DECEMBER, 1960

RSGB BULLETIN

VOL. 36, No. 6

Hillcourt,
Freshwater East,
Pembroke.

Messrs. Stratton & Co.Ltd.
Alvechurch Road,
Birmingham.31.

Dear Sirs,

Eddystone "888A" Receiver
Serial No.HJ.016½

As a transmitting amateur who has been active for 40 years, and, during that time, has handled many types of receiver, may I congratulate you on your "888A" Amateur Band receiver. The general performance is most excellent and the many good features about the receiver all assist considerably towards reliable communication under often difficult conditions.

The receiver operates well in all modes and I particularly like the audio filter, the use of which makes a fantastic difference with morse signals on a crowded band.

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Yours faithfully,

G. Courtenay Price
GW2OP

This is one of many testimonials amply confirming our recommendation of the EDDYSTONE " 888A." It is designed for amateur use, covering the six bands 1·8 Mc/s to 28 Mc/s each spread over the whole 12 in. long scale; in addition, a logging scale allows reading from 2 kc/s per division on 10 metres to 250 c/s on the top band, the accuracy being ensured by an internal crystal controlled calibration oscillator. Some further features are double superhet circuit, R.F. stage, 12 valves, noise limiter, excellent S.S.B. reception, variable selectivity, aerial trimmer—and a host of other details directed to one aim, to meet the highly specialised needs of the Amateur Radio operator. A full specification comes to you post free on request. The cash price of the " 888A " in its attractive grey hammer finish is £110.

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0 — 1000 V.		

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Volume 36 No. 6
December 1960
2/6 Monthly

R.S.G.B. BULLETIN

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Telephone: FLEet Street 4353

The R.S.G.B. Bulletin is published on or about the 15th of each month as its official Journal by the Radio Society of Great Britain and issued free to members. Closing date for copy is the 22nd of the month preceding publication.

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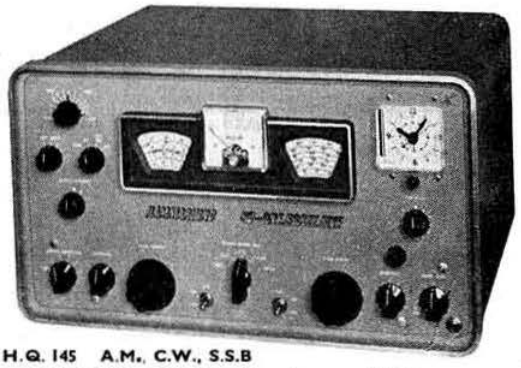

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Current Comment

discusses topics of the day

Intruders

IT is a disturbing thought that intruder operations outside the United Kingdom could jeopardize to a great extent the work done at the Geneva Radio Conference of 1959.

During the period of that Conference a special report on the work done by the R.S.G.B. Intruder Watch, under the leadership of Major D. W. J. Haylock (G3ADZ) was sent to every I.A.R.U. Member Society, whilst at the Conference itself representatives of the amateur movement took the opportunity of bringing the report to the notice of Government delegates, many of whom expressed surprise at the position revealed therein. Since that time the Intruder Watch has submitted further reports to Society Headquarters which have been passed on to the Radio Services Department of the G.P.O.

There is not the slightest doubt that responsible officials of the G.P.O. understand and appreciate the concern with which the Society views operations in the exclusive amateur bands by stations of other services, but there are certain factors that seriously limit the scope of the G.P.O. for action. Unfortunately, these factors tend to come into play in just those cases where the interference is most widespread and continuous and where, therefore, a remedy is most needed.

The most serious factor is that the G.P.O. can take action only on the basis of obligations subsisting between the United Kingdom and foreign administrations. Unless these obligations exist, and are recognized to exist, it would be unreasonable to expect another administration to move a station simply at the behest of the British Post Office. For example, it would be quite unrealistic to press the Government of a country which was not represented at the Atlantic City Radio Conference of 1947 to move a broadcast station from, say, 7054 kc/s, when it is apparent from the published International Telecommunication Union monitoring reports that it has been intentionally placed there. Even so, it is known to the Society that the G.P.O. often make representations in such cases at the technical level, although it is not always easy to assess whether the approach has been successful.

Amateurs generally do not seem to appreciate that the Frequency Allocation Table covering the bands below 27,500 kc/s which was drawn up in Atlantic City nearly 14 years ago has never formally been brought into force, although the countries that signed the Extraordinary Administrative Radio Conference agreement in Geneva in 1951 did, in fact, agree to implement the Table. This rather vague position should be cleared up after May 1, 1961, when the Geneva Frequency Allocation Table comes into force. In the meantime there are a number of intruder cases, particularly in the 14 and 21 Mc/s amateur bands, which the G.P.O. will find great difficulty in raising with the countries concerned.

There is one further point which must be taken into account, namely, the case of those countries which have accepted in general terms the decisions of the Atlantic City Conference and of the Extraordinary Administrative Radio Conference yet have reserved freedom of action in respect of certain frequencies.

Although all of the foregoing factors are important when considering the general question of intruders, it would be wrong to over-emphasize them too strongly. In many cases representations can profitably be made by the G.P.O. when the existence of interference to the amateur stations of the United Kingdom has been established and the stations responsible identified.

Although as a Society we are chiefly concerned with intruders that operate in exclusive amateur bands it is a known fact that other services suffer from out-of-band working to a very large extent. The knowledge that this state of affairs exists is a symptom of the congestion in the high frequency portion of the radio spectrum, a world-wide problem which the Geneva Conference sought to grapple with by the decision to set up a Panel of Experts to examine all frequency allocations between 4 and 27·5 Mc/s. Substantial progress towards clearing intruders from the amateur bands will come about only as a consequence of the measures which are proposed by that Panel and subsequently adopted by the next Radio Conference.

In this issue Major Haylock calls for the assistance of a few more enthusiasts to help him with the Intruder Watch. Here is a real job of work to be done. We commend his call to all those who have the cause of Amateur Radio truly at heart. J. C.

London Meeting
Friday, January 20, 1961

Presidential Address
" Military Communications "

A survey of radio and signals communications methods and problems of the past, present and future.

By Major-General E. S. Cole, C.B., C.B.E. (ex-G2EC),
Director of Telecommunications, War Office

at the

Institution of Electrical Engineers, Savoy Place, Victoria Embankment

Buffet Tea 6 p.m. **Lecture 6.30 p.m.**

R.S.G.B. International Radio Hobbies Exhibition 1960

A Review of some of the Highlights

ATTENDANCE at the fourth R.S.G.B. Radio Hobbies Exhibition, organized by Phil Thorogood (G4KD) on behalf of the Society and held at the Royal Horticultural Society's Old Hall, London, from November 23-26, 1960, was somewhat higher than in 1959. But for the extremely wet weather on the Friday the numbers would undoubtedly have been even higher.

The exhibition was opened by Mr. Brian Rix (G2DQU) the actor-manager, in a typically witty speech before a large crowd which included the Society's President (Mr. W. R. Metcalfe, G3DQ), and a number of distinguished guests, among them Major-General E. S. Cole, C.B., C.B.E., Director of Telecommunications, War Office (President-elect, R.S.G.B.), Vice-Admiral E. R. Buckley, M.I.E.E., M.Brit.I.R.E., Director of Engineering and Electrical Training and Chief Naval Electrical Officer, Admiralty, Air Commodore F. E. Tyndall, Director of Radio, R.A.F., Group Captain A. H. Dormer, Chairman, R.A.F. Amateur Radio Society, Wing Commander H. E. Bennett, M.B.E., G8PF, Electronics Planner of Fighter Command, Lieutenant-Colonel E. W. Milner, T.D., 65th Signal Regiment, Territorial Army, and Mr. H. A. Daniels, Assistant Secretary, Post Office, Radio Services Department.

Home Constructed Gear

Equipment shown on the amateur stands again displayed a very high degree of craftsmanship and ingenuity. The Silver Plaque for the best overall exhibit was awarded, together with a cheque for 10 gns., to E. St. B. Sydenham (G3LOK) for a beautifully constructed heterodyne frequency meter. This is the third time Mr. Sydenham has won a prize in the Home Constructors' Competition; in 1958 his communications receiver (described in the December 1959 issue of the R.S.G.B. BULLETIN and in *A Guide to Amateur Radio*) brought him first prize for members living outside Region 7. Last year he was placed second in the same section.

The best exhibit by a member living outside London was a triple conversion six-band transistorized communications receiver by R. H. Hammans (G2IG) (see *Technical Topics* in this issue). In second place was a neatly constructed s.s.b. exciter by P. Lumb (G3IRM). The best group or club entry was a seven-band transistorized receiver covering 0·65-30 Mc/s built by C. J. Salvage (G3HRO) of Aquila Radio Club.

Another ambitious piece of equipment using transistors was a two-band s.s.b. transmitter for motor-cycle use by G3IVP (12 transistors, six valves and a transistorized power supply). Other transistor gear included a voltmeter (B.R.S.20533), a microphone mixer (G8TL)† and a transistor tester (G3JLH).

In the test gear section G3ONS exhibited a well-made multipurpose tester. This instrument combines the functions of a g.d.o., r.f. signal generator (with or without modulation) covering 440 kc/s to 110 Mc/s, a sensitive absorption wave

The picture at the top of this page shows, left to right, G3HRO's transistor receiver, G3LOK's heterodyne frequency meter and G2IG's communications receiver—all prizewinners. (Photo by Tella Co. Ltd.).

