The SHORT WAVE Magazine

2/6

VOL. XVI MARCH, 1958 NUMBER 1

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The SHORT WAVE Magazine

EDITORIAL

Allocations

The new Frequency Allocation Committee — the Bragg Committee, the chairman being Sir Lawrence Bragg — appointed by the P.M.G. and now sitting, has as its terms of reference " to advise on the broad aspects of radio frequency planning with a view to the efficient use of the radio frequency spectrum and the economic development of equipment for that purpose by the radio industry." *For the deliberations of the Committee, the net could hardly have been cast wider.*

It is perhaps too soon to comment here upon what approach the Bragg Committee should make to the problems of Amateur Radio frequency allocations — they will have more than enough to think about in the next few months, and it is fortunate that at least five members of the Committee can be relied upon to give the amateur requirement proper consideration.

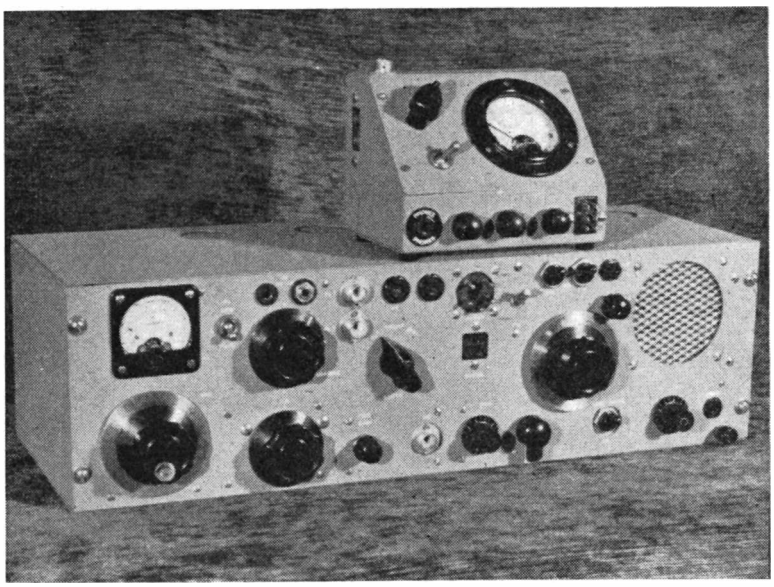
However, there are one or two observations that might now be made, touching upon " the efficient use of the radio frequency spectrum " *as it affects Amateur Radio. Working from the basic assumption that the ether must be free for all to use, under reasonable safeguards and with proper consideration for the rights of all users, there would seem to be no reason why U.K. amateurs should not be permitted, if they wished, to have the medium-wave (330-460 metre) broadcast band between, say, midnight and 6.00 a.m. There is no BBC activity at that period, and it is a fair assumption that there is no public interest in the DX broadcast stations that might be coming through at that sort of time.*

In the same context, there is the LF section of the old 160-metre band, empty at week-ends. Some years ago, we had the range 1715-2000 kc; when the band was narrowed to 1800-2000 kc, it was stated that the 1715-1800 kc area was " needed for additional commercial services." But it can be said that the occupancy of this section has remained exactly as it always was. In fact, it now emerges that there was no need for U.K. amateurs ever to have been deprived of 1715-1800 kc, for week-end working at least.

Similarly, there seems no valid reason — if " the efficient use of the radio frequency spectrum " *is the aim — why amateurs should not have the use of, say, a one-megacycle piece of Band I during that period of the 24 hours (roughly, midnight to mid-day) when the BBC is not transmitting television.*

Arrangements of the sort suggested here would not only make fuller use of the ether, but would help in some degree to make up for the scandalous disregard of established amateur rights on certain of the DX bands.

Austin Forbes G6FO



The complete mobile transmitter-receiver-monitor unit installation designed for G3CIM/M, in a Ford Prefect. The monitor box is an important and very useful auxiliary item, the circuit of which is given in Fig. 2. Another photograph shows how the assembly fits into the parcel shelf on the car.

Design for Top Band Mobile

A COMPLETE INSTALLATION

From Notes by **G3CIM**

AT G3CIM attention was first turned to mobile operation in the autumn of 1956, when it was decided to leave DX working for the home station, and to go out /M on either Top Band or two metres. As even then 160 metres was the popular band for mobile working, while two metres was unpredictable and the band itself not nearly so well populated, the ultimate decision was to design and build for 160 metres.

This involved a complete installation, tailored for the parcel shelf of Ford Prefect 633-GEX, and the photographs show the outcome of the work—and here acknowledgments are due to G3DSW for his invaluable assistance in the evolution of G3CIM/M.

General Design

The block schematic at Fig. 1 shows the circuit arrangement and layout, the actual circuitry being conventional—hence, no details of it are thought necessary for this description.

With the transmitter and receiver to be constructed as one assembly, size was dictated by the space available ; this gives final dimensions overall of 20in. long by 5¾in. high by 7¼in. deep, so as to allow access to the bonnet release. By adopting a unit form of construction —receiver, modulator, PA and VFO — each could be built and tested before they were fitted together ; this approach also permitted the design to be modified as circumstances dictated.

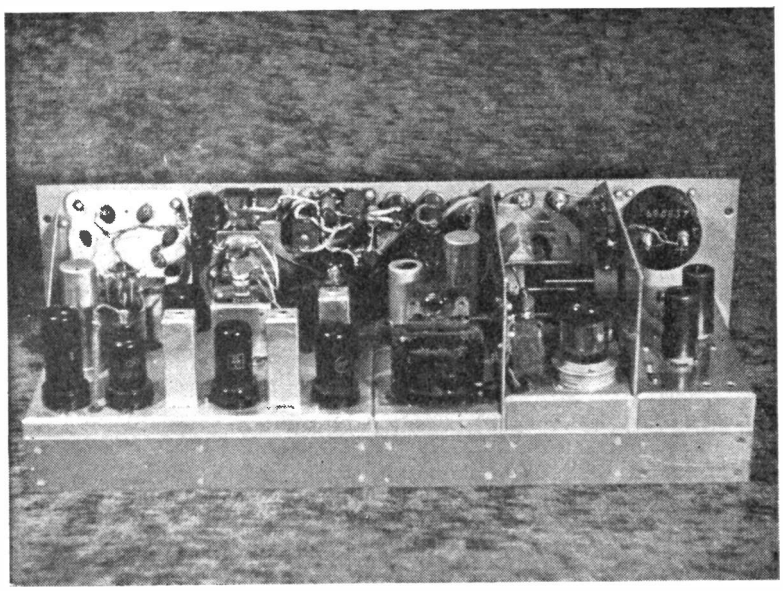
For effective mobile working, good control, switching is essential and proper monitoring arrangements very desirable ; for the present installation, considerable attention was given to these details. An external monitor unit, as seen in one of the photographs, has been produced to give, from the one box, the following indications, switched in as required : Field-strength meter, for checking aerial radiation and resonance tune ; Phone side-tone monitor ; S-meter for the receiver ; modulation depth indicator for transmission ; and car battery voltmeter for regular on-load checks.

The circuit of this Monitor Unit is shown in Fig. 2. Under practical conditions, it has been found to be indispensable for correct operation and full control of the installation.

Main Panel Layout

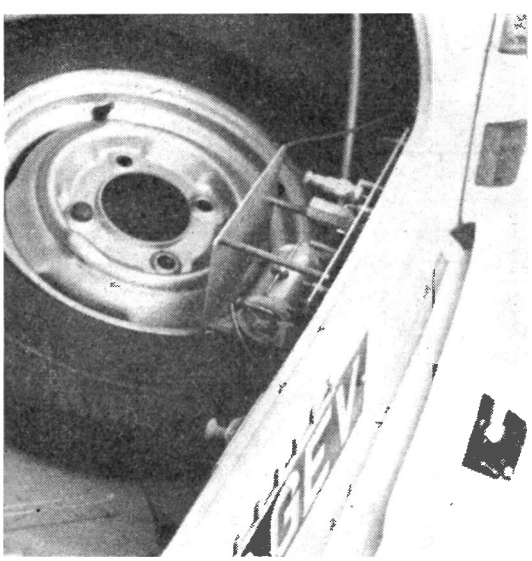
The front-view photograph shows, left to right, top row : PA meter, switch for grid/anode current readings, PA tank loading condenser, pair of sockets for plug-in RF ammeter, coax aerial feed, net-receive-send switch, HT fuses, power input socket, S-meter connection, HT switch, heater switches, receiver main tuning control, jack for external audio, tone control knob, and 2½in. internal speaker.

Along the bottom row come the VFO control knob with an anti-vibration lock, the PA tank tuning condenser, speech amplifier gain control, microphone socket, receiver RF gain control, noise limiter on-off, audio gain control, and headphone jack (which mutes the speaker when the headset is plugged in).



General construction behind the panel of the G3CIM/M transmitter-receiver ; the PA section is second from the right. The receiver runs 12v. valves (see Fig. 1), incorporates a noise limiter, and itself involves seven of the 14 valves used in the complete installation.

A rear-view photograph shows the general construction behind the panel, the PA stage being in the second compartment from the right.



Installation of the G3CIM/M aerial system, showing the variable inductance coil section in the boot, controlled from the operating position. The electrical layout is shown in Fig. 3, and the winch for resonating the variable inductance in one of the photographs.

Power Supply

The installation is run from two rotary converters mounted in the engine compartment. Both machines are fused and filtered, and the total current drain on the car battery, at 7½ watts PA input fully modulated, is 7·5 amps, which includes 2·25 amps in the heater line for the 14 valves involved.

This loading is not regarded as excessive for the battery, but it is considered essential to know what the battery is giving, and getting. Therefore, an external ammeter has been fitted, with a toggle switch to change over from automatically regulated charge (as provided in the normal electrical system) to manual control of the charge, through a variable resistor ; this has involved a slight modification of the charging circuit. (Useful practical information on car electrical installations was given in the article " Initial Amps. for Mobile Working," in the July, 1956, issue of *Short Wave Magazine*.) It should also be added that more than usual care is taken over battery maintenance.

An interesting and very useful by-product of the charging modification is that when on manual control of the charge rate, much noise interference from the automatic charge controller is eliminated. Those who are suffering noise beyond the range of the receiver AVC might consider this factor.

[over

The normal methods of general noise-suppression have been embodied in the installation, including screened power leads, suppressors on each plug, and a condenser across the generator. Some ignition noise on the grid of the speech amplifier was cured by filtering the heater leads. The receiver itself incorporates a noise limiter—*see* Fig. 1.

Aerial System

As in the case of all effective mobile installations, special attention has been paid to the aerial system. The mobileer succeeds or fails largely by the efficiency of his aerial. Much time was therefore devoted to developing a system which gave a satisfactory compromise between efficiency, tunability and æsthetic considerations—it not only had to work well, but look good. The main aim was to avoid excessive length which, while not being at all necessary for efficiency, can cause dangerous movement and always attracts unfavourable attention. Thus, the problems to be overcome were: Easy QSY, adequate water-proofing, safe mounting, and neat appearance.

It seemed desirable to make the main loading coil (*see* Fig. 3) a fixed-inductance unit, so that it could be constructed to be as efficient as possible, and then proofed against the weather. Its dimensions were chosen so that, while being as long as possible having regard to the mechanical factor, it just about came into the HF end of the 160-metre band. The coil itself was then carefully wrapped in plastic tape and sealed off.

The use of a long thin, instead of a short fat, coil is dictated by the primary consideration of good radiating efficiency—the greater part of the radiation is off the coil itself. To tune the system "on the nose," an additional variable inductance was added at the base of the system, in series with the loading coil—*see* Fig. 3. As shown in one of the photographs this (with the matching coil for achieving a

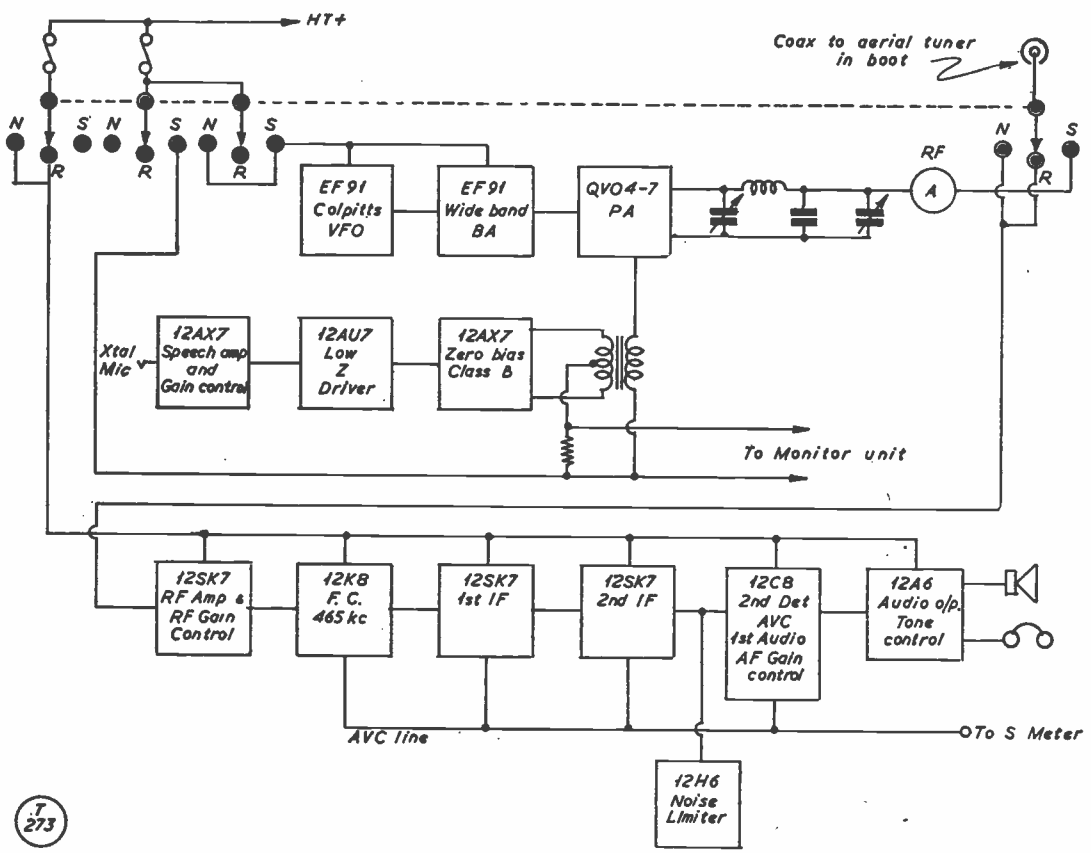


Fig. 1. Block schematic of the G3CIM/M transmitter-receiver layout, showing switching and control circuits. Construction is in unit form (see text and photographs) and the circuitry of the various units of the assembly is conventional. The PA runs up to 7½ watts input, and the receiver section is specially designed for mobile working.

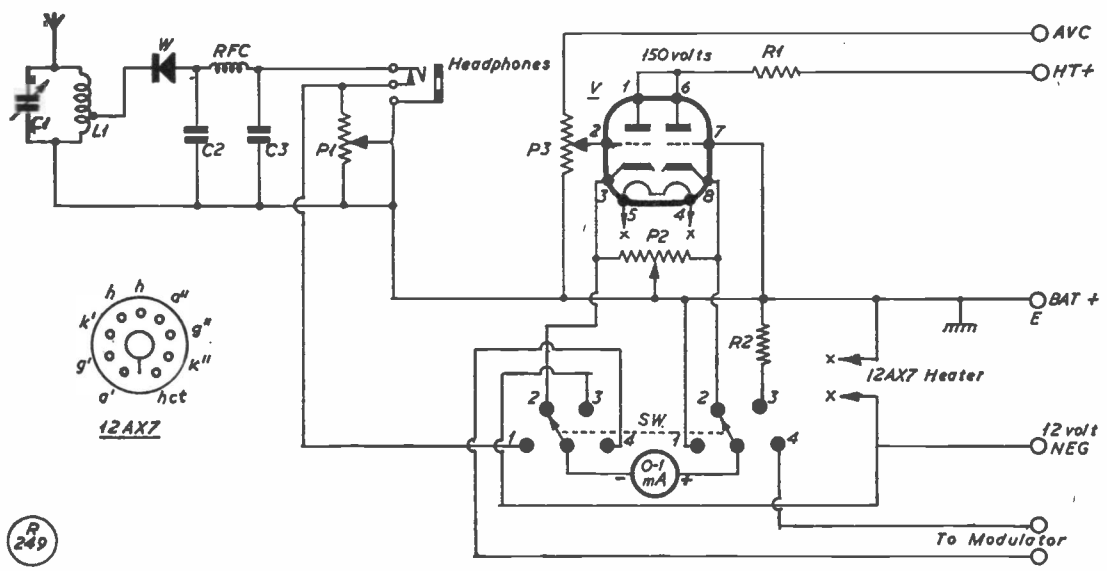
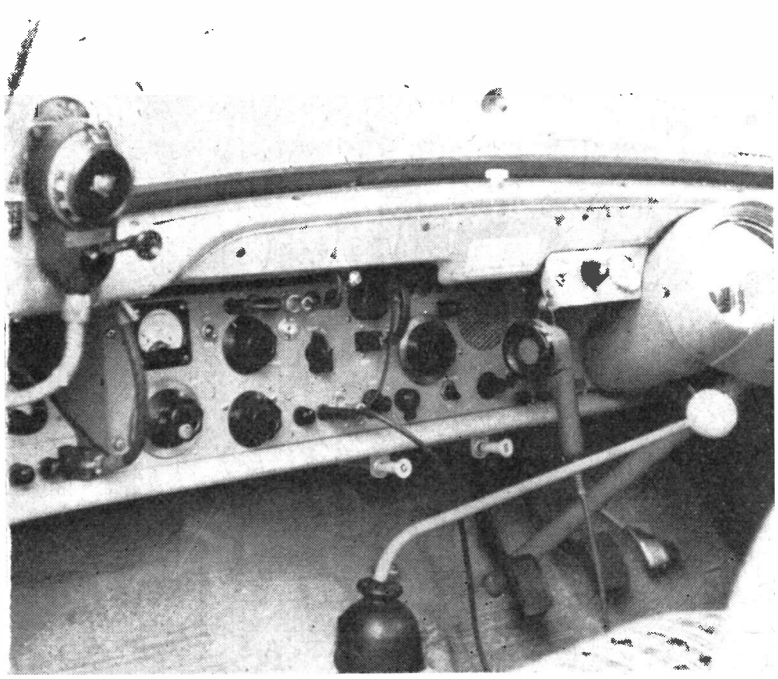


Fig. 2. The monitor unit designed by G3CIM for his mobile installation, the functions of which are discussed in the text. Values are as follows : C1, 100 $\mu\mu$F ; C2, C3, .001 μF ; R1, to reduce HT to 150v.; R2, to suit meter resistance, about 20,000 ohms ; P1, F/S meter sensitivity, 500 ohms ; P2, S-meter zero-adjust, 500 ohms ; P3, S-meter sensitivity control, 2 megohms ; RFC, 1 mH ; W, crystal diode ; Sw, 2-pole 4-way break-before-make ; L, to tune band required with C1 ; V, 12AX7.

low - impedance feed - point connection) is housed inside the boot, the variable inductance itself being a roller-tuned coil controlled by flexible drive from the operating position. This variable inductance is of the type found on many items of "surplus" equipment, a good example being that used in the old Wilcox-Gay Type MI-19467A "Master Oscillator" VFO unit. (For those who may have a copy, this is shown on p.513 of the September, 1949 issue of *Short Wave Magazine*.)

Dimensions of the loading, variable inductance and matching coils are, of course, chosen so that the tunable section gives the system as a whole coverage of a good area of frequency in the 160-metre band. On QSY, the aerial system can be peaked up on frequency from the operating position, the monitor unit already mentioned giving the necessary



The fitting of the G3CIM/M installation into the parcel shelf of Ford Prefect 633-GEX. The aerial control winch is at upper left ; this adjusts the variable section of the aerial coil assembly in the boot — see text and Fig. 3. The monitor unit shown in another photograph is at the left.

indication of resonance tune on "transmit."

Results

With inputs of 5-7½ watts, R5 Top Band contacts, mobile-to-fixed-station, can be expected over distances of up to 40 miles in daylight, using the equipment as described and illustrated here. The best daytime distance actually worked (with a "Q5" signal) is 61 miles, which must surely be approaching the ground-wave limit for any quarter-wave aerial system on 160 metres.

This article is not, of course, intended to be a detailed point-by-point description of a practical mobile installation, about which most readers will have their own ideas, anyway. But it is hoped that it will show what can be done in the way of designing and constructing a complete installation, including the receiver—as such, it may give those who are contemplating /M working this season some ideas worth incorporating in their own equipment.

(EDITORIAL NOTE: As many readers interested in /M working will know, G3CIM/M has been very successful in several Rally contests. His equipment as described here also took the premier award for the best piece of home-constructed apparatus shown at the Radio Hobbies Exhibition last October.)

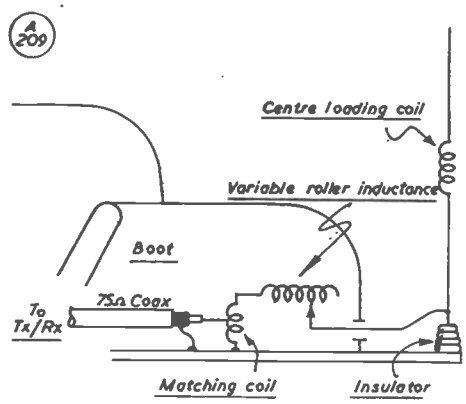
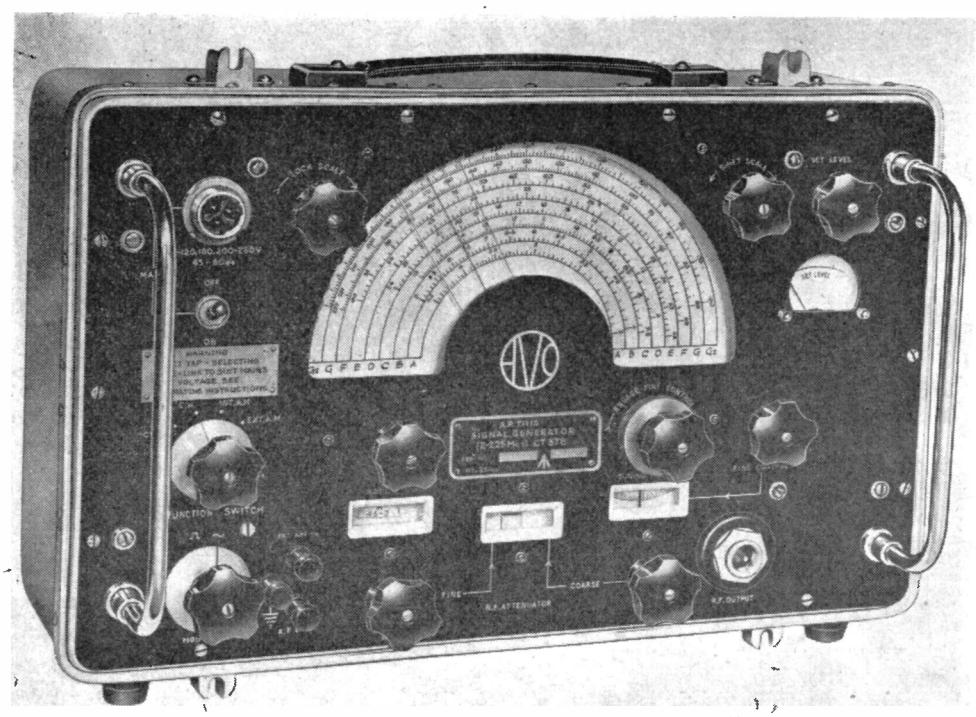


Fig. 3. Electrical layout of the G3CIM/M aerial system, showing arrangement of the loading and matching coils. The variable inductance is roller-tuned by remote control from the operating position.



The AVO Signal Generator Type 378 is a CW/AM RF instrument covering the wide range of 2-225 mc; it employs modulation on the post-oscillator stage and provides an amplitude modulated RF signal with negligible FM effect. The Type 378 is ideal for use with AM receivers.

KT88's in a Class-B Modulator

IMPROVING ON THE 807

G. T. SASSOON (G3JZK)

As this article shows, we have to hand a British valve which is distinctly superior to the 807 in audio applications, and probably in some RF circuits as well. It will be noted that the G.E.C. KT88 is octal based and pluggable with the 6L6. The data given in this article on the Class-B zero-bias connection for a pair of KT88's in push-pull have not previously been published.—Editor.

TILL recently, the writer used 807's in Class-B zero bias in the modulator. However, this arrangement was unsatisfactory for four reasons, namely :

(1) Insufficient output for 100% modulation at the HT voltage available (650v.).
(2) Drive requirements of the 807's too great for the single-ended KT66 driver in use.
(3) Although operated within ratings, the 807's showed signs of distress when driven to full output with a sine wave.
(4) It was felt desirable to have something in hand, not to run everything flat out all the time. Speech quality was poor as a result of driver and output stage overload.

It should be borne in mind that when speech clipping is used, 75 watts of audio will *not* give full modulation of the 150 watt DC input. In fact, for square-wave 100% modulation, 150 watts of audio are required—and speech subjected to 20 dB of clipping looks very like a square wave ! If 150 watts were available, there would be something in hand over modulation transformer losses, which are usually about 10%.

Therefore a means was sought of improving the situation with the minimum of effort. The solution was found to be the KT88. A comparatively recent valve, the KT88 has 35 watts anode dissipation, base connections the same as a 6L6, and is considerably smaller physically than the KT66. This is because the pinch, the glass column in the lower part of the envelope, has been eliminated, the leads passing straight through the glass into the pins. It has a 6.3 volt heater, and is rated at 100 watts out for a pair in Class-AB2. Though no information on Class-B operation was immediately available, bases were changed and KT88's plugged in instead of the 807's, with no circuit changes.

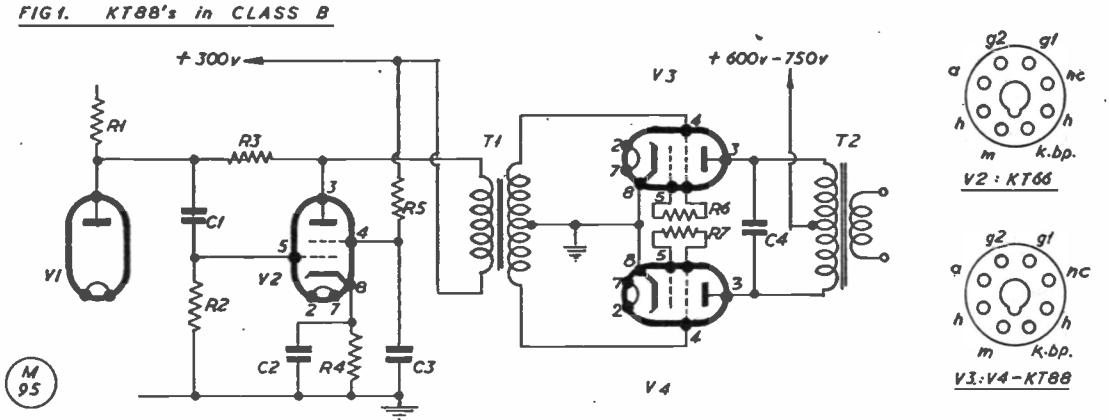
The difference was startling ; the gain control had to be given a severe backward twist, and reports from stations worked before the change indicated cleaner speech. It was quite possible to overmodulate, the envelope being observed on an oscilloscope.

