RF along the anode line. In the writer's model no neutralization was required, but the photograph shows the ceramic lead-through just behind the 4-65A through which a stiff wire could pass from the junction of C2 and L2 to a position near the 4-65A anode.

With some chokes an unpleasant howl or " talk-back " may occur with modulation. This is due to audio resonances in the choke and can generally be eliminated by resistive loading. The highest value of resistance (R3) which will cure the noise should be used.

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**PLANNING PERMISSION REFUSED**

It was reported in *The Builder* for May 24 last that an amateur at Lepton, near Huddersfield, had been refused permission to erect a 33 ft. lattice mast in his back garden. The application had been made, in the first instance, to the local urban district council; their refusal to grant planning permission was upheld, on appeal, by the Ministry of Housing and Local Government. The reasons given for the rejection were the " large number of objections lodged by local residents " and that " a mast of the size and design proposed would be highly detrimental to the amenities of the neighbourhood." As this is described as a " closely developed housing estate," with further development projected, it is difficult to see where the amenities could lie, as the houses are, no doubt, already festooned with TV aerials! Reading between the lines, one is led easily to the conclusion that this unfortunate amateur's real trouble is his neighbours. Planning authority decisions of this kind always seem incomprehensible when one sees the lines of giant pylons marching across the countryside—and till the Super-Grid comes your way, you haven't seen a giant pylon!

# Thirty Years of SWL DX Work

## EXTRACTS FROM THE LOG OF

E. W. TREBILCOCK

*The author of this article is probably the world's best-known SWL, and here he discusses his Amateur Radio experiences strictly from the point of view of a listener. BERS-195 would be more qualified than most to take out an amateur licence and come on the air, but he prefers to operate as an SWL. His article is full of interest and practical information for the DX listener—and the licensed amateur operator—whether or not he aspires to an international reputation such as that now enjoyed by BERS-195 after his 30 years on the amateur bands, with 9,000 QSL cards in his files and more than 180,000 entries in the log.—Editor.*

BOTH the name of Eric Trebilcock and the Australian SWL identification, BERS-195, have been known to the amateurs of the world for the past 31 years. . . . The combination is probably as well known in Amateur Radio circles the world over as any transmitting call-sign.

BERS-195 was born in 1911 in South Australia and spent the first 23 years of his life in the country areas of that Australian state. After leaving school, he joined the Post Office, and during his spare time and at night, when not doing telephone duty, he studied Morse (sounder) and passed the PO traffic handling speed test at 15 years of age, thus becoming qualified to handle public traffic "over the landline" by Morse code. At the same time as learning sounder, he took to learning radio Morse whenever time permitted, and soon became proficient in the art of reading both.

At 16, he was able to copy both radio and sounder at 25 w.p.m. He used to spend many hours per session copying world-wide signals and making a log of ships heard at the same time. He did his listening on 600 metres for more than a year before deciding to listen for Amateur Radio DX transmissions, which in those days were made mainly on 32 metres.

A short-wave receiver was first used when he found himself working for the Post Office at the remote goldfields outpost of Tennant Creek in Northern Australia; he had a battery receiver here for a year and then, upon transfer back to Adelaide, acquired an AC short-wave Rx and, as he says, "he thought he was made." By now he was an "old timer" in the Amateur Radio receiving game and had become fully proficient in the art of reporting accurately to amateurs all over the world. In 1938 he was transferred by the PO to the northern outpost of Darwin, and his battery portable short-wave receiver went with him. After 12 months at Darwin, came another transfer inland 500 miles, and for the next 21 months he had plenty of time on his hands and did much logging and reporting when the 11 years cycle was at its best and 7 mc was *the* band in so far as DX was concerned.

### War Experiences

In 1939 BERS-195 left the Post Office and transferred to the Civil Aviation Department as a radio telegraphist. (He is still with that department in the capacity of Radio Supervisor at the Melbourne International Airport.) His first year with the new department was spent in Sydney. From here he was posted to New Guinea to the airfield at Salamaua, where he was to remain for nearly two years, until driven out by the Japanese in early 1942. After being under fire for several days, Eric, with a number of the more fit residents of the area, commenced to trek overland to Port Moresby in Papua. After two weeks in the jungle, during which time the party climbed to 6,000 feet to cross the mountain barrier at its lowest point, the then front line Allied post of Wau was reached. After further bombing and strafing attacks, BERS-195 was rescued by a small Allied aircraft and flown out under the nose of the enemy to Port Moresby, having lost all his possessions, including most of his QSL cards. From Port Moresby he reached Townsville, on the N.E. coast of VK4 land, in a flying-boat.

### Post-War Results

When the war ended, BERS-195 was soon into his stride once the ban on Amateur Radio was lifted. He has been hard at it ever since. During the past 11 years Eric has made 121,000 log entries, which, added to the 60,000 entries made pre-war, makes a total of 181,000 entries in 31 years of logging Amateur Radio signals. Approximately 16,000 reports have been compiled and mailed to amateur stations, and from this a total of about 9,000 QSL cards has been received. Pre-war, 172 countries in 40 zones were logged with a QSL figure of 144/38. Post-war, the logged score to date is 243 countries in 40 zones, and the QSL figures to end of May, 1957, are 232 countries in 40 zones.

During his 31 years of SWL activity, BERS-195 has used but the simplest of equipment. He has had only four receivers, all of which have been five valves or less, mainly with long-wire aerials. Headphones have been employed at *all* times for the full 31 years period, as Eric believes he can get closer to the signal that way.

BERS-195 has always been a CW addict and 90% of his DX logged is by this method. He has never liked phone logging, which is, perhaps, understandable in view of his long and continuous association with dots and dashes, both professionally and from the hobby point of view. (In this respect, he says he is like his good friend, VK3RJ, who has been on the air continuously for about as long as Eric has been an SWL and has never yet used a microphone.)