† To be described in a forthcoming BULLETIN article.

meter and a 100 c/s audio oscillator. Other items in this category were a 2-15 Mc/s g.d.o. (G3KMD), a transistorized crystal activity checker (B.R.S.20533), and a band edge and centre marker for 144 Mc/s (B.R.S.20533).*

V.H.F. equipment was displayed on both the **Home Constructors'** and the **U.H.F. Group** stands. On the latter an important exhibit was the microwave receiver developed by G3LRH with the encouragement of the R.S.G.B. Technical Development Sub-Committee. This is the first part of a complete high performance 10,000 Mc/s station and employs a balanced mixer and magic T (both home constructed). The klystron at present in use is a type 723 A/B but this will shortly be replaced by the type 25157 loaned to the Society by E.M.I. The heaters are fed with d.c. and with h.t. by a fully stabilized electronic power supply.

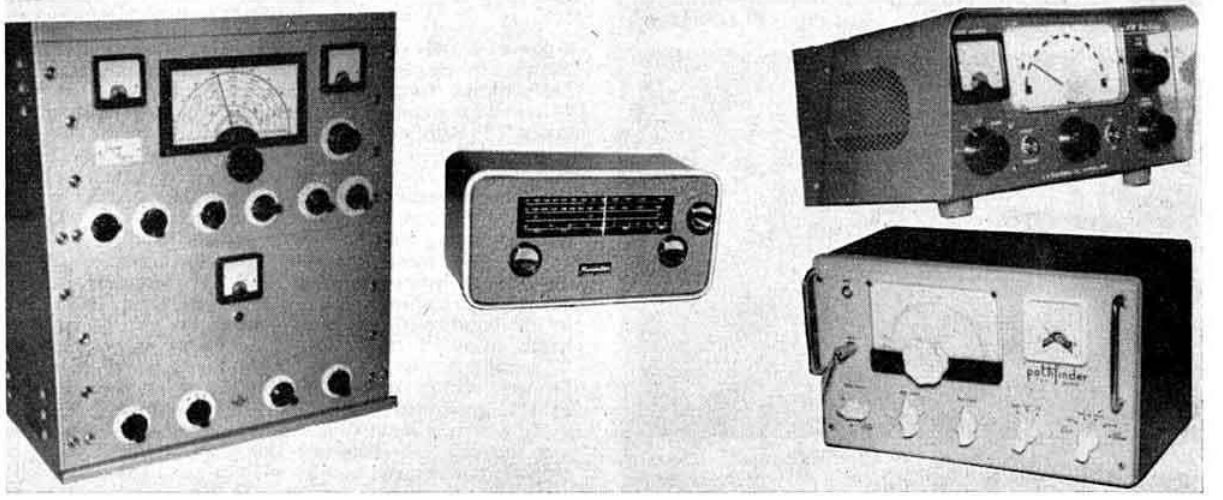
Among the many other v.h.f. and u.h.f. exhibits the following were noted with interest: a transistorized crystal controlled converter using 2N503s in the r.f. and mixer stages and an OC170 oscillator (G3LBA), a 600 watt p.e.p. 144 Mc/s p.a. using VT90 triodes (G3MED), a 4m transistorized converter and a home-made co-axial relay (both by B.R.S.20533). The layout used by G3HWR for his v.h.f. gear was particularly worthy of attention. Each item was mounted on a 19 in. by 1¾ in. panel. The converters (for 2m and 4m) are mounted in the transmitter rack so allowing short r.f. cables. The long cable to the operating position and main receiver is therefore at i.f. The oscillator (which is common to the converters) is external. The 2m exciter and 4m transmitter are electrically identical apart from the inductances. Both employ a VXO (variable crystal oscillator).

V.H.F. equipment on the Home Constructors' stand included a beautifully built packaged 2m station (G3HTC)† a very neat 2m mobile transmitter using a QQV03/20 in the p.a. (G3KMD), a 2m mobile station (G3CBU) comprising a transmitter running 12 watts input to an 832, screen modulated, an eight valve double conversion receiver (first i.f. 3·42-5·42 Mc/s, second i.f. 465 kc/s), 2m transceivers (G3IBI and G3ION), a 2m and 70cm transmitter using an 832 (144 Mc/s) and QQV03/20 (420 Mc/s) on an 8¾ in. rack panel (G3IBI)—a really fine piece of craftmanship, 2m crystal controlled converters (G3JPN and R. Yates), a 2m transmitter-receiver (G3ITH), evidently designed to fit on the parcels tray of a car, and a bandswitched 2m/70cm transmitter using a QQV03/10 (G3KPT)—another fine example of careful workmanship.

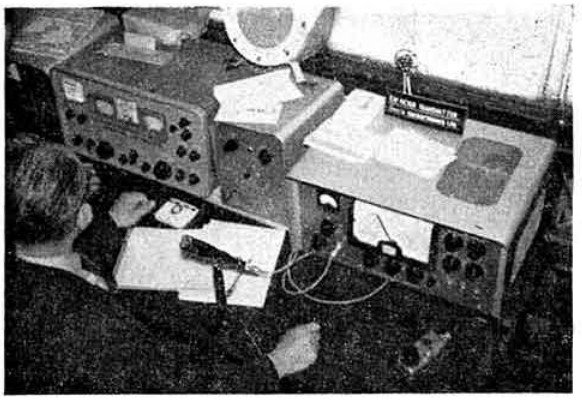
Brian Rix (G2DQU) signing autographs after opening the R.S.G.B. Radio Hobbies Exhibition on November 23, 1960.
(Photo by G2AHL).

Among the notable items for the h.f. bands was a 10-80m exciter (G3NKX), a high stability DX transmitter with mixer type v.f.o. (G3JJG), an all band transmitter in a 3 ft. rack (G3LHM), a TT21 transmitter for 14, 21 and 28 Mc/s (G6JP)† a beginner's Top Band transmitter with series gate modulation (G8TL) and a Top Band fixed or mobile transmitter using a QV03/12 p.a. (G3OBD). A bug key constructed by G3MWO attracted a great deal of interest. Items also on show included an automatic R.A.E.N. call out alarm (G3LOK), a *plate* dip oscillator (G3HBE) and a D/F receiver (G3HKC), the latter another fine example of craftmanship.

On the **Amateur Radio Mobile Society's** stand there was an excellent demonstration arranged by G3KVF to show the efficiency of a transistorized power supply and overload protection and transmitter control methods. Other equipment on the same stand included a 50 watt all-band transmitter (G3ENG), a Top Band mobile rig (G3OGB) and a



Some of the new equipment seen on the commercial stands: the Tiger TR100 transmitter (left), Minimitter TC1 transistorized converter (centre), KW Electronics One-Sixty transmitter (upper right) and Electroniques (Felixstowe) Pathfinder. (Photos by G2AHL).



A view of the h.f. equipment used by the exhibition station, GB3RS. From left to right, KW Viceroy transmitter, Hammarlund HQ170 receiver, Viceroy power supply and KW Victor transmitter. The microphone was a Grampian type DP4 dynamic. At the time this picture was taken, G3ABB was operating.
(Photo by G2AHL).

selection of mobile aerials based on standard electrical fittings.

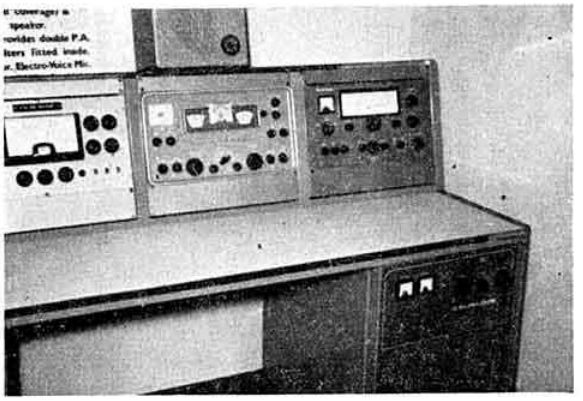
Slow scan television was again the principal exhibit by the **British Amateur Television Club,** the demonstration pictures being reproduced from a tape recorder running at $3\frac{3}{4}$ i.p.s.

GB3RS

During the period of the exhibition GB3RS was in operation on the h.f. bands using a Hammarlund HQ170 receiver and Viceroy and Victor transmitters loaned by K.W. Electronics. The station also operated on 2m using G3LAR's mobile equipment with a BRT400 receiver as the tunable i.f. Two five-element Yagis, one firing north-west, the other west, were selectable from the operating position. QSL cards were provided by Mullard Ltd.

Around the Commercial Stands

A Silver Plaque for the most interesting piece of new equipment for the radio amateur manufactured by a commercial concern was awarded to **K.W. Electronics** for their Viceroy S.S.B. Exciter, a complete unit with built-in power supply suitable for driving a linear amplifier employing such valves as the 807, 6146 or TT21, either singly or in parallel. Basically, the design and external appearance is similar to the Viceroy s.s.b. transmitter introduced at the 1959 exhibition.



The model station arranged by KW Electronics. The equipment, installed in an Imhof console, comprised a Victor transmitter, Hammarlund HQ170 receiver, Viceroy s.s.b. transmitter and (in the right hand pedestal section) a KW500 linear amplifier and power supplies.
(Photo by G2AHL).

Grid block keying is provided for c.w. transmission and a.m. is possible by re-inserting the carrier. The output is 8 watts p.e.p. Another new item for the s.s.b. operator was the KW500 Linear Amplifier using a grounded grid 813 in the p.a. in class AB1. The power supply employs a pair of GXU1 rectifiers. A new transmitter shown for the first time was the K.W. One-Sixty, a small (10 in. × 9 in. × 6 in.) unit for a.m. and break-in c.w. operation, complete with built-in a.c. power supply. Like other K.W. transmitters, including the restyled Vanguard, the One-Sixty is housed in a cabinet of contemporary appearance. Receivers by Hammarlund were an important exhibit on the firm's stand.