Since then, the manufacturers (the G.E.C.)

Table of Values

C1 = .05 μF
C2 = 25 μF, 25v. elect.
C3 = 8 μF, 350v. elect.
C4 = .005 μF, mica, 3000v. DC test
R1 = Existing anode load
R2 = 220,000 ohms, ½-w.
R3 = *See text*
R4 = 160 ohms
R5 = 10,000 ohms, 1-w.
R6, R7 = 22,000 ohms, ½-w.
T1. = 2 : 1 step-up, or SCR-522 type mod. xformer
T2 = Woden UM3
V1 = Existing last-stage speech amp.
V2 = KT66 driver, G.E.C.
V3, V4 = KT88, G.E.C.

FIG 1. KT88's in CLASS B



Circuit for the KT88 Class-B modulator, with a KT66 driver stage. With this arrangement, a full 150 watts of audio can be obtained under the conditions stated in the article. The KT66 needs but 15v. grid drive, and in this circuit will produce the necessary 360v. across the grids of the KT88's to drive them to full output. In this application, the G.E.C. KT88 is much superior to the conventional 807, so often featured in Class-B zero-bias modulators.

have provided operating data for the Class-B zero bias connection, which is summarised in the table, together with that for the 807.

	807	KT88
Output, V_a = 750v.	120w.	150w.
Output, V_a = 600v.	80w.	100w.
Peak drive volts, g_2-g_2:	555v.	360v.
Peak anode current.	240 mA.	280 mA.
Quiescent anode current:	15 mA.	20 mA.
Optimum load, *a-a*:	6,650 ohms.	6,000 ohms.
Input impedance, *g-g*:	20,000 ohms.	18,000 ohms.
Distortion:	?	6-8%

The superiority of the KT88 is very evident. The circuit in use at G3JZK is shown in the diagram ; G.E.C. recommend push-pull triodes for the driver, but state that a pentode stage is adequate where quality is not of prime importance. About 15 volts of audio on the KT66 grid are required for full output.

No meter is shown in the circuit, as modulation is monitored on a 'scope. A 300 or 500 mA instrument could be placed in series with the KT88 cathodes. The purpose of R3 is to provide negative feedback, which greatly improves quality. The correct value depends on the value of R1, and the amount of gain in hand. To start with, a value three or four times that of R1 should be tried for R3, and reduced until a considerable reduction in gain occurs. The circuit may become unstable, however, if it is reduced too far. On-the-air tests with a near-local station will indicate the best value.

The output stage should present no trouble, as there is so little to it. The slight discrepancy in optimum loads between 807 and KT88 is nothing to worry about, as such variations occur within the normal range of PA loading. The writer's pair functioned happily for months at a load of 5,000 ohms, a guess-value used until the official figures were obtained. Incidentally, the manufacturers also note that for applications other than speech, such as sine waves or music, a load of 7,500 ohms should be used. Therefore, it would do no harm to use a slightly higher value than 6,000 ohms.

From its appearance and high slope (11 mA/V), the KT88 should also be useful at RF. Due to the pinchless construction, leads are much shorter than in the 6L6 and similar types, and it would be worth while plugging one in instead of a 6L6 if there is a shortage of drive. (The writer's transmitter uses no 6L6's in the RF section, so he has been unable to try this.)

Taken all round, the KT88 is a useful valve and a very worthy addition to the range at our disposal.

Improving Receiver Sensitivity

PEAKING UP ON TEN METRES

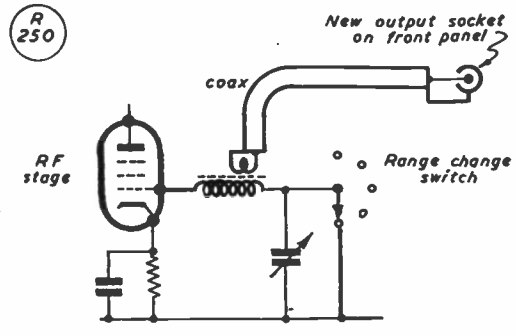
C. E. GODSMARK (G3IWL)

AS is well known, the HF range 20-30 mc is the usual weakness of many "surplus" (and even commercial) receivers. Substituting the existing valve in the RF stage by a modern counterpart often improves things, up to a point.

The main trouble is, of course, the large tuning condenser of 300 or even 500 $\mu\mu$F which limits the size of signal frequency coils to about 5 turns. Hence, the efficiency of the RF coils is low, due to incorrect L/C ratios.

Sensitivity on *one range* can, however, be considerably increased by a dodge, thought by the writer to be worth passing on. This is the treatment for the 10-metre band :

The RF grid coil, on a $\frac{3}{8}$in. Aladdin iron-cored former, is rewound with approximately 12 turns of 26 gauge. This coil is then wired in between RF valve grid and the junction of the tuning condenser with the common segment of the band-change wafer. The wafer contact for the HF range is then connected to chassis. A co-axial link of two turns is wound round the coil and taken to a new aerial input socket on the front panel. (*See* sketch).



The circuit modification suggested by G3IWL, and applicable to any receiver in which the RF stage coil assembly is accessible. Values are given for the 10-metre band, and the effect is a considerable improvement in sensitivity. The aerial is taken to the additional "output" socket shown.

Plugging the aerial into the new socket, the coil should be peaked to, say, 28.4 mc, and will be fairly broad over about 500 kc. This coil, resonating at approximately 28.4 mc, is effectively a short circuit on other bands, but it is the tuned circuit for Ten.

The number of turns on the coil will vary slightly according to RF valve used, the lay-out of the coil pack, internal wiring, and so on.

Note that the inner and outer of the co-axial link must be isolated from the coil, which can be wound to suit the band required and should resonate *only with valve and stray capacities.*

The increase in gain to be expected with a grid coil having 12 turns as against only five or so needs no further comment. A couple of hours' work will improve the front end of a "dead" receiver out of all recognition.

STEREOPHONIC SOUND TRANSMISSION

SUCCESSFUL AMATEUR EXPERIMENT

F. C. Judd (G2BCX)

ON Sunday, 2 February, the first experiment in Amateur Radio Stereophonic Sound Transmission and Reception was successfully carried out by G2BCX (Woodford) and G3JHL (Leytonstone).

G3JHL's twin channel transmission was recorded and later listened to over a stereo twin speaker and amplifier system at the QTH of G2BCX. A preliminary test was made during the preceding week, but evening QRM from ships and shore stations spoiled reception, although the stereo effect was obtained. However, the following Sunday afternoon seemed to offer best results from the point of view of clear channels, and accordingly G3JHL set up two transmitters to operate about 50 kc apart in the 1·8 mc band. (Permission had already been obtained from the Post Office for transmission on two frequencies in the same band.)

The transmission consisted of speech and various sounds from different parts of the room. By listening with headphones—one connected to the "left" and one to the "right" hand channel—G2BCX was able to monitor the live transmission and record in stereo simultaneously. No difficulty was experienced in placing the source of sound or speech relative to the two microphones used by G3JHL—for example, a door slamming on one side of the room whilst speech and other sounds were occurring at the centre and opposite side. Footsteps could be followed quite easily from one side of the room to the other, and such effects were faithfully reproduced from the recorded version, which was later played back in a room of approximately the same size as the original. A description of the equipment chain may be of interest.

At the transmitting end two microphones, spaced about ten feet apart on opposite sides of the room, were used to obtain the "two-eared" effect required for stereophonic sound. Then followed the necessary twin amplifiers and modulators, each coupled to a transmitter for the left- and right-hand channels respectively.

Separate aerials were used for each transmitter, the latter operating each with an input of five watts. (It has since been decided to use a full ten watts input to each transmitter in order to keep down the noise level at the receiving end.)

For reception (G2BCX) two straight receivers. each with an output from a linear detector, were fed to twin recording amplifiers and thence to the upper and lower halves of a standard quarter-inch tape. Staggered recording heads were used with a tape speed of 7½ ins. per second. Playback was effected *via* twin high-quality amplifiers, each with a frequency response of 30 cycles/sec. to 15 kc, together with two corner loud-speaker systems. With the possibility, at a later date, of two-way stereo transmission, G3JHL's recording equipment will most likely use an "in line" stereo head. Apart from slight noise on one channel, the stereo effect and quality of transmission and recording were certainly good enough to warrant future experiment in this new trend in sound recording. The use of one frequency for the transmission of the twin channels is being investigated.

WORLD-WIDE CONTEST FOR SSB OPERATORS

As mentioned in "SSB Topics" on p.651 of the February issue of SHORT WAVE MAGAZINE, this takes place during 1800 GMT March 15 to 1800 GMT March 16. All bands may be used, and the same station can be worked to score on more than one band. The serial number exchange consists of five digits, *e.g.* 56004, of which the first two are the signal report and the last three cover the number of the contact, starting from 001, *i.e.* in the example, this is the fourth QSO in the Contest, the report given being RS-56. Contacts between different continents score 3 points; between different countries of the same continent, 2 points; and between stations in the same country, 1 point. The multiplier system operates by taking the total points scored on one band, and multiplying by the number of different countries worked on that band; the grand total is the sum of the points thus gained on each band used. For instance, if on 14 mc 700 points are scored and 12 countries worked, the score for that band is 8,400 points. If, similarly, 500 points are gained on 28 mc, the total entry score would be 8,900 points. Entries should be sent to: R. Adams, W3SW, 919 McCeney Avenue, Silver Springs, Maryland, U.S.A., post-marked not later than April 16.

Notes on the CR-300

MARINE COMMUNICATIONS RECEIVER ON "SURPLUS" MARKET

A. D. TAYLOR (G8PG)

THE Marconi CR-300 communications receiver, which has recently appeared on the "surplus" market, is not well known to amateurs in general. The purpose of this article is to provide a general description of the receiver and also to give sufficient detail to enable a purchaser to set it up, operate it and re-align it. To prevent disappointment the writer must state immediately that he *cannot* supply circuit diagrams, nor detailed conversion data, though he will be very happy to deal with letters on specific points. It should be noted, on the other hand, that the receiver is a commercial model, not ex-Service equipment, so it is possible that the handbook may be available when the receiver is purchased; it should in any case be asked for from the supplier.

Technical Summary

The CR-300 is an 8-valve communication superhet designed for use aboard merchant ships. The main technical details are as follows:

Frequency coverage: 15 kc to 25 mc in 8 bands;
Circuit: RF stage, frequency changer, two IF stages, 2nd detector — A.G.C. — 1st AF stage, output stage, BFO and crystal calibrator.
Intermediate Frequencies: On ranges 1 and 4, 98 kc. On other ranges, 570 kc.
Aerial: Single wire or 100-ohm feeder.
AF output: Speaker 2 watts, Phones 100 milli-watts. (A built-in speaker is fitted.)
Selectivity: Variable in steps down to 100 cycles.
Bandspread: Mechanical, using dial similar to CR100.
Crystal Calibrator: Fundamental frequency 500 kc on CR300/1, 690 kc on later models.
Power Supply: 24 volts at 1A (AC or DC) and 250 volts DC at 60 mA from external power source.
Overall Dimensions: 18¼ x 15½ x 13½ inches. Weight 55 lbs.

The CR-300 has recently begun to appear as "surplus" and this article discusses it in general terms, with information on installation, operation and alignment, and modification data for 6-volt operation.—Editor.

Brief Circuit Description

This short description covers the more unusual points in the circuitry. The RF stage (V1) is transformer-coupled to the aerial and tuned-anode coupling is used between this stage and the frequency changer; this point should be noted as it means that there is HT on the stator of the FC signal frequency tuning condenser. The frequency changer (V2) is a triode-hexode, the triode portion of which is used as a tuned grid-untuned anode oscillator with temperature compensation incorporated. The signal anode of the frequency changer is tapped down the primary of the first IF transformer, this transformer and the third IF transformer both employing band-pass coupling. V3 and V4 are the IF amplifier valves, the 98 and 570 kc IF transformers being automatically switched in and out of circuit by the band-change switch, which also selects the appropriate tuning coils.

The second IF stage incorporates controlled regenerative feed-back which is set up automatically by the operation of the pass-band switch, which cuts resistors in or out in the cathode circuit of the valve. The output from the second IF amplifier is applied to V5, a double diode-triode. One diode acts as signal rectifier and the other as AGC rectifier, while the triode works as the first AF amplifier. On the two broadest positions of the pass-band switch, conventional resistance-capacity coupling is used between this stage and the output valve (V7). On the next switch position, an R-C network is introduced between the two valves to limit the AF response, and in the fourth position a 1000-cycle audio filter is introduced to provide high selectivity for CW reception. The output stage is conventional except for the output transformer, which has four secondary windings. One of these feeds the internal loudspeaker, and one the internal phones jack; the other two are wired to the multi-way socket on the side of the receiver to feed an external loudspeaker and external phone jacks respectively. The phone jacks on the receiver front panel are wired in such a way that the internal loudspeaker is disconnected when the phones are plugged in.

The BFO employs a conventional pentode oscillator (V6), 98 or 570 kc coils being

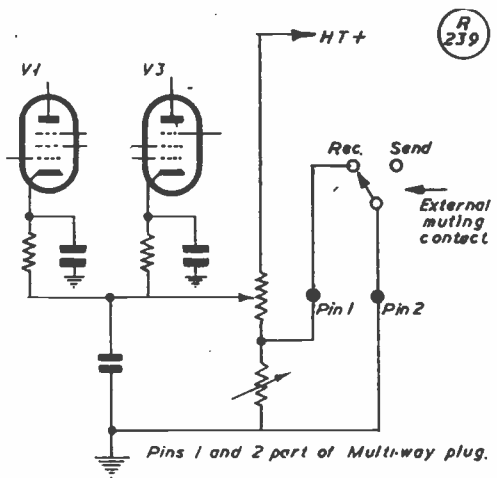


Fig. 1. The "de-sensitising" circuit used in the CR-300, enabling the receiver to be operated near a high-power transmitter; this part of the circuit can be pre-set for monitoring pick-up.

switched into circuit as necessary by means of the band-change switch.

The calibrating oscillator (V8) is also a pentode. The circuit is similar to the conventional Hartley oscillator, except that the crystal replaces the normal grid condenser, *i.e.*, wired in series between the control grid and the tuned circuit. Two additional features are the crystal receiver and the "desensitising" circuit. The crystal receiver circuit (compulsory on marine receivers in case all supplies fail) is brought into action by removing the top cap of V1 and inserting it into a plug on the crystal assembly. The normal RF tuning coils then act as the crystal tuned circuit and the output from the crystal is applied to the phone jacks *via* the normal output transformer.

The desensitising (muting) circuit is shown in Fig. 1. It is used to increase the cathode bias on the RF and first IF amplifiers during transmission periods, thus preventing overloading and providing a comfortable level of side-tone.

Setting-Up

The valves required for the receiver are as follows: V1, KTW61 (CV1281); V2, Z66 (CV1099); V3, KTW61 (CV1281); V4, KTW61 (CV1281); V5, DH63 (CV587); V6, KTW61 (CV1281); V7, 6V6 (CV509); V8, KTW61 (CV1281).

The positions of the valves are shown in Fig. 2. Where alternative types are used in an unmodified receiver, care must be taken to see that they have the same heater current ratings as the valves specified above.

External connections are made *via* an aerial socket, earth bolt and multi-contact socket, all mounted on the side of the receiver. The positions of the pins on the multi-way socket are shown on Fig. 4 and the connections to these pins are as follows: Pin 1, Desensitising control circuit; Pin 2, HT –, external loudspeaker and phone jack returns, desensitising control return path; Pin 3, HT+; Pin 4, External speaker; Pin 5, External phones; Pin 6, 24v. heaters (earthy side); Pin 7, 24v. heaters ("live" side).

Note that the desensitising contacts connected between Pins 1 and 2 must be wired so that they make in the "receive" condition and break in the "send" condition.

The heater circuit of the receiver is shown in Fig. 3. If it is desired to modify the circuit for 6-volt operation, the decoupling condensers should be maintained as a safeguard against modulation hum.

Operation

The functions of the front panel controls are as follows: — Top row, left to right: Tuning control (coarse and fine tuning dials), RF gain control, AF gain control. Bottom row, left to right: Power switch, makes and breaks HT and heater supplies, and operational switch, which, in the Phone position, switches

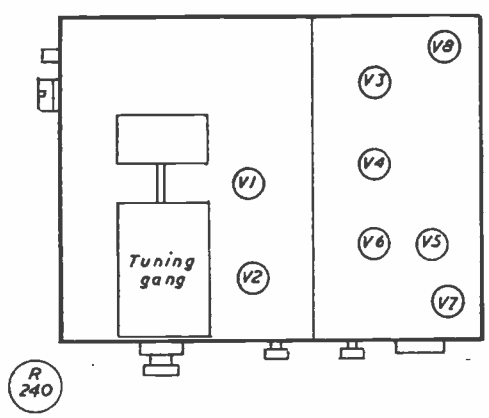


Fig. 2. This sketch is to locate the valve positions and types on the chassis of the CR-300; details of the valves used are given in the article.

the BFO off, in the Off position breaks the HT supply, in the CW position switches the BFO on, in the Calibrate position switches the BFO and crystal calibrator on.

The band-change switch brings in the following bands: 15-85 kc, 85-210 kc, 210-550 kc, 375-1000 kc, 1-2·6 mc, 2·6-6·8 mc, 6·8-17 mc, 15-25 mc. Operation of the switch also rotates

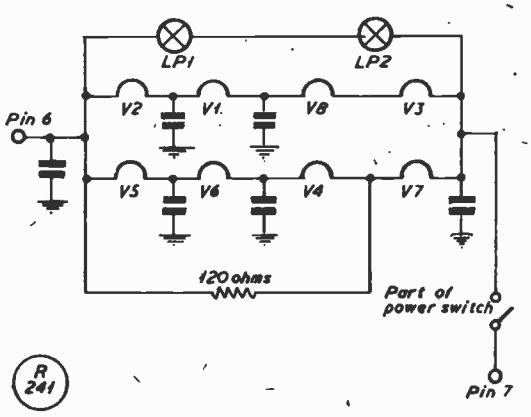


Fig. 3. This is the dial-lamp and heater circuit modification suggested by G8PG to enable the receiver to be run from a normal LT supply; it is designed for 24v. operation.

the drum dial. The pass-band switch provides the following pass-bands (to 6 dB points): Wide, 4000 cycles; Medium, 3600 cycles; Narrow, 2000 cycles; Filter, 1000 cycles. A separate switch is fitted for AGC on-off. The operation of all the controls follows normal practice.

When the receiver is used in conjunction with a transmitter, the desensitising control must be set up. With the external desensitising contacts at "send" (open) and the transmitter running at normal power, the circular cover plate above the loudspeaker grille should be unscrewed, allowing access to the pre-set potentiometer shaft. The potentiometer should then be adjusted to provide a reasonable level of sidetone without overloading the receiver.

Aligning the Receiver

If it is necessary to line up the IF amplifiers, use 98 kc as the aligning frequency on Band 1 and 570 kc on Band 2. The 98 kc tuning slugs are accessible through the holes in the bottom of the IF cans and the 570 kc slugs through the top of the cans. During line-up the operational switch is set to "Phone," the pass-band switch to "Normal" and the RF and AF gain controls to maximum. A modulated test signal is used, the signal generator being connected between the frequency changer signal grid and earth. Starting at the IF transformer associated with the second detector, work forwards through the IF chain, adjusting the secondary and primary of each IF transformer in turn for maximum output. Next, switch to "CW," and on Band 1 zero-beat the BFO (bottom slug) with a 97 kc unmodulated test signal. Switch to Band 2 and zero-beat the BFO (top slug) with a 571 kc test signal. Finally, switch to "Filter," and using an unmodulated test signal on Bands 1 and 2 in turn, adjust the signal generator tuning for maximum output, then carry out a final peaking of the appropriate IF tuning slugs.

Signal frequency line-up is carried out at the various spot frequencies shown in the table. In each case the test signal is injected at the aerial terminal and the local oscillator adjusted to the correct HF setting by means of the trimmer across the coil in use and to the correct LF setting by means of the slug in the coil.

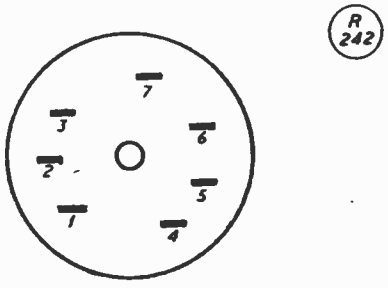


Fig. 4. Sketch to locate the pin connections on the multi-way socket, when viewed from the front.

The mixer and RF coils are then peaked in turn for maximum output, using the trimmer at the HF end of each range and the slug at the LF end.

Lining up at Signal Frequency

BAND	LOGGING SCALE AT 23	LOGGING SCALE AT 1
1 ...	18 kc ...	84.4 kc
2 ...	84.4 kc ...	208 kc
3 ...	208 kc ...	533 kc
4 ...	392 kc ...	1 mc
5 ...	1 mc ...	2.57 mc
6 ...	2.57 mc ...	6.74 mc
7 ...	6.74 mc ...	16.75 mc
8 ...	14.3 mc ...	25.15 mc

The front coil box contains the oscillator coils, the next the mixer coils, and the rear box the RF stage coils. Looking from the front of each box and reading left to right, the first row of holes allows access to the coils for Bands 7, 5, 2 and 1 and the second row to the coils for Bands 8, 6, 4 and 3, in that order.

Conclusion

The CR-300 receiver seems to hold considerable promise for amateur-band use, either as it stands or as the "back end" of a double-superhet, and it is hoped that this article may be of interest to those who may have already purchased one.

Phase and Frequency Modulation

PART II

REACTANCE MODULATION, AND A COMPLETE PHASE MODULATOR CIRCUIT

N. SHIRES (G3BTM)

The first part of this article appeared in our January issue. Here the author discusses the practical applications of reactance and phase modulation systems.—Editor.

For long-distance communication either FM or PM compares very favourably with AM due to the random phase shift which occurs in the sidebands relative to the carrier. When listening to a signal arriving *via* one or more skips it is often observed that a considerable distortion appears which is not due to fading or adjacent station interference. A study of this distortion will show it to be due to phase modulation caused by random phase shifts of the original sidebands with respect to the carrier. Experience has shown that if the original modulation is PM or FM, similar phase shifts will produce equivalent AM and the intelligibility will be comparable. In fact, if two or more skips occur in the transmission path it is frequently difficult to detect the phase of the original sidebands ! The use of an FM receiver may not provide an increase in effective signal strength under these conditions.

The main disadvantage of these systems lies in their use for local contacts, when it is necessary for the receiving station to be equipped for the reception of narrow band FM or PM. The detection of these signals by mistuning *is* possible, but the results are generally inferior to those obtained with a true FM receiver.

A second adverse feature is the reduced power output from the transmitter. In the case of AM the power of the modulator is added to the carrier and an effective 50% increase in radiated power occurs on the positive peaks if 100% modulation is attained. With either NBFM or NBPM the total power radiated is that of the carrier only, and some of this power is used to provide the sidebands.

Generation of NBFM

The simplest method of generating NBFM is to use a reactance modulator. This is a valve circuit arranged to act as a variable inductance or capacity which will change its value in accordance with the applied modulation.

Fig. 6 shows one such circuit in which the valve is operated on the lower bend of its Ia/Vg characteristic; in this condition any change of Vg will result in a change of Ra and in the effective capacity between the point X and earth. With this arrangement a positive increase in grid voltage will cause a decrease in frequency. Excellent linearity can be obtained and the sideband levels will be equal to within 1 db over the range from 200 to 3000 c/s. The adjustment is simple, being carried out in the following manner: The resistor R6 is varied (if necessary) to allow the valve V1 to pass about 250 micro-amps with no voltage applied to its grid. The audio level is then adjusted with the aid of a receiver fitted with a narrow (100 c/s or less) filter. With the BFO on and the AVC off, the receiver is tuned to the unmodulated carrier and adjusted for a convenient beat note. It should be noted at this stage that because modulation level is unchanged by amplification, it is not necessary to have the output stage of the transmitter switched on for this test. (All the frequency multipliers necessary for the band being

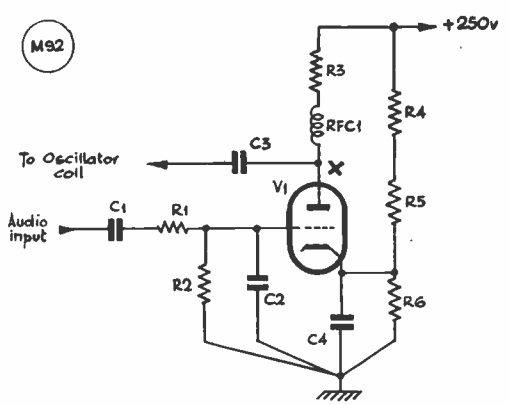


Fig. 6. Circuit for a reactance modulator providing the effect of variable capacity. V1 can be any triode with low internal capacities.

Table of Values

Fig. 6. The variable-capacity Reactance Modulator

C1, C4 = .01 μF	R3 = 47,000 ohms
C2 = 100 μμF	R4 = 100,000 ohms
C3 = 25 μμF	R5 = 22,000 ohms
R1 = 5,000 ohms	R6 = 4,700 ohms
R2 = 50,000 ohms	RFC = 1.4 mH

Table of Values

Fig. 7. The variable-inductance Reactance Modulator

C1	= 50 $\mu\mu$F, var.	R3	= 1,000 ohms
C2	= 200 $\mu\mu$F, silver mica	R4	= 180 ohms
C3, C4,		R5	= 68,000 ohms
C5	= .01 μF, mica	RFC	= 1.4 mH
R1	= 47,000 ohms	V	= 6AM6, or similar
R2	= 470,000 ohms		

checked should, however, be operating.)

An audio frequency of about 3 kc should now be applied to the modulator and the level increased until sidebands can be detected either side of the carrier, spaced by 3 kc. The level should then be increased until a further pair of sidebands appear spaced 6 kc either side of the carrier. With the receiver gain advanced the audio level applied to the modulator should now be reduced until this second set of sidebands disappears. If an accurate dB meter is available on the receiver an alternative method would be to adjust the level until the first sideband appears at minus 6 dB relative to the carrier level; this method is not advisable unless the accuracy of the level indicator is beyond question.