### Choice Items

BERS-195 has listed some of the more interesting of his many rare QSL cards post-war. The countries


**A particularly interesting group of DX cards, all from islands of the Pacific Ocean, held by a British short wave listener who has been pursuing rare DX since 1938. Any one of these cards would be prized by most transmitting operators in this country now active on the DX bands. The islands represented are Koro (Palau), KC6WC; Midway, KM6AT; Palmyra, KP6AA; Roguron (Marshall Is.), KX6BA; Rarotonga (Cook Is.), ZK1BC; and Niue, ZK2AA.**

represented by these QSL's make a geography lesson, so varied are those named: AC4YN/Tibet, Zone 23, which is the rarest card of all; W2WMV/C9, Manchuria; CEØAD, Easter Island; CR5UP, Sao Thome and Principe; EAØAB, Spanish Guinea; EL3A, Liberia; FB8AX, French Antarctica; FB8XX Kerguelen Island; FN8AD, French India; FL8AB, French Somaliland; FY8AC, French Guiana; HC8GRC, Galapagos Islands; WØOZW/KS6, American Samoa; LB6XD, Jan Mayen Island; MP4KAC, Kuwait; OY3IGO, Faroe Islands; PK6EE, Celebes Islands; PZ1WK, Surinam; XABU/SV5, Dodecanese Islands; UJ8AE, UI7KAA, UM8KAA, U.S.S.R.; VK9TW, Nauru Island; VP2AD, Antigua; VP2GB, Grenada; VP8AI, Falkland Islands; W6RWQ/VR6, Pitcairn Island; VS4BA, Sarawak; YA1AM, Afghanistan; ZD2GWS, Nigeria; VR2BZ/ZM7, Tokalau Island; ZS2MI, Marion Island; ZS8A, Basutoland; 3A2AB, Monaco; 4W1AC, Yemen. For the record, all the QSL's mentioned, with the exception of CR5UP, are for CW reports. In addition, Eric has QSL's from 60 mobile marine (ship) stations, from air mobile and motor car stations, and from one balloon (a Russian with call AERO above Moscow several years ago!).

**Some Advice**

A few words on the art of DX'ing and SWL reporting, based on his own long experience, may prove helpful to our SWL readers. First, BERS-195 says it is essential that the budding SWL should learn the Morse code, because under normal circumstances phone stations do *not* supply the bulk of rare DX. However, learning the Code to a standard such as attained by Eric and other of the leading CW SWL's cannot be achieved overnight. He says that it takes three years at least of continuous CW practice to qualify as an expert. (An "expert" is one whose copying ability exceeds 35 w.p.m.).

Secondly, when reporting to any station, make certain you have your details concerning Date/Band/Time correct and include in your report some repeats of details given by the station concerned, such as those relating to his equipment, and so forth. Unless for some special reason, never report on CQ calls, as many amateur stations do not keep a record of the CQ calls they make. Always give the RST at your location, and do not overdo details of your own equipment.

Including reply coupons with the report, in order to pay the postage on the return QSL card, has been found to be a waste of time in many instances. Eric believes that the various QSL Bureaux channels are as good a means as any for the passage of QSL cards, and, because of this, the number of IRC's he sends out is about one for every 100 reports. He has also discovered that some operators QSL all reports, while others do not QSL at all. Therefore, it would seem to be a question of luck whether you gain by including an International Reply Coupon with your report. If using the local QSL Bureau for receipt of inward QSL's, make certain that you have a stamped addressed envelope with it at all times. BERS-195 has sent 70 per cent. of his reports direct and 30 per cent. *via* the Bureaux, and although

SWL reporting has cost him a good deal over the years, he says it has been well worth it.

In connection with the logging of signals, whether CW or Phone, Eric says he has seen, over and over again, that many operators do not tune-in signals properly. This, in most cases, is due to the fact that the operator is too impatient. Under normal circumstances, it takes a good 30 minutes to go through 50 kc of a DX band.

An accurate and easy-to-follow log, which contains all "copy" as a permanent record, has always been kept at BERS-195. References to loggings from 20 to 30 years ago make pleasant reading and bring back many happy memories of earlier days. Up-to-date filing systems on reports mailed and incoming QSL's have always been a feature of the BERS-195 organisation. All inward QSL's are filed alphabetically, with the QSL card of AC4YN in the forefront, and that of 9S4DE at the extreme end of a big pile of cards.

**Contests**

BERS-195 is a staunch advocate and supporter of the many Contests held throughout the world yearly. He has won the SWL Sections of most of them—but nowadays he is content to leave the prizes to the newcomers.

This story would not be complete without saying that BERS-195 has been disappointed down through the years to learn that so few SWL's go in for Contests. In his opinion, one of the best training grounds for budding operators is the Contest field; more SWL's should take an interest in contests, irrespective of whether they win or lose. Like the Olympic Games, it is just as important to be a competitor as a winner.

Finally, BERS-195 urges those SWL's who read this article to have patience, to keep up their Morse practice, and learn the art of correct signal tuning with the receiver. Through your reports, you will make many friends the world over.


**Another group of DX cards with a high rarity value. All have been gained by a British SWL. The best of this selection is probably PK5AR, when operating portable for a short time from Timor. While cards such as these are acknowledged rarities, held by very few U.K. SWL's, they show what has been possible by keen DX listening over the last ten years. At this moment, equally rare and elusive stations are on the air — in other words, you can start a collection of interesting QSL cards at any time. But you must be able to read Morse, and have developed a DX sense — all of which comes only by patience and experience.**

## REPORT OF AN S.O.S.

It is interesting to hear from G3KYT (Wigan) that on May 19 he was able to receive her distress signal direct when the *Tahiti-Nui* was struggling in the storm that was to prove her undoing. Very properly, G3KYT immediately passed the traffic from FO8AP/MM on to Seaforth Radio; from there, it was sent to Portishead and then re-transmitted to the West Coast Telegraph Company at Santiago de Chile, who passed it to the Chilean coast station of Playa Ancha, Valparaiso. As a result of the part that he was able to play in these events, G3KYT has had letters of appreciation from the West Coast of America Telegraph Co., Ltd. and from H. E. the Chilean Ambassador in London.