A newcomer was **Tiger Radio Ltd.** displaying the TR100 Transmitter which uses a TT21 in the p.a. modulated by KT88s in class AB1. Three linear amplifiers were on show, the 200 watt model (capable of 600-700 watts p.e.p.) employs a QY3/65 valve and covers 10-80m. The power supply uses silicon rectifiers. The 150 watt model (400 watt p.e.p.) uses parallel TT21s. A kit is also available for a linear using a single TT21. Other interesting items exhibited were a prototype phasing type s.s.b. driver for 3·6-29 Mc/s, a standing wave ratio meter for 52-75 ohm co-axial cables and a "talking box"—a completely transistorized speech amplifier in a diecast box with an output suitable for driving

The Heathkit Mohican transistorized communications receiver.
(Photo by courtesy of Daystrom Ltd.)

a pair of KT88s or 807s. Two OC71 and two OC74 transistors are employed. A silicon rectifier produces the necessary d.c. from the 6·3 volt a.c. supply.

Another newcomer, **Electroniques (Felixstowe) Ltd.,** introduced The Pathfinder, a Top Band transmitter for a.m. and c.w. operation supplied complete with an Acos 39/1 crystal microphone. The modulator incorporates speech clipping, volume compression and negative feedback. Also to be seen on this stand were examples of " Stabquoils " and " Quoilpax," including types for use in amateur band receivers.

One of the most interesting new kits displayed on the **Heathkit** (Daystrom) stand was the Mohican general coverage ten transistor receiver covering 550 kc/s to 32 Mc/s in five bands with electrical bandspread for the amateur bands from 3·5 to 28 Mc/s. Selectivity is provided by " Transfilters " which replace the conventional i.f. transformers. Other British kits on the stand included the MM1U multimeter, the OS1U oscilloscope, the RF1U signal generator and two new grid dip oscillators. American kits included the Mohawk communications receiver, a reflected power meter and a transistor radio navigator.

Another firm exhibiting for the first time was **Withers Electronics** who showed their TW2 and TW4 miniature transmitters for 2m and 4m respectively as well as converters for

these bands and a mains power supply and control box. The TW90 2m p.a. unit, also on display, uses a QQV06/40A with a linear tank circuit and EL84 clamp valve.

Making a welcome return to R.S.G.B. Exhibitions were **Webbs' Radio** who showed the National NC60, NC66, NC109 and NC303 receivers and the Eddystone 680X, 770R (v.h.f.), 888A and 840A models, as well as the 870A which now covers 1860 kc/s to 24 Mc/s. Small items included Belling-Lee sub-miniature co-axial connectors, Rendar screened jack plugs and connectors, Bulgin miniature neon indicators and Eddystone capacitors. Audio gear was represented by Quad and Leak amplifiers and Grampian and Lustraphone dynamic microphones.

Equipment displayed for the first time by the **Minimitter Co. Ltd.** included the type TC1 transistor converter for 1·8, 3·5 and 7 Mc/s and general coverage. The new Minibeam Minor for 10m and 15m (forward gain up to 6db) has a boom only 5 ft. long, the maximum element length being 16 ft. 6 in. and is claimed to be no more conspicuous than a TV aerial. The G4ZU " Birdcage " aerial for 20m was also on show and a full-size version was erected on top of the exhibition hall. The MR44/2 receiver, a new 12 valve version of the MR44 shown last year, was also on show. In addition to a restyled cabinet, a better noise limiter operative on a.m., s.s.b. and c.w. has been installed and the a.v.c. system improved to give fast attack/slow release on s.s.b. signals.

An interesting demonstration on the **Avo** stand showed the assembly of the Multiminor movement by skilled workers. New products on display included the MK4 Valve Tester (an improved version of earlier models with a number of important advantages).

Taylor Instruments again featured the Model 127A multimeter and the Model 105 multi-range meter. The 127A has recently been adopted by the General Post Office. New products on show included the Vista range of panel meters, new edgewise meters and the Model 45C Valve Tester which tests 12 volt car radio valves in addition to other types.

Jason Electronic Designs Ltd. showed a wide range of equipment in both ready-built and Jasonkit form. The FMT4 f.m. tuner now has a printed circuit front end and a ratio detector. Test gear displayed included a wobbulator, 3 in. oscilloscope, audio generator and crystal calibrator.

Aveley Electric Ltd. exhibited examples of their d.c. to d.c. transistorized converters and showed a demonstration of the high efficiency obtained. Other items on show included a variety of toroids and toroidal transformers for hi-fi audio use, the German " Ruff " beam rotator complete with compass type indicator and an electrical aerial tuning unit for remote control.

A wide range of Hallicrafters receivers, transmitters and accessories were shown on the **James Scott and Co.** stand. A notable exhibit was the Type HA1 T.O. keyer for high speed c.w. operation. This unit employs four triodes, two voltage regulators, two neons and three semi-conductor diodes. Also on show were the range of co-axial relays and TR switches manufactured by the Dow-Key Co.

Valves and semi-conductors of many types were displayed by **Mullard** together with examples of hi-fi and tape recording amplifiers. Noted amongst the valves were the TD03-10 and TD04-20 disc seal pentodes, the 6080 low-mu power double triode and frame grid valves such as the EF183 and EF184 and the 6AS6 dual control pentode. Transistors included the OC170 and the OC19, a high power germanium *p-n-p* type for use in a.f. amplifiers and d.c. converters.

Semi-conductor devices were also featured on the **A.E.I. (Woolwich)** stand. For use in transistor receivers, packaged supplies are available in which the gain spread is limited. Typical are the RF1, which comprises one PXA102 for mixer/oscillator use, and two PXA102 for i.f. purposes and the LF5 which contains one PXB113 a.f. driver type and one PXC131 push-pull output transistor. New types include the XA701 germanium *p-n-p* alloy high voltage (150 volts) switching type and the XC171, a matched pair of output transistors supplied in a heat sink and capable of 1 watt output.

Enthoven Solders displayed a wide range of solders and fluxes for all purposes and demonstrated the Superspeed low voltage soldering iron.

An electric guitar, available in kit form, was to be seen and heard on the **Jennings Musical Industries** stand. The instrument is unusual in that it can be played without an amplifier if desired.

A solution to the problem of how to support a rotary beam was provided by **Sound Vision Service** who showed their 36 ft. and 45 ft. crank-up masts. It is claimed that, due to the ingenious design, these masts may be erected single-handed. The firm also supplies all the bits and pieces required for home-made masts; for example, a roof apron for use where the mast it fitted through a slate or tiled roof. This useful items is made of welded polythene and is made to the customer's requirements. Other accessories include a rotary mast collar and a rotary head.

Typical Amateur Stations

A special feature showed typical amateur stations arranged by James Scott & Co. (Electronic Engineering) Ltd. using Hallicrafters equipment, Daystrom Ltd. (Heathkit), Minimitter Co. Ltd. and K.W. Electronics Ltd. The latter station was built into an Imhof console costing around £90. Also on show was a typical club station arranged by Southampton R.S.G.B. Group and the equipment used by Stamford Group to win the 1960 N.F.D. event.

Radio Press

The radio press was well represented. **Data Publications** (*Radio Constructor*) featured the tunnel diode and showed a tunnel diode 100 Mc/s transmitter and tunnel diode synchrodyne receiver for 80-100 Mc/s, both loaned by S.T. & C. Other equipment on show included a four transistor a.f. amplifier for use with the synchrodyne receiver and the Cooper-Smith Bantam 3-4 watt audio amplifier.

A wide range of **Iliffe** publications and reprints were shown on the *Wireless World*/*Electronic Technology* stand. Examples of equipment built to designs published in the *Wireless World* were a transistor v.h.f./f.m. receiver and a 100 kc/s crystal marker designed by G3OGR.

The publications of many American publishers were featured by the **Short Wave Magazine** together with the *S.W.M.* Great Circle Map and a display of operating certificates issued by the magazine.

The **British Recording Club** demonstrated electronic music and *musique concrête* and displayed recent issues of *Popular Hi-fi* and *Amateur Tape Recording*. A number of pieces of simple equipment for the audio enthusiast were also on show.

Selray Book Co. introduced the " picture book " training courses now available in British editions of *Basic Electricity*, *Basic Electronics*, *Basic Synchros and Servomechanisms* and *Basic Radar*. These books were originally produced by Van Valkenburgh, Nooger and Neville Inc. for the U.S. Navy and have been adapted to British usage by the Royal Electrical and Mechanical Engineers.

The Services Stands

The Services were again represented by the Royal Naval Reserve, the 65th Signal Regiment, Royal Signals, Territorial Army and by the Royal Air Force through the R.A.F. Amateur Radio Society. All three had one feature in common: teleprinters were shown in operation, the R.A.F. displaying a particularly effective demonstration of the relative speeds of signalling from semaphore to high speed Morse. Equipment on show included the combined transmitter-receiver issued to qualified ratings in the Radio Communications Branch of the R.N.R.

(*Continued on page 287*)

Ground Wave Propagation at 1·8 Mc/s

By F. C. JUDD, A.Inst.E. (G2BCX)*

THE purpose of this article is to explain some of the features of ground wave propagation and discuss the use of vertical transmitting aerials for fixed station and mobile operation on Top Band. Numerous references [1], [2], [3], [4], [6], [7], to propagation and aerial design have been consulted which, in conjunction with field strength measurements and the use of scale models operating at high frequencies, have provided much useful information on the subject. The co-operation of the operators of several mobile and fixed stations is acknowledged.

As an aid to field strength measurement a pen recorder and a magnetic tape recorder were used to obtain a continuous record of changes in signal level and modulation characteristics over various ground contours and at different ranges. Both recorders were automatically operated from a receiver coupled to an inductively loaded vertical aerial 72 ft. high

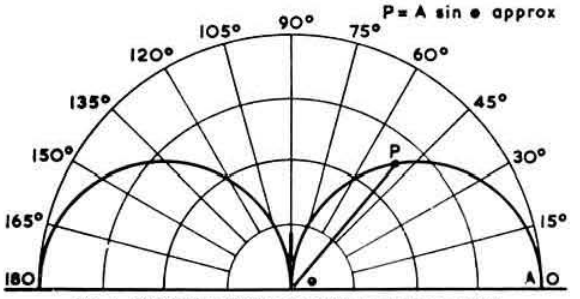


Fig. 1. Vertical radiation pattern for a short aerial.

and tuned to quarter wave resonance in the frequency band 1·8 to 2 Mc/s. The receiver r.f. gain control was calibrated in terms of microvolts at the aerial terminal (70 ohms) without a.v.c.