A second type of reactance modulator is shown in Fig. 7, the action of which depends upon the voltage on the grid of the valve being in phase quadrature to that driving it, the necessary 90° lag being introduced by the network R1, C1. The RF current through R1 and C1 will be approximately in phase with the applied voltage but across the condenser alone the voltage will lag on the current by 90° and this lagging voltage will appear at the grid of V1 to produce an anode current in phase with it. This current will therefore be lagging on the voltage originally producing it and the effect is to simulate an inductance across the oscillator tuned circuit. As the value of this inductance is dependent upon the anode current flowing in the valve, it follows that a variation of anode current will cause a varying inductance, an increase in current causing an increase in oscillator frequency. If an audio voltage of sufficient magnitude to vary the anode current is applied to the suppressor grid of V1, the frequency of the oscillator will vary at the audio rate, the degree of variation depending on the amplitude of the applied signal; variation of sensitivity can be obtained by adjusting C1, but if this is insufficient to give the desired condition, the value of C2 can be altered to suit the oscillator in use. The gain control on the audio input (wherever it is placed in that circuit) should be calibrated to permit an accurate adjustment of level to be made if the multiplication factor is altered when band changing.

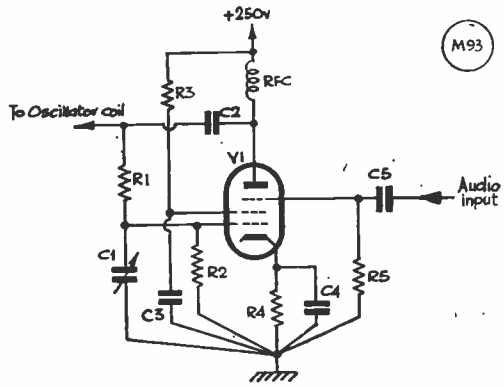


Fig. 7. The difference between this circuit and Fig. 6 is that here the reactance modulator simulates a variable inductance. Values are given in the table, and the valve can be a 6AM6.

Improved Phase Modulator

Fig. 8 shows the more complex circuit required for phase modulation. This circuit can be used with either crystal controlled or variable frequency oscillators and as the inherent stability of the oscillator circuit to which it is coupled is not impaired, its use in place of the simple reactance modulator is advised. V1 and V2 are modulators in which the anodes are parallel and the grids are driven with out-of-phase voltages. The modulation is applied to the grids in anti-phase, the necessary voltages being obtained from the conventional phase-splitter V3. The RF carrier voltage is applied to the grids in phase quadrature, which will introduce the 90° phase shift necessary to achieve phase modulation. Any AM component produced will be suppressed owing to the parallel connection of the anodes. The values of inductance and capacity shown for the circuit are for operation in the 80-metre amateur band; suitable adjustment of these values will permit operation at any other frequency required.

If it is desired to use the circuit without the low impedance terminations, two additional transformers similar to T1 should be constructed. The first transformer will replace L1, with its primary winding forming the anode load of the driving stage. No 560-ohm resistor is required in the secondary of the other transformer, which replaces L2, as this winding will form the grid circuit of the driven stage. Both the RF and audio power input to the unit should be kept low in the interest of linearity; 50 mw of RF is usually adequate with the audio voltage adjusted to give the requisite first sideband level. The method of determining the

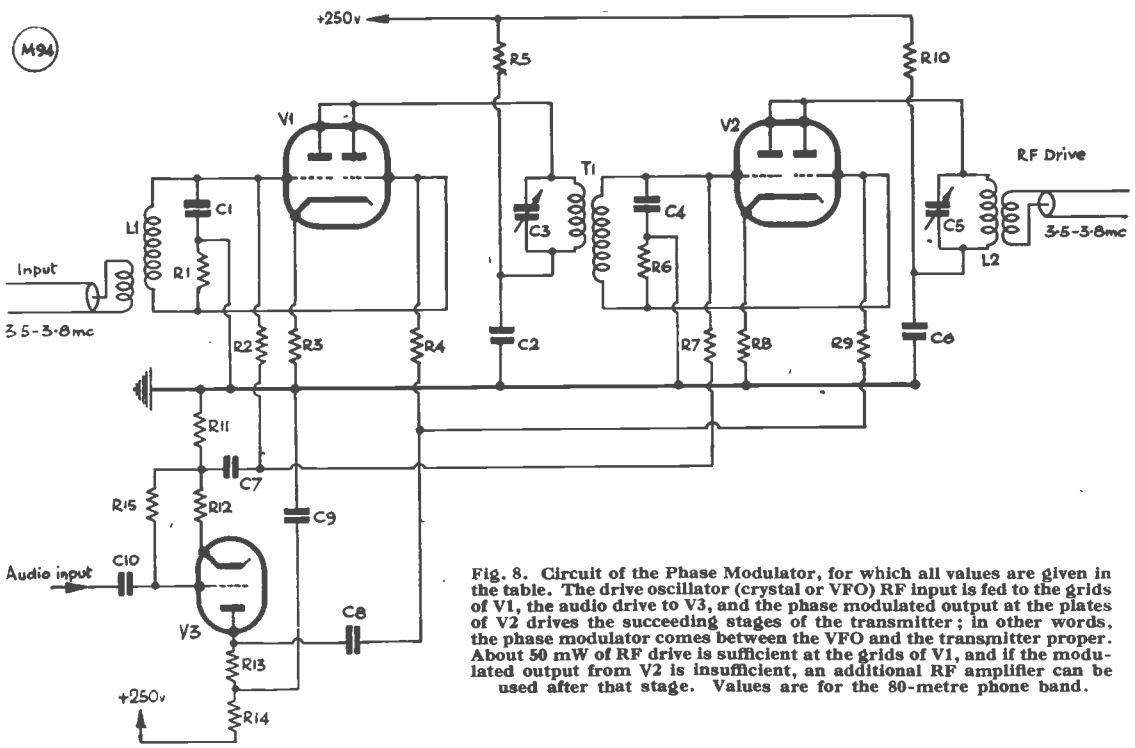


Fig. 8. Circuit of the Phase Modulator, for which all values are given in the table. The drive oscillator (crystal or VFO) RF input is fed to the grids of V1, the audio drive to V3, and the phase modulated output at the plates of V2 drives the succeeding stages of the transmitter; in other words, the phase modulator comes between the VFO and the transmitter proper. About 50 mW of RF drive is sufficient at the grids of V1, and if the modulated output from V2 is insufficient, an additional RF amplifier can be used after that stage. Values are for the 80-metre phone band.

sideband levels is the same as that outlined earlier for the reactance circuits. The provision of a potentiometer with some sort of calibration on it for the audio input is necessary to enable the settings to be reproduced at will after the initial adjustments are completed.

General Design Considerations

In all circuits which can affect the stability of an oscillator the highest standard of workmanship is required to minimise any degradation of the original performance due to the addition of the modulator. The power supply should be well smoothed and regulated: generally, it will be possible to use the same supply as the oscillator, in which case adequate decoupling is essential to avoid any unwanted coupling between the two circuits.

The audio equipment used in conjunction with all amateur equipment should have a restricted passband and the maximum limits for NBFM or NBPM should be 200-3,000 cycles per second.

These limits could be 300-2,000 for speech of "communication quality," which would reduce the level of interference to adjacent stations and increase the intelligibility.

As with all modulation systems it is necessary to maintain the highest level of average modulation consistent with correct operation. Some method of volume compression or speech clipping and filtering should always be employed. The correct use of such systems can *double* the effective radiated power of the station. The reader is referred to past articles on modulation for details of suitable circuits of this type.

Table of Values

Fig. 8. Circuit of the Phase Modulator

C1, C4	= 100, $\mu\mu$F, silver-mica	R3, R8	= 1,000 ohms
C2, C6	= .001 μF, mica	R5, R10	= 2,200 ohms
C3	= 50 $\mu\mu$F, midget	R11, R13,	
C5	= 100 $\mu\mu$F, var.	R14	= 10,000 ohms
C7, C8	= .005 μF, mica	R12	= 220 ohms
C9	= 8 μF, elect.	R15	= 100,000 ohms
C10	= .01 μF, mica		
R1, R6	= 560 ohms		
R2, R4, R7, R9	= 22,000 ohms	V1, V2	= 6J6
		V3	= 12AT7

COIL DATA

L1 = 70 turns 39g. enam. on $\frac{1}{4}$in. Alladin former. Link winding 8 turns insulated on primary.

L2 = 90 turns 39g. enam. on $\frac{1}{4}$in. Alladin former. Link winding 8 turns insulated on primary.

T1 = *Primary:* 90 turns 39g. enam. on $\frac{1}{4}$in. Alladin former. *Secondary:* 70 turns as above on primary, with one layer of oiled silk between sections.

(*NOTE: Values given are for* 80-*metre amateur band*)

Are Your Power Circuits Safe?

CW Monitoring System

ADAPTING THE BC-221

N. P. SPOONER (G2NS)

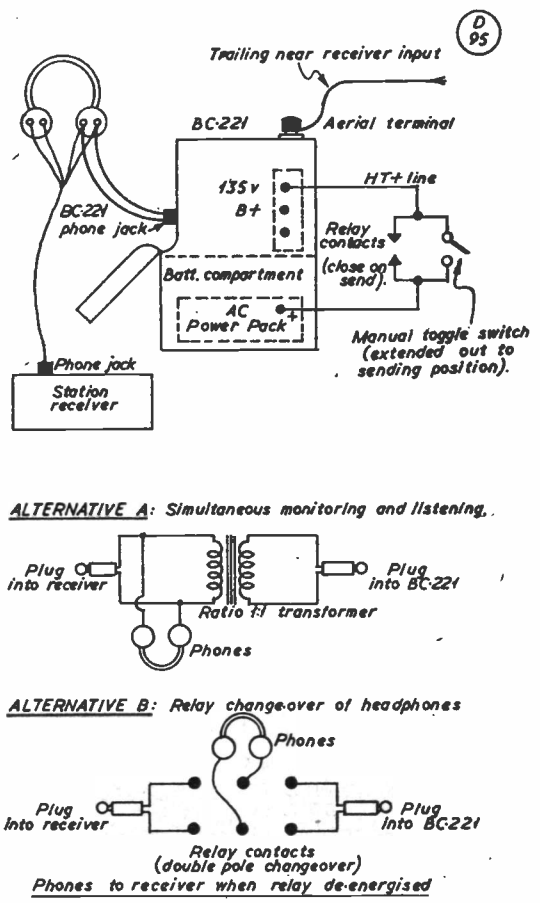
SINCE it first appeared on the "surplus" market some ten years ago (at a price, incidentally, of £15 brand new), the usefulness of the SCR-211 (BC-221) Frequency Meter has been extended in various ways, with characteristic amateur ingenuity. Some owners have added modulation; others have found that it makes an exceptionally stable oscillator unit for a VFO. Yet another application is suggested in the present article, and is one that, like those mentioned, does not impair the original functioning or interfere in any way with the circuitry.

Most readers will agree that the station receiver does not always make a good monitor and that the absence of "side tone"—especially when using a bug key—can lead to indifferent sending, just as lack of a telephony monitor can result in poor speech quality, and even forgetfulness to switch the microphone on at all. If not already foreseen by the designer, the ideal way to run any station is to arrange for a pair of auxiliary contacts to open or close whenever the receiver or transmitter send-receive or on-off switch is operated, and by including the necessary relays and a DC supply to energise them, this system provides one-knob control of the entire equipment. The HT to the monitor itself can then be alternatively switched by a manual toggle extended out to the sending position.

During operating sessions a CW monitor should be placed wherever its signal can be nicely heard in the receiver and where in turn a comfortably strong signal from the transmitter can be heard in the monitor. With a crystal-controlled rig the monitor is, of course, left permanently tuned to the transmitter frequency, but with VFO control the simplest procedure is first to heterodyne the chosen incoming signal in the receiver with the VFO alone (all other stages of the transmitter being dead) and then by means of the toggle switch manually to apply HT to the monitor so that it may be tuned likewise to beat with the received signal. In this easy manner both VFO and monitor are placed ready for action close to the desired frequency when the change-over to call the distant station is automatically made by relay.

Every monitor should therefore be capable of accepting a signal from the station transmitter and of impressing its own beat on the station receiver.

A glance at the BC-221 circuit diagram (that should still be in the battery compartment lid or failing this in one of the two manuals issued originally with every set) shows that the aerial terminal ("Antenna Post") caters for both these requirements. It is coupled to the detector control grid through two 10 $\mu\mu$F fixed condensers and through one of the same condensers to the VFO (Het. Osc.) output. When used as originally intended, the aerial terminal provides input to the BC-221 detector for the frequency measurement of external signals and this, from a CW monitoring point of view, means that the BC-221 will accept signals from the station transmitter. The same aerial terminal also provides output from the BC-221 heterodyne oscillator (VFO) for the frequency calibration of receivers and this, for



Arrangement suggested by G2NS in order to make full use of a BC-221 as a station CW monitor.

CW monitoring, means that it will impress its own signals on a station receiver, whenever required.

Circuit Layout

Here, then, we have the ideal set-up for checking all outgoing signals. To put the matter into practice requires only a short length of wire permanently attached to this aerial terminal and a plug wired across one side of the station headphones, as indicated in the sketch, for inserting in the BC-221 phone jack. The BC-221 circuit diagram also shows that HT and LT (Power On-Off) are switched together, with a consequent loss of monitored signals while waiting for the heaters to warm up. To obviate this the 135-volt HT line (B Pos.) should be cut between the AC power pack output (usually housed in the empty battery compartment) and the B Pos. tag on the original battery terminal board. The two cut ends are then taken to the contacts of a Type 3000 relay so that the HT can now be switched automatically during change-over, or manually at will by means of a toggle switch wired across the contacts. During a QSO (or if preferred during an entire operating session) the BC-221 power on-off switch is left in the "On" position, so that the heaters get a continuous LT supply (but HT only comes on when applied by relay or manual toggle).

Procedure

For monitoring across the 1.8, 3.5 and 7 mc bands, the Meter is set up in the usual way just as if a frequency measurement was to be taken in the Top Band only; for 14, 21 and 28 mc it is set up in the 14 mc band. Owing to the exceptional stability of the "monitor," the manual toggle switch will be found doubly useful should the incoming signal happen to become temporarily inaudible through QRM or QSB. There usually arises at such a moment a temptation to re-tune the receiver and search, whereupon the signal either becomes elusive or else entirely lost. If, however, this temptation is firmly resisted and instead the BC-221 monitor—already set to the distant station's frequency at the time when the contact was first made—is switched on by means of the toggle, its beat will immediately locate the exact spot at which the distant station originally appeared.

Apart from all this, there can be no doubt whatever that continuous monitoring always gives timely warning of breaks in transmission, lapses in quality of tone and irregularities in sending or procedure, and its adoption will invariably tend greatly to improve general operating on all bands, under all conditions. The plug wired across the station headphones as described can also be used with a separate diode unit for checking on telephony.

OBITUARY

We very much regret to have to record the deaths of:

Jack Elliott, G2AHT, of Bedford, on December 8, 1957, at the early age of 37 years, after a long and trying illness. He was a keen Top Band operator, his other interest in Amateur Radio being constructional work, which was of a very high standard. He leaves a widow and a young son.

* * * *

Gp.-Capt. A. F. Johnson, C.B.E., D.F.C., G3JN, of Berkhampstead, Herts., on January 24, 1958, at the age of 49 years. He served in the Royal Air Force from 1924 to 1954, and on retirement from the Service became technical liaison and latterly public relations officer to the Guided Weapons Division of the English Electric Co., Ltd., at Luton. Always a keen and active amateur, G3JN operated on all bands from 160 to two metres, invariably with home-built gear or apparatus otherwise contrived by himself. It is noteworthy that his interest was always strictly amateur, in that his training and career in the R.A.F. were in no way connected with Signals or even technical administration. He gained his D.F.C. for war-time squadron service in the Desert, and his C.B.E. for air staff duties in East Africa. Gp.-Capt. Johnson is survived by a widow and one son.

* * * *

We offer our sympathy and sincere condolences to the family and friends of G2AHT and G3JN in their bereavement.

BATTERY PRICE REDUCTION

Siemens Edison Swan, Ltd., announce that, with improved production facilities, they are able to reduce the price of their "Siemax" radio batteries. The reductions vary from 1s. on the more expensive types, to 6d. and 9d. on the cheaper.

F.O.C. NOTES AND NEWS

The 1957 DX Marathon run by the First Class Operators' Club (F.O.C.) resulted in a win for ZC4IP with 336 points, followed by CR6AI with 279; 4X4BX was third with 202. There were 25 entrants, plus many check logs, the prefixes represented by the entrants totalling 15. The F.O.C.'s tenth annual dinner in December last was attended by 34 members, with G8VG in the chair. The honorary secretary of the Club is L. W. Belger, G3JLB, 103 Whitehill Road, Gravesend, Kent. Membership of the F.O.C. is by a system of sponsoring, and is confined to those who can send and receive at 18's and have held a licence for not less than three years.

DX COMMENTARY

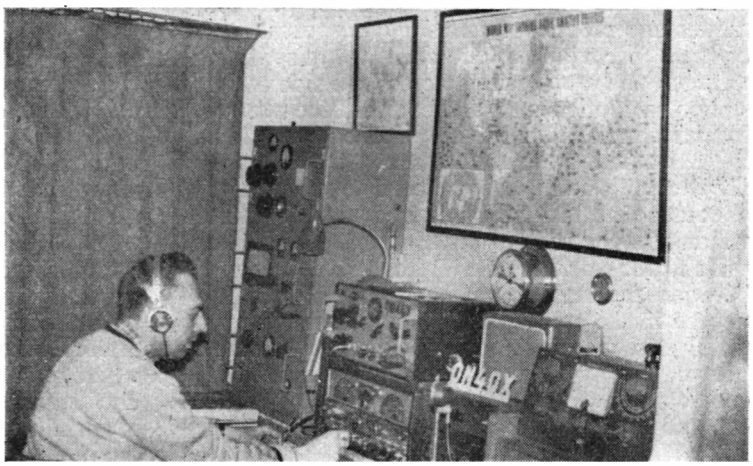
L. H. THOMAS, M.B.E. (G6QB)

ANOTHER very interesting month has provided us with all kinds of DX on all bands. The only break in the steady flow occurred with the spectacular Aurora display on February 10/11, which cut the bands off in their prime and left them rather sick for a couple of days. Even so it provided some interesting freak conditions . . .

There have been no new DX-peditions to report this time, but the BERU Contest and the Phone section of the ARRL affair both livened things up considerably. The latter's first CW fiesta will have occurred by the time you read this, and the QRM should have been absolutely marvellous !

This month we are presenting the Commentary in a slightly altered form, with the bulk of the " DX Worked " extracted from the letters and displayed separately. Correspondents can help us a lot if they will observe this format in future, when writing in. " DX Gossip " can be incorporated in the letters *ad lib*, and that includes any outstanding stations worked ; but if you want to tell us of all the other good DX worked, please list it, *by bands,* at the end of the letter. And, also, if you can put the callsigns in alphabetical order, it will help.

This will enable us to make the bulk of these pages a real Commentary and not just a list of DX worked, whether good, bad or indifferent. This month, owing to the early deadline, many of our regular correspondents seem to be missing. If they put this omission right next time, we shall have a goodly box full of DX Worked over which you can all browse after reading right through the gossip.



ON4QX

CALLS HEARD, WORKED and QSL'd

Round the DX Bands

G2HKU (Sheerness) read the eulogy of 21 mc last time, but remained a bit sceptical. Not so four hours later, having worked JT1AA and KR6AK in the interval. He was involved in a nice little round-table with OK1MB, SM3AKW, JT1AA, JT1YL (*see* later paragraph) and YN1AA.

G3ISX (Welling) tells us that G3FJU is in Kuwait, and will shortly be on as many bands as possible with CW — either as MP4KAU or 9K2AQ ; when time permits he will be listening on One-Sixty, although on that band the static level out there is *terrific.*

G3ATH (Lincoln) was called by two stations who both admitted to being pirates, and apologised for not being where their prefixes said they were ! These gentlemen signed " VQ9AC " and " ZL3BD." On more pleasant subjects, G3ATH, who was XZ2HP in 1947, claims a possible world's record for QSL-ing, having just got one from a W7 after eleven years !

G6VC (Northfleet) is still chasing JT1AA, and another got-away was PY1CK/Ø on Ten phone. A new one that he did collect was ZD3G on 21 mc, and he also worked SM1BVQ (Gotland Is.) on Eighty.

G2DC (Ringwood) covered most bands, as usual, but thought conditions during BERU were abnormally poor. The usual gaggle of VK/ZL stations on 21 mc was missing. and scores were not terrific. VE8MX and KL7FLA have both been very good on 21 and 28 mc ; FY7YC turned up again on 21 mc, and YN1AA was a welcome arrival, same band. When a pile-up forms, this latter type moves off to 28 mc.

G2DC wonders whether others noticed the rapid fade-out of 21 mc on the night of February 5, when just before 2000 GMT the phone section was full of DX, and by 2007 the band was flat. Interesting contacts were—five bands with ZC4IP, four bands with VE3KE, ZD3G and 9G1BQ ; YN1AA on 21 and 28, and ZC5AL on 14 were both all-time new ones.

G3DNR (Broadstairs) stayed around on 28 mc mostly, and collected 3V8BW, FF8AP and IS1ZDT for three new ones thereon. Other DX worked was 9G1CH, ZD3E, ZE, ZS, UR and

5A. VS6DL came back to a call and then disappeared.

G3GGS (Preston) was active mainly during BERU, in the course of which he raised JT1AA on 21 mc! A session on 3.5 mc produced UA9 and W for first Asia and America on that band; 7 mc yielded ZC4, VE and VO. On 14 mc ZS2MI was an all-time new one, others being VS1, VS6, VQ3 and VQ6LQ. But 28 mc was the best band of all, with ZD2DCP, MP4BBE, VQ2, VQ4, VU, ZC4 and stacks of VE's. G3GGS queries that "9G5BBE" mentioned last month, and says the MP4's were using their old calls during BERU.

G6TC (Wolverhampton) would like to know more of the types of aerial used by successful DX'ers, and hopes they will describe them briefly for future Commentaries (we have one or two replies, this month, to last month's appeal to the Long-Wire Brigade). He would also welcome Calls Heard from overseas readers, not on 14 or 21 mc, but especially on 7 mc and 3.5 mc. If any *overseas* correspondents care to oblige with such a list, we will certainly cover it.

G3LET (Westcliff) worked through BERU with a lot of interest—it was his first—but his ground-plane came down in the snow just before the contest. However, it was replaced with a 14-mc dipole which apparently now performs well on three bands, with 50 watts! On 21 mc he worked JT1YL, and on 14 mc FY7YF, who passed word that CR5AC is up at 2215 GMT on 14012 kc. VE7JB was trying to collect lots of British 73 for Joe Davis, who was defending his title in Vancouver that night — a bit irregular, as G3LET says! Cards arrived from FB8XX and 8ZZ.

G3JAF (Lymington) served a three-years' apprenticeship on the 3.5 mc band, during which he achieved WAC and worked 22 States. Now he has transferred to the regular DX bands, with 130 countries in 37 Zones, WAS and other awards.

G3BST (Bletchley) continues to run 7 mc only, and he found conditions excellent until the Aurora ruined them. Africa was well represented, and though he didn't raise them he heard signals from OQ5, EL and ZS6. The jammers have been troublesome in the evenings until 2300, but a W station said they were hardly audible over there. Two nice new cards that have been awaited for some time came through from LX1DW and OY1R.

G3GZJ (London, S.E.23) has already raised his "best DX of 1958," having collected JT1AA on 21 mc. He heard him tuning up—one quick call and he was in the bag. And after that, the pile-up! Others worked, same band, were UI8, VS1, VS6, OX and UO5. A little spree on 14 mc pulled in CR6, KH6, VQ2 and some ZS's.

News from Overseas

W6AM (Long Beach) goes up to 248 on Phone, thanks to UJ8KAA and ZD3E. He worked another HL phone in the ARRL Contest, but this was not a new one for him.

W8KIA (Defiance, Ohio) pushes his Five-Band score up by 39 points in one go, and tells us that he was the first W station to apply for the WAE-I, by submitting all the cards for all three classes at once. Finally, he says that VQ8AS is now on 28 mc phone and also 7 mc CW.

EI6X (Limerick) thought conditions were not "of the best." The main excitement was provided by PY1CK/Ø on 14, 21 and 28 mc, and the 14 mc phone of HV1CN. EI6X's ambition is to raise JT1AA on phone . . . He completed his WAS on phone with W3UWO (Delaware) on 21 mc, and he only needs New Brunswick on any band but 28 mc to collect the WAVE. Likewise HR and HI contacts would complete two other sheepskin claims—for the TPA and the WAA.

DL7AA (Berlin) raises his Five-Band score considerably and gets still further out of reach. Most gains were on Ten, and included KH6, VR2AS, FB8BV, VQ8AH, VQ6LQ, ZD4CH, VP5FH and F9QV/FC. Fifteen came up with JT1AA, FB8ZZ and M1H; and YK1AT and OH2YV/Ø helped swell the total on Forty and Eighty.

ZC4FL (Ayios Nikolaos) is G3KFL, and tells us that during last year he worked 80 countries in 32 Zones, without particularly looking for DX. ZC4GT never received that RAF-ARS kit mentioned in our January issue . . . it got as far as Nicosia and was then "lost." New calls recently issued in Cyprus are ZC4BW, 4FB and 4PT. ZC4FL will be QRX for G contacts on Forty by the time this appears.

VS1GC writes to introduce himself as ex-G3LMO, just arrived in Singapore (17 Bedok Avenue,

" . . . Well, it's one way of beating TVI . . . "

Bedok). When he has finished the business of "getting the YXL out from England" he hopes to be on 14 and 21 mc with 150 watts to an 813—probably on phone. VS1GC has already been made the hon. sec. of the Club at RAF Changi (VS1GZ).

Even VS1 is a rare spot to some people . . . VS1GC put out a 14 mc CQ from VS1JF at 2145 local time, and there was *still* a queue of W's there at 0600 next morning! He sends 73 to the old 7-mc gang, and would be glad to hear from them, on the air or through the mail.

VS1HU (Kranji) has been having a good time with VK9JF (Cocos), VK9AT (New Guinea), ZK2AD, CR9AH, CR10AA, JT1AA, YJ1DL, FB8ZZ, ZC3AC, KH6OEJ/KJ6, XV5A and ZM6AS, to mention only a few of the more mouth-watering calls. On Forty he has raised ZS5, VQ8AS, VU, CR6AI, ZD2CKH, FE8AH, DU7SV, VK and 4S7. Overall scores for the station are 146 worked, 78 confirmed, and 45 States worked. In the *CQ* Contest the Club made 54,000 points. VS1HU and VS1FJ, who are G3JFF and G3IDC respectively, are both on the 1958 council of the Malayan Amateur Radio Society.

ON4QX (Antwerp) writes (we quote): "I still have some LX QSL's for G stations. It seems that some G stations are not interested in LX QSL's—how is that possible?" ON4QX now totals 170 countries, WAZ with JT1AA, *all on Twenty CW*. And he reminds us of the two Antwerp awards, WOSA and HOSA—details from ON4QX, Everdystr. 33, Antwerp.

DX Gossip

DL4AAP, who ran the very successful SVØWQ expedition to Crete last October, now tells us that he made 3502 QSO's in 119 countries and 40 Zones. He will be writing up the full story of the sortie later on.