## N.C.B. ON THE AIR

If you happened to hear, or work, the somewhat unusual callsign GB3NCB on June 22, it came from the Amateur Radio station put on by the Barnsley and District Amateur Radio Society for the National Coal Board Gala at Worsboro Park, Huddersfield.

# NEW QTH's

**This space is available for the publication of the addresses of all holders of new U.K. callsigns, as issued, or changes of address of transmitters already licensed. All addresses published here are reprinted in the quarterly issue 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.**

**G2CMW/A,** F/O J. F. West, A.T.C. Headquarters, South Benfleet, Essex.

**G3FWD,** B. Purchase, 126 Renton Road, Oxley, Wolverhampton, Staffs.

**G3JDC/A,** G. Metcalfe, Green Hills, Skelton, Penrith, Cumberland.

**G3KYE,** J. Orr, 62 Graham Road, Yardley, Birmingham, 25.

**G3LET,** P. A. Hobbs, 59 Southborough Drive, Westcliff-on-Sea, Essex.

**GM3LNE,** R. W. McInnes, Station House, North Queensferry, Fife.

**G3LNZ,** G. J. Ralph, 16 Western Drive, Grassendale, Liverpool, 19.

**G3LOG,** A. Grace, 44 Cedar Avenue, Ripley, Derbyshire.

**G3LRK,** J. D. Gilbert, 14 Nightingale Road, Hampton, Middlesex. *(Tel.: Molesey 5409).*

**G3LRO,** J. H. Tinker, 68 Caulfield Road, East Ham, London, E.6.

**G3LSL,** D. Lunn, 29 Brooklands Road, Hazel Grove, nr. Stockport, Cheshire.

**G3LSW,** K. L. Willis *(ex-MI3KW/ET2KW),* 60 Black Butts Lane. Barrow-in-Furness, Lancs.

**G4ZA,** E. W. Anderson, 96 Nork Way, Banstead, Surrey.

*CHANGE OF ADDRESS*

**G2CMW,** J. F. West, 116 Lymington Avenue, Leigh-on-Sea, Essex. *(Tel.: Leigh-on-Sea 78765).*

**G2DRT,** F. S. G. Rose, Uplands, Cock Lane, High Wycombe, Bucks.

**G2DUS,** I. B. Howard, 40 Regent Street, Stotfold, Beds.

**G3ASG,** R. F. Fautley, 123 Ashdown Drive, Tilgate, Crawley, Sussex.

**GM3ASM,** S. E. Hincks, 90 Montford Avenue, Kings Park, Glasgow, S.4.

**G3AST,** J. A. Plowman, 4 Hewish Farm Cottages, Bradford Abbas, Sherborne, Dorset.

**GM3CVJ,** J. W. Sime, No. 2 Bungalow, P.O. Engineering School, Muirhouse Avenue, Edinburgh, 4.

**GM3DJT,** J. M. Mitchell, 85 Northfield Drive, Edinburgh, 8.

**G3DXY,** B. O. Leach, 50 Merevale Road, Gloucester, Glos.

**GW3EAW,** J. Rigby *(ex-G3EAW),* Benallt, Bron Meirch, Pen-y-groes, Caernarvon.

**G3FIB,** G. A. Livesey, Waveney, Wandene Avenue, New Barn, Longfield, Kent.

**G3GWO,** M. G. Groom, c/o 55 Broadwater Way, Worthing, Sussex.

**G3HVO,** J. D. Loader, c/o Panda Radio Co., Ltd., Autavia House, Redcliffe Gardens, Kensington, London, S.W.10.

**G3IRE,** R. Ireland, 11 Farnway Close, Greenleas, Hove, Sussex.

**GI3IVJ,** C. J. Rourke, 63 Kirkliston Park, Belfast.

**G3IZJ,** M. J. Faulkner *(ex-VP8AZ),* Grange Hostel, Hawley Lane, Farnborough, Hants.

**G3JDC,** Sgt. Metcalfe, G. *(ex-GI3JDC/ZE2KL),* c/o Sgts.' Mess, R.A.F. Station, Watton, Thetford, Norfolk.

**GI3JIM,** A. J. Rourke, 63 Kirkliston Park, Belfast.

**G3JKO,** M. Dransfield, B.Sc., Ph.D., 39 Cliff End, Purley, Surrey.

**G3JLF,** L. Beevers, Howard Private Hotel, 292 North Promenade, Blackpool, Lancs. *(Tel.: Blackpool 25467).*

**G3JMF,** G. F. Browne, 7 Redburn Avenue, Shipley, Yorkshire. *(Tel.: Shipley 53529).*

**G3KDV,** R. Coleman, 6 Hillpark Estate, Brixham, S. Devon.

**G3KGU,** M. McBrayne, 25 Purlieu Way, Theydon Bois, nr. Epping, Essex.

**G3KTF,** R. D. May, 46 Stansted Close, Chelmsford, Essex.

**G3KVA,** Sgt. Hall, J. C. *(ex-GI3KVA),* c/o Sgts.' Mess, R.A.F. Station, High Wycombe, Bucks.

**G3KXK,** 576783 C/T Barraby, c/o Sgts.' Mess, R.A.F., Medmenham, nr. Marlow, Bucks.

## OCCUPATIONAL THERAPY

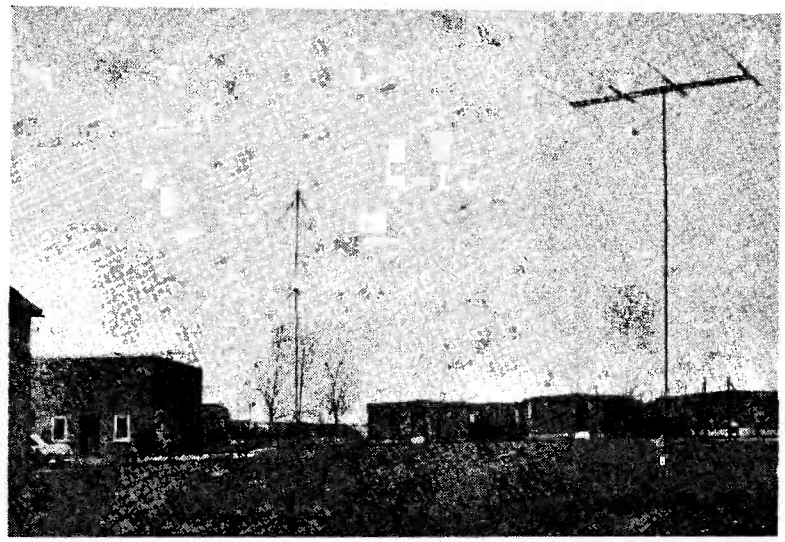
Having recently had to spend some months in Stoke Mandeville Hospital, Aylesbury, a large query for G3IYX (Bradwell) was whether he would be able to get on the air during his enforced rest for treatment and observation. Through the kindness and co-operation of the Hospital authorities not only was permission readily granted, but they even went to the length of putting up a good aerial for him. With gear loaned by amateur friends in the neighbourhood, G3IYX/A started up on 160-80-40-20 metres, using a B2 transmitter and S.640 receiver, and in the course of his sojourn at Stoke Mandeville he had over 300 QSO's and worked some 20 countries, including a certain amount of DX on the 14 mc band. Being able to use CW and phone, his operations were also a source of interest and amusement to the others in his ward. There can be no doubt that being allowed to get on the air contributed in large measure to G3IYX's quick recovery — which justifies the enlightened attitude that prevails at Stoke Mandeville.