Propagation from Vertical Aerials

In the frequency band 1·8 to 2 Mc/s a signal at the receiving aerial may originate from: (a) A ground wave; (b) an ionospheric wave (sky wave) reflected from an ionized layer under certain conditions.

When using a vertical aerial, especially for mobile operation, the ground wave is the predominant component and transmitting range is normally set by attenuation or absorption by nearby objects.

Since the radiation of both ground and sky waves are determined by the properties of the transmitting aerial any discussion on propagation must be linked with the characteristics of aerials. Nearly all aerials for mobile operation on 1·8 Mc/s and 3·5 Mc/s for example, consist of vertical rods with inductive and capactive loading and such aerials produce, as any other vertical aerial, a vertically polarized wave. The field strength depends on the radiation pattern, the power input and the electrical characteristics of the aerial.

Assuming the ground to be flat and perfectly conducting and that the current distribution in the aerial is sinusoidal, the radiated power in the vertical plane of a short aerial, i.e. whose height for example is less than $0{\cdot}12\,5\lambda$ is approximately a semi-circle as shown in Fig. 1. As the aerial height is increased the vertical radiation pattern tends to flatten with an increase in energy along the ground and a reduction of energy skywards.

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Calculation of Field Strength

Prior to 1930 the Austin-Cohen formula had been in general use and although having the advantage of simplicity, was found to be inaccurate for predicting field strength at great distance, especially at the higher frequencies. For lower frequencies, however, and with slight modification, the accuracy is sufficient for calculation of field strength for a few miles. For greater distances the Sommerfeld equation produces results that agree much more closely with actual measurements. This has been used to produce the curves of Figs. 2 and 3 which show the rate of attenuation for *ground wave signals* and are based on the characteristics of actual aerials and their measured (or calculated) field strength at 1 kilometre (0·625 miles). The reference signal level of S9 is taken as 55 microvolts at the receiver terminal assuming reception from an aerial equal to that being used for transmitting.

The field strength due to the ground wave signal at a range (d) assuming the earth to be perfectly conducting is given by Sommerfeld as $\Sigma = \frac{E_1 \cdot A}{d}$ (Fig 4)

where E_1 is the field strength at a horizontal distance (d) of 1 kilometre from the aerial. E_1 is usually designated the unattenuated field strength at 1 kilometre.

As sea water has the nearest practical approach to perfect conductivity an attenuation factor A must be provided to take into account the effect of the ground. This attenuation varies with frequency and as the ground wave induces a charge into the ground (which travels with the wave), a flow of current is constituted; thus other important constants are

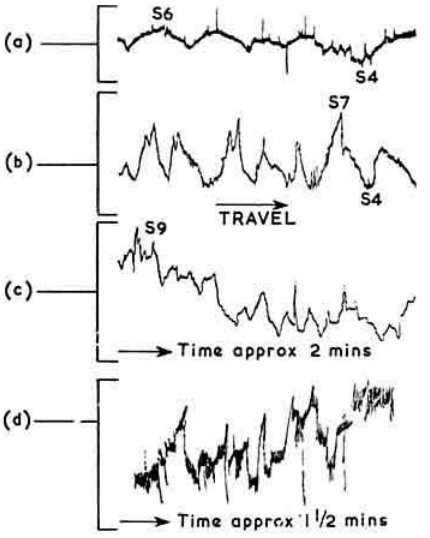

Fig. 2. (a) Recording from the signal of G3HWG/M showing variations whilst travelling along a country lane with considerable undulation. Recording represents a distance of 1½ miles at a range of 14 miles from the receiving station. Increase and decrease in signal corresponds to rise and fall in height of road above sea level. (b) Signals from G3AGP/M travelling under trolley bus wires for a distance of 1½ miles at a range of about 3 miles in a built-up area. (c) Fading on signals from MSF, the frequency standard station at Rugby, over a period of approximate 2 minutes. (d) Noise from rain precipitation during a heavy thunderstorm during a period of 1½ minutes.

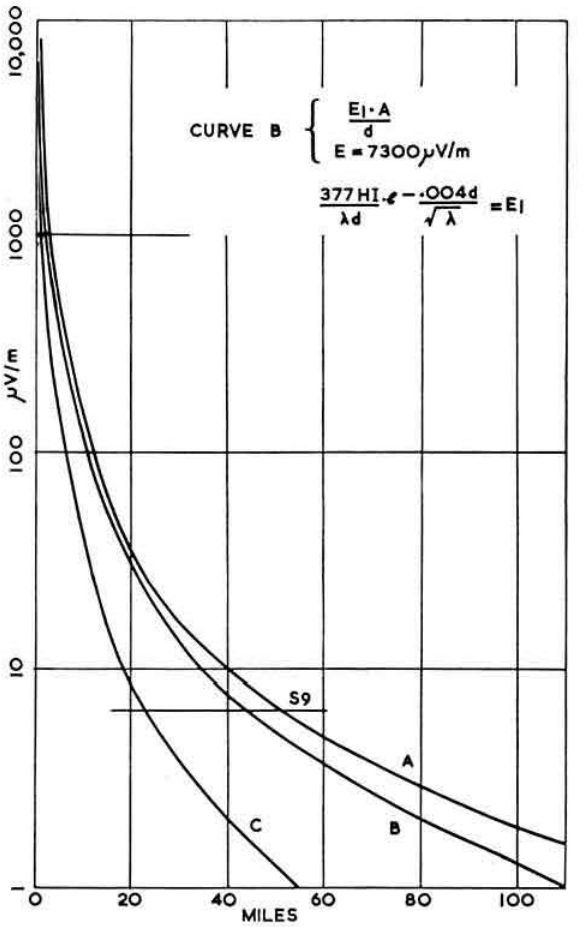

Fig. 3. Sommerfeld curves for (a) a 72 ft. high vertical aerial on 1·8 Mc/s. (b) An average inverted "L" aerial on Top Band. (c) Field to be expected from a poor 132 ft. inverted "L" aerial.

(i) Conductivity σ which governs the loss of energy whilst the charge is moving; (ii) Permitivity ϵ which influences the production of the charge.

Conductivity is usually more important as far as propagation is concerned and is expressed in electro-magnetic units (E.M.U.) the values of which vary with frequency and the nature of the ground down to considerable depth.

To use the Sommerfeld equation for calculating field strength the attenuation factor A must first be derived and the field strength found from $\Sigma = \frac{E_1 \cdot A}{d}$ (Fig. 4)

where Σ is the field strength, A the attenuation factor from the Sommerfeld formula and d distance in metres.

The unattenuated field at 1 kilometre must be either measured or can be approximated from

$$\frac{377\,HI}{\lambda\, d} \cdot e^{-\frac{\cdot 004d}{\sqrt{\lambda}}}$$

where H is the height of the aerial in metres, I the current at the base in amperes, λ the wavelength in metres, d the distance in metres and 377 the impedance of free space (constant).

Field Strength from 1·8 Mc/s Mobile Aerials

The curve A of Fig. 5 shows the field strength to be expected from an average mobile aerial with an approximate height of 14 ft. and is based on a measured E_1 of 110 microvolts at 1 kilometre, and where d = distance in kilometres, σ = average ground conductivity value of 12×10^{-14} E.M.U., c = velocity of propagation of electro-magnetic wave at 3×10^8 metres/second.

Curve B (also based on E_1 as 110 microvolts at 1 kilometre) was produced from the recorded signal of a mobile travelling over ground of average conductivity. The differences in signal level are due to rising ground along the route. The approximate contour of the ground is shown against the curve.

The Pen Recorder

Some details of the pen recording equipment and its operation may be of interest. The instrument is driven from a 24 volt d.c. motor with a speed variation control so that the Teledeltos recording paper will run through at a speed of n feet per second to provide some relationship between the ground covered by a vehicle at an average speed of n miles per hour.

Teledeltos recording paper is marked by applying a voltage which produces an arc between the recording pen point and the metallic undersurface of the paper, thus burning a sharply defined black line as the paper moves along. The pen mechanism has an action similar to that of a moving coil meter with the pen arm traverse at right angles to the direction of the paper. The pen coil operates in a magnetic field of great strength to maintain sensitivity and linearity of the pen movement. With a suitable d.c. amplifier a change in signal level of plus or minus 2 microvolts can be recorded, the amplified signal voltage being rectified and applied directly as a negative voltage to the d.c. amplifier. The sensitivity of the instrument is such that a rapid fadeout due to sudden screening (passing under a bridge, etc.) or a change in signal level of less than 2 microvolts, is faithfully recorded. Some examples of recordings taken from Top Band mobiles in motion and other sources are shown in Fig. 2.

Field Strength from Vertical and Folded Aerials

Probably the most popular aerial used by amateurs for 1·8–2 Mc/s operation is the 132 ft. inverted "L" arrangement which at these frequencies is resonant at quarter wavelength and often used as a harmonic radiator on the higher frequency bands.