W2EQS (Westwood, N.J.) would like to know the status of ZC6BU, worked on 21 mc last year, also a character signing "L7SP" and giving QTH as St. Valsod Island, during the *CQ* Contest. W2EQS reports that all the FP8AS cards have long since been sent out, and if any have not been received, an envelope to him, with IRC for reply, will bring one. Recent DX for W2EQS includes JT1AA, 9G1BQ, ZD3G, VS1HU, PY7AN/Ø, YK1AT (all on 14 mc) plus KR6AK on 7 mc and UL7HB on 21. (In a later message, W2EQS tells us that his old FP8AS call is now being pirated and is *not good*.)

JT1YL seems to have been the main topic of conversation in DX circles recently. She is perfectly genuine and is Milada, JT1AA's wife. (He handed the key over to her one day, without warning, and said, in effect, "Work 'em"!). She can receive at 25-30 w.p.m., but sends, as yet, on a straight key only. Meanwhile, Ludvik himself is preparing for phone work, with suppressor-grid modulation, using the amplifying system of his office 16-mm. movie camera as a modulator! We are asked to warn the DX man that he can't expect any ragchews—reports will be exchanged by a kind of phonetic system which Ludvik has been taught by OK1JX. Operation nowadays is mostly on 21 mc.

VK2AGH, *via* G3RL, passes on the word that ZL1ABZ *is* active from Kermadec Island, and now on two frequencies — 3690 and 3844 kc. These are his only frequencies, but he is looking for European contacts.

The annual Goose Bay Amateur Radio Club party will take place from April 4 to April 10, on all bands, Phone and CW. A "WAG" Certificate will be awarded to stations outside USA and Canada who send in a log proving four QSO's with VO2 stations during this period (no QSL's required). Send the log to VO2AB, Aeradio, Dept. of Transport, Goose Bay, Labrador.

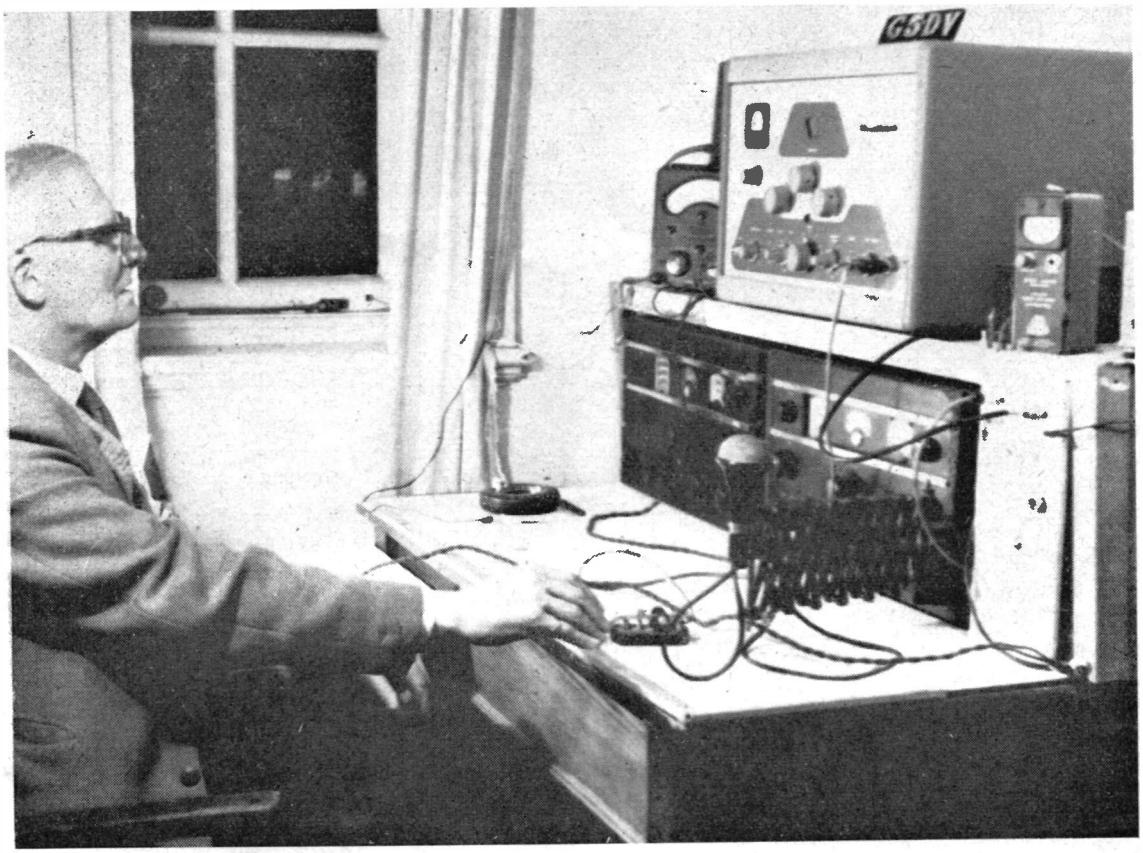
DX Shorts

VPØRT is due to be on from Anguilla Island (near St. Martin) and is, of course, Reg Tibbetts, of W6ITH/FS7RT . . . XE4COH is supposed to be active from Revilla Gigedo Island—he is W6COH . . . PY1CK/Ø has been on 21 mc phone from Fernando Noronha . . . VK9RH (21 mc phone) is on Norfolk Island . . . ZD7A's return

FIVE BAND DX TABLE
(POST-WAR)

Station	Points	3.5 mc	7 mc	14 mc	21 mc	28 mc	Countries	Station	Points	3.5 mc	7 mc	14 mc	21 mc	28 mc	Countries
DL7AA	863	113	170	235	182	163	249	G6VC	370	34	47	138	84	67	154
W8KIA	784	68	145	269	164	135	269	W6AM (Phone)	353	13	32	248	39	21	248
G3FXB	733	72	130	209	184	138	234	JA1CR	348	19	49	174	70	36	176
G5BZ	715	64	118	246	170	117	252	G3GZJ	326	25	60	102	94	45	135
G3FPQ	664	69	94	196	178	127	218	G3IGW	309	44	65	86	66	48	121
G2DC	657	74	100	202	144	137	218	G6TC	285	17	64	123	50	31	137
G3DO	623	24	46	232	155	166	249	G3JZK	270	15	53	58	91	53	135
W1VG	604	25	120	204	139	116	209	G3JJG	250	37	43	92	48	30	109
W2EQS	577	79	118	177	114	89	193	G2BLA	248	27	45	63	62	51	105
W6AM	506	30	58	275	86	57	275	G3JVJ	241	23	63	65	53	37	97
G2YS	478	67	86	154	109	62	171	G3HQX	226	12	37	74	45	58	104
G3ABG	471	45	84	170	92	80	186	G2DHV	219	20	27	121	37	14	129
G3WL	463	39	78	147	115	84	178	G3LET	210	11	44	107	32	16	117
G3BHW	446	15	32	161	133	105	197	G3DNR	209	10	21	81	45	52	97
GM2DBX (Phone)	417	34	31	158	100	94	173	VO2NA	139	13	16	74	26	10	79
G2HPF	406	38	65	157	74	62	172	G3IDG	100	11	15	22	22	30	42

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



Originally licensed as G5AS more than 25 years ago, the call became G5DV in 1937, and the location is now R.A.F. Upavon, Wilts. The transmitter is a Heathkit DX-100, below which are the two AR88 receivers.

to St. Helena is promised, and he still holds the call.

Fernando Noronha (PY1CK/Ø and PY7AN/Ø) is promised country status by the ARRL, but not until May 2, 1958. It seems that "certain people" can now decide not only *what* is a country, but *when* it becomes one! (Isle of Wight papers, please copy.)

VK9XM will be on some time from ZC3-land . . . KF6AA is said to be on Lisianski Island, N.W. of Hawaii . . . HA5AM operates from ZA-land quite frequently (he is an air-line pilot!).

OD5AM, as promised, has left for the Yemen (4W1) . . . CEØZA may be operating from Juan Fernandez Island, halfway between Easter Island and Chile . . .

VS4FC is in Bintulu, Sarawak, with a 25-watt rig . . . AC3PT, AC3SQ, AC4NC and AC5PN are *all genuine and active*, though spasmodically . . . ZC3AC will shortly have an HRO and will be active again on 14 mc.

VQ4EO's Sideband *safari* is expected to take in the following DX locations: VQ3, VQ5, OQ5, FE8, ZD2, FQ8, 9G1, ZD1, ZD3, VQ2 and ZD6. He will be transmitting on 14325 kc—primarily SSB but possibly also CW.

VK9AD will be on SSB, starting about May 1 . . . SM8BYG/MP4T has been on from Trucial Oman . . . KS6AD was hoping for a Tonga (VR5) licence . . . CN8FQ was expecting to organise a trip to 3A2-land, but it may be all over by now . . . KP4AIO will operate from Navassa (KC4) during the last two weeks of July . . . VR5AZ has been active on 14020 CW . . . Lundy Island will be on the air at Easter (*see* Top Band Topics).

VQ8AQ has joined VQ8AS on Rodrigues Island, and apparently sits around 14050 kc . . . FKØAD is on Chesterfield Island, east of Rockhampton, VK4-land. New one? Could be . . . ZK1AK is on Aitutaki, Cook Island. A philatelist whispers that there used to be separate stamps for Cook Islands, Aitutaki, Penrhyn Island and Niue. Cook Islands are ZK1 and Niue ZK2—what about some differentiation for Aitutaki? (After all, if we can't work new countries we can always have a shot at making some!)

There are rumours of extra activity in Albania, due to a YU visiting that spot with a view to using a ZA call. Starting time said to be March 1.

On the very day of going to press we found JT1AA on 21 mc with a wonderful 599 signal—quite different from the 568 affair with which he started on the band. Easy to raise, no pile-up, and

apparently inaudible to the W's at the time (1200).

Acknowledgements, for many of these details, to the West Gulf DX Club, the *Malayan Radio Amateur*, and our numerous correspondents, including the SWL's.

DX WORKED

By G3LET

28 mc: VQ6LQ, ZB1HKO, OX3DL
21 mc: ZD3G, MP4BBE, VO2AB, JT1YL
14 mc: MP4BBE, ZE5JE, VS9AD, ST2AR, HH3L, VQ6LQ, FY7YF
7 mc: VO1DX, KP4UW

By G3BST

7 mc: LX1DW, ZC4BL, UI8BO, ZD2CKH, 3V8AU, CR6AI, OY1R, MP4BBL, ZD3G

By G3JAF

28 mc: UA9DN, VE1AK (*P.E.I.*), VU2MD, VQ6LQ, XE1AX
21 mc: ET2US, KG6FAE, VK9XK, ZB2I
14 mc: VKØAB, ZS3B, OX3IGY PJ2ME, FF8AC, FL8AC, FB8BD, FB8XX, KR6MJ, KH6CQS, HK3KG

By G6TC

21 mc: VE8MX, UAØOM
14 mc: VS6DV
7 mc: KZ5BB

By G2YS

28 mc: MP4BBL
21 mc: ZD3G
14 mc: HH2LD, FY7YF, HA5AM/ZA, OY7ML, VQ6LQ
3.5 mc: M1B, UB5UW, UA1DH

By G6VC

28 mc: CX6CB, MP4BBL, YN1AA, ZE3JO, ZS6DL
21 mc: EA8BF, VE8PB, ZD3G

By G3ATH

14 mc CW: 3A2CD, 3A2CE, HH3L, KL7MF, OX3DL, PY4ZG, VK2ADN, ZE5JU
14 mc Phone: CR6CR, KR6CP, MP4KAC, UL7FA, ZS6UR

By G2HKU

28 mc: ZE1JN, ZC4IP, UA9CC, IT1PA.
21 mc: JT1AA, KR6AK, UQ2AD, VK3VJ, ZB1DZ, ZC4IP
14 mc: KL7MF, 7BA, 7CAS, 7BVY, 7PJ
3.5 mc: HE9LAC, PI1LC/MM, OH3UO, HA3MA, HA5KFN

By EI6X

28 mc: ZE1JQ, 6JE, 6JJ, VP9DL, PY1CK/Ø
21 mc: HH2Y, 2R, 2HH, XQ8AG, VS1HX, CP1AM, PY1CK/Ø, CR4AO, VP4LF, VP5RS, VP6WR, 6ZX

Long Wires and Suchlike

Last month we threw out a hint that we should like to hear from those who have never used a beam (like ourselves). We can now reveal—as they would say in the *Sunday Defective*—a few interesting facts. For instance, G2NS (Bournemouth) has collected DXCC, WAC, WBE, WABC and 36 Zones on a 260-footer with *eight* right-angled bends in it! But he blotted his copybook by working his 48th State for WAS (Utah) on a Minibeam (although the long-wire is still up!)

G3ISX (Welling) has *no* beam and *no* long wire either, but he recommends a 7-mc dipole for use on 21 mc . . . G3JAF uses three separate dipoles for the HF bands, all running NE/SW.

G2HKU has never had a beam, or a long-wire either, but uses the multi-band dipole described in "The Other Man's Station" last month.

Miscellany

G3LXD (London, S.E.6) asks whether anyone can verify the SL3AG type he worked on 7 mc some while back. (Surely there's nothing peculiar about SL's these days? They are Swedish Army Amateur stations.) He also says a pirate is collecting QSL's for him on 7 mc phone; furthermore, the pirate is calling himself "Jack Hawkins"—the name is John!

W2SAW (Webster) has been invited to put on a display of DX Awards at the Dayton Amateur Convention in April. He tells us he can muster up about 65—and we have just sent him a WBC to add to the collection. He promises a picture of the full display.

G3ISX queries whether all UAØ stations are in Zone 19. They are not, of course; they are more or less evenly distributed over Zones 18 and 19, but there are some in Zone 25, too. (A recent tabulation showed the distribution by initial letters—*see* September 1957 issue, p.368.

LA6CF (Sarpsborg) is in the Norwegian Navy, but working very close to his home. However, he has a long-range posting at the end of March, and he wants to collect his WAE II before then. To this end, he says, "All those who want 5 points from Norway towards their WAE can help me to get those five from their country" and he proposes to work on five bands from now on. You will find him on 3525 kc from 2100-2200 and 0200-0300; 7025 kc from 1900-2000 and 0400-0500; 14025 kc from 0600-0700 and 1300-1400; 21025 from 0900-1100 and 1500-1600; and 28075 from 1000-1100. At other times one presumes he is either eating or sleeping!

Top Band Topics

Lundy Island is a spot which, so far as we know, has never been on the DX air before, though it was

Short Wave Magazine

DX CERTIFICATES

The following have been awarded since the publication of our last list, in the December 1957 *issue:*

WFE
No. 31 W6USG (Hayward, Calif.)

FBA
No. 104 G8GP (London, S.E.4.)
105 LA3DB (Bodo)
106 HA5AM (Budapest)
107 EA5BD (Valencia)
108 G3AMM (Scunthorpe)
109 SM5CCE (Stockholm)

WNACA
No. 154 G3GSZ (Castle Eden)
155 G3BHW (Margate)
156 G3FST (Northfleet)
157 DL9TJ (Solingen)
158 PY4PI (Juiz de Fora)
159 HA5BI (Budapest)
160 G3BDS (Worcester)
161 F3ZU (La Frette)
162 G3BHT (Liverpool)
163 DJ2BW (Trier)

WABC
No. 162 G8GP (London, S.E.4.)
163 G2AO (Malvern)
164 G2CZU (Bath) (*Phone No.* 1)
165 G3GIM (London, S.E. 26)

WBC
No. 90 W3DKT (Baltimore)
91 PAØVD (Rotterdam)
92 OH3TH (Tampere)
93 W2SAW (Webster, N.Y.)

Details of MAGAZINE DX AWARDS and CERTIFICATES, and the claims required for them, appeared in full on p. 253 of the July 1957 issue.

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 any or all cards may be called in by us. Claimants from the U.K. should send the relevant cards for each award.

once visited by a pre-war 5-metre expedition. It ought to have its own prefix, judging by recent tendencies, and we gather that the GPO has allotted a call-sign; but we are not yet told what it will be. The operators will be G3IQO, G3JMQ and G3JPJ, who hope to run both phone and CW. There is a possibility of 7 mc operation as well, but Top Band is the main objective. Snappy QSO's — no ragchews — and keep off the frequency. This expedition is planned for the Easter week-end, but should anything unforeseen crop up, G3IQO will be on from the same spot towards the end of June.

The three operators would much appreciate the offer of either a loan or the sale of a ZC1, Type 62 or similar mobile equipment; likewise the loan or sale of any 160-metre crystals would be considered. The present frequencies quoted are 1978, 1912 and 1830 kc. Write G3IQO—*QTHR*. More news of this effort next month.

G3MCP (Leicester) tells us that OK1AEH (Prague Radio Club) will be on the band every Wednesday from 2100 onwards, looking for G's. He has worked them, as well as OK1KKJ, 1RX, 1VE and 1WR, also DL1FF, 3CU and 6YE, not to mention HB9IN, GD3LXT and GM3KHH/P (Banff).

G3JMJ (Reading) raised DL1FF, DL3CU, OK1WR and the same GM3KHH/P. G8GP (London S.E.4) and G8FW (Epworth) both worked *ZC4BL* on February 11; and the former, with a number of other G's, raised *SP1KBK*. The snag is that his cards come through with "3.5 mc" on them. (We recently worked SP8KAA on Top Band, but no card at all as yet.) The SP's are not licensed for the band, we imagine.

DL1FF (Kiel), with that very potent and consistent signal, has had contacts with SP3HD, UA3CH, UA9CM, UB5FJ, UO5FC and YU3EU, quite apart from the usual OK's, HB9's and, of course, some hundreds of G's. Several people report working SP's, but when the cards come through they are always as mentioned above.

The annual Grafton Top-Band Contest for the G2AAN Cup will be taking place on two Saturdays, March 22 and 29, from 2230 GMT until 0100 on the Sunday morning. The first will be the CW section, the second Phone. Entrants for this contest collect points for all their contacts, so it is hoped that all Top-Band stations will join in and give them QSO's.

The station of W1BB, Winthrop, Mass. with ex-G3GGN (who now holds a VE call) on the key, calling "CQ DX Test" at 0645 GMT on 1st December 1957. W1BB is, of course, the well-known Top Band DX operator, who has worked many U.K. stations on 160 metres.

G3IGW (Halifax), in congratulating G2CZU (Bath) on achieving the first WABC on Phone, tells us that he himself had 63 counties confirmed on Phone by Spring 1954, when he was operating from Clackmannan as GM3IGW. These just accumulated in the course of normal Top-Band working. But conditions were better then, and the GM prefix was certainly no disadvantage. Nowadays G3IGW finds it easier to work continental DX than GDX, and quotes DL1FF, 3CU, 6YE, 7AH and many OK's to prove it.

G3JHH (Hounslow) has in his possession a certified list of all the stations worked by G3CMJ/P on his Scottish trip last year. G3CMJ is not sending out QSL's, but G3JHH will send a copy of the list to anyone who forwards a s.a.e. for that purpose. Such a verification will, of course, count for WABC in lieu of a QSL.

Meanwhile, G3JHH has built himself a portable battery Tx which, with a small battery TRF receiver, makes a nice Top-Band outfit. The input is only about 1.1 watts, but it gets around the Home Counties and has worked Lancs. and Leicester, too. G3JHH awaits the starting of a QRP Ladder with interest.

Hastings Amateur Radio Club will be running a seven-days' mobile expedition from April 12 onwards, during which Top-Band operation will take place from Rutland, Merioneth and Montgomery, to mention only three counties. Look for the calls G6HH, C3BDQ, G3FXA, G3HRI and G3KMP, either /A or /M. Full details will be found in the current "Month with the Clubs."

SWL Corner

Ray Small (Kenton) tells us that Fernando de Noronha (PYØ) can hardly be compared with Scroby Sands (*see* last month), as it is about 200 miles off the PY coast. PY7AN/Ø on CW and PY1CK/Ø on phone have both been logged. Good CW catches were JT1AA on 21 mc, plus XZ2TH and KP6AL on 14 mc. HA5AM/ZA was heard peeling off "contacts" and not listening to the incoming reports. HB9EU was noticed "guiding" HE9LAC

towards contacts with FB8XX and KP6AL, but every time there was a pause, Europeans came up on top of the DX, calling HE9LAC! Finally, R.S. queries XU1YO, said to be in Mongolia back in 1946 . . . we have checked his QSL, which very clearly says "Tsingtao, China."

S. R. Smith (Crewe) reports that PY1CK/Ø will be returning to the island in April with phone *and* CW. On 21 mc phone he logged VU2ET, VS1AF and VS2DO . . . these chaps are now coming through again after being absent since about October. Other loggings on 21 mc—CP1AM, CR6AR, HC1FG, HK7AB, OA4's, OD5BZ, VP5RS, ZD3F and ZS7C.

J. F. Pyatt (Coventry) listened on Top Band and was surprised to find quite a pile-up caused by HB9IN on phone, who worked a long string of G's . . . M. J. Prestidge (Birmingham) says that MP4KAA and 4KAM are still using their old calls and haven't gone 9K2 yet. And, he says, PY7SC is supposed to be going to Fernando de Noronha from April 3 onwards. M.J.P. managed to log W1QCC/VE1 on *six metres*, using the family TV set as a receiver (complete with the standard 5-element fixed beam, directed on Lichfield!).

P. E. Day (Sheffield) covered all bands from 50 mc to Top Band. The former he now finds poor; 28 mc phone pulled in UAØLA, VP1JH, HZ1SD and ZD3E; 21 mc phone gave him HL9KT, FB8BX, VU's and ZC6UNJ; 14 mc was the most consistent band, with VS9 and VKØ on phone and VS8WB (who on earth is *he*?) on CW, together with CR8AC, HS1C, HE9LAC and others. On 7 mc a ZD2, UQ2 and CN2 were logged on phone; on 3.5 mc VE1ZZ on CW; and on Top Band that very consistent signal from DL1FF.

V. Porter (Loughton) says that owing to the publicity about PY1CK/Ø (PY2CK put out a

TOP BAND COUNTIES LADDER

(Starting Jan. 1, 1952)

Station	Confirmed	Worked
G2NJ	98	98
GM3EFS	97	97
G3ELZ	96	96
G3JEQ	96	96
G6VC	95	95
G3HEK	92	94
G3GGS	92	94
G3FNV	91	92
G3JHH	90	90
G3AKX	89	89
G2AYG	88	88
G2FTK	86	91
G2CZU	77	77
G3KOG	75	79
G3DO	75	75
GW3HFG	66	80
G3EJF	60	65
G2CZU (Phone)	60	60
G2AO	60	60
G5JM (Phone)	59	60
G3JMJ	51	55
GM3COV	49	62
G3KEP (Phone)	49	60
G3HKF	47	61
G3LBQ	40	53
GW3HFG (Phone)	30	40
G3LEV (Phone)	30	39
G3LNR	24	38
G3LNO	23	41

UA3KBO is the amateur station of the radio club of the University of Moscow, and is located at the highest point in the tallest building in that city. The transmitter runs 100w. to a neutralised triode, and operation is on 3.5, 7 and 14 mc only, into a Windom-type aerial suspended from the central tower of the University building. Few readers will need to be told that one of their receivers is an AR88! The other, below the '88, is a 14-valve Russian product. This photograph, with the notes, reached us direct from one of the operators on UA3KBO.

broadcast beforehand) he was being called in all languages *before* he was on ; V.P. heard and taped him several times. Other interesting loggings were HKØAI (San Andres), VKØRR (Mawson Base), W2YVX/O/KL7 portable, and, finally, a pair of G stations verbally attacking a pirate and telling him to get off the air. To this the pirate retorted that *they* had no right to work *him*, and should read their licences !

Next month's deadline is another of these early ones, being **first post on Friday, March 14.** Publication date is March 7, and many bookstall readers may not collect their copies until March 10 or thereabouts, so that means getting busy *right now* and sending your news along. Please read the first few paragraphs of this Commentary once again, and prepare your letters accordingly . . . this is for *your* convenience, not ours (it actually makes our job more difficult). Then address everything to " DX Commentary," *Short Wave Magazine*, 55 Victoria Street, London, S.W.1, and we will do the rest. Meanwhile, the best of DX, 73 and—BCNU.

HOW TO GET IT

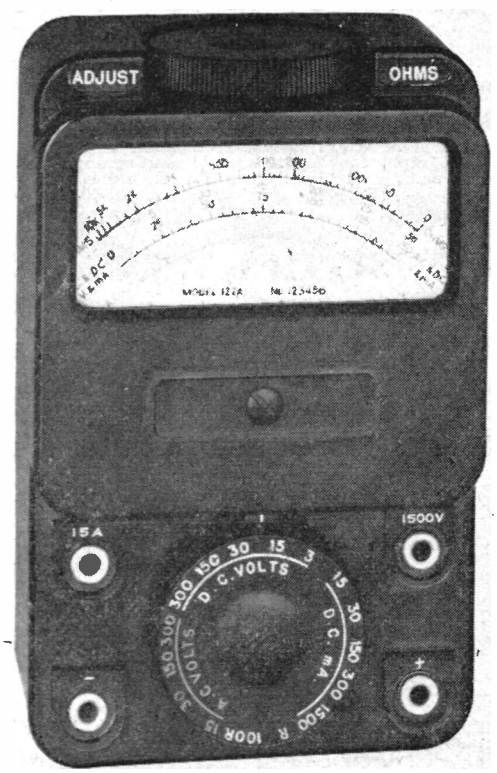
Any local bookstall or newsagent can get SHORT WAVE MAGAZINE for you if you give him a firm order ; he can obtain his supplies either through his usual wholesaler, or direct from us. There should be no delay or difficulty about this. If there is, you can put in a direct subscription on us ; this costs 33s. for a year of twelve issues, post free, and if you are in the U.K., will ensure delivery by post on publication day every month. Direct-subscription orders, with remittance for 33s. (or 16s. 6d. for six months), should be sent to: Circulation Dept., Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

ORIGINS OF RADAR

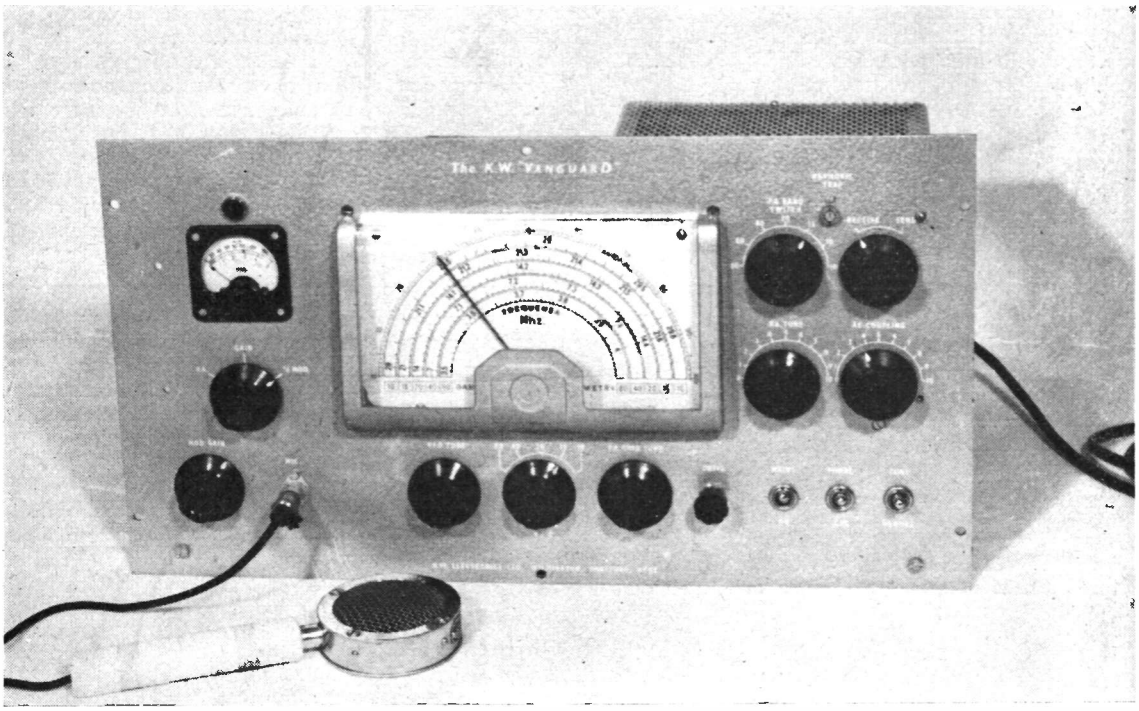
At the February meeting of the Radar and Electronics Association, Sir Robert Watson-Watt, C.B., LL.D., F.R.S., lectured on " The Early Days of Radar," tracing the story from its beginnings. From what he said, it was evident that three countries—Germany, the U.K. and the U.S.A.—were groping for the answer to the long-range detection problem at about the same time, during the period before the last war. Fortunately for us, the German approach was so ineffective that they were still at the experimental stage by the outbreak of World War II, whereas we had a fully operational system in being and ready for continuous working. Though the American progress was much slower than ours, they had a fairly effective system in operation by the time of Pearl Harbour and, in the opinion of Sir Robert, could have prevented that calamity if the American Command on the spot had been prepared to accept the warning of the Japanese approach that their installation was giving.