## POSTAGE — PLEASE NOTE!

We would again remind readers that queries involving the attention of the Editorial staff *must* be accompanied by a stamped, self-addressed envelope. Owing to the volume of our mail, and the heavy postage bill that it entails, we cannot guarantee to deal with correspondence on which return postage is not paid.

# THE OTHER MAN'S STATION

## G3JHI



G3JHI is owned by F/Lt. R. L. S. Hathaway, and operated by him from the Officers' Mess at R.A.F. Station, Odiham, nr. Basingstoke, Hants.

These views show the whole installation, the aerial system being laid out at the back of the Mess and consisting of a wide-spaced 4-element beam for Ten; a ground-plane for Fifteen; and a folded dipole for Twenty. A change to Cubical Quads is in hand for 15 and 20 metres, thus going beam-wise on the whole aerial system.

Receivers at G3JHI are an Eddystone 680X and an AR88, and also on the table is the Clapp VFO-buffer unit. On ten metres, the PA is an 829B run at 100 watts, but for the other bands an alternative PA is used, with a pair of 807's taking the same input. The speech amplifier is EF37-6SN7-6J5 into a pair of EL-38's as modulator, and the microphone is a Geloso crystal. The station is fully TVI-proof on ten metres, and at present the operating record stands at 98 countries worked, mainly on Ten; various operating certificates are held, and only one state (Oregon) is now needed for WAS.

G3JHI is a New Zealander, and started in Amateur Radio as an SWL out there in 1936. Since becoming licensed, he has also operated (during the Berlin Air Lift) as DL2MP. Many of our R.A.F. readers will probably draw the (erroneous) conclusion that G3JHI is in Signals—and even that he might be the Station Signals Officer at Odiham, having regard to the facilities he enjoys in the matter of aerials! Not so—Amateur Radio is simply a hobby with G3JHI, and in no way connected with his duties in the Service.

While the main interest is aerial experiment—for the very good reason that it is the most important factor in DX working—all sorts and conditions of QSO's are welcomed at G3JHI, whether from "across the parish, or across the world."

# THE MONTH WITH THE CLUBS

## By *"Club Secretary"*

**(Deadline for August Issue : JULY 19)**

THE onset (or should we say onslaught ?) of hot summer weather corresponded more or less with our time for sending this to the printers, and doubtless accounts for the scarcity of reports this month. Quite a few Clubs close down for the holiday season, and many of those which keep open find their attendances melting away.

It has often occurred to us that inter-Club Mobile Field Days would be an interesting activity during holiday months, since there can now be few active Clubs in this country without one or more "mobile members." Progressing one step further, we can envisage a Mobile Club Contest occupying a parallel place in the summer to that held by "MCC" in the winter.

Secretaries are asked to co-operate, to the extent of informing us of the number of active Mobile installations that they can produce from among their members. If the demand is great enough, we intend to think seriously about an all-Mobile Contest—or a Club Mobile Rally. The latter event could have the effect of bringing hon. secretaries together, too !

**Bradford** recently held their AGM, at which Mr. J. L. Peevoy was elected president, G3IBN vice-president and G3KEP secretary. The next gathering, on July 16, will be an Informal Meeting. **Clifton** met in May to hear a lecture from a member of the GEC staff on Light and Lighting. On May 12 their D-F Contest was won by G3HZI and R. Popp—the only team succeeding in locating the hidden transmitter. On July 28 they will be holding a transmitting field day of their own at Farnborough, Kent. Normal meetings continue, every Friday, at 225 New Cross Road, London, S.E.14.

**Derby** will be together on July 10 for a talk and demonstration on Radio Interference, by G2CVV ; on July 17 they have an Open Evening ; on July 24 the subject is The Short-Wave Listener (B. J. C. Brown) ; and on the 31st there is a general discussion on four subjects of topical interest. **Edinburgh** will hold only monthly meetings (July 24 and August 21) during the summer, their weekly gatherings re-starting on September 4 with the opening lecture on Wobbulators, by Alex Don.

**Flintshire** meet on the first Monday at the Railway Hotel, High Street, Prestatyn, except during August. On July 1 they visited Prestatyn Telephone Exchange ; on September 2 there will be a talk on Uses of RF in Landline Communication. Members GW2CCU, 2FVZ, 3FPF and 3CF are all mobile on the Top Band, and two other members are awaiting RAE results with interest and trepidation !