In considering an aerial for 1·8 Mc/s operation an average

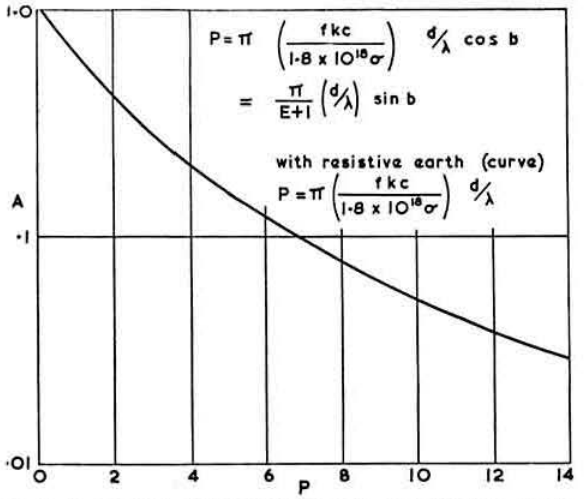

Fig. 4. Sommerfeld attenuation factor A as a function of the numerical distance P for phase constant 0°.

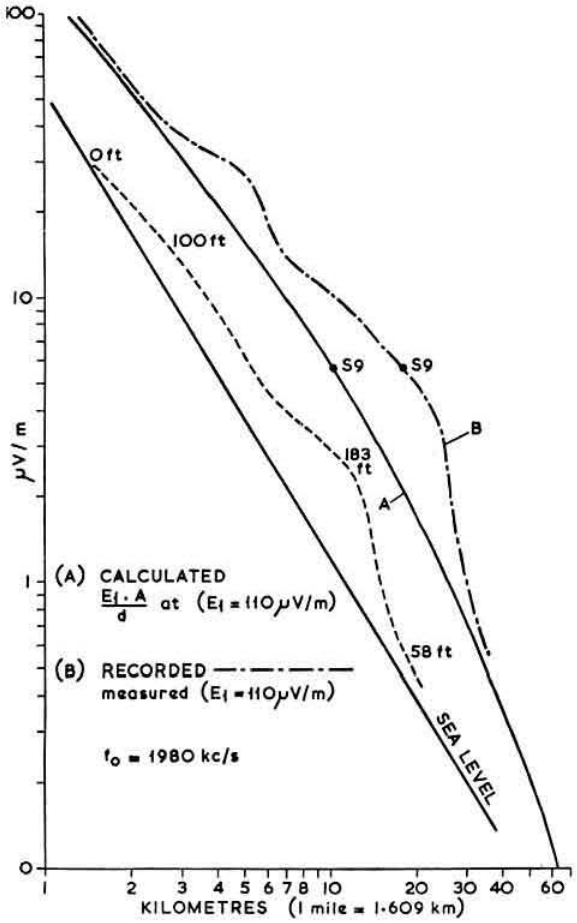

Fig. 5. Sommerfeld curve for a mobile aerial 13·5 ft. high. (a) Calculated. (b) Measured.

physical height of 30–35 ft. will be assumed, leaving 90–100 ft. for the horizontal portion. The effective height will be:

$$\frac{2H}{\pi} \cdot Aff$$

$$(\textit{where } H \textit{ in metres} = \frac{Hft.}{3} \times 0{\cdot}9114)$$

The aerial form factor (Aff) is derived from the ratio of L, the length of the horizontal portion, and l the height of the aerial. For an average height and length the form factor is about 0·98 so the effective height will be of the order of 10m. For a fully vertical radiator the effective height is simply $\frac{2H.}{\pi}$

The Sommerfeld curve of Fig. 3(b) is based on the calculated average field of three 132 ft. inverted aerials each with slightly different values of height and length and with slightly different power inputs. The curve of Fig. 3(a) shows the field from a fully vertical aerial (72 ft. high tuned quarter wave) [8]. Again it must be emphasized that the curves show the rate of attenuation for *ground wave signals only*.

The Efficiency of Vertical and Inverted " L " Aerials

Aerial efficiency can be derived from

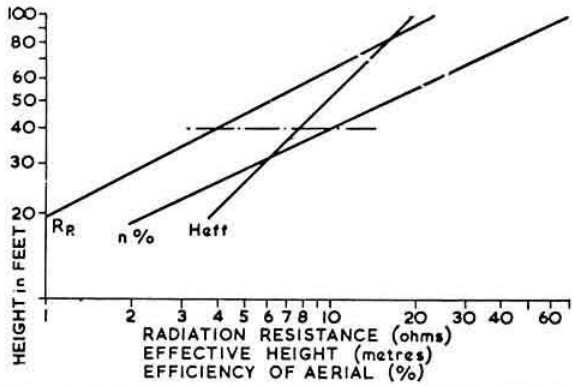

Fig. 6. Radiation resistance v. effective height of vertical aerials from 20 to 100 ft.

$$\frac{\textit{Power Radiated}}{\textit{Power Supplied}} = \frac{R_R}{R_L + R_R.}$$

where R_L denotes loss resistance due to ground and other components and R_R is the radiation resistance. A fully vertical (quarter wave) radiator whose radiation resistance

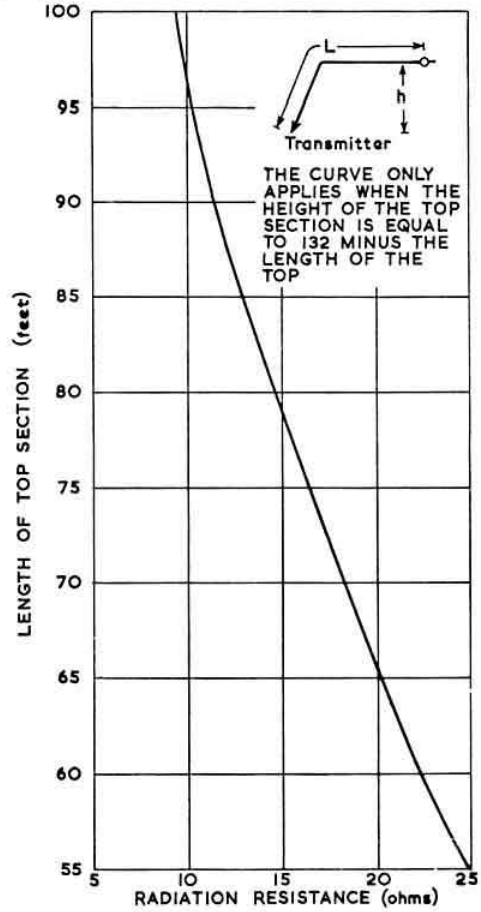

Fig. 7. Radiation resistance of inverted " L " aerials with a total length of 132 ft. (L).

is approximately equal to its base impedance (36–40 ohms) will radiate all the power supplied to it, assuming no other losses, and may be regarded as 100 per cent efficient. By comparison (but including ground loss) an average mobile loaded whip aerial will have an efficiency of around 4 per cent.

The effective total resistance of an aerial is therefore made up of two parts—*radiation resistance* and *loss resistance*, the former useful and the latter wasteful. Loss resistance is due to a number of causes and it is clearly desirable that this " resistance " should be small and the radiation resistance large.

Most of the loss resistance is due to the ground, eddy-currents in nearby conductors, poor insulation and dielectric losses due to nearby trees and buildings, etc. The radiation resistance R_R is proportional to the effective height which, in the case of an all vertical aerial, is considerably less than the physical height. Taking for example, a 30 ft. high radiator, the effective height, when operated on 1·8 Mc/s, will be

$$\frac{2H}{\pi} = 5{\cdot}8 \text{ metres}$$

where H is in metres

$$\left(\frac{Hft \times {\cdot}9114}{3}\right)$$

The radiation resistance R_R is derived from

$$\frac{160\pi^2 \, Heff^2}{\lambda^2} = 2{\cdot}05 \text{ ohms.}$$

The power actually radiated will be due to I^2R_R.

The curves in Fig. 6 show the effective height, radiation resistance and efficiency of verticals up to 132 ft. high. The curve of Fig. 7 is for inverted " L " aerials of 132 ft. total length and shows the radiation resistance for various ratios of height (l) to length of top section (L).

Mobile Aerials

The curve of Fig. 8 shows the effective height *v.* radiation resistance for aerials up to 20 ft. high. Increasing the height by $\sqrt{2}$ will double the radiation resistance and therefore the radiated power. With the mobile type of loaded aerial the position of the loading coil has some effect on the radiated power but because of the complex nature of these aerials it is not easy to allow for the exact impedance at the base. For an average short length resonant aerial the impedance lies between 10 and 15 ohms, so that careful design of the transmitter output circuit is essential if all the power is to be transferred to the aerial.

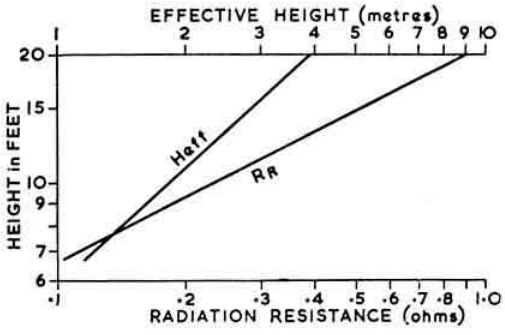

Fig. 8. Radiation resistance v. effective height of vertical aerials from 7 to 20 ft.