In his earlier historical references, a very interesting fact, unconnected with radar, brought out by Sir Robert was that David Hughes, of (London) University College, was actually the very first to give a practical demonstration of radio communication ; he used to walk about the neighbouring streets listening to the spark discharges from an induction coil, keyed at regular intervals in the University laboratory. This was in 1879, *eight years* before the practical work of Heinrich Hertz, who has always been credited with the first demonstration. Unfortunately, Hughes was discouraged from going any further or publishing his work by the attitude of the senior physicists of his time, who told him " it could all be explained by induction." Curiously enough, exactly the same experience befell Sir Oliver Lodge at the turn of the century ; his early experiments (based on Hughes's results) anticipated Marconi by several years.

With these examples of early efforts frustrated before him, Sir Robert Watson-Watt, in pursuing the problems of radio-location, did not allow anyone to deter him by saying " it couldn't be done," or that it would be " better with sound locators "—which is what people did say.



The Taylor Model 122A is a pocket-size multi-range Universal Meter, rated at 5,000 ohms-per-volt, giving 21 AC/DC ranges up to 1500v. AC and 15 amps DC. The Taylor range of test and measuring instruments includes insulation testers, capacity and inductance bridges, valve testers and oscilloscopes.



Front view of the K.W. Vanguard Transmitter, as made up from the kit of parts (which includes an enclosing cabinet, not taken with this photograph), showing the general panel arrangement. Behind the central dial is the Geloso Signal Shifter Type 4/102, which is the drive unit for the Transmitter, running a 6146 (QV06-20) PA at up to 45 watts input, phone and CW. The switching gives full control and the Geloso VFO ample drive for the PA, on all bands.

Constructing and Testing the New K.W. "Vanguard"

KIT COMPLETE FOR 50-WATT CW/PHONE TRANSMITTER, 10-80 METRES

MAGAZINE REVIEW

NATURALLY, the first complete Transmitter Kit to be offered on the U.K. market has created widespread interest. For one thing, if you build from specified parts, designed for their purpose, not only have you "rolled your own" in the accepted tradition of Amateur Radio, but you are likely to get a much more satisfactory result than building haphazardly from odd bits that happen to be available. Secondly, you get the finished job much more cheaply than if it were factory-assembled and tested, because the essentially costly item of labour is eliminated.

For all these reasons, therefore, we were very glad to obtain delivery of a K.W. "Vanguard" Kit for the purpose of investigating the manufacturer's claims and informing readers of the results. It was also the idea that the Kit itself, with the assembly and working instructions, should be checked for accuracy and reliability. As the Kit supplied to us was one of the earliest, it was possible to suggest some minor improvements and slight modifications, of which current buyers now have the advantage.

General Approach

In accordance with modern ideas in the production of constructional kits, the K.W. Vanguard comes absolutely complete down to the last detail, including drilled chassis and panel, fastenings and wires. All that the buyer has to provide is the ability to use a few tools and follow instructions. A comprehensive check list is included in the pack-up, together with a full circuit diagram and physical wiring plans. Standard parts and components of reputable make are used throughout, and the four transformers required have been designed and are manufactured specially for the K.W. Vanguard.

The assembly instructions are worked out to give a step-by-step procedure and the wiring plan shows almost where each lead goes. Following the paper-work implicitly, it was found that the only tools needed for the work were three sizes of screw-driver, a pair of pointed-nose pliers, BA box spanners, some Multicore solder, and a light soldering-iron. The total time taken to complete construction, from receiving the parts as packed to the first test with power on, was 20 working hours.

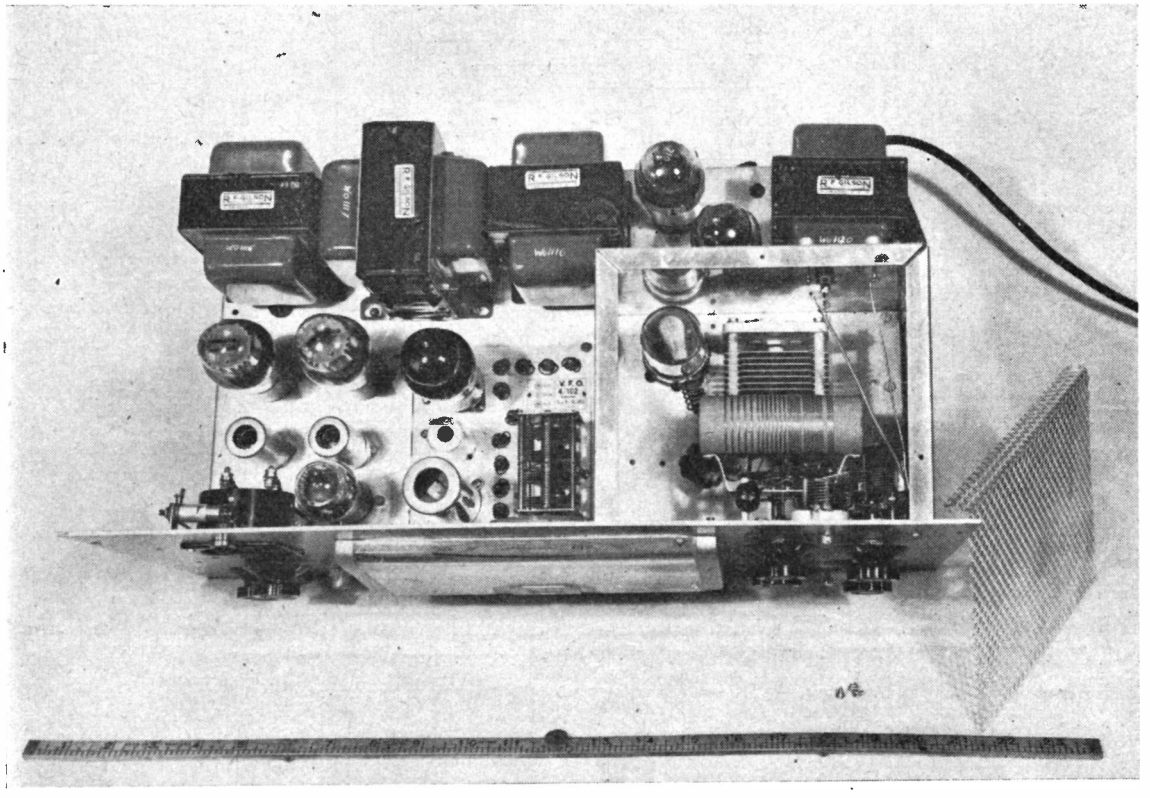
For anyone with some experience of radio construction, assembly can present no particular difficulty. The kit supplied for *Short Wave Magazine* test purposes was handed over, just as it was received, to a junior enthusiast with no previous experience of actual transmitter construction. He was simply told to go ahead with the work as laid down in the instructions supplied with the Kit, and to produce the finished Transmitter as soon as he conveniently could—*without* conducting any power-on tests on his own account.

The result of this exercise is shown in the photographs herewith. And it can be said that after the proper DC and continuity checks had been made, RF was obtained on the 7 mc band as soon as power was applied for the first time.

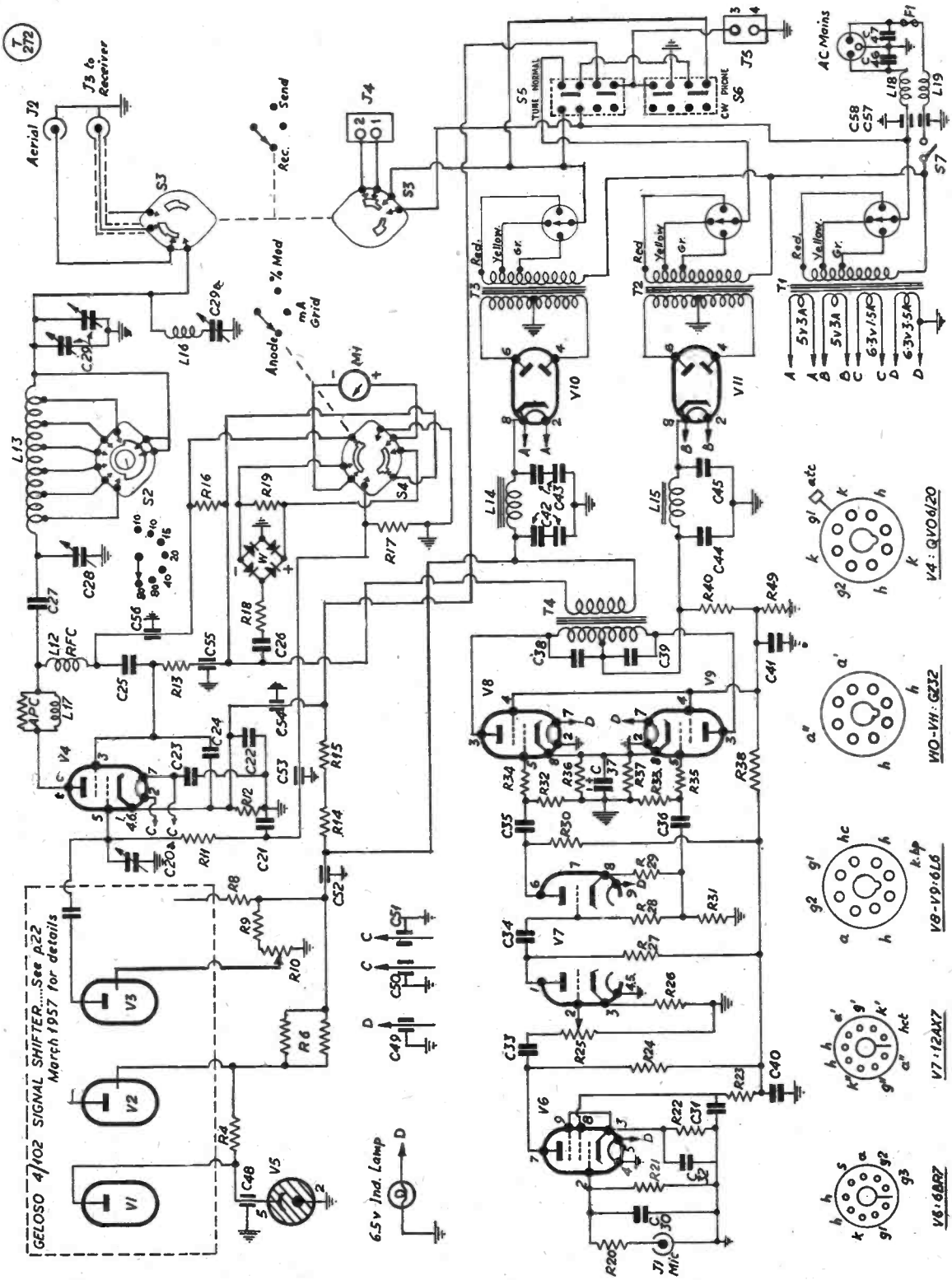
Design of the " Vanguard "

From the circuit, it can be seen that the VFO is a Geloso Type 4/102 Signal Shifter, first described in the March 1957 issue of *Short Wave Magazine*. This drives directly, on all five bands 3.5 to 28 mc, a QVO6-20 (6146) PA, the output side of which consists of the Geloso band-switched pi-section tank assembly, rated for 50 watts.

The VFO is supplied as a pre-fabricated unit, requiring only some slight trimming adjustment to fix the band edges accurately. The 180-degree swing of the VFO pointer gives excellent band-spread; with the outer graduated scale divided into an arbitrary 100 divisions (*not* " degrees," as often incorrectly described), the coverage is ample and the re-setting



Looking down into the completed K.W. Vanguard, showing the PA box on the right ; the output side uses a standard Geloso pi-section band-switched tank assembly, rated at 50 watts. To the left of the PA is the pre-fabricated Geloso VFO, and below the panel meter is the speech amplifier-modulator, running a pair of 6L6's in Class-AB1. The transformers used are all of Gilson manufacture, specially designed for their purpose, that for the heater supply being on the right along the rear edge of the chassis. The rectifiers are next to the left, followed by the separate transformers for modulator and PA HT supply, and on the extreme left the fixed-ratio modulation transformer, T4 in the main circuit diagram. The foot-rule gives a front-panel measurement of 19 inches. In the right foreground is the grille to enclose the PA box, with its fixing screws.


GELOSO 4/102 SIGNAL SHIFTER....See p.22 March 1957 for details
Aerial J2
J3 to Receiver
Send
Rec.
% Mod
mA Grid
Anode
6.5v Ind. Lamp
Mic
5v 3A
6.3v 1.5A
6.3v 3.5A
AC Mains
TUNE NORMAL
CW PHONE
V1
V2
V3
V4
V5
V6
V7
V8
V9
V10
V11
V4 : QV06/20
V8-V11: GZ32
V8-V9: 6L6
V7 : 12AX7
V6: 6BR7

accuracy very good. Further and more detailed information regarding the VFO itself will be found in the March 1957 issue, as mentioned above.

For telephony, the QVO6-20 (which is identical to the American 6146) is plate-and-screen modulated by a pair of 6L6's in Class-AB1. The 6BR7 speech amplifier and 12AX7 driver give ample gain using any usual type of crystal microphone, so that full modulation is possible at maximum carrier level; one toggle switch controls the change-over from phone to CW, and cut-off is complete on keying.

The switching is, in fact, particularly good.

Table of Values

Circuit complete of the K.W. "Vanguard"

C1-C19 = Incorporated in Geloso 4/102
C20 = 100 $\mu\mu$F silver mica, VFO feed
C20a = 15 $\mu\mu$F air-spaced
C21, C23 = .001 μF ceramic
C22 = 3/.001 μF on 6146 cathode points
C24, C25 = .005 μF, silver mica, 1000v.
C26 = .01 μF, 500v.
C27 = .002 μF, silver mica, 1000v.
C28 = 200 $\mu\mu$F, variable
C29 = 2/500 $\mu\mu$F, gang
C29a = 50 $\mu\mu$F, air-spaced
C30 = 100 $\mu\mu$F, ceramic
C31 = 0.1 μF
C32 = 25 μF, 12v. elect.
C33, C34 = 300 $\mu\mu$F, silver mica
C35, C36 = .01 μF
C37 = 25 μF, 25v. elect.
C38, C39 = .005 μF, 800v.
C40, C41 = 8 μF, 450v. elect.
C42, C43 = 2/32 μF, 450v. elect. in series
C44 = 32 μF, 450v. elect.
C45 = 8 μF, 500v. elect.
C46, C47 = .001 μF, silver mica, 500v.
C48-C58 = 500 $\mu\mu$F feed-through ceramic
R1, R2, R3, R7 = Incorporated in Geloso 4/102
R4 = 15,000 ohms, 3/4w.
R5 = 2,200 ohms, 3/4w.
R6 = 7,500 ohms, 5w., or 2/15,000 ohm 2w.
R8 = 3,300 ohms, 2w.
R9, R11 = 22,000 ohms, 2w.
R10 = 30,000 ohms, 3w.
R12 = 33,000 ohms, 1w.
R13 = 27,000 ohms, 2w.
R14, R15 = 68,000 ohms, 1w.
R16 = Meter shunt
R17 = 470 ohms, ½w.
R18 = 27,000 ohms, ½w.
R19 = 100 ohms, ½w.
R20, R30, R31 = 100,000 ohms, ½w.
R21 = 1 megohm, ½w.
R22 = 1,000 ohms, ½w.
R23 = 2.2 megohms, ½w.
R24, R27, R28 = 470,000 ohms, ½w.
R25 = 1 megohm pot'meter
R26 = 4,700 ohms, ½w.
R29 = 2,200 ohms, ½w.
R32, R33 = 220,000 ohms, ½w.
R34, R35 = 47,000 ohms, ½w.
R36, R37 = 470 ohms, 2w., or 250 ohms, 5w.
R38 = 22,000 ohms, 1w.
R39 = 47,000 ohms, 1w.
R40 = 4,700 ohms, 5w.
R41 = 33 ohms, 2w.
T1 = Mains, all LT's
T2 = Mod. HT
T3 = RF HT
T4 = Fixed-ratio mod. xformer
L1-L11 = Incorporated in Geloso 4/102
L12 = RF choke
L13 = Geloso tank coil
L14 = 3 Hy, 200 mA choke
L15 = 3 Hy, 120 mA choke
L16 = Harmonic rejector
L17 = Anti-parasitic choke
L18, L19 = Mains chokes
S1 = Geloso band switch, in 4/102
S2 = PA band-change
S3 = Send-receive switch
S4 = Meter function
S5 = Net-normal switch
S6 = Phone/CW change-over
S7 = Mains on-off
J1 = Mic. socket
J2 = Aerial socket
J3 = Receiver aerial (*see text*)
J4 = Receiver muting
J5 = Key socket
M1 = Meter

Circuit of the K.W. Vanguard is shown up above, and described in the article. The transmitter is designed for CW/phone operation on all bands 80 to 10 metres, with 25-30 watts of RF output. A full kit of parts is supplied to make up the complete assembly shown in the photographs.

One knob, at upper right-hand on the panel (*see* front-view photograph) is for send-receive, controlling transmitter on-off, aerial change-over and the external relay circuit that might be used for muting the receiver. A "tune-normal" toggle switch gives control of the VFO alone for netting. Switching is simplified (and rationalised) by reason of the fact that a separate heater transformer is used, feeding all valves and not associated with the two HT transformers; hence, they can be switched in their primaries, as heaters are on all the time. One transformer runs the RF section of the Transmitter (VFO and PA) and the other the speech amplifier-modulator, each power supply section having its own rectifier.

An interesting feature of the circuit is the modulation-level indicator, contrived by rectifying the audio on the secondary side of the modulation transformer and presenting it in terms of modulation percentage on one scale of the three-range meter; the meter switch selects PA plate current, PA grid drive, or percentage modulation.

It will also be noticed that a mains input filter is provided which, constructionally, is contained in a separate screening box—*see* under-side view photograph. All HT and LT connections feeding into the VFO/PA circuitry are by-passed by 500 $\mu\mu$F feed-through condensers, as indicated by C48-C58 in the circuit diagram.

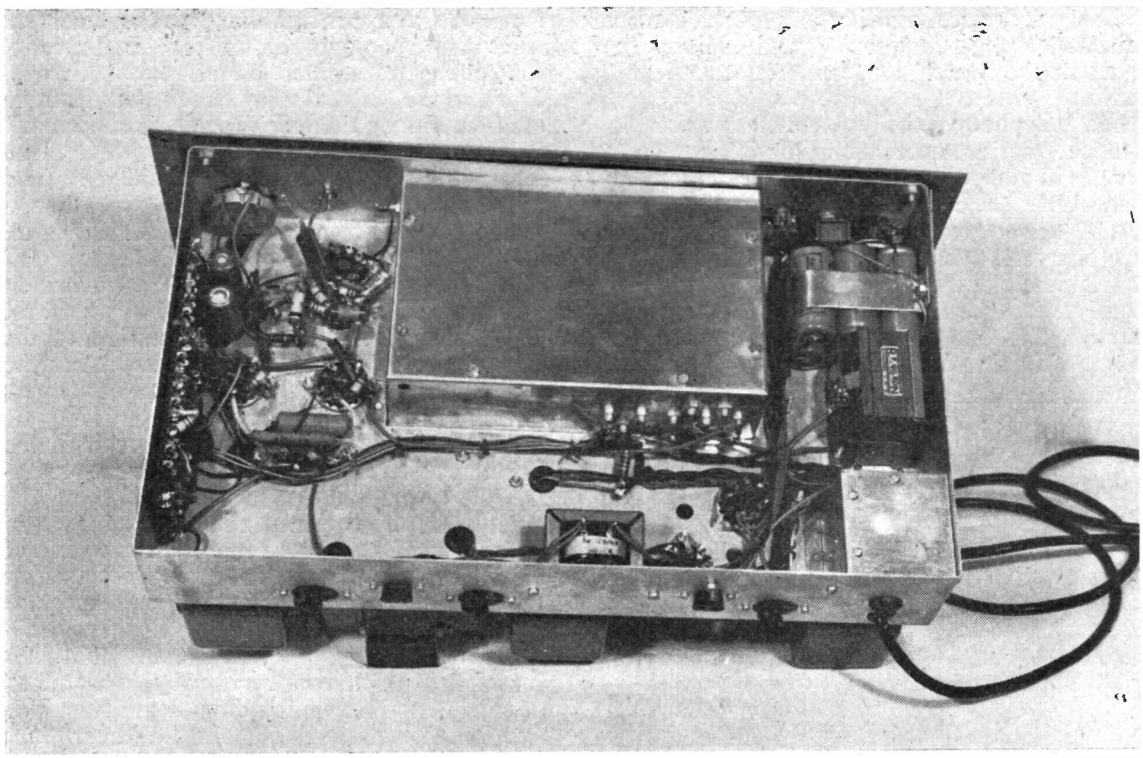
On the PA enclosure, two output coax sockets are provided; one is for the aerial connection and the other for the receiver, so that the send-receive switch throws the aerial from transmitter to receiver.

Finally, as regards the general design, the K.W. Vanguard makes up into a cabinet which is 21½ins. wide, 10½ins. high, by 11½ins. deep overall. The total weight is about 60 lbs. complete, so that the Transmitter is of convenient table-top dimensions and not too heavy to move.

Performance

As may be expected, the Transmitter gives a most satisfactory account of itself on all bands. The keying characteristic is good and, with the crystal microphone shown in one of the photographs, speech quality is always reported as excellent, and entirely hum-free even at local ranges. The quick change-over from CW to phone is particularly useful, and the general arrangement of the switching and the layout of the panel controls make the Transmitter very convenient to operate alongside a receiver.

There is no undue heating anywhere in the



The construction underneath the K.W. Vanguard Transmitter, as wired out from the assembly instructions supplied with the Kit, which is complete down to the last tag-board, and includes ready-drilled panel and chassis. Under the cover of the centre box is the RF section of the Transmitter, including the VFO and the grid side of the PA. The small box at lower right contains the mains filter chokes, and along the rear chassis drop (in foreground) are the voltage selectors for the mains transformers — heater, modulator, RF section — and the key and external relay connectors.

assembly, and even after long runs all the transformers are quite cool.

The electrical and mechanical design is such that, combined with the moderate power used, a good anti-TV performance can be relied upon—though complete freedom from TVI cannot, of course, be guaranteed, in the sense that though the K.W. Vanguard itself should be TVI-proof, a nearby TV receiver with an open front-end may still be subject to shock interference. (However, this would be the fault of the receiver, not the Transmitter, though that would have to be proved to the complainant and the Post Office).

Where the owner wishes to insure himself against all possibilities, the manufacturers have produced a neat low-pass filter which fits *inside* the cabinet, drilled to accommodate it. This filter gives very good attenuation of all unwanted frequencies above about 35 mc. The harmonic trap L16,C29a inside the PA box is designed primarily for use with a low-impedance feed-line of the order 50/100 ohms. With this trap out of circuit, the pi-section tank assembly can be made to match into impedances of from 40 to 2,500 ohms or so, on all bands; this means that, by cutting it out, most types of end-on aerial can be brought to resonance, the tuning procedure then being as for the well-known "Collins coupler." Do *not*, however, try to do this with the harmonic filter connected, and remember that voltage-feed can sometimes produce undesirable effects, such as RF getting back into the speech amplifier.

Top Band Working

We are informed by the manufacturers that they have now devised a simple modification to enable the K.W. Vanguard to be operated on Top Band, thus giving six-band coverage—of course with reduced power on 160 metres. This modification has not yet been applied to the model shown here, but some notes about it will appear in an early issue.

Input/Output Ratings

With a line voltage of 235v. AC applied at the 0-240v. taps of the transformers, a no-load

HT voltage of 490v. was given by the RF section power pack. At 110 mA PA plate current, this voltage dropped to 415v., giving a PA input of about 46 watts. This order of DC input to the PA can be obtained on all five bands.

On an artificial load test, using a properly calibrated set-up for testing, currents up to 0.62 amps could be obtained through 75 ohms. From I^2R, this gives an output of just over 30 watts RF, and is at a maximum on 7 mc.

The paper-work supplied with the Kit includes a sheet headed " Operating and Tuning Procedure." This gives the sort of information which would be familiar enough to the experienced operator, but would need to be very carefully read by a beginner before he attempted to set up a frequency for the first time. It is understood that in due course the manufacturers intend to produce a printed handbook covering design, construction, testing and operation, all in full detail.

Conclusion

For those wanting a moderately - priced built-it-yourself kit for a medium-power self-contained transmitter, capable of all-band operation in both modes, and making up into a very nice-looking piece of equipment, the K.W. Vanguard is the choice. The manufacturers are to be congratulated both on their enterprise and on its product; already, many Vanguards can be heard about the bands, giving a good account of themselves on the air—which, in the end, is what matters more than anything.

The K.W. Vanguard is produced and supplied in complete kit form by K.W. Electronics, Ltd., 136 Birchwood Road, Wilmington, Dartford, Kent, England, and costs £50 8s. 0d. complete, or £31 10s. 0d. less valves, cabinet and Geloso signal shifter; it is understood that all parts needed for the Transmitter are also available separately.