**Spen Valley** made some alterations to their rules at a recent Special Meeting. In May they heard a lecture on Tape Recorders, by G3IBN, and also held their annual Coach Trip, during which they visited the Mersey Tunnel Control Rooms at George Dock Building. On July 17 there will be an Open Meeting; nothing in August, but programme resumed in September.

Highlight of the month for **Bailleul** was a visit from the Newbury Club, whose party were talked in, given a conducted tour of the establishment and shown the current military equipment. Much interest was shown in the SSB installation as well as the new range of miniature and unit-constructed gear. Bailleul will be paying a return visit to Newbury in October. Meanwhile, any other Clubs interested in a visit to Bailleul (located at an important Army training establishment) should contact their hon. sec. with suggested dates.

The former West Cornwall Radio Club (which was very active and successful in the early post-war days) has now changed its name to the **Cornish Radio**

**All Clubs and local groups are invited to use this space for publicity and the reporting of their activities. Reports should be addressed to "Club Secretary," "Short Wave Magazine," 55 Victoria Street, London, S.W.1, and posted to arrive on or before the date given every month at the head of this article. Reports received late cannot usually be taken into this feature. Photographs suitable for reproduction are always welcome.**

**and Television Club,** and meets at the Y.M.C.A., Falmouth, at 7.30 on the first Wednesday of the month. A monthly bulletin called *The New Link* is published and sent post free to members for 5s. per annum, this being the only subscription for those who cannot attend meetings. Members foregather on Forty every Sunday morning. At the last meeting there was a demonstration of Valve Voltmeter and Oscilloscope kits (by Cossor) and an all-Transistor receiver was also shown.

**Crystal Palace** meet on July 20 for a talk by G3IWA on The Design and Construction of Power Packs: some unusual examples will be shown. There will also be a meeting on Tuesday, August 6, both being at Windermere House, Westow Street, London, S.E.19, at 7.30 p.m.

**Liverpool** succeed in getting a tremendous amount of information into their *News Letter,* which occupies one foolscap sheet (both sides). In the current issue we find local gossip items, a technical note on Aerials, a "For Sale" section, a list of DX heard, Safety Hints, a Quiz, and their forthcoming programme. From the latter we gather that July 9 will be an Open Night, July 16 a D-F Contest, and the following four meetings "Open" because of holiday periods. The Club remains active during that period, and the Tx Room will be available as usual.


**In June "Month with the Clubs" we featured GB2JD, station of the Deal & District Amateur Radio Club in operation at an exhibition held locally. Here is another view of GB2JD, with G3LDV (left), G3HWO sorting out the DX, and SWL Bourner (right). Under the headset on G3HWO's right is G3KFR.**

NAMES AND ADDRESSES OF CLUB SECRETARIES REPORTING IN THIS ISSUE:

ALDERSHOT: S. E. Hume, 25 Kingsway, Aldershot.
BAILLEUL: G. Seeney, G3HDD, B.R.S., Bailleul Camp, Arborfield, Berks.
BRADFORD: D. M. Pratt, G3KEP, 27 Woodlands Grove, Cottingley, Bingley.
BURY: L. Robinson, 56 Avondale Avenue, Bury.
CLIFTON: C. H. Bullivant, G3DIC, 25 St. Fillans Road, London, S.E.6.
CORNWALL: J. Brown, G3LPB c/o W. A. Thomas, 38 Lower Market Street, Penryn.
CRYSTAL PALACE: G. M. C. Stone, G3FZL, 10 Liphook Crescent, London S.E.23.
DERBY: F. C. Ward, G2CVV, 5 Uplands Avenue, Littleover, Derby.
EDINBURGH: M. Darke, GM3KGK, 44 Howe Street, Edinburgh 3.
FLINTSHIRE: J. Thornton Lawrence, GW3JGA, Perranporth, East Avenue, Bryn Newydd, Prestatyn.
LIVERPOOL: W. D. Wardle, G3EWZ, 16 Mendip Road, Liverpool 15.
MEDWAY: H. G. Cheeseman, G3KNO, 265 Cliffe Road, Strood, Rochester.
MIDLAND: C. J. Haycock, 360 Portland Road, Birmingham, 17.
NORTH KENT: D. W. Wooderson, 39 Woolwich Road, Bexleyheath.
NOTTINGHAM (Amateur Radio Club): F. V. Farnsworth, 32 Harrow Road, West Bridgford, Nottingham.
PLYMOUTH: C. Teale, G3JYB, 3 Berrow Park Road, Peverell, Plymouth.
PURLEY: E. R. Honeywood, G3GKF, 105 Whytecliffe Road, Purley.
SPEN VALLEY: F. Pearson, 24 Fenton Road, Lockwood, Huddersfield.
SURREY (CROYDON): S. A. Morley, G3FWR, 22 Old Farleigh Road, Selsdon, South Croydon.

**Aldershot** have welcomed two new members, both aspirants to the RAE Course, in connection with which they wish to thank their president, G2FNQ. Morse practice also progresses well, and various summer activities are being planned. Next meeting is on July 10, and fortnightly thereafter, at the headquarters, The Common, Aldershot.

**Bury** announce that their July meeting (no date given) will be a "Noggin and Natter Night" at the George Hotel, Kay Gardens, Bury. The following meeting will be on August 13 at the same place—also at 8 p.m. On September 14 the society will be holding their Hamfest at the Derby Hotel, Bury, and it will include dinner, the usual raffle and a film show. Tickets, price 10s. 6d., available from the hon. sec.

**Surrey** (Croydon) will meet on July 9, 7.30 p.m., at the Blacksmiths' Arms, South End, Croydon. Mr. P. Welch, of Brimar, will give a talk on Miniature and Sub-Miniature Valves, illustrated by films. Visitors will be welcomed, as always. The Club held their annual Motor Rally on July 3. **Nottingham** (Amateur Radio Club) meets every Tuesday, 7.15 p.m., at Woodthorpe House, Mansfield Road. The Club's rebuilt transmitter is now working on Top Band. Members recently visited the Newark Club and heard an excellent talk on D-F by Mr. John Clayton. New members will be welcomed.