A centre loaded aerial will generally radiate more effectively than one with base loading and a theory which may or may not be accepted is that more radiation occurs from the length of aerial under the coil by virtue of the amplitude ($I = Imax \sin \theta$) of the current flowing in that portion, if the current distribution is as shown in Fig. 9. On the other hand,

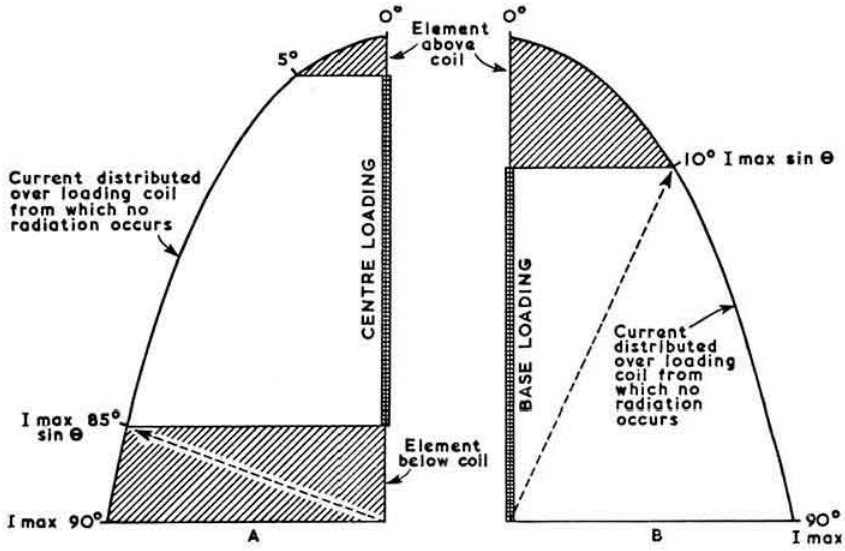

Fig. 9. Current distribution in (a) a centre loaded aerial; (b) a base loaded aerial.

as the current distribution over the actual radiating element is linear, there would be no gain in radiated power providing the radiation resistance and base impedance of a centre loaded aerial remained the same as for a base loaded version. The loading coil contributes very little to the *radiated* power.

Owing to the small height, the efficiency of a mobile aerial is extremely low. An example of this, based on a 13·5 ft. high aerial driven by a transmitter with a 10 watt input, is as follows:

Effective height—2·61m.
Radiation resistance—0·42 ohm.
Power to aerial—6 watts.
Power dissipated in losses—5·68 watts.
Ground and coil resistance loss—10·24 ohm.
Power radiated—235 milli-watts.
Efficiency of aerial—approximately 3·9 per cent.

Practical use of Loaded Vertical Aerials

Flat dwellers in particular are often limited to an aerial draped around the walls or coiled up in a loft; such aerials are generally rather inefficient. Quite a number of operators in this predicament are resorting to the use of short vertical aerials of the loaded resonant type from which greatly increased efficiency may be gained by simply increasing the length of the aerial and modifying the value of loading inductance to bring the system to resonance. Attenuation due to surrounding buildings can be reduced by increasing the height of the whole aerial system above ground. It is possible then to think in terms of an aerial, say 25 ft. high, mounted on a roof where insulated guy wires may be used

for support, or a height of 30 ft. or more where a very short garden may be the only available space. In considering such an aerial the curves of Fig. 6 are useful as they show the effective height, radiation resistance and percentage of efficiency for physical heights up to 132 ft.

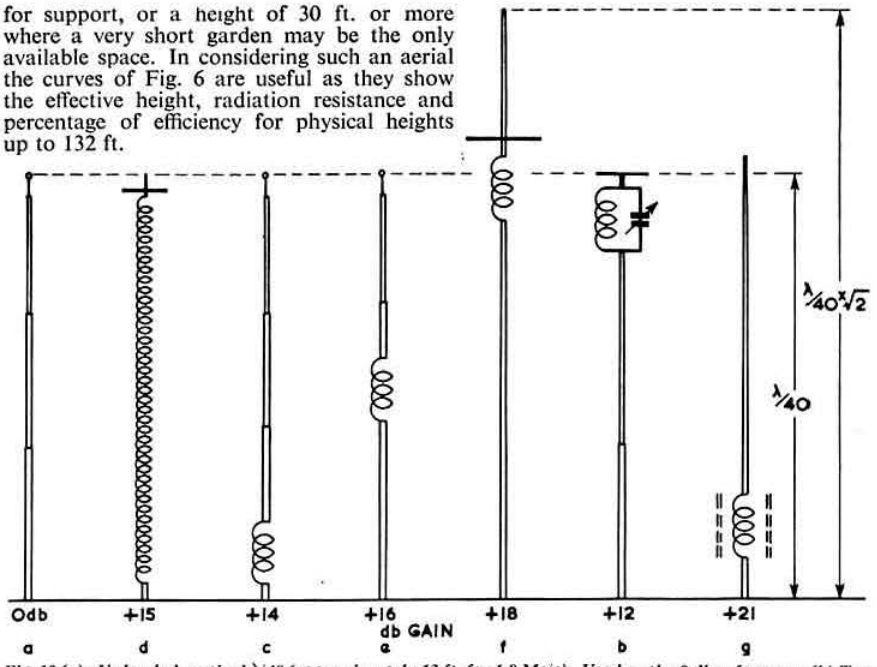

Fig. 10 (a). Unloaded vertical λ/40 (approximately 13 ft. for 1·8 Mc/s). Used as the 0 db reference. (b) Top loaded with a height of λ/40. Small inductance tuned with shunt capacitor and capacity hat (gain 12 db). (c) Base loaded aerial, same height as (b), using high Q coil at base (gain 14 db). (d) Height λ/40. Uses no open elements as the loading inductance is distributed over the length of the aerial. This type of whip is used by some mobile operators and constructed from fibreglass rods with the coil wound the whole length of the rod. A small variable capacity hat could be placed at the top to facilitate tuning (gain 15 db). (e) Centre loaded aerial (λ/40) with high Q coil (gain 16 db). (f) Aerial with height λ/40 increased by √2 and having the loading coil placed at approximately one third of the length from the top. Use of capacity hat reduces coil inductance (gain 18 db). (g) Height λ/40. Using a very high Q coil with a laminated core of special high grade ferrite. Capable of handling up to 400 watts without overloading the ferrite (gain 21 db).

The approximate capacity of the section of aerial above a loading coil can be obtained from

$$Ca = \frac{17L}{\left[\left(Log\ \epsilon\frac{24L}{D}\right)-1\right]\ \left[1-\left(\frac{FL}{246}\right)^2\right]}$$

where Ca is the capacity in pF, F the frequency in Mc/s, L length of aerial in feet, D the diameter of the radiator in inches.

$$Log\ \epsilon\frac{24L}{D} = 2{\cdot}3 \times Log_{10}\frac{24L}{D}$$

Tapping points should be provided every four or five turns at the lower end of the loading coil as other conductors and nearby walls are likely to effect calculated values. Placing the inductance high up the aerial and the use of a capacity hat above the coil will increase the efficiency. The use of combination loading coils for multi-band operation is possible and some details of this application may be found in the reference [5].

The inverted " L " aerial with an average height of 30 ft. has some advantage in sky-wave propagation since radiation from the horizontal portion will be at a high angle to the ground. The ground wave signal, however, will be less than that from a vertical of twice the height.

The following results of tests with six different types of aerials will be of particular interest to mobile operators. All show that radiation is maximum at an angle of about 10 deg. to the ground and probably due to a theory which proves that there is a certain critical angle of incidence for vertically polarized waves after which a change of phase of 180 deg. occurs in the reflected wave. This critical angle, sometimes known as " Brewster's Angle," varies with frequency and earth constants generally becoming greater as the frequency increases and as the conductivity of the earth decreases.

Other tests with respect to radiated power were made using full size aerials of approximately λ/40 at 1·9 Mc/s and scale models of λ/40 at 21 Mc/s. Fig. 10 shows the type of aerials tested where the gain of each aerial is compared with a non-resonant vertical of the same height.

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[3] " Sommerfeld Formula," W. A. Fitch, *Electronics*, September, 1936.

[4] *The Admiralty Handbook of Wireless Telegraphy*, Section R.

[5] *A.R.R.L. Antenna Handbook*.

[6] *Electric Oscillations & Electric Waves*, G. Pierce, McGraw-Hill.

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[8] " Vertical Transmitting Aerials," F. C. Judd, *Short Wave Magazine*, June 1958.

GB2RS SCHEDULE

R.S.G.B. News Bulletins are transmitted on Sundays in accordance with the following schedule:

Frequency	Time	Location of Station
3600 kc/s	9.30 a.m.	South East England
	10 a.m.	Severn Area
	10.30 a.m.	North Midlands
	11 a.m.	North East England
	11.30 a.m.	South West Scotland
	12.00	North East Scotland
145·55 Mc/s	11.15 a.m.	Beaming south-east from Leeds
	11.30 a.m.	Beaming south-west from Leeds
	11.45 a.m.	Beaming north from Leeds
145·3—145·4 Mc/s	12 noon	Beaming north from South East England
	12.15 p.m.	Beaming west from South East England

News items for inclusion in the bulletins should reach Headquarters not later than first post on the Thursday preceding transmission. Reports from Affiliated Societies and from non-affiliated societies in process of formation will be welcome.

Quote of the Month

ON the air checks prove that double sideband with injected carrier is still the most popular mode of transmission.—*Amateur Radio.*

TECHNICAL TOPICS By PAT HAWKER (G3VA)

Transistor Hazards · DJ2ZF Multi-band Dipoles · The ZE4JJ Special Quarter-wave Ribbon Aerial · Voltage Stabilizing Tips Causes of Low Audio Output

WITH every passing month, the transistor grows in status and importance to the radio amateur: yet too many of us are taking but little part in application development. Two recent events have emphasized the place which semiconductors will ultimately fill. First, there was the startling forecast made at the Cambridge National Convention by T. D. Towers that 150 watt h.f. transistors at prices comparable to valves of equivalent dissipation are now but two years or so distant. Secondly, there was the fascinating demonstration by G2IG at a recent Society meeting at the I.E.E., London, of his miniature, entirely self-contained, s.s.b./a.m./c.w., six band (1·8—30 Mc/s), triple-conversion, selectable-sideband receiver in a package about the size of a 1 lb. box of chocolates—and even then with most of the space taken by some 13 standard quartz crystals. Weighing 5 lb., this high-performance, mobile/portable receiver consumes from its internal 12 volt battery a total power of about ½ watt. If anyone in this day and age thinks that the transistor is just a snag-ridden substitute for a valve let him try his hand at producing a valve receiver of similar specification!