BOOK FOR BEGINNERS

" How to Assemble a Station and Get on the Air "

For those starting to take an interest in Amateur Radio, good references to the subject are essential—in particular, the beginner needs something to start him off on the fundamentals of theory, practice, construction and operation.

Such a reference is the *Novice and Technician Handbook*. Though American in origin and slanted on that view-point, this in no way detracts from the usefulness of the book to the English reader, because the differences between British and U.S.A. radio techniques and nomenclature are quite minor. The notes on the American amateur licensing system can, of course, be ignored; as regards the constructional material, practically all the American parts specified can be substituted by components of British manufacture.

What the *Novice and Technician Handbook* does give the U.K. reader is a thorough practical grounding, in straightforward non-mathematical language, in the basic principles of Amateur Radio—covering the background and *modus operandi* of Amateur Radio itself; the way radio waves are propagated; the use of the various amateur bands; guidance on constructional work, and the tools required; receiver theory simplified, with designs for several practical receiver arrangements; transmitter theory and construction " the easy way "; power supply units; and the basic rules for amateur-band aerial systems, with constructional data for representative types.

All this is discussed in some 150 pages, indexed, with diagrams and illustrations on practically every page. One of the joint authors of this very useful, practical manual on Amateur Radio is W6SAI, who has already been so successful with his handbook on beam aerials.

Novice and Technician Handbook costs 23s. 6d., post free, and is obtainable from stock, of the Publications Dept., Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SATELLITE III FIRED

At 1548 GMT on January 31, the Americans launched " 1958 Alpha " from Cape Canaveral, Florida, the orbit taken up by the satellite being equatorial and approximately between the latitudes of 35°N. and 35°S. " 1958 Alpha " was fired by a three-stage rocket, and is quite different from the spheroids used by the Russians. The American satellite is 80 ins. long by 6 ins. in diameter, weighs 30 lbs., and carries two transmitters, one on 108 mc, and the other on 108.3 mc. The speed of " 1958 Alpha " is given as 19,000 m.p.h., the shape of the orbit being such that its distance from the earth varies between 200 and 2,000 miles. The circuit time is stated to be about 105 mins. Unfortunately, " 1958 Alpha " is well below our horizon at all times and, as far as is known, nothing from it has been heard in the U.K. The U.S.A. tracking network has, however, been getting very good signals, and in due course, no doubt, we shall be seeing in *QST* reports of the results obtained by American amateur observers. The 108 mc frequency is that agreed internationally for the IGY, and it is to be hoped that the next one put up by the Russians (which should be in a much more favourable orbit for U.K. observation) will have 108 mc as one of its transmitting frequencies.

VHF BANDS

A. J. DEVON

Aurora Opening, February 11—
PE1PL on Schedule Again—
Activity Reports and Tables—
Six-Metre Notes and News—

YOUR A.J.D. has to apologise for the non-appearance of this piece last month, for reasons explained on p.631 — except that he is still waiting for that bit of leave! Some at least of our correspondents missed "VHF Bands," but the truth is that, with conditions still in the doldrums, few reports have been received. As always, the regulars have kept at it, and the usual schedules—such as G2HCG/G3FAN, G3ENY and G3JWQ with G8VZ, and G3HBW/G5BD—have been maintained. Generally speaking, conditions have been poor and very little in the way of GDX is mentioned since our last appearance.

Talking of schedules, we are very glad to be able to report that PE1PL, The Hague, resumed regular operation with effect from February 10, and the following is their present programme for two metres:

Daily, with G2NY at 0900; with G6FO at 0915; with G3CZZ at 1035; and with G2HCG at 1315. Times are BST or GMT as in force, and between 1300 and 1315 PE1PL calls CQ for U.K. stations who may want a contact. It should be noted that these schedules are Monday - Friday every week, and on each Saturday except the first of the month, when PE1PL is shut down. On Saturdays, G5WW takes G6FO's turn.

Aurora Opening

By a fortunate chance, the reappearance of PE1PL coincided with the remarkable Aurora manifestation of the night of February 10-11. A warning of this was broadcast by the BBC, and evidently the condition developed very late—probably in the early hours of February 11. Not only did it cut off the HF bands for two days, but the display was seen as far south as the Channel Is. The 11th was PE1PL's second day back, and during his schedule with G2NY that morning, his note (as observed at G6FO) had the characteristic hiss; G2NY and PE1PL worked *via* Aurora with beams north-west and T3; at 0915, when PE1PL called G6FO on the schedule, they likewise QSO'd with beams north-west, and broad spark-type signals. On turning beams to face, east-and-west, notes both ways went T8-9, with just a trace of roughness. Signals were R5 all round, and PE1PL was up to S7 at G6FO.

Later, PE1PL was getting an Aurora-type beat on the TV sound carrier from Dresden; this again was with his beam N/W, the correct heading being a few degrees south of east. That was at 0945; nothing was heard of G3CZZ on the 1035 schedule, but at 1240 PE1PL had an Aurora contact with DJ1XX, headings then being north-*east*; then at about 1300 OZ7IGY was heard at PE1PL with a rough T4 note, but no QSO was possible. When G2HCG came on at 1315, the Aurora reflections had died away, and his contact with PE1PL was normal.

What is interesting about the foregoing is that, so far as is known, it is the first time there has been a proved Aurora opening during a morning period; in this instance, the condition evidently lasted from early morning until about mid-day.

And that is about the only real excitement there has been during the last two months.

The Tabular Matter

Latest positions reported are shown in the Tables, and though all claims made to date are included, there must be a good many more outstanding; these we would be glad to have, in order to keep the record up-to-date.

Here it should be explained, for the information of those who have joined us only recently, that the All-Time and Annual Counties Worked Tables are *not* intended to be in any sense competitive, but a record of achievement. The data go back many years—in fact, right back to when U.K. activity first began on two metres and 70 centimetres. We have complete records of two-metre "First" contacts, and of Countries Worked by upwards of 70 U.K. operators on the 144 mc band.

We can only continue to hold the threads if all interested and active on VHF will keep us up-to-date with their own results.

Gleanings

Conditions were fairly good during the evening of February

TWO METRES

COUNTIES WORKED SINCE SEPTEMBER 1, 1957

Starting Figure, 14

From Home QTH Only

Worked	Station
47	G3KEQ
45	G5MA
43	G3HBW
41	G3GHO
34	G8VZ
32	G2CIW
30	G3JWQ
27	GM3DIQ
25	G3KHA
24	G2AHY
22	G3KQF
17	G3DLU
15	G3CKQ

This Annual Counties Worked Table opened on September 1st, 1957, and will run till August 31st, 1958. 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 worked for them, as soon as 14C have been achieved. Thereafter, the list can be added to as more counties accrue.

TWO METRES

ALL-TIME COUNTIES WORKED LIST

Starting Figure, 14
From Fixed QTH Only

Worked	Station
78	G5YV (787)
73	G6NB
71	G3CCH
70	G6XM
68	G3BW, G3GHO
66	EI2W (286), G3IUD (302), G5BD
65	G5MA
64	G3BLP
63	G2FJR (542)
62	G3KEQ
61	G3HBW
60	G2OI (402), G3DMU
59	G3EHY, G4SA
58	G3FAN (637), G3IOO, G8OU
57	G8SB
56	G3WW (770), G5DS (654)
55	G2HDZ (495), G2HIF, G5BM, GW5MQ
53	G2AJ (519), G4CI, GM3EGW (196)
52	G2NH, G6RH, G6XX, G8VZ, GW2ADZ
50	G3ABA, G3GSE (518)
49	G3HAZ (358)
48	G3FIH, G5ML, G6TA (487)
47	G3DKF, G3JWQ (357), G5WP
46	G2CIW (247), G3LHA, G4HT (476), G5BY, G6YU (205)
45	G2AHP (647)*, G2DVD (362), G2XC, G3BJQ, G5JU
44	G3BK, G8DA
43	G2DDD, G3BA, G3COJ, G3DLU,* G3HWJ, G3KHA (262), G4RO, G5DF
42	G2HOP, G3BNC, G6CI (220)
41	G2CZS (282), G2FQP, G3DO, 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, G3DLU* G3IIT, G3KUH (169), G6CB (312), G8IP
35	G3FZL, G3FYY (235), G3HCU (224)

16, when the glass went relatively high. Though a certain amount of GDX was possible, signals were subject to QSB to an unusual degree. G3KHA (Bristol) was telling G8VZ of some results he was getting with a small super-regen. receiver. G5BM (Cheltenham), a very good signal in the South Midlands, was heard discussing cameras with G3IER, oblivious of the fact that he was swinging from S8 to S3 about 100 miles away.

Worked	Station
34	G3AEP, G3CKQ (162), G8IC
33	G3FUR, G3GFD, G3HHY(125)
32	G3HIL, G8QY, G8VR, GC2FZC
31	G3HXO, G3KPT (108), G3KQF G5RP, GM3DIQ
30	G2AHY, G3FRY, G3GOP (208), G3GSO (160), G3GVF (129), G3IRA, G3KEF (110), G5NF, 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	G3JMA, G3JXN (220), G5SK, G6PJ
24	G3FD, G3FXG, G3FXR, G3JHM
23	G3CWW (260), G3HSD, G4JJ/A G5PY
22	G2DRA, G3AGR (135), G3ASG (150), G3BPM, G5AM, G8NM
21	G2AOL (110), G3DVQ, G3IOE, G3IWJ, G6XY
20	G3EYV
19	G3FEX (118), G3GCX, G5LQ (176)
18	G3DBP, G3JGY, GC2CNC
17	G3EGG
16	G3FRE
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 accrue.

* New QTH

The G3JWQ/G8VZ schedule, over about the same sort of distance, has been maintained daily, but with considerable variations in signal level, mainly following the barometer. A log check at G8VZ shows that Jack made 891 contacts on two metres during the year of 1957, 200 of them being with G3JWQ, without a single failure.

A new station to be worked on Two is G3NR (Bracknell, Berks.), formerly of Kings Langley, and now back again after seven years off the air. G3CKQ (Rugby) writes to put in a claim for the Annual, remarking that *somebody* has to hold up that ladder!

GC2FZC (Guernsey) is a bit cross about the QSL situation; during one of the openings, 'way back, he pushed out 56 cards to G's, in the hope of getting enough returns to qualify for VHFCC; the response was only 18 cards received! This is really not good enough and shows a most regrettable slackness (not to say lack of consideration) on the part of those who, no doubt, were glad enough to get GC2FZC's card—for a new contact, a new county and a new country. As GC2FZC puts it, he has now been forced to adopt the QSL procedure often advocated here: To send a card only on receipt of a QSL; GC2FZC hopes he will live long enough to collect enough for his VHFCC!

G3KPT (West Bromwich) keeps steadily at it from his new QTH there, and has been working round the Midlands stations. G2AHY (Crowthorne, Berks.) says that things have been quiet and slow, much the same being the impression at G2HDR (Stoke Bishop, Bristol); he shows a total of 8S worked (including GW8SU) and 9S heard (amongst them G3HAZ and G3KPT) for the period to February 17. G2HDR repeats, once again the complaint and the plea so often aired in these columns: Phone carriers with barely perceptible modulation, which would be easily workable on CW. And even when the speech is readable, if two buddies are in QSO, they make their call-signs so indistinctly that they cannot be identified. Our SWL's, who listen much more closely

SEVENTY CENTIMETRES

ALL-TIME COUNTIES WORKED

Starting Figure, 4

Worked	Station
29	G2XV
26	GW2ADZ
24	G3HBW
23	G3BKQ, G6NB
19	G3KEQ
18	G3IOO
17	G2CIW
16	G6NF
15	G4RO, G5YV
14	G2HDZ
12	G5BD
10	G2OI, G3IRW
9	G2DDD, G3LHA, G5DS
7	G2HDY, G3JHM
6	G3FAN, G3JMA, G3KHA, G3WW
5	G3FUL, G3IRA, G3IUD, G5ML
4	G3JGY

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

round the two-metre band, tell us exactly the same thing.

G3DLU (Sheffield) is back in the two-metre business again—with a G2IQ converter, just for a change. This instrument also incorporates the Rx suggestions made by G2HCG in his article in the August 1957 issue of SHORT WAVE MAGAZINE. Using a 12AT7 as oscillator in place of the 6J6 originally specified for the G2IQ, oscillation can be obtained with down to 25v. HT, the beat being T9 and the stability very good; in the RF stage, a direct feeder connection is made to the first grid coil, with inductive coupling to the mixer; the "coil former" type of neutralising condenser, as suggested by G2HCG, is also used. The IF is 13 mc, and G3DLU says that sensitivity and stability with this version of the G2IQ are now most satisfactory.

The SWL Clip

Those reporting are SWL's Tomlin (Malvern), Woodhouse (Storrington), Hattemore (Penarth, Glam.), Winters (Melton Mowbray), Day (Sheffield), and Button (Frome, Somerset). Between them they show quite a large number of calls-heard, mainly over 50/100 mile distances, with a fair proportion of CW logged.

For instance, SWL Woodhouse, who has some 120S listed during December 18 to February 17, took 17 of them on CW. Up in Melton Mowbray, however, SWL Winters logged only three stations on CW during Jan. 19-Feb. 17; for the record, they were G3ALC, G6NB and G6XM. He is in touch with G5HB locally, and is co-operating with him in some /P operations.

In an interesting log summary (reliable statistics are always very useful to us), SWL Tomlin, over in Malvern, records 55S heard in Dec. '55; 43S in Dec. '56; and 46S in Dec. '57. What this amounts to, of course, is proof of steady activity by the stalwarts.

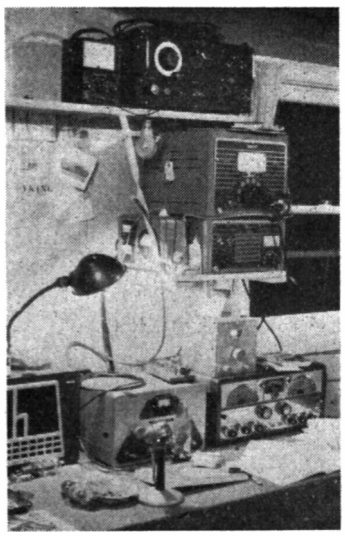
Six Metres

SWL's Hattemore, Button and Day discuss 50 mc reception, the latter finding W/VE stations only, of which he has heard about 200, including W5's and WØ's; SWL Day runs an RF-26 into an Eddystone 358X, with an indoor dipole—which just shows how good the 6-metre band has been!

In a most comprehensive report, covering the period Dec. 22 to Feb. 16, SWL Hattemore not only shows a large number of W's heard, but also the band opening and closing times, and the observed MUF. The earliest opening was about 1400 and the latest closing hour 1800, with Jan. 19 as the very best day in the period. when the MUF went as high as 56 mc—which in five-metre days would have made a Trans-Atlantic contact possible!

EI2W Results

It will be remembered that EI2W is specially licensed for 50 mc transmission, and much of his work has been discussed here from time to time. He has now produced a comprehensive report covering all this activity (up to Jan. 5), from which we see that by that date he had had 206 contacts with 156 different stations in



In "VHF Bands" in the January issue we discussed the two-metre station, shown here, installed by ex-MP4BCA on Ramea Is., off the Newfoundland coast. He has now been allotted VO1EX and listening watch is being maintained for VHF signals from the U.K. whenever Trans-Atlantic conditions seem favourable. Aircraft control signals on 121.5 mc have frequently been received, so it seems hopeful.

all W call areas, including three W6's and seven W7's. Additionally, signals from EI2W were heard by VE7AQQ in British Columbia.

Harry, who has gone into this 6-metre business very thoroughly, is to be congratulated not only on his results, but on the really excellent report he has published covering them.

Scottish VHF Convention

As mentioned on p.635 of the February issue, this is on Saturday, March 15, 2.00 p.m. to midnight, at the Brabloch Hotel, Renfrew Road, Paisley (nr. Renfrew Airport, Glasgow). The convention charge is 21s. inclusive, and overnight accommodation can be arranged for about 25s. by advance booking. All applications for convention tickets and accommodation should be made immediately to: Wm. C. Bradford, GM3DIQ, 6 Langside Park, Kilbarchan, Renfrewshire.

And Finally——

Closing date for April "VHF Bands" is **March 20,** with everything addressed, as usual, to A. J. Devon, at the office. *73.*

An Effective Low-Pass Filter

DESIGN AND CONSTRUCTION

E. H. TROWELL (G2HKU)

The essential factor in the elimination of TVI is to prevent transmitter harmonics reaching the aerial. The low-pass filter described here will give effective attenuation on Channel 1, and a considerable reduction through the whole VHF range. If your transmitter is already completely screened, this filter may be the final answer to your TVI problem.—Editor.

THIS filter is not offered as a certain cure for TVI but it will attenuate the harmonic output of a transmitter by approximately 60 dB at 41.5 mc and continue higher in frequency at 40 dB increasing. It is designed to match into an impedance of 75 ohms with negligible insertion loss and will comfortably handle the output of any amateur transmitter operating into its correct load.

Circuit

The basic circuit is shown in Fig. 1, and consists of two *m*-derived half section terminating filters with a constant-*k* full section interposed. Fig. 2 is the practical circuit, from which it will be seen that the inductances L2 and L3 are combined in one coil whose inductance is the sum of the two. However, due to the stray inductance of the wiring the theoretical values are reduced to those shown. The cut-off frequency *fc* is 33.2 mc and maximum attenuation is at 41.5 mc, with useful attenuation through the VHF region, as indicated by Fig. 3.

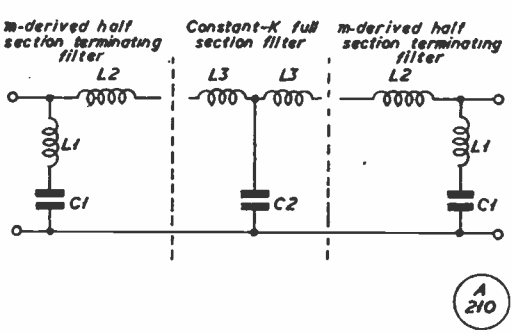


Fig. 1. For this circuit, values would be: C1, 40 $\mu\mu$F; C2, 130 $\mu\mu$F; L1, 0.36 μH; L2, 0.21 μH; and L3, 0.345 μH. Fig. 2 shows the practical expression of this arrangement.

Construction

The filter is built into an Eddystone die-cast aluminium box, as shown in the photograph. Any metal box will, of course, be suitable if of size approximately 4½in. by 3½in. by 2in. deep —but it must be absolutely RF tight. The Eddystone box is practically air tight and is ideal for the job. It should be divided into three compartments by means of two aluminium screens which must be neat fitting and attached with self-tapping screws. The condensers should be mounted so that the moving vanes can be earthed directly and the coils must not be too close to the sides of their compartments or their "Q" will be lowered. The two coils shown in one compartment in Fig. 2 (L4, L5) must be positioned at right angles to each other, as shown in the photograph, in order to avoid unwanted coupling.

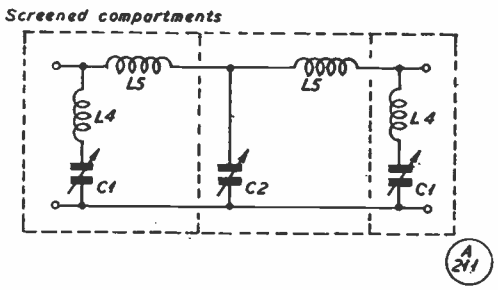


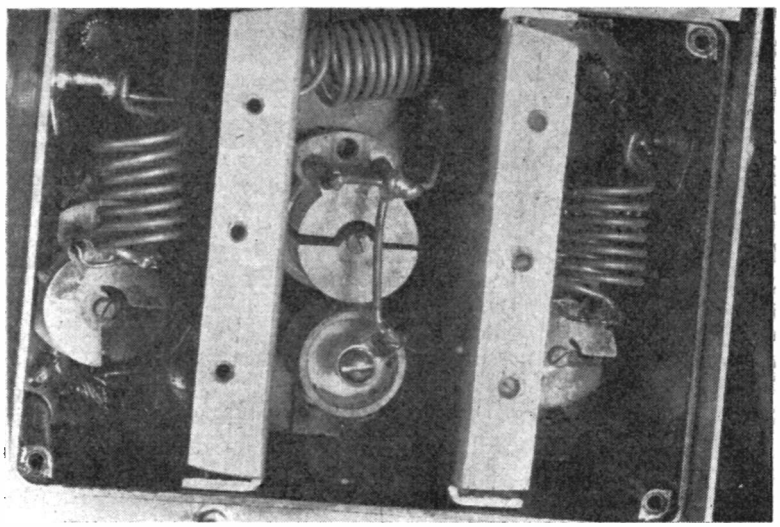
Fig. 2. A practical low-pass filter, as designed by G2HKU. For C1, use a 50 $\mu\mu$F air-spaced variable, pre-set, to get 40 $\mu\mu$F; for C2, a 100 $\mu\mu$F air-spaced pre-set variable, with a 50 $\mu\mu$F ceramic fixed condenser in parallel, to get 130 $\mu\mu$F; L4 is 0.31 μH, which can be 7 turns of 16g. ¼-in. diameter by 1-1/16 in. long; and L5 is 0.50 μH, 9 turns as L4.

The only reason for the use of a pre-set variable and a fixed condenser in parallel with it was that a 150 $\mu\mu$F variable was not obtainable easily for use as C2 owing to the fact that most manufactured condensers were too large in physical size. Actually, C2 need not be variable as the constant-*k* circuit is fairly broad in tuning, but it does help to set the frequency exactly. A means of locking the shafts of the pre-set variables should be provided. Belling-Lee co-ax input and output sockets were used as this manufacturer uses polythene as the insulant, whereas a number of others use plastic or mica which the writer has found to be inferior.

Alignment

The pre-set condensers may be set to their approximate capacity by eye and L4, C1 should resonate at 41.5 mc for maximum rejection. L5, C2 should be adjusted for *minimum* rejection at 33.2 mc. A grid-dip meter was used to align the filter, section

by section, and after alignment the filter should be inserted in the co-ax line between the transmitter and aerial tuning unit and checked for maximum attenuation on a harmonic indicator connected to the co-ax line between the filter and the aerial, as shown in Fig. 4. It must be installed so that *all* the output of the transmitter flows through it; if RF is permitted to flow on the outside of the co-ax then no filter made will be of any use in reducing the harmonics as they will merely by-pass the filter and continue to the aerial tuning unit or the aerial itself.



The low-pass filter as designed and constructed by G2HKU, and described in his article. An Eddystone die-cast box, partitioned as shown, is used and the degree of attenuation to be expected with the device is indicated in Fig. 3. Once adjusted, the variable capacities are sealed with the unit inserted in the transmitter output in the manner shown in Fig. 4.

Once correctly installed C1 should be adjusted for minimum reading on the harmonic

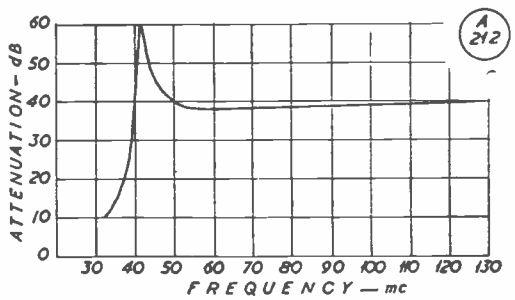


Fig. 3. Approximate theoretical attenuation curve for the design shown in Fig. 2 and the photograph. It has quite a useful cut-off right into the VHF region.

indicator and the transmitter adjusted for full input on 28 mc. If there is any difference in the reading of the transmitter tuning controls with the filter in or out of circuit then C2 should be adjusted for maximum transmitter output, *i.e.*, minimum insertion loss. The harmonic output of the transmitter should be checked at pt. X in Fig. 4 and the reduction in harmonics observed with the harmonic indicator connected as shown, on the aerial side of the filter.

As a further check this filter was inserted in the aerial feeder to a television *receiver* tuned to the BBC Channel 1 frequency. No trace of a signal was seen or heard even with the receiver sensitivity control advanced! This check compared favourably with an expensive commercial low-pass filter and was borne out in practice with the transmitter operating at 60 watts input on 21 mc. Without the filter in circuit in the transmitter aerial feeder the television receiver was blocked on sound and vision. Installing the filter resulted in a clear screen and perfect sound.

After final testing the condenser shafts should be locked as no further adjustment will be required.

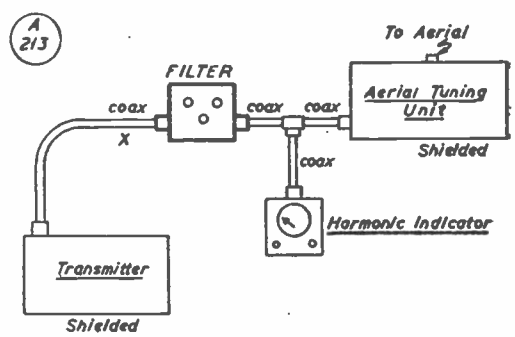


Fig. 4. Connecting the low-pass filter into the transmission line, fully explained in the text. It is necessary to be able to check on the harmonic content in order to adjust the filter correctly.

COURSE FOR THE R.A.E.

We are asked to announce that courses of instruction in Morse and Radio Theory are offered by the Wigan Technical College. The College holds its own licence and operates with the most modern equipment. Those interested should apply to the Head of the Department of Physics, Wigan and District Mining and Technical College, Library Street, Wigan.

Crystal Frequency Shifting Circuit

AND ITS APPLICATION TO FM PHONE WORKING

G. ELLIOTT, B.Sc., A.R.I.C. (G3FMO)

There are several methods by which the frequency of a crystal can be changed. Here is an interesting circuit for doing it electronically, which has the advantages of preserving the original characteristics of the crystal itself, while making it practicable to use FM control on a crystal oscillator.—Editor.

IN some communication bands where crystal control is still commonly used, especially the amateur wavebands around 70 mc, 145 mc, and 430 mc, it sometimes happens that two or more stations may be attempting to work on practically the same frequency, due to a fortuitous choice of crystals. In such cases it is useful to be able to shift the frequency 10 kc or more to avoid interference. Assuming that another crystal is not available the methods by which the frequency may be changed are very limited. At one time some crystal holders were made with an adjustable air gap between the crystal and one of the plates, whereby small adjustments of frequency could be effected, but such construction is no longer in general use and the modern tendency is for hermetically-sealed units. In the ordinary way, it is *not* advisable to attempt to alter the frequency of a crystal by grinding or by plating the surfaces, as these treatments require very precise control to obtain the desired frequency change, and may lead to a loss of activity. In addition, the hermetic sealing has to be broken and the original careful finish and frequency calibration by the manufacturer is permanently lost. The author was faced with this problem, and after consideration of the above arguments, decided that the frequency change must be brought about electronically.

The Frequency Shift Circuit

A number of combinations of the crystal with condensers and inductances were tried. Small changes of frequency could be obtained by shunting the crystal with capacities, but worthwhile changes were not possible without considerable loss of output. Shunting the crystal with an inductance, of such a value as to resonate near the crystal frequency with the self-capacity of the unit, produced quite small changes until the inductance was adjusted nearly to resonance, when most crystals abruptly ceased to oscillate.