**Plymouth** will be meeting on July 9 at the Virginia House Settlement, St. Andrew's Cross, after which the Clubroom will be closed until August 13. From then onwards the weekly meetings will be resumed. Present activities include much mobile work on Top Band, where Club members can be found on Sunday afternoons (1860 kc).

**Medway** (M.A.R.T.S.) will be holding their "South-end Do" on August 25. This annual affair has become

quite an institution, and the Medway types mostly travel to Southend by boat from Chatham, although some go by car, some by train, and some fly! The initial meeting between the Southend and Medway Clubs is at the land end of Southend Pier, 12 noon to 1.15 p.m. After that there are visits to shacks until 3.45 p.m., when all meet again at the Pier and move off for tea. Members of other Clubs are invited to join in, but to notify G6NU, 42 Richmond Road, Gillingham, Kent, of numbers in advance.

We have received *Broadcast,* the Newsletter of the **Army Wireless Reserve** Amateur Radio Society. As implied in the name, membership is, of course, restricted; at present there are 18 full members and 7 associates. Full details are obtainable from G3BIX, Gate Cottage, Chicheley, Newport Pagnell, Bucks.

Recent meetings at **North Kent** have included a talk on Magnetic Recording (G3MZ), with a demonstration of a particularly fine home-built tape recorder, and on Radio Astronomy (G3JJC). G2ATD/P, the Club station, was on the air for field day, and though only three operators were available, they made their best-yet score. On July 11, G3HKX will talk about Maps for Radio Purposes.

At **Purley,** they have been discussing field day results, though we do not yet know what the *post-mortem* disclosed. Next meeting of **Midland** (M.A.R.S.) will be on July 16, when G2HCG, of J-Beam Aerials, will give his lecture-demonstration on Slot Aerials. All interested locally are invited to be at the Midland Institute, Paradise Street, Birmingham, that evening.

## THE PASSING OF THE "TAHITI-NUI"

No sooner had that note on p. 182 of the June issue of SHORT WAVE MAGAZINE gone to the printers than news came in that *Tahiti-Nui,* FO8AP/MM, had foundered at the end of her tow-line — a most unhappy ending to a gallant adventure. The tow would in any case have been a very difficult operation, even in calm weather, as the heavily water-logged raft would swing and porpoise continually, and be anywhere but dead astern on a taut line. We have no news yet as to whether Eric de Bisschop, leader of the FO8AP/MM expedition, intends to attempt the return voyage over the *Kon-Tiki* route in another raft. In the meantime, we offer our French confreres, who have taken such a close interest in the attempt, our sincere condolences on the loss of their *Tahiti-Nui.*

## VHF/FM MARINE RADIOPHONE

The Post Office has just opened the first British station (in the Clyde estuary) of their network for marine VHF/FM telephony. The new system, conforming to the recently recommended international standards, marks a big advance in marine communication, providing highly efficient telephone facilities, free from static and other interference. It is already in operation in the U.S.A. and Canada, on the Great Lakes and the Eastern Seaboard, and has recently been introduced in Europe, in Scandinavia and elsewhere. Its adoption by the British Post Office is a big step forward towards a world-wide system of marine VHF/FM communication.

To meet the demand from shipowners, Cossor Communications Co., Ltd., announce a new range of shipborne VHF/FM telephone equipment, suitable for use with all stations on this international system. Ships working into the Clyde, if fitted with this equipment, can now be linked from a range of 40 miles out with the whole public telephone system, and given a clear interference-free connection to any subscriber in the United Kingdom. It is expected that the main use of the new system will be for navigational purposes and for ship's business, the shipborne equipment being usually controlled from the bridge of the vessel. Installations can, of course, also be made for use by passengers if desired.

The equipment has been made available by a link-up between Cossor and Storno, the latter being a division of the Great Northern Telegraph Company of Denmark. Storno, who have for several years been engaged in the VHF/FM maritime communications field, will produce the equipment, marketed under the name "Cossor-Storno," and Cossor will handle the sales, installation and servicing in the United Kingdom as well as in many British overseas territories.

## "PLESMIN" PAPER CAPACITORS

The advent of the transistor with its low operating potentials has necessitated reductions being made in the physical size of paper condensers, without, as far as practicable, impairing their electrical performance. To meet this need Plesseys have recently introduced the "Plesmin" range of paper capacitors. The small size and high standard of performance has been achieved by entirely new methods and processes. Physical sizes are considerably smaller than condensers made entirely by orthodox methods. The smallest capacitor in the new Plessey range measures only $\frac{3}{8}$ in. long and $\frac{1}{8}$ in. in diameter and the largest $1\frac{1}{4}$ in. long and 19/32 in. diameter. The range extends from 0.001 $\mu$F up to 1.0 $\mu$F, with a normal tolerance of $\pm 20\%$ for 0.01 $\mu$F and above, but below this the normal tolerance is $\pm 25\%$. Voltages normally covered by "Plesmin" capacitors are 12, 25, 50 and 100v., but working voltages up to 150v. DC are also obtainable. An insulation resistance of 1,000 Ohm-Farad minimum at 20°C at the rated DC working voltage can be obtained.

As previously mentioned, the special requirements of transistor circuitry were of the first consideration in the development of this new range of condensers. However, it was also realised, that in many positions in radio, television, and in electronic equipment circuits, the usual practice was to use capacitors where the rated working voltage was not approached even under fault conditions. Now that "Plesmin" paper capacitors of lower working voltages are available this practice can be eliminated. Moreover, like metallised paper capacitors, they have self-healing properties if circuit parameters are suitable.