But, let us be frank, we still, as a group, tend to fight shy of semiconductors. This may be partly the unfamiliarity of many of the terms used and the emphasis on design mathematics of so much of the available literature (but not in the American paperbacks from Gernsback and some other publishing houses). And partly because at one moment we read that the transistor is a sturdy, almost everlasting device, only to turn the page to discover the umpteen ways in which the unwary can send one of these tiny tots to immediate ruination. Perhaps, then, it is high time that *Technical Topics* spared a little space for an appraisal of the hazards in the construction and testing of transistor equipment.

Without attempting to allot any order of priority, most authorities agree that the major risks of damaging or destroying a transistor are by applying the battery the wrong way round; applying an excessive surge of transient voltage; or subjecting the junction to excessive heat. Now let us see how these conditions are most likely to arise and what, if anything can be done to avoid them.

Back in the days when most of us had battery valves in our receivers, few escaped altogether the horrible sensation that came from the realization that one had flashed the h.t. across the filaments. The damage was done in a second and afterwards not all the king's men could put the filaments together again. The position is rather the same if we reverse the polarity of a supply to transistorised equipment. On the now popular small broadcast receivers, the hazard to the user is much reduced by fitting a non-reversible type of battery plug or clip. But for constructors there is always the risk of making a slip during wiring—made the easier by a *p-n-p* collector (roughly equivalent to the anode of a valve) requiring connection to the *negative* pole. There are methods of protecting equipment—for example, by passing battery supplies through a diode—but even so there will always remain (just as with valves) some risk of a wiring error, and so careful checking or double checking before connecting up new equipment is indicated. Luckily, in practice this fault is usually much less lethal than is h.t. across a valve filament. For equipment using standard alloy junction transistors, connecting the battery the wrong way round will seldom result in the complete destruction of the transistors though, as it may bring about a permanent increase in transistor noise and a decrease in gain, it is very much to be avoided. With the recent h.f. transistors, such as alloy diffusion types, the damage is usually more serious.

The internal resistances of a transistor are low and even quite low voltages applied across the wrong electrodes can cause excessive currents which burn out or damage the junction. Rather unexpectedly, the large power transistors are among the most susceptible to this hazard because of their lower internal resistances. Some of the ways in which these conditions can occur inadvertently include: (i) Leakage voltages to earth, for example, from the bit of an electric soldering iron (the answer is to earth the casing of the iron) or from the output leads of mains operated test gear such as signal generators (always include isolating capacitors in the leads between such test gear and the transistor equipment: 0·1 μF is suitable for r.f. leads; 8 μF for a.f. connections). (ii) Voltages from internal batteries in low-resistance continuity testers or low-resistance ohmmeters (if you must use this type of instrument either check that its internal resistance exceeds about 10,000 ohms or connect an external resistor of this value in series with it); or from the sudden discharge of one of the large-value electrolytics which abound in transistor equipment. (iii) Excessive currents arising from too great an input: for instance from a signal generator or—of particular concern to amateurs—by severe overloading from a nearby transmitter (has anyone any practical experience of the extent and degree of this problem in amateur practice?). We note that an overload protection circuit, comprising a GEX34 across the first tuned circuit, is included in G3KBS's recent 2m transistor receiver (BULLETIN, November, 1960).

There is also some hazard arising from a sudden disturbance in operating conditions: do not disconnect a transistor until all potentials have been removed; do not run a transistor with its collector circuit open; do not short-circuit base to collector while the transistor is operating. With power transistors it is important not to operate them without a load, as this may cause high voltages to appear on the collector.

A good deal has been written about the danger of overheating germanium transistors during soldering (silicon types have an appreciably higher safe temperature) and the need to use a heat sink (see *T.T.*, October, 1960). In practice the danger is usually only acute when soldering a short transistor lead to, for instance, a fairly substantial tag which can hold a good deal of heat—in such conditions an effective heat sink should always be interposed between the tag and the transistor. On the other hand, a quick join to a wire ended component involves very little risk, and for this some constructors even use their thumb and finger as a heat sink, arguing that if you burn yourself it only goes to prove a need to better your soldering technique!

The dissipation of heat from power and intermediate power transistors during operation by means of a permanent heat sink (often the chassis) is vital; and such transistors should on no account be run out of their "sink." Should you wish to run a power transistor right up to its maximum ratings (or in good amateur tradition above this figure) it is

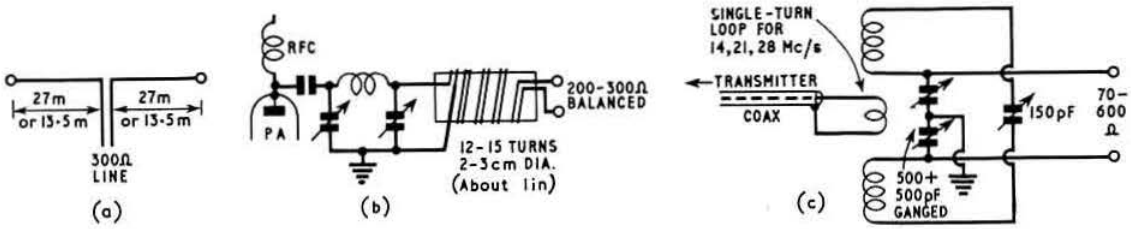

Fig. 1 (a) The DJ2ZF multi-band dipole; (b) Balun suggested by DJ2ZF; (c) Alternative pi-network type aerial tuning unit which provides balanced output.

worth taking trouble to ensure a really good heat transfer between transistor and heat sink: two tips which emerged from Cambridge are the liberal use of silicon grease smeared between casing and chassis and (for use above maker's ratings) the careful burnishing of the mounting base.

Some makers warn against scratching the outer casing of a transistor as this renders the transistor sensitive to light and may, for example, lead to hum pick-up from a fluorescent lamp. This recalls a money-saving tip from *Break-In* (August, 1960) in which ZK1AA says that if it is desired to experiment with any of the many gadgets which call for a photo-transistor such as the OCP71, try deliberately scratching the paint off a much cheaper OC71—he suggests there is then less difference than you might suppose from comparing list prices!

A Span of Aerials (or should it be a " Clutch of DX "?)

From time to time, we have drawn attention to aerials which use 300 ohm ribbon feeder either as a transmission line or for the aerial itself. Recently several more have come to our notice. Admittedly, the evaluation of new amateur aerials is not always simplified by the " wash whiter " claims sometimes put forward on their behalf; it is as well to remember that, in the words of *CQ* Magazine, " everything is experimental and we guarantee nothing." So do not ask how, why or if they really work for everyone as well as apparently they do for their originators!

In *DL-QTC* (November, 1959) DJ2ZF described a new " all band doublet antenna " which consisted simply of a dipole of dimensions 2 × 27m (i.e. overall length about 167 ft.) fed at the centre by 300 ohm line: see Fig. 1(a). The author claimed—and provided mathematical analysis—that the centre impedance at least on the 3·5, 7 and 14 Mc/s bands falls within the range 240-300 ohms and thus presents an excellent match to ribbon feeder. A further article of his in the September 1960 issue suggests that the overall length can if necessary be scaled down to half the above figure (2 × 13·5m, or 83 ft. 6 in. overall) for 7, 14 and 28 Mc/s. The DJ2ZF aerial should preferably be fed from a balanced source and details of a simple balun were given in the original article though as a translation is not available Fig. 1 (b) represents the only information we have. An alternative matching unit, suitable for providing 50-600 ohms or so balanced output from a co-ax line is shown in Fig. 1 (c), this being a system which has proved satisfactory at G3VA for a number of years.

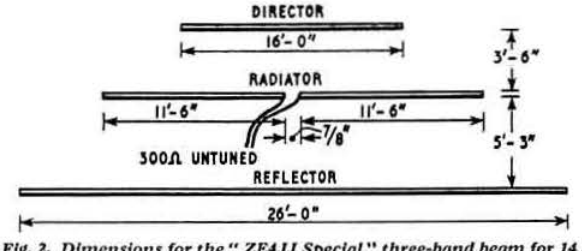

Fig. 2. Dimensions for the " ZE4JJ Special " three-band beam for 14, 21 and 28 Mc/s. Elements are made from ⅞ in. tubing and the radiat or is mounted 2 in. above the plane of the other elements.

The lively *Journal of the Radio Society of East Africa* occasionally reprints items from this feature: now we are glad to return the compliment by showing (Fig. 2) details of the multi-band " ZE4JJ Special " described in the September 1960 issue by VQ2JV (ex-ZE4JJ). This is said to provide excellent results as a tri-band beam for 14, 21 and 28 Mc/s. No analysis of the mode of operation is given but it is stated that dimensions must be followed accurately. An unusual feature is that the driven element should be mounted 2 in. above the plane of the other elements; if this is done, it is said, the s.w.r. on 14 Mc/s can be as low as 2 : 1 and unity on the other bands. It is claimed that this beam can be used directly from an unbalanced pi-network without using a balun. (This incidentally seems in line with an article in *Proc. I.E.E.*, January 1960, giving detailed information on the performance of balanced aerials when connected directly to an unbalanced line and suggesting *inter alia* that the distortion of the radiation pattern is appreciably less for a Yagi array than for a simple dipole.)

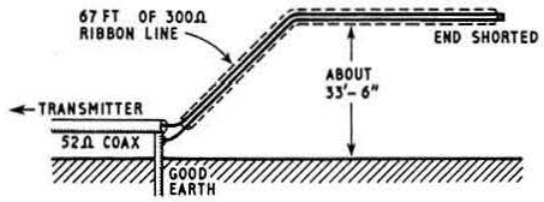

Fig. 3. The quarter-wave grounded Marconi for 3·5 Mc/s using 67 ft. of 300 ohm ribbon line.

The 3·5 Mc/s grounded quarter-wave Marconi aerial formed from 67 ft. of 300 ohm ribbon feeder shown in Fig. 3 is not new, as it has appeared in several editions of *Radio Handbook* but our excuse for including it this month is that it was reprinted recently in *Radio ZS* (September, 1960) on the recommendation of ZS6AUB. A good earth, such as a rising water pipe is needed. It could be scaled down for 7 Mc/s or the dimensions doubled for 1·8 Mc/s.