Much more success was obtained by placing an inductance in *series* with the crystal. The circuit used is shown in Fig. 1 (basically, the crystal oscillator stage in the author's transmitter) which uses an electron-coupled oscillator on 8 mc, with the anode tuned to 24 mc.

It can be seen that for the inductance L1 to

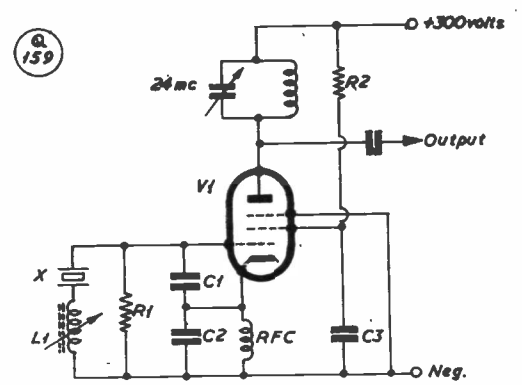


FIGURE 1

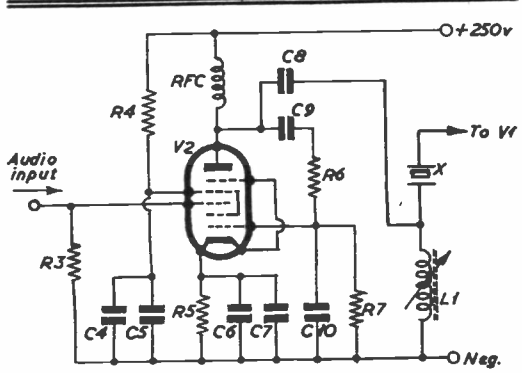


FIGURE 2

Fig. 1 shows the crystal frequency shift circuit suggested by G3FMO; it will give a good move when the frequency is multiplied up, with perfect stability if the process is not taken too far. At Fig. 2 is the application of this circuit to FM phone working; the tank circuit values are as normally obtain.

Table of Values

Figs. 1-2. Circuit for Crystal Oscillator Frequency Shifting

C1, C10 = 10 $\mu\mu$F
C2 = 100 $\mu\mu$F
C3 = .001 μF
C4 = 8 μF
C5, C7 = .01 μF
C6 = 25 μF
C8, C9 = 300 $\mu\mu$F
R1 = 100,000 ohms
R2 = 25,000 ohms
R3, R7 = 470,000 ohms
R4 = 33,000 ohms
R5 = 300 ohms
R6 = 47,000 ohms
L1 = 30 μH max. (*see text*)
RFC = 2.5 mH RF choke
V1 = 6AG7 (Fig. 1)
V2 = 6SA7 (Fig. 2)

resonate near the crystal frequency it must combine with the shunt capacitance of the crystal, in series with C1 and C2 and the valve input capacitance. The crystal shunt capacitance is of the order 20 $\mu\mu$F, C1 is 10 $\mu\mu$F and the valve input capacity is about 10 $\mu\mu$F. C2 has a large value and can be disregarded for approximate calculations. The effective capacitance across L1 is therefore around 10 $\mu\mu$F. A coil with an adjustable iron core, having a maximum inductance of approximately 30 microhenries, is used for L1. As the inductance of L1 is increased from its minimum the oscillation frequency moves to a lower value. The crystal frequency can easily be lowered by 5 kc in this way, good stability being maintained. Measurements with a grid-dip oscillator showed that in the circuit described, L1 was resonant at frequencies between about 8·5 and 9 mc. At the minimum inductance of L1, and resonance at 9 mc, the frequency change was about 2 kc, compared with the original crystal frequency, obtained by shorting out L1. A frequency change of 5 kc was given when L1 was resonant at about 8·5 mc. Larger frequency changes could be obtained by bringing the resonant frequency of L1 closer to that of the crystal, but the oscillations were then less stable and there was a loss of output. At the transmitter operating frequency in the 144 mc band, eighteen times the crystal frequency, the maximum change obtainable was therefore minus 90 kc, adjustable continuously to minus 36 kc, giving ample movement for avoiding interfering signals.

Frequency Stability

Under the conditions described, the stability is nearly as good as that of a simple crystal oscillator. By beating the signal on the 144 mc band against a crystal standard, it was found that the long-term drift was only a few hundred cycles, which is quite satisfactory for most communication purposes. When larger frequency changes are attempted, greater drift results, and when a shift of about 30 kc at the fundamental frequency is produced, the oscillations become very unstable. The frequency can also be adjusted by placing a small variable capacity across the inductance L1 or across the crystal, but again the oscillations are less stable, and under some conditions frequencies *above* that of the crystal can be produced. It is possible that further work on the circuit may show that the controlled frequency may be varied on either side of the crystal frequency with an acceptable degree of stability.

Application to Frequency-Modulation

Some earlier experiments had been carried out to obtain narrow-band frequency-modulation on the 145 mc band with a crystal oscillator. A conventional reactance valve was placed across the crystal and driven from a suitable audio-frequency amplifier. It was found difficult to obtain sufficient deviation in this way, the value obtained being only about 500 cycles at the higher audio frequencies. The crystal frequency-shift circuit provided a means of obtaining a much wider deviation, being sensitive to changes in the series inductance. The reactance valve was simply shunted across the inductance L1, as shown in Fig. 2. The valve behaved as a variable inductance of much larger value than L1, so that the deviation was linear and did not exceed about 15 kc. In practice the audio frequency input is adjusted to give a deviation of no more than 4 to 5 kc, so that only a small band-width is occupied, and the transmission can be received on an ordinary detector circuit by slightly detuning from the centre of the carrier.

Choice of Crystals

All the crystals used in these tests were of the BT-cut, low temperature coefficient type, which is the sort most commonly found in both "surplus" and new supplies. Various frequencies were tested between 5 and 8 mc, all giving satisfactory results. No data are available on X- or Y-cut crystals, but it is possible that these might be found to give greater frequency changes in the circuit described, as they are known to give larger deviations than the BT-cut when modulated directly by a reactance valve.

KILLED BY RADAR BEAM

From G2TA (Bushey Heath, Herts.) we have an extract from the *Industrial Accident Prevention Bulletin* describing how an electronics technician died as the result of exposure to a high-power microwave radar beam. He was in the path of the beam for less than a minute, and felt no more than a sensation of warmth—but the *post-mortem* revealed destruction of the internal organs, which had literally been cooked by the rays.

INDEX TO VOLUME XV

Every copy of this issue should contain, as a free loose supplement, a complete Index to the volume just concluded. Any reader who does not find his Index can have one on application, with a stamped addressed envelope. The Index covers a very wide range of subjects, and we should explain that though new readers may want certain back-numbers, we have, in fact, very few copies left of any issue of Vol. XV.

NAME IN BIG LETTERS

We are notified by the American publishers of the international *Radio Amateur Call Book* that they can now accept—through us. on behalf of G's who may be interested—orders for the insertion of call-sign/addresses in **bold face type**, *i.e.* heavy black print, which makes the entry a great deal more prominent. Normally, of course, there is no charge of any sort for *Call Book* entries, but since these bold face insertions have to be specially done, there is a charge for them of 42s., covering a year of four issues (and you still have to buy your copy of the *Call Book !).* U.K. readers who may wish for this special entry should send us their order, with remittance, addressed QTH Dept. and stating clearly what it is for, with the call-sign and address as intended for publication on a separate slip. The next available issue of the *Call Book* in which such entries can be made is the Summer edition, for which orders must reach us by March 15 at the latest. (A sample of how these bold face entries look can be found in the American section of recent issues.)

NOTE — CIRCUIT CORRECTIONS

In the February issue, there are two slight drawing errors: In the circuit on p.637, the lead from pin 4 of the octal power socket should, of course, go to the strapped screens of V3, V4, and not as shown. And on p.656, Fig 3, the junction of R25, R26 should connect to the junction of C54, R28. We apologise to those who may have been inconvenienced by these slips.

MOBILE RALLY CALENDAR

It is quite evident that Rallying is going to be a feature of Amateur Radio activity during the coming season. The following arrangements are announced for Mobile Rally meetings during the next three months:

Northern Mobile Rally. At Harewood House, Leeds, on Sunday, April 13, during 12.15 - 6.00 p.m. Talk-in stations will be operating on 160-80-2 metres for local routeing, while fixed stations in the district will guide visiting cars into Leeds or Harrogate. Entrance to Harewood House grounds is 1s., with a free car-park, and a private room is being arranged in the cafeteria for those making meal-bookings in advance. The Northern Mobile Rally is being organised by the Spen Valley Amateur Radio Society in association with the Bradford, Leeds and Leeds University Radio Societies. There will be a raffle, a *concours d'elegance,* and Harewood House itself (the residence of H.R.H. The Princess Royal) will be open to visitors. Bookings and applications for car stickers should be made as soon as possible to: N. Pride, Hon. Secretary, Spen Valley Amateur Radio Society, 100 Raikes Lane, Birstall, nr. Leeds.

North Midlands Mobile Rally. To be held at Trentham Gardens, near Stoke-on-Trent, Staffs., on Sunday, April 20, and organised as a "family affair" in addition to the strictly Amateur Radio interest. Good catering and car parking facilities are promised, and the Trentham Gardens attractions include boating, a miniature railway, acres of grounds, and a ballroom. Co-operating Clubs are Midlands Amateur Radio Society, British Amateur Television Club, and Stoke-on-Trent Amateur Radio Society. The site is easily accessible by bus or train as well as by car, and there is ample cover (with spacious rooms and plenty of seating) if the weather should be wet. No advance booking is required, but any further information can be obtained from: T. P. Douglas, G3BA, 141 Russell Road, Four Oaks, Sutton Coldfield, Warwickshire.

Bournemouth Mobile Rally. This is scheduled for Sunday, May 18, organised by the Bournemouth Amateur Radio Society, and full details are to be communicated later. At the moment of writing, the exact *venue* and final arrangements had not been fixed. Information can be obtained from: C. R. Davies, G3JAU, Hon. Secretary, Bournemouth Amateur Radio Society, 107 Talbot Road, Winton, Bournemouth, Hants.

Manchester Mobile Rally. Also to be held on Sunday, May 18, at a location and under arrangements to be notified later, this is being organised jointly by the South Manchester Radio Club and the Stockport Radio Society. Events will include a mobile field-strength contest and a walking D/F competition. Talk-in stations will be in operation, and those intending to be present are asked to get in touch with: C. M. Denny, G6DN, joint hon. secretary, Rally Committee, 18 Willoughby Avenue, Didsbury, Manchester, 20.

SCOUT INTERNATIONAL RADIO EVENT

The outstanding success of the Amateur Radio organisation for the great Scout Jamboree at Sutton Coldfield last year inspired the idea for an annual on-the-air event for Scouts, by Amateur Radio. From L. R. Mitchell, G3BHK, we hear that this Radio Jamboree has been arranged for the week-end May 10 - 11 (midnight Friday - Sunday, local time), and the objective is to encourage phone communication between Scouts holding amateur call-signs — and licensed amateurs interested in the Scout movement— throughout the world. The event is not a scoring contest, and no prizes are offered; international Scout contact only is sought. It is hoped that Scout groups and amateurs locally will make personal contact to establish /A stations from troop or district headquarters, in order that as many as possible may join in the Jamboree. The G.P.O. and the Boy Scouts Association have agreed to these arrangements, and the general call "CQ Jamboree" can be used on all bands. During May 10 - 11, the Scout station GB3BP will be on the air from Gilwell Park. The hon. organiser for the Radio Jamboree is L. R. Mitchell, G3BHK, 965 Oxford Road, Tilehurst-on-Thames, Reading, Berks., to whom all queries and offers of assistance should be addressed.

RADIO AMATEURS' EXAMINATION — MAY

The attention of readers who have not yet completed their applications for taking the May R.A.E. is drawn to the notes which appeared on p.638 of the February issue of SHORT WAVE MAGAZINE. Applications to sit cannot be accepted after the end of this month.

STRANGE CONTACT

SOMETHING A LITTLE DIFFERENT

"FIRST come, first served" was the rule at Ramsden Radio Club as far as the use of the Club transmitter was concerned. On that particular night, by missing my tea at the digs., I had got there ahead of the others, so the 150-watt Tx and 3-element beam were mine for an hour. When you have a brand-new ticket burning a hole in your pocket and are stuck in lodgings with a TV-mad landlady, missing a meal is a small price to pay for an hour's DX!

I switched on the receiver and tuned it to 14 megs; then pressed the transmitter "start" button. Ramsden was a safety-conscious Club and the Tx was relay-controlled and fitted with an interlock system. "G9BF himself couldn't get hurt on this one" was our proud boast. I checked the controls and found that the Tx was on 80. It took only a moment to swop the long wire for the beam and to set the exciter band-switch to 14 mc; then I lifted the 14 meg plate coil out of the rack and opened the door of the PA cage.

I was reaching forward to pull out the 80-metre coil, when suddenly I knew I was not alone; someone was standing behind me. My hand fell to my side, almost as if pulled back by some external force, and I turned towards the door of the shack.

He was standing just inside the door — a little, frail figure with slightly bowed shoulders, wearing a linen jacket and an old-fashioned stiff collar with a knitted tie. The thin, grey hair was carefully brushed and over the left eye there was a small, puckered scar. But it was the eyes themselves that held me. They seemed to radiate peace and a pure "goodness" such as I had never seen before. They looked straight into mine for a moment; then the old face broke into a gentle smile of satisfaction, and suddenly he was gone. I have no recollection of his moving or of the door opening. One moment he was there, the next he wasn't, and that was that . . .

Many seconds later I was still staring at the door, when there was the sound of footsteps in the passage, and it opened to admit Jim Hodges, a famous DX man and one of our oldest members.

"What's up, lad?" he asked, with his slight North Country accent.

With an effort I found my voice. "That chap that just went out — who was he?" I asked.

"Chap that went out?" echoed Jim in a puzzled voice. "I saw nobody."

"But he was here; I saw him," I cried. "I was just starting to change the PA coil, then I felt somebody looking at me. When I turned round he was standing by the door; then he smiled at me and disappeared."

"What was he like?" asked Jim.

"A little old man wearing a stiff collar and a linen jacket. And he had a scar over his left eye."

Jim stared at me for a moment, his eyes slowly widening and the colour draining from his face. Then he dropped into the operating chair with a bump and mopped his brow with a big red handkerchief.

"Linen jacket and a scar!" he murmured. "You say you saw *him* in *here?*"

"Yes, Jim, as plain as I see you; but who *is* he?" I demanded, my curiosity thoroughly aroused.

Jim mopped his forehead again, then sat for a moment nervously ruffling the handkerchief between his big fingers. When he finally spoke it was almost in a whisper.

"Thirty years ago, when I first joined this Club, our best-known member was George Marigold. He was one of the old-timers from the 1,000-metre spark days, and his big interest was the beginners. He taught me my Morse and, in one way or another, he helped most of the two-letter men around here to get on the air. I can see him now, sitting in the corner with his old linen jacket on, helping one of us youngsters with some problem or other. Yes, a real old-timer was George — he got the scar when he was an Army telegraph operator in the Boer War."

Jim paused for a moment and shuddered slightly; then continued: "One club night in November '31 I came in here early, just like I did tonight. We ran the rig off a gas engine and high-voltage DC genny in those days. George was always very careful with the high-voltage stuff and we never really found out what had happened that evening. When I came in he was across the HT bus bars. I stopped the engine and tried artificial respiration, but it was too late — George was dead."

Jim let his head sink and gazed at the floor, lost in his own thoughts. Then, as he raised his eyes, he started and seized my arm with one hand, at the same time pointing towards the Tx indicator lamp panel with the other.

"Look, lad, look!" he said hoarsely.

I looked at the panel and suddenly felt a cold, stabbing finger of fear run down my spine. The "PA HT ON" lamp was glowing its warning red and I realised that after three years of trouble-free operation a broken contactor spring had made a mockery of our much-vaunted safety system. My knees had a queer, wobbly feeling as my mind slowly registered the fact that about one-fifth of a second had stood between me and a painful, twitching dance of death across the 1,500-volt HT supply. If I hadn't felt someone behind me at the crucial moment . . .

Then in my mind's eye I saw again the gentle smile of satisfaction on the face of the old man, and now its meaning was plain. They had let George Marigold come back to help his last beginner.

A.D.T.

THE INSTITUTE OF PHYSICS

We are asked to announce that the firm of Chapman & Hall, the well-known publishers of technical books, of 37 Essex Street, Strand, London, W.C.2, have been appointed publishers of books to the Institute of Physics.

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.

EI4AD, C. B. Kelly, Milford Haven, North Circular Road, Limerick.

GM2CFU, O. McCusker, 29 Easter Drylaw Place, Edinburgh, 4.

G3LWJ, C. F. Way, 8 Cross Park Way, Crownhill, Plymouth, Devon.

G3LWN, R. Q. Clark, 7 Queen's Avenue, Dover, Kent.

G3MAA, E. Pearson, 1 Cowper Avenue, Clitheroe, Lancs.

G3MCO, W. C. Mills, 65 Queen's Road, Chelmsford, Essex.

G3MCQ, A. G. Smith *(ex-DL2XO),* 4 Robinson Rd., Dagenham, Essex.

G3MDB, D. A. Greer, 26 Elmswood Road, Aigburth, Liverpool, 17.

G3MDH, P. A. L. Shoosmith, 31 Fairfield Close, Hythe, nr. Southampton, Hants.

G3MEP, R. D. Luscombe, 51 Tamar Avenue, Shiphay, Torquay, Devon.

G3MEW, G. E. R. Denman, 5 Testcombe Road, Alverstoke, Gosport, Hants.

GM3MEX, A. Cunnane, c/o Sgts. Mess, R.A.F. Station, Kinloss, Forres, Moravshire.

G3MFB, J. G. Whitney, 104 Grand Drive, Raynes Park, London, S.W.20.

G3MFO, P. J. Elliot, 17 Weighton Road, Harrow Weald, Harrow, Middlesex.

G3MFQ, S. A. Kerrison, 30 Belvoir Street, Norwich, Norfolk.

G3MFW, H. G. Woodhouse, 14 Carnsmerry Crescent, St. Austell, Cornwall.

GW3MFY, W. M. Lee, Avondale, Bryntirion Hill, Bridgend, Glam.

G3MGC, R. M. Russell, The Cross, Nailsworth, Stroud, Glos.

G3MGF, S. H. Heaven, 1 Sunnyside, Downend, Horsley, Glos.

G3MGH, P. J. Clegg, 19 The Crescent, Totteridge, High Wycombe, Bucks.

G3MGQ, Dr. T. H. Parkman, 1 Amherst Gardens, Hastings, Sussex.

G3MGR, H. H. Preston, 24 Cromwell Road, Malvern Link, Worcs.

GM3MGT, A. W. Hope, 11 Craigs Road, Corstorphine, Edinburgh, 12. *(Tel.: Corstorphine 2691).*

G3MGX, J. M. Tomlinson, 65 Carlton Avenue, Worksop, Notts.

G3MHA, R. H. Knights, 65 Ravensbourne Road, Bromley, Kent.

G3MHB, Bradford Grammar School Amateur Radio Club, The Grammar School, Bradford 9, Yorkshire.

G3MHD, A. E. Williams, 68 Doods Rd., Reigate, Surrey.

G3MHV, T. G. Langdon, 20 Upper Marsh Road, Warminster, Wilts. *(Tel.: Warminster 3227).*

G3MHW, J. R. R. Baker, 10 Dagnell End Road, Bordesley, Redditch, Worcs.

ZC4FL, D. R. Britten *(ex-G3KFL).* 264 Signals Unit, R.A.F. Station, Ayios, Nikolaos, B.F.P.O. 53.

CHANGE OF ADDRESS

DL2BG, J. H. Edwards, Australian Embassy, Admiralitatstrasse, 46, Hamburg, Germany.

G3AJX, G. Stanton, 30 Lynford Way, Winchester, Hants.

G3ALK, E. J. Holmes, 10 Bedford Road, South Woodford, London, E.18. *(Tel.: WANstead 7836).*

G3BAC, R. A. Bastow, The Four Winds Private Hotel, Victoria Parade, Ramsgate, Kent.

GM3DOD, A. M. Murray, 3 Kirkwall Road, Greenock, Renfrewshire.

G3GDC, T. W. Savage, 10 Thornyville Drive, Oreston, Plymouth, Devon.

G3GJR, H. J. Randall, 3 Boston Grove, Ruislip, Middlesex.

G3HFZ, J. H. G. Yardley, 30 Wheathampstead Road, Harpenden, Herts.

GM3HSF, W. H. Hier, 146 East Clyde Street, Helensburgh, Dunbartonshire.

G3HSU, K. J. Richards, 4 Warfield Court, Weighton Road, Anerley, London, S.E.20.

G3IMV, J. Hunter, 28 Whiteley Crescent, Bletchley, Bucks.

G3ISP, P. Cairns, 10 Rede Avenue, Hebburn, Co. Durham.

G3JDN, P. D. Lucas, 14 Rushetts Road, Woodhatch, Reigate, Surrey.

G3JKG, J. Richardson, 37 Glenholt Road, Crownhill, Plymouth, Devon.

G3JMA, J. M. Appleyard, 46 Ladyshot, Harlow, Essex.

G3JMJ, D. E. Nunn, 37 Eastern Avenue, Reading, Berks. *(Tel.: Reading 62259).*

G3KAY, R. J. Lang, c/o Sgts.' Mess, R.A.F. Station, Yatesbury, nr. Calne, Wilts.

G3KFI, B. K. Stewart, 74 Mendip Crescent, Westcliff, Essex.

G3KTS, T. A. Shaw, 149 Station Street, Burton-on-Trent, Staffs.

G3LDO, P. G. Dodd, 17 Canberra Square, Orford, Warrington, Lancs.

G3MAK, R. Roberts, 3 Clarendon Square, St. Paul's Cray, Orpington, Kent.

G3RB, K. N. Smith, 41 Broomcroft Road, Ossett, Yorkshire.

GW4NZ, S. Roberts, 14 Upper Cimla Road, Neath, Glam.

G4OI, W. J. Vincent, jun., 113 Hampton Lane, Solihull, Warks.

G8SB, H. Boakes, 170 Marsland Road, Sale, Cheshire.

THE MONTH WITH THE CLUBS

By "Club Secretary"

(Deadline for April Issue : MARCH 14)

IN view of the greatly increased number of Club reports this month, we are dispensing with the usual preamble except to remind Secretaries to keep an eye on the *Deadline*, as always featured at the head of these notes.

It is also essential that they realise that the publication date is in the first week of the month *following* this deadline. Thus, it is rather pointless writing to us in time for March 14 and giving notices of meetings occurring on March 17 and 24! The information in your report (catching our March 14 deadline) should concern meetings from April 4 onwards.

And so to this month's Activity Reports :

Wanstead and Woodford are hard at work on their new "Shack" even to the extent of putting in new floorboards! The Wednesday lectures on Radio Theory are very successful, the keenest members being schoolboys who hope to be on the air soon. This club has been completely reorganised and has many interesting projects afoot. New members, whether licensed or not, will always be welcomed.

Wirral meet on March 7 for a talk on Aerials : March 21 is an Open Night. The April meeting dates have been changed to the 11th and 25th. On Friday, April 18, the annual club dinner will be held at the Coach and Horses Inn, Moreton, Wirral. Tickets, 10s. each, from the hon. secretary. Wirral has at present one "mobile member"—G3EGX/M, running 8 watts on Top Band and 80 metres. G2AMV and G3ERB are building mobiles and hope to be active soon.

Brighton, meeting every Tuesday, will have their Tx on the air on March 11, on the occasion of a committee meeting to fix the April and May programme. On March 18 Mr. T. Henley will talk on Getting Started, and on the 25th there will be an NFD Discussion. Morse and Fundamentals Classes are held on all evenings when possible.

Bradford are holding a Display of Members' Gear on March 18 ; on April 1 the event is their AGM. **Bournemouth** meet on March 7 to hear their chairman on "Radio Noises," and they announce that they will be organising a Mobile Rally for May 18—full details later. G3GYK/M is their "mobile member," active on 80 and 160 metres.

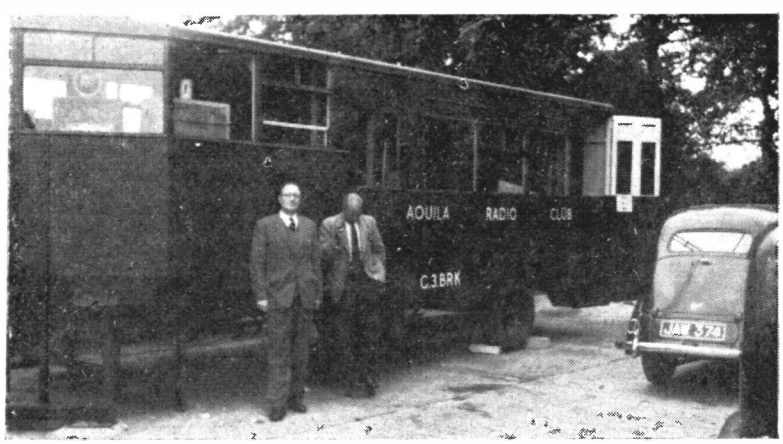
Cornish met at Falmouth on February 5 for a talk by G3AET on the Monimatch Mark II. They also heard a tape lecture on Receivers. The AGM is booked for April 2.

Coventry announce talks on Aerials (G3RF) on March 10, Plastics (G6WH) on March 24, and a constructional evening for April 21. In addition, they gather every Monday, 7.45 p.m., at the clubroom, 9 Queens Road, Coventry.

Derby, one of the oldest active clubs in the U.K., held their AGM and elected officers for the year ; they were able to show a paid-up membership of 101, and a favourable balance of £118! The meeting concluded with an exhibition of members' gear. Weekly meetings continue, at the School of Arts and Crafts, Green Lane, Derby.

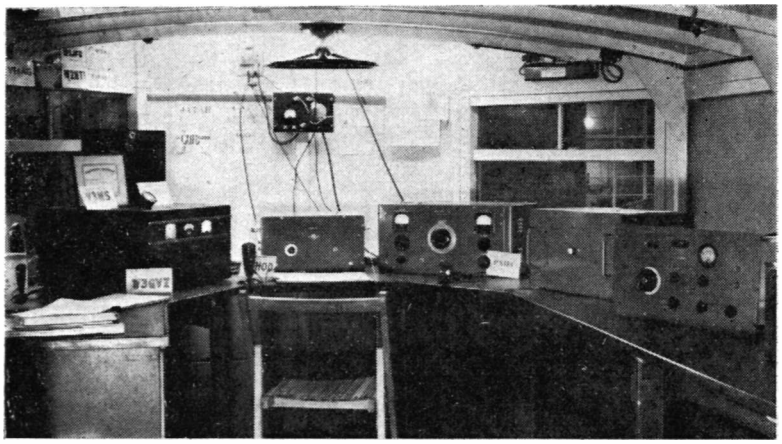
Edgware meet every Wednesday in their new headquarters at the Canons Park Community Centre, Merrion Avenue, Stanmore (adjoining the Bakerloo station). **Gravesend** elected their new season's officers at the recent AGM—*see* panel for new secretary. Club night is every Thursday, 7.30 p.m., at 4 Cobham Street.