## SMALL ADVERTISEMENTS

**9d. per word, minimum charge 12/-. No series discount; all charges payable with order. Insertions of radio interest only accepted. Add 25% for Bold Face (Heavy Type). No responsibility accepted for errors. Replies to Box Numbers should be addressed to The Short Wave Magazine, 55 Victoria Street, S.W.1.**

### SITUATIONS VACANT

## ROLLS-ROYCE

**DERBY**

have vacancies for

**ELECTRONIC TECHNICIANS**

who have completed military service, to operate and maintain recording equipment used for Aero Engine Development. Good knowledge of basic principles of electronics necessary. Applicants accepted for these posts will be required to work alternate morning and afternoon shifts. The posts carry a salary of £600 per year upwards according to age and experience, together with additional payment for overtime and shift work. This is an excellent opportunity for men wishing to undertake varied and interesting work in an expanding section of the civil aero engine industry. Interviews can be arranged at any time, including evenings or Saturday mornings, expenses paid. Apply: **The Manager (T.4), Technical Administration, Rolls-Royce Limited, Derby.**

MINISTRY OF TRANSPORT AND CIVIL AVIATION: TRAINEE COMMUNICATIONS OFFICERS.—Applications invited from men and women aged at least 18. Candidates must have an elementary knowledge of radio communication principles, be able to send and receive Morse signals at 20 words a minute; type or teleprint at 30 groups a minute; transmit and receive telephone messages. Weekly rates of pay whilst under training from £6 1s. 9d. at age 18 to £8 17s. 6d. (men) and £8 13s. 0d. (women), at age 25 or over, *plus* free meals and accommodation. On successful completion of training course, annual salary will be £347 at age 18; £568 at age 25 or over, rising to £706 for men; £349 at age 18, £536 at age 25 or over, rising to £637, for women. Slightly lower rates at certain stations. Women's pay being improved under equal pay scheme. Appointments will be temporary (non-pensionable).—Application form and further particulars from Ministry of Transport and Civil Aviation (ESB1/COM), Berkeley Square, London, W.1.

## NEW ZEALAND

*Radio Mechanicians*

Applications for posts with the New Zealand Post and Telegraph Department are invited from fully experienced single men between 21 and 30. Excellent pay and conditions. Free passages are granted to successful applicants. For full information apply to New Zealand Migration Office, Adelphi Building, John Adam Street, London, W.C.2 quoting this advertisement.

## RADIO AMATEURS . .


You **must** be a good MORSE Operator to possess an Amateur Radio Transmitting Licence. A "slap-dash" 12 w.p.m. neither satisfies the authorities, yourself nor your operator friends. Morse operating is an exacting art unless your training is made simple and is based on sound fundamentals. For this reason the Candler System was invented to take the "grind" out of Code tuition and to turn a "tricky" subject into a pleasurable pursuit.

*Send 2½d. stamp for full details.*

## CANDLER SYSTEM CO.

**(Dept. 55SW) 52b ABINGDON ROAD, LONDON, W.8.**

*Candler System Company, Denver, Colorado, U.S.A.*

## Southern Radio's Wireless Bargains

**TRANSRECEIVERS.** Type "18" Mark III Two Units (Receiver and Sender) Complete with Six Valves, Microammeter, etc. in Metal Carrying Case. Untested, without guarantee but COMPLETE ..... **£2 18s. 6d.**

**RECEIVERS R.109.** Short Wave Receiver complete in Case with eight valves. Built-in Speaker and 6-volts Vibrator Pack. Untested without guarantee but COMPLETE..... **£2 18s. 6d.**

**ATTACHMENTS** for Type "38" Transreceivers. ALL BRAND NEW. HEADPHONES, **15/6**; THROAT MICROPHONES, **4/6**; JUNCTION BOXES, **2/6**; AERIALS, No. 1, **2/6**, No. 2, **5/-**; WEBBING, **4/-**; HAVERSACKS, **5/-**; VALVES, A.R.P. 12, **4/6**; A.T.P.4, **3/6**. Set of FIVE VALVES **19/-** the set.

**ATTACHMENTS** for "18" Transreceivers. ALL BRAND NEW. HEADPHONES, **15/6**; HAND MICROPHONE, **12/6**; AERIALS, **5/-**; SET OF 6 VALVES, **30/-**.

**RESISTANCES.** 100 Assorted useful values. New wire end **12/6**

**CONDENSERS.** 100 Assorted. Mica, Tubular, etc.....**15/-**

**BOMBSIGHT COMPUTERS.** Ex-R.A.F. NEW. Hundreds of Components, Gears, etc. Ideal for Experimenters.....**£3**

**LUFBRA HOLE CUTTERS.** Adjustable ¾" to 3½". For Metal, Plastic, etc. ..... **7/-**

**QUARTZ CRYSTALS.** Types F.T.241 and F.T.243, 2-pin, ½" Spacing. Frequencies between 5675 Kcs. and 8650 Kcs. (F.T.243) 20 Mcs. and 38.8 Mcs. (F.T.241, 54th Harmonic), **4/-** each. ALL BRAND NEW. TWELVE ASSORTED CRYSTALS, **45/-**. Holders for both types 1/- each. Customers ordering 12 crystals can be supplied with lists of Frequencies available for their choice.

**MORSE TAPPERS.** Standard type, **3/6**; Extra Heavy on Base, **5/6**; Midget, **2/9**.

**TRANSPARENT MAP CASES.** Plastic, 14" x 10¾". Ideal for Maps, Display, etc.....**5/6**

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WANTED: BC610 Hallicrafters, ET-4336 Transmitters. BC-312 Receivers, BC-221 Frequency Meters and spare parts for all above. Best cash prices.—P.C.A. Radio, Beavor Lane, Hammersmith, W.6.

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**3d. per word, min. charge 5/-, payable with order. Please write clearly, using full punctuation and recognised abbreviations. No responsibility accepted for transcription errors. Box Numbers 1/6 extra. Replies to Box Numbers should be addressed to The Short Wave Magazine, 55 Victoria Street, S.W.1.**

BARTER: AR88D for HQ129X, SP400.—Poppi, 265 Kent House Road, Beckenham, Kent. *SYD 5859* (evening), *BRI 2600* (day).