Harlow held their annual dinner, which was well attended. New members have been enrolled, and many more would be welcome. This club did very well in last year's contests, and their Mobile Rally was a great success—another will be organised this season.



G3BRK is the station of the Aquila Radio Club, at the Inspectorate of Electrical and Mechanical Engineering, Ministry of Supply, Bromley, Kent. A trailer-caravan, actually a converted 44-seater coach, is completely fitted up with an all-band station, and here we see G3HRO (left) and G3HRC, honorary secretary of Aquila, outside the caravan.

Huddersfield South Methodist Radio Club is a new venture founded by the Rev. A. W. Shepherd, their president. Operating under the call G3LQK, they have a permanent club station working on the Top Band, using a version of the "Top Band Talking Box" as transmitter. The official licensee is G2BMC, with G3ATM, 3ETJ, 3KHU and 3LHY as additional operators. Meetings are held on Mondays, 7.30 p.m., and the local Education Authority is co-operating with an R.A.E. course. Huddersfield South claim to be "the first Church amateur radio club in the world." They would like to hear from all interested in their venture.



Equipment set-up for G3BRK, inside the Aquila Radio Club trailer-caravan. The operating position is located on a raised dais at the front of the coach; the receiver is an AR88, and the transmitter covers the five bands 3.5 to 28 mc. The modulator and PA stages run 807's, and the input is 120 watts, fully TVI-proof on all bands. The aerial installation comprises a Minibeam at 35 ft., a two-metre Skeleton Slot and a multi-band wire. Test gear includes a frequency meter, signal generators covering a wide frequency range, an AF oscillator and all necessary measuring instruments. The Club has ten licensed operators, including G3JKY (ex-VS6DN), with many keen potential amateurs.

Leicester will be holding a Free Night on March 10 and a talk on Multivibrators and Other Circuits, by G3GXZ, on March 17. On the 24th they will hear G6CJ's tape lecture on Aerials, followed by another Free Night on the 31st.

The Radio Amateur **Invalid** and **Bedfast** Club exists for the purpose implied in its title—the helping of disabled and handicapped amateurs. Help of all kinds, from voluntary donations to gear and periodicals, will always be welcomed. Full details from the secretary—*see* panel.

Liverpool report several new call-signs among their members, and recent events up there were the annual Hamfest and the North-West Radio Societies Construction and Operating Contests. **Midland** announce the "North Midland Mobile Rally," to be held at Trentham Gardens on April 20. The club meets on the third Tuesday at the Midland Institute, and at the March meeting G2ATK will be talking about Two-Metre Mobile.

Northampton will be hearing VK3BG's tape lecture on Radio in the Antarctic on March 7, and G8TL's Hints on Mobile Operation on April 4. Very successful Film Shows were given on January 31 and February 28, thanks to G3IAI and his equipment. There are now 22 members, 11 of whom are licensed.

Purley met recently for a lecture on Quality Sound Reproduction, and at the previous meeting devoted their time to some practical work on Transistors, since they hope to be building an audio amplifier shortly. **Wellingborough** are visiting Northampton Power Station on Saturday, March 8, and at their regular meeting on the 13th they will see and hear the Mullard film lecture on the CRT (at Wellingbourough Technical College).

Slade meet on March 14 for a lecture on Modern Trends in Oscilloscope Design, and again on March 28 for two B.T-H. films on Electronics, and Electronics in Industry. Their transmitter, G3JBN, is available every day of the week for members' use at Church House, High Street, Erdington.

West Lancs have now found new premises in the Conservative Club Rooms, Colonsay, Crosby Road, Waterloo, Liverpool 22, and their AGM will have been held there by the time this appears. Following meetings will take place every Tuesday at 8 p.m., when new members and visitors will always be welcome.

Aberdeen report once again after a long silence; they now have a membership of 50, and a club

HASTINGS CLUB'S SPRING TOUR

HASTINGS are breaking new ground this year by embarking on an 800-mile tour of the country, leaving on April 12 and returning by April 19. A convoy of cars and a specially-equipped van will transport both mobile and portable gear; the two mobiles will be G6HH/M (the Club call-sign) and G3FXA/M, while "stroke A" operation will be carried out by G6HH/A, G3BDQ/A, G3FXA/A, G3HRI/A and G3KMP/A.

In brief, the itinerary is as follows:

April 12: **Hastings to Oakham, Rutland, via London.**
April 13: **Oakham, Leicester, Nuneaton, Birmingham, Wolverhampton.**
April 14: **Wolverhampton to Corwen via Shrewsbury.**
April 15: **Corwen to Newtown via Bala and Dolgelley.**
April 16: **Newtown to Presteign.**
April 17: **Presteign to Brecon.**
April 18: **Brecon to Gloucester via Cardiff and Newport.**
April 19: **Gloucester to Hastings.**

Top-Band operation will be maintained in the "rare" counties, including Rutland, Merioneth and Montgomery, and the other bands will also be covered as conditions warrant. As many personal QSO's as possible will be made, and it is hoped to rendezvous with many Clubs through whose territory this Club Convoy will pass, especially in the thickly-populated areas in the Midlands.

Last-minute news will appear in this section of our next issue.

station, GM3BSQ. Available to members is a fully-equipped workshop, and meetings take place every Friday at 7.45 p.m. On March 7 there is a Junk Sale; on the 14th a talk by GM2FHH on The Cascode RF Amplifier; on the 21st the subject is Metalwork for the Radio Amateur; and on the 28th Mr. Sinclair Forbes will talk on Interplanetary Space.

Aldershot meet regularly at The Cannon, Victoria Road, Aldershot, where visitors and new members are always welcome on alternate Wednesdays (no dates given). **Barnsley** recently held their annual dinner and social, organised by G5KM and G3EAE. The president, G2BH, mentioned in his speech that the club is now one of the oldest in the world, having been in existence for 45 years! On March 14 there will be a tape lecture on Receivers, and on the 28th the subject will be Valve Characteristics, and the lecturer G6LZ.

Crystal Palace will be hearing about Power Pack Design and Construction from G3IWA on March 15, and on April 1 there will be another talk in the series supplementary to R.A.E., on RF Amplifiers. Meetings are at Windermere House, Westow Street, S.E.19, at 7.30 p.m.

Edinburgh meet every Wednesday at 7.30 p.m., and on March 12 will be discussing Field Day Preparations. On March 26 Mr. Alex Smith will talk on Making Up a Multimeter, and the AGM is due to be held in April. **Ravensbourne** now meets on alternate Wednesdays at Durham Hill School, 8 p.m., on account of the closing of the radio class at the school.

Torbay will meet for their AGM on April 12 at the YMCA, Torquay. The next regular meeting, at the same place, is on March 8. The February gathering was devoted to a talk on Aerials by G3CMT.

Bailleul have been very active on the air, mostly on 21 mc and the Top Band. G3GIE and G3LEQ are due to arrive there, and ex-member GM3COV recently paid a visit. **Bury** will hear a talk on TVI, by G2BTO, on March 11; on April 8 G2HW will lecture on a subject to be announced later. Both meetings at the George Hotel, Kay Gardens.

Cambridge will hold their AGM on March 21, and from March 24-29 they will be running a stand at the Model Engineering Society's Exhibition, in the University Examination Hall. They will be on the air on most bands, as well as joining in with Pye for a demonstration of Amateur TV.

Cheltenham elected new officers at their AGM—*see* new secretary's QTH in panel. They are organising a series of D-F tests, the winner of which will be awarded the G5BK Memorial Cup. On March 19 members will hear a tape lecture on Receivers, by G2IG. Meetings every Wednesday in the Clubroom (St. Mark's Community Centre) at 8 p.m.

Cray Valley will gather on April 22, 8 p.m., at the Station Hotel, Sidcup, when Mr. C. Burgess will talk on Some Aspects of Directional Aerial Design.

At a recent meeting, **Grafton** were able to hand out no less than seventeen R.A.E. Certificates to their successful candidates. Lectures have covered the "Selectoject" and "Ultrasonics in Industry," with a Junk Sale and Radio Quiz thrown in for good measure. On March 28, G2AIW will conduct VHF Questions and Answers, and the Annual Top-Band Contest will be run on March 22 and 29.

With reference to last month's paragraph, **North-Kent's** hon. secretary points out that their meetings are held on the second and fourth *Thursday* of the month, and not as stated—sorry, OM!

For the **Science Museum** Radio Society, the 1957/8

All Clubs and local groups are invited to use this space for publicity and the reporting of their activities. We sometimes get complaints that "Our Club is never mentioned." The reason always is that no report has been sent in! Reports should be addressed to The Club Secretary, "Short Wave Magazine," 55 Victoria Street, London, S.W.1, and be posted to arrive on or before the date given every month at the head of this article. Reports received late cannot be taken into this feature. Photographs suitable for reproduction are always welcome, and a small fee is paid for those used, immediately on appearance.

NAMES AND ADDRESSES OF CLUB SECRETARIES REPORTING IN THIS ISSUE:

ABERDEEN: A. G. Knight, 6 Blenheim Lane, Aberdeen.
ALDERSHOT: S. E. Hume, 25 Kingsway, Aldershot.
BAILLEUL: B.R.S., Bailleul Camp, Arborfield, Berks.
BARNSLEY: P. Carbutt, G2AFV, 19 Warner Road, Pogmoor, Barnsley.
BOURNEMOUTH: C. R. Davies, G3JAU, 107 Talbot Road, Winton, Bournemouth.
BRADFORD: D. M. Pratt, G3KEP, 27 Woodlands Grove, Cottingley, Bingley.
BRIGHTON: R. Purdy, 37 Bond Street, Brighton 1.
BURY: L. Robinson, 56 Avondale Avenue, Bury.
CAMBRIDGE: F. A. E. Porter, 38 Montague Road, Cambridge.
CHELTENHAM: C. Wallis, G3CWV, 147 Hales Road, Cheltenham.
CORNISH: J. Brown, G3LPB, Waterworks, Penryn, Cornwall.
COVENTRY: N. J. Bond, G3IHX, 12 William Bree Road, Coventry.
CRAY VALLEY: S. W. Coursey, G3JJC, 49 Dulverton Road, London, S.E.9.
CRYSTAL PALACE: G. M. C. Stone, G3FZL, 10 Liphook Crescent, London, S.E.23.
DERBY: F. C. Ward, G2CVV, 5 Uplands Avenue, Littleover, Derby.
EDGWARE: E. W. Taylor, G3GRT, 99 Portland Crescent, Stanmore, Middx.
EDINBURGH: M. Darke, GM3KGK, 44 Howe Street, Edinburgh 3.
GRAFTON: A. W. H. Wennell, G2CJN, 145 Uxendon Hill, Wembley Park, Middx.
GRAVESEND: L. C. Bodycombe, 21 Grives Road, Northfleet, Kent.
HARLOW: A. T. White, The Chestnuts, Fyefield, Ongar, Essex.
HASTINGS: W. E. Thompson, 8 Coventry Road, St. Leonards on Sea.
HUDDERSFIELD SOUTH: Rev. A. W. Shepherd, 11 Station Lane, Berry Brow, Huddersfield.
LEICESTER: P. G. Goadby, G3MCP, 535 Welford Road, Leicester.
LIVERPOOL: W. D. Wardle, G3EWZ, 16 Mendip Road, Liverpool 15.
MIDLAND: C. J. Haycock, G3JDJ, 360 Portland Road, Birmingham 17.
NORTHAMPTON: S. F. Berridge, G3ITW, 20 Ethel Street, Northampton.
NORTH KENT: D. W. Wooderson, G3HKX, 39 Woolwich Road, Bexleyheath, Kent.
PURLEY: E. R. Honeywood, G3GKF, 105 Whytecliffe Road, Purley.
RADIO AMATEUR INVALID AND BEDFAST CLUB: W. Harris, 25 Playford Lane, Rushmere, Ipswich.
RAVENSBOURNE: J. H. F. Wilshaw, 4 Station Road, Bromley, Kent.
SCIENCE MUSEUM (London): G. C. Voller, G3JUL, The Science Museum, London, S.W.7.
SLADE: C. N. Smart, 110 Woolmore Road, Birmingham 23.
TORBAY: G. Western, G3LFL, 118 Salisbury Avenue, Barton, Torquay.
WANSTEAD: K. Smith, G3JIX, 82 Granville Road, Walthamstow, London, E.17.
WELLINGBOROUGH: P. E. B. Butler, 84 Wellingborough Road, Rushden.
WEST LANCS: K. Wright, G3KVE, 24 Stuart Road, Liverpool 20.
WIRRAL: H. V. Young, G3LCI, 9 Eastcroft Road, Wallasey.

session comes to an end on April 15 with a demonstration of amateur TV transmission by the B.A.T.C. This particular meeting will be open to any interested non-members, who are asked to get in touch with the hon. secretary, G3JUL (*KEN 6371, Extn. 237*) for details.

EXHIBITIONS AND MEETINGS

The season for conventions and exhibitions is now upon us, and following are brief details of the London arrangements for the next three months:

On March 12, 7.30 p.m., at University College, Gower Street, W.C.1, Professor A. C. B. Lovell, O.B.E., F.R.S., will lecture to the **Radar and Electronics Association** on "The Jodrell Bank Radio Telescope in Action." Visitors are welcomed and admission is free.

The highly specialised and extremely interesting exhibition of **The Physical Society** takes place during March 24-27 at the Horticultural Halls, Westminster, London, S.W.1. Admission is by ticket only.

Earls Court, London, is booked for March 25-29 for the large **Electrical Engineers' Exhibition,** 10.00 a.m. to 7.00 p.m., and a trade card will give free admission.

During April 14 - 17, the **Radio and Electronic Component Manufacturers' Federation Exhibition** takes place in premises in Park Lane, W.1. Admission is by invitation-ticket only, strictly confined to those directly connected with the radio and electronics industry.

The **I.E.A. (Instruments, Electronics and Automation) Exhibition** is scheduled for April 16-25, at Olympia, London, and is open to the public through the turnstiles. It will be noticed that the I.E.A. and R.E.C.M.F. events overlap by two days, which is convenient for those who, having to travel to London, wish to visit both exhibitions.

Then, for May 19-23, the **Institution of Electrical Engineers,** Savoy Place, London, W.C.2, has arranged an important international convention entirely devoted to the subject of Microwave Valves. Papers will be read by many Commonwealth and overseas scientists, and some 17 countries will be represented at the convention, which will take place at the Institution.

AMERICAN RADIO MAGAZINES

As authorised importers of American technical books and publications, we can accept, in sterling, subscriptions or subscription renewals for Amateur Radio periodicals such as *CQ* and *QST*. The cost of *CQ* is 44s. and of *QST* 36s., for a year of twelve issues. We do *not*, however, carry stocks of either of these periodicals, and cannot supply specimen copies. The time taken to clear a subscription order for any American publication is about three months —and no other agent in the U.K. can do it quicker, because bank exchanges are involved and U.S.A. periodicals normally go to press at least two months ahead of cover date.

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TRADE

G3CGD QSL's. Fixed and mobile samples on request. Printing enquiries welcome.—30 St. Luke's Road, Cheltenham.

CRYSTAL Microphone Inserts with exceptionally high output (Cosmocord Mic. 6), guaranteed newly-made and boxed, 15/6, post free.—Radio Aids, Ltd., 29 Market Street, Watford, Herts.

QSL's and Logs by Minerva. The best there are.—Samples from Minerva Press, 2 New Road, Brentwood, Essex.

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.

QSL CARDS AND LOG BOOKS, G.P.O. APPROVED. CHEAPEST, BEST. PROMPT DELIVERY. SAMPLES. — ATKINSON BROS., PRINTERS, LOOE, CORNWALL.

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VOLUMES 8, 9, *Short Wave Magazine*, bound, 15/- each; two 832A, 12/6 each; 829B and base, 25/-; Universal Avominor, £4; ARC5/R28, three 717A only, circuit, 20/-; BC-455, unmodified, less valves, 12/6; BC-454, converted 28 mc, 35/-. All carriage extra.—Stevens, 51 Pettits Lane, Romford, Essex.

OFFERS: Eddystone 888 or exchange 680X, BRT-400 or *good* general coverage Rx (cash adjustment). Offers: Minimitter Tx, ATU, LP Filter, Mike; RL85, Rx, 85-28 mc, £12 10s. 0d. (London.)—Box No. 1967, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SALE: BC-348, internal power supply, £8; Eddystone Converter, 10 and 15 metres, in Philpotts cabinet, 75/-. — Waddington, 18 Barnwood Road, Earby, Colne, Lancs.

AR88D, spare set valves, W/C switch, and R.C.A. Manual, perfect condition and appearance, £45. Or exchange for Eddystone 750, as new.—J. Zanre, 86 Cardenden Road, Cardenden, Fife, Scotland.

FOR SALE (surplus to requirements): One 832 Valve, guaranteed brand-new, never been used, 15/-; p.p., 1/- extra.—G3HUM, 25 Cheriton High Street, Folkestone. *(Tel.: 75248).*

SMALL ADVERTISEMENTS, READERS—*continued*

LEICA 111B, Summar F2 and ELMAR F3.5 wide-angle E.R.C. Exchange good QRO table-topper. —G4BL, 48 White Street, Derby.

BENDIX TRANSMITTER TA-12G, 160/80/40 metres, with modulator/power supply, control box, new, £10 (o.n.o.). Complete Command Tx rig, two transmitters 80/40, mounting rack, plugs, cables, modulator/power supply, control box, mike, spare modulator, valves, £8 (o.n.o.).—Burrow, 12 Glenmore Avenue, Farnworth, Lancs.

CR100 RECEIVER, £12 10s. 0d.; HRO receiver, built-in power pack, 5 coils, £12 10s. 0d.; brand-new Canadian 52 receiver, 1.75 mc to 16 mc, less xtal checker, £8 10s. 0d. Full details, s.a.e.—G3IDW, 136 Beech Avenue, Swindon. Wilts.

WODEN 1250/0/1250v. 250 mA, tapped 1000/0/1000v., £6; Woden 2.5v., ct., 10A, 35/-; (2) Woden 5/25H, 250 mA, £2; Woden 12H, 250 mA, 50/-; Partridge 30H, 300 mA, 50/-. Little used (not surplus). Parmeko 620/0/620v., 200 mA, tapped simultaneous 550/0/550v., 200 mA, 375/0/375v., 250 mA, 5v. 3A twice, 55/-. Coax relay 78A. 25/-. Labgear Low-Pass Filter, £3. Prefer buyer collect.—G2CNN, The Mount, Studland, Swanage, Dorset.

MOBILE Vibrator supply, 6-12-24v. input, 500v. 200 mA out, 100% spares, £8 15s. 0d. Webster Band-spanner centre-loaded whip, 10-80m, £12 10s. 0d. Ronette Crystal Mike and Stand, £2. Vortexion 2B Tape Recorder, as new, £73 (cost £109). Hammarlund Super-Pro, 540 kc - 40 mc, £29. Mastermobile Bumper Antenna Mount, £3. Woden UM2, 50/-. S.a.e., please.—BM/CVWK, London, W.C.1, or *Museum 9188.*

FOR SALE: AR88LF, £36; Hallicrafter S52, 1956 model, £38; Hallicrafter S380, 1957 model, £20; Marconi CR100/7, with Marconi noise-limiter, new, £18 10s. 0d.; Zenith Transoceanic. 5 S/W Bands + MW, 110/230 AC/DC, and Batt., £25. New: AVO Electronic Multimeter (requires small mechanical repair), £12 10s. 0d.; AVO Valve Tester, meter OK, 35/-; Car Radio, 12v., £4 10s. 0d. Large quantity of Rx's, Tx's, Meters, Transformers, Chokes, etc. Please send for list.—Clappison, 291 Beverley Road, Hull, Yorks.

DISPOSING of station for widow of G3JN. Gear includes:—Transmitters: SCR-522, Q-Max B4/40, 54A, Top Band (complete mod. p/pack). Receivers: BC-348, 1392A, RF 27 2m. Converter. Power Unit 234A, BC-221, etc. Offers? S.a.e. full list.—G3PV, 29 North Road, Berkhamsted, Herts.

SALE: Late CR100/8, clean, unmodified, with quality spares, manual; also mains BC-221, G.E.C. Crystal Calibrator, 1-V-1 Battery Receiver, S-meters. — Box No. 1966, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

G3JDV/A urgently requires accommodation for self only, preferably with facilities for operating own rig, in or near Newhaven.—Write S. Haseler, G3JDV/A, c/o Starhaven Engineering, Ltd., Robinson Road, Newhaven, Sussex.

RF26, 18/-; RF25, 9/-; RF24, 11/-; brand-new, in original cartons. Postage, 3/6.—Jay, 69 Church Road, Moseley, Birmingham, 13.

SMALL ADVERTISEMENTS, READERS—*continued*

WANTED: Collins 75A3 or 75A4 receiver; good price paid. FOR SALE: Morse training records (3-speed L.P.); Beginners or Advanced Course, complete with booklet. Send 45/-; course by return.—G3HSC, 45 Green Lane, Purley, Surrey. *(Uplands 2896.)*

BC-348R, 200 kc to 18 mc, xtal filter, S-meter, Q-Fiver, using six IFT's at 85 kc and xtal controlled mixer, ex-cond., £10; fully-metered P.U., 250v. 180 mA, 6.3v. 10A, 12.6v. 3A. AC 120-150-200-220-240v., 200w.; 50/-. — Jennings, 201a East Lane, North Wembley, Middlesex.

G2NS wants two or more RV2P800 (Roger Victor Two Peter Eight Hundred) valves in good condition.—N. P. Spooner, 7 Foxholes Road, Southbourne, Bournemouth, Hants.

TWO Canadian 58 Transreceivers, complete with batteries, vibrator pack, headphones, mikes, spares, telescopic and sectional aerials, £10 each (o.n.o.).—Gregory, 30 Barnhill Lane, Hayes, Middx.

ARMSTRONG AM/FM 15w. chassis, AF-105, £29 (mint). Goodman's "Sherwood" Cabinet, fitted AX10m.-150 speaker, £20. Would exchange FB Rx, or table-topper.—33 Sherlock Court, N.W.8.

SSB EQUIPMENT: 80m. Exciter, £12 10s. 0d.; 40/20m. Mixer, £9; 15/10m. Mixer, £8 10s. 0d. All aligned and air-tested. S.a.e. for details.—G3AOO, 106 Nasmyth Street, Denton, Manchester.

MODERN SELF-CONTAINED TRANSMITTER, 50 Watts, Phone/CW, Geloso 4/102-6146 PA, P/P 6L6 Modulators, *pi*-output, commercial appearance. Few hours' use only; £65 (o.n.o.). Electronic Keyer, self-contained P/P, £4 10s. 0d. — Box No. 1965, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

FIVE-BAND, 150w., CW/Phone Tx, "5RV" PA and exciter, £48; AR88LF, S-meter, aligned, v.g. condition, £55; B2 Rx/Tx, PSU, coils, in two watertight cases, mint, £15; BC-342, £14; BC-614 Speech Amplifier, £9; AR88 manual, new, £1; AR88 455 kc crystal, 25/-.—G3CTR, 29 Aspinden Road, London, S.E.16.

MUST CLEAR (top quality gear): VFO Unit, *ex*-Panda PR120V Tx, enclosed die-cast case, 6 ins. x 5 ins. x 2½ ins., ready for use, complete with valves, 32/6; D104 xtal mike, with chrome desk stand, 30/-; new mA meters, 3-in. flush round, 0-10, 0-100, 0-200, 0-250, 6/- each; Ferranti 4-in. super quality, as new, as above mA ranges, 9/- each; Johnson vari: tank coil, with panel turns indicator, also Johnson HV condenser, ideal all bands, *pi*-output, 20/- complete; 250-watt modulation transformer, p/p pri., fine for 813, etc., 18/6. Unused valves: 807 (ceramic bases), two, 5/6 each; two 6SN7, one 12AX7, 4/6 each. First 20/- gets rig parcel, all my sundry Tx gear (mostly new), too numerous to mention; genuine gift. Include postage items above.—Tee, 436 Colne Road, Burnley, Lancs.

AR88 RF Unit, complete, together with IFT's, and BFO transformer, crystal, etc., £10. Frequency sub-standard 1 mc - 100 kc - 10 kc, £3 10s. 0d. R.1115, £2 10s. 0d.—Box No. 1973, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SMALL ADVERTISEMENTS, READERS—*continued*

SALE: 120-watt 5-band Elizabethan, separate power each stage, AB2 mod., control panel with indicator lights, switches, and relay control. No TVI. Prefer buyer test/collect. £25 (o.n.o.).—G3LDV, 7 Diana Gardens, Deal, Kent.

TABLE-TOP Transmitter with modulator, mobile transmitter, £15 : Command transmitters, 12/6 ; Command receiver, 25/-; Parallel 807 all-pi PA, professional, 9 gns.; 15-watt modulator, built-in power pack, 9 gns.; mobile genemotors, 35/-; new 12v. vibrators, 7/-; new 3S4, £3. WANTED: UM1. Add carriage, s.a.e.—G3ATL, The Limes, Midland Road, Hugglescote, Leics.

SOUND Tape Recorder, three-speed, one year's guarantee (cost £58), £45 ; Connoisseur-Q, 25-watt hi-fi amplifier, £15 ; 100-watt tapped auto transformer, 250/100v., £2 ; 813, 29/-; 1132A, 100 - 124 mc, perfect, 35/- ; Type 117 wavemeter, 250 kc - 20 mc, calibration chart, six spare valves, £5 ; Mk. III 18 Set Transceiver, 25/- ; RF-27, 12/6 ; RF-26, 12/6 ; S36A manual, £1 ; EB34 (6H6), three for 5/-; Dulci VHF/FM Tuner, mint, £15. Or offers any item. Please add carriage.—Box No. 1968, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

BC-22IT, new and unmodified, complete with calibration book, spare valves, manual and carrying case. Sell or exchange for Eddystone 640, 750 or similar. Cash adjustment either way. WANTED: FL8 Audio Filter, Geloso Rx front end, and signal shifter.—Box No. 1970, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

CANADIAN Marconi Wireless Set No. 52, 1.75 to 16 mc, with built-in power supply and speaker ; output stage modified to 12A6 ; £10. New 813 valve, £3.—Box No. 1971, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

CR100, unmodified, excellent condition, RF-26 unit, Brookes 1.000 kc crystal. S.a.e. for particulars.—R. Crabtree, Lynton, Halifax Road, Nelson, Lancs.

160m. Tx. Ph./CW, £5 ; R1392 (95-150 mc), new, 70/- ; 145 Osc., £1. Valves: 35T, DET25, 811, 809, 8/-.—G3LPY, 20 Bramley Road, N.14. *(BARnet : 3238).*

PANDA CUB, nine months old, original and as new, with AR88D which is externally rough but works well ; £60 the two.—Box No. 1969, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

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