CR100 Coil Unit with wavechange switch urgently required. Good price offered.— Write details: G2OS, 27 Seafield View, Tynemouth, Northumberland.

WANTED: Valves, Type 814 or RK-47. Buy, or Exchange 813's.—G6RF, Little Lodge, Lower Cookham Road, Maidenhead, Berks. *(Maidenhead 3594).*

SMALL ADVERTISEMENTS, READERS—*continued*

FOR SALE: National 1-10, 5 sets coils; also RF24 unit, unused. Offers? — Stephenson, 17 Park View, Wandle Road, Morden, Surrey.

FOR SALE: Hallicrafters SX100 receiver in mint condition, three months old, used only about 50 hours. — Offers to Box No. 1880, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

MOBILE TX.—Size 5 x 4 x 6 inches, Phone/CW, relays, mike, etc. (send for photo), £8; 12v. Dynamotor, 350v. 200 mA, compact, 30s.; Vibrator Pack, 240v. 40 mA, 12v., 10s.; Hallicrafters S.39, 32 mc - 500 kc portable Battery/Mains, used for mobile, £9.—Box No. 1881, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

FOR SALE: 10m. Converter, £5; 10m. Tx, 3 xtals, 807 Linear, PU, Mod., 90ft. coax., GP aerial, £12; three partly-completed items SSB exciter, £3; Top Band Tx, £2; 2m. converter, 30s.; 832, 10s.; 2m. PA Lecher, 10s.; Q-Max GDO, £9; 100 kc xtal, 15s.; 1155 DF meter, 10s.; 50 $\mu$A. meter, 30s.; (carriage extra).—Box No. 1883, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SALE: 12-volt, 70 A.H. batteries, as new, £6 each (surplus to requirements).—Apply Tilcock, 62 Fleming Mead, Mitcham, Surrey.

EDDYSTONE 680X for sale, £85; excellent condition; just had a complete check-up by Webb's Radio.—J. Hall, 15 McArthur House, Greenways, London, E.2.

BC221 with P/Pack, HRO rack mounting, with P/Pack and coils, 1.8 - 30 mc, bandspread 3.5, 7, 14 and 28 mc, unmodified, £45 lot (o.n.o.). Many other odds and ends. State wants? N.E. England.—Box No. 1882, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

B2 MINOR Tx/Rx, as new, complete spares, handbook, £10. B2 Tx/Rx transit case, £1. BC-610 handset, 15s.—L. Grout, 68 The Drive, Worthing, Sussex.

TWO 4-element 2-metre beams, 15s.; GPO 5ft. rack, £1; 100 kc xtal oscillator, £1; VCR-138A and 5CPI, the pair £1 5s.; pair 3in. Magslips, £2; Dynamotors, brand-new, offers (2)? Modulation transformer, 7/6; QCC 7200 kc xtal, with certificate, 15s. Quantity modern and miniature valves, cheap to callers. New 832's, £1 each (3). New 829B, £1 5s. Large quantity co-ax and tubular 300-ohm feeder; also multi-way screened cables.—G2FZV, 18 West End Crescent, Ilkeston *(Ilkeston 3637)*, Derbyshire.

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SMALL ADVERTISEMENTS, READERS—*continued*

WANTED URGENTLY: Main Tuning Scale and Drum for CR100 receiver.—40, Kirkland Square, Carrickfergus, Co. Antrim, N. Ireland.

BC221O, less case charts and crystal. Will exchange for transmitter, receiver or what-have-you?—Details, offers, to Box No. 1885, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

FOR SALE: 813, £3; GL211, 25s.; PT.15 (3), 7/6; 6SN7GT (14), 6SL7GT (5), 6H6GT (6), TT11 (3), 6J7GT (3), 6J5GT (3), 6G6G (2), 6B4G, 12H6—all 5/- each; 12Z3G (2), 12SJ7 (3), 12C8, 12A6, DET.19 (4), 6V6 (2), 6F6, KT61 (2)—6/6 each. Wireless Set No. 21, complete and with manual, £4. Two Walkie-Talkies, No. 38, Mk. 11, complete with phones and mikes, £2 each. Wavemeter-type 1191, £3. TA12-B, complete, £3. AC/DC Avo Minor, £4. All post-war *Short Wave Magazines* to date, 10s. per volume. Transformers, Chokes, Condensers, mA Meters. Carriage extra all items. S.a.e. enquiries.—G3ATI, Poppleton, York. *(Tel.: Upper Poppleton 203).*

S440B Tx, converted for 2m. CW, 8 mc overtone xtal and 3/RK34, £3. For your new 2m. rig: 2/EF91, 1/TT15, 1/QQVO3/20A, brand-new and guaranteed, £3; 1/QQVO3/20A, £2. RF27, partly converted 2m., 7/6. Ind. Unit ASB7, less valves, with 5BPI CRT, £1. CRT's 3BPI, 15/-; VCR522, 15/-; EHT Trans., 1400v./2v., 15s.; Co-ax relay type 78, 7/6; PE94, 24v. to 300/150/12, 15/-; 12v. 36w. BTH handlamp xformer, 10/-. Lists of valves available. Small amount for carriage, please! WANTED: 2m. Xtal Converter, 3GPI CRT. Willing to exchange.—Box 1884, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

WANTED: Perspex Escutcheon Plate for AR88, or complete front panel; also set of knobs. Valves transmitting 4069A. — Farlow, G3BXI, 55 Mount Pleasant Road, Chigwell *(Hainault 4546)*, Essex.

MANUALS: 4350, HRO-60, NC125, R9, S37, SX101, T90, Pacemaker, Viking, Valiant, Ranger, £6.—R. Grain, 15 Waverley Gardens, Grays, Essex.

VALVES: 5763 (13/6), 5R4GY (12/6); brand-new boxed British valves, *not ex-WD*. Guaranteed Morse Recorder, 230v. AC motor, complete, £3. LG.300 Modulators/Power Pack, new, complete, in matching cabinets, only £55, guaranteed.—G8VB, 124 Carr Road, Greenford, Middlesex.

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