Screen Voltage Stabilization

There is often a need both in s.s.b. and a.m. rigs for a stabilized voltage rail of about 300 volts, usually for the screen grids of output tetrodes. This supply is usually obtained by connecting two VR150/0A2 regulators in series, with high value resistors across them to assist ignition. But a common difficulty is that such an arrangement requires an initial igniting potential of approximately 370 volts and this may not always be available. G3WW draws attention to an ingenious circuit device (*Electronics World*, September 1960) whereby a stabilized 300 volt line can be obtained from any supply delivering about 315 volts under load. The only components required are two 47 K ohm 1 watt resistors and a 1N69 diode: see Fig. 4. The 1N69 is listed as a general

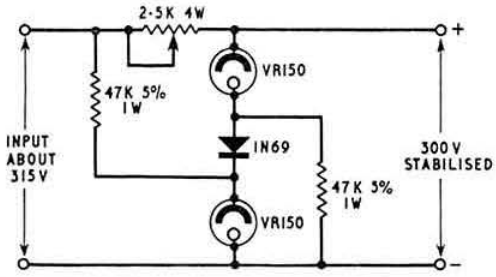

Fig. 4. How to obtain a stabilized 300 volt line from a supply which does not have peak voltage sufficient to ignite two VR150s in series.

purpose germanium diode having maximum inverse volts of 75 and a maximum forward current average of 40 mA. In effect, before ignition, the regulator tubes are connected as though in parallel across the supply, but on firing the bias is removed from the diode which then conducts, thus placing the two regular tubes in series. Output voltage will be a little above 300 volts, because of the resistance of the diode, and the degree of regulation slightly reduced but quite satisfactory for most purposes.

Another interesting looking circuit (Fig. 5) for stabilizing screen voltage of an anode and screen modulated power amplifier comes from a survey article on this subject by PA0ADR (*Electron*, June 1960). It is not always appreciated that where the screen-grid is fed from a simple series voltage dropping resistor, an appreciable amount of audio power may be wasted in the resistor. PA0ADR quotes figures suggesting that with an 813 p.a. running at 150 watts something like 19 watts of audio can be saved by using the stabilized screen supply, apart from other advantages. To determine a suitable valve for V2 it is necessary to consider the amount of anode dissipation required. For an 813, a triode-connected 807 would probably be suitable, with smaller valves at lower powers. Presumably, the heater of V2 should be fed from an isolated winding to avoid exceeding heater-cathode insulation ratings.

Audio Power Ratings

While on the subject of audio power, it is worth mentioning an article in *Mullard Outlook* (November, 1959) which dealt with the question of why the actual output power of a good deal of audio equipment falls well below the value quoted in the maker's lists for the particular output valve(s). One of the most important factors is non-optimum matching to the output load. For domestic amplifiers it is stated that one of the most common causes of mismatching is that the d.c. resistance of the primary and secondary windings of the output transformer and of the loudspeaker leads have been neglected. Further, it is not always appreciated that valve characteristics are quoted in terms of *anode voltage in respect of cathode* and this is often confused with the voltage between

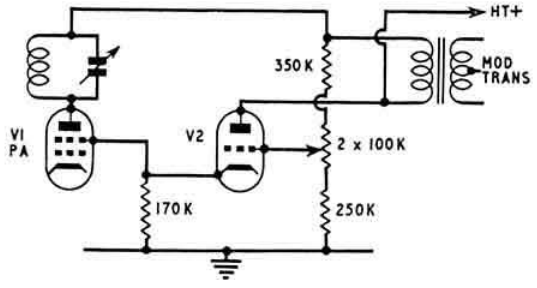

Fig. 5. Outline of a method of stabilizing the screen voltage for an a.m. anode screen modulated p.a.

the h.t. line and chassis. The actual anode voltage is in fact usually the h.t. line voltage less the voltages dropped across the primary of the output transformer (which often has an appreciable d.c. resistance) and across the cathode biasing resistor. How important these various factors can be were graphically illustrated by analysis of a single-ended amplifier using an EL84 which the designer hoped would provide 4·2 watts but, from the causes mentioned above, actually gave only 2 watts undistorted output.

In Brief

● G3AEX mentions that the double-pentode miniature valve type ELL80 (see *T.T.* October, 1960) is available from Brimar. ● Those who harvest a good crop of aerials must be casting envious eyes on B.O.A.C.'s new Boeing 707 airliners which have—for communications and navaids—no less than 18 separate aerials. ● A new broad-band fixed beam aerial suitable for use over a 3 or 4 : 1 frequency range and with gains of up to 18 db said to be a good substitute for the rhombic is the "Triangular V Aerial" (*Proc. I.R.E. of Australia*, August 1960). It comprises essentially a sloping V aerial with sides which flare out triangularly as one goes away from the feed point.

NEW BOOK

"A Backroom Boy"

THIS is the life story, as far as security reasons permit, of Eric Megaw, M.B.E., D.Sc., D.I.C., M.I.E.E., told by his father, Arthur Stanley.

All who remember Eric's early work as a radio amateur (GI6MU, GX6MU, G6MU) will read, nostalgically, of those experiments which he carried out from the Ulster Steamship Company's ship *Lord Antrim* during the summer of 1926 when he sought to investigate trans-Atlantic radio conditions generally and to find out to what extent low power short wave radio was capable of keeping ships at sea in reliable communication with land. An account of these experiments was published in the December 1926 issue of the *T. & R. Bulletin*. Many of the old timers of Amateur Radio still possess QSL cards confirming contacts with Eric Megaw who used the call GX6MU with G.P.O. permission.

Arthur Stanley refers to the debt of gratitude which his son always acknowledged to Professor T. Palmer Allen, M.Sc. (GI6YW), then a lecturer and now Professor of Light Electrical Engineering at the Queen's University, Belfast, for his never-failing assistance and advice.

To later generations of radio amateurs Eric Megaw's name will always be associated with the development of the Magnetron Oscillator and even more recently with his work in connection with the scattering of electro-magnetic waves by atmospheric turbulence.

His last paper—Fundamental Radio Scatter Propagation Theory—published after his death, received the Posthumous Award of Highest Premium of the Institution of Electrical Engineers. The paper, nearly completed when he died in his sleep on January 25, 1956, was finished by two of his colleagues, F. A. Kitchen and M. A. Johnson.

In an Introductory Letter Sir Eric Ashby, now Master of Clare College, Cambridge, and formerly Vice-Chancellor of the Queen's University, Belfast, writes with the full knowledge that Eric Megaw's achievements had their roots in his radio room and in the lecture theatres and laboratories of Queen's.

At the time of his untimely death Dr. Megaw was Director of Physical Research, Royal Naval Scientific Service, a position which placed him in the front rank of British scientists.

A Backroom Boy is published at 10s. 6d. by W. Erskine Mayne Ltd., of Belfast. J. C.

Single Sideband

By G. R. B. THORNLEY (G2DAF)*

IN a single sideband transmitter the whole of the available peak power output is put into one sideband instead of half of the power being wasted in the carrier and a further quarter in the mirror image sideband. This represents a power gain of 6db—that is the equivalent of increasing the transmitter power output by four times. In addition this does not necessitate building a high power modulator because the modulation has already been introduced at the single sideband source.

Because of these important considerations single sideband working is becoming increasingly attractive to the 2m operators and many amateurs are looking for information on some simple and effective method of obtaining a 2 metre s.s.b. output with sufficient power to drive an existing p.a. as a linear amplifier on this band.

Two Metre Single Sideband

There are obviously many different methods of obtaining an s.s.b. output on 2 metres. Theoretically it is possible to use the phasing method with the initial sideband generation actually on this frequency. However, the practical difficulties of maintaining sufficient stability to give an effective carrier and unwanted sideband suppression at the balanced modulator are so great that to the best of the writer's knowledge no one has yet attempted to do this. The most flexible and practical arrangement is either to use the existing s.s.b. exciter—or to build an existing design that can also be used on the main s.s.b. bands of 80 and 20m—and convert the 20m output to the 2m band when this is required.

An output power of about 1 watt R.M.S. is sufficient fully to drive the usual 2m p.a. in class AB or AB1, and this amount of power can be obtained from a high level mixer using easily obtainable standard B9A valves. The basic 20m s.s.b. signal is required to be heterodyned to 2m by mixing it with the output from a crystal controlled oscillator. A very satisfactory, yet relatively simple method of doing this has been developed by G3LNP and a number of 2m s.s.b. stations have already copied his design and are obtaining excellent results.

The circuit diagram is shown in Fig. 1 and it will be seen that the first half of the 12AT7 is a third overtone oscillator and the second half a tripler; the output at the coil L3 is therefore nine times the frequency of the controlling crystal X1. This output at about 130 Mc/s is further amplified by the EL91 buffer amplifier and fed via a link winding to the coil L6. The voltage developed across L6 is then fed into the " centre tap " of the balanced mixer grid input circuit so that the heterodyning voltage is connected to the mixer grids in parallel and can be balanced out in the output circuit L7 by adjustment to VR1, the balancing control. The 20m output from the basic s.s.b. exciter appears across the resonant input circuit L8 and the two series connected 50 pF capacitors and feeds the sideband input into the mixer in push pull. L7 and the 10 pF variable capacitor form a push pull anode circuit tuned to the sum of the two input frequencies (i.e. 130 + 14 Mc/s) giving the required s.s.b. output at 144 Mc/s.

The heterodyning input is of course fixed by the crystal frequency and the required tuning of the output frequency is done on the main 20m exciter. Therefore the frequency of X1 will be determined by the wanted output in the 2m band and by the available tuning range on the 20m exciter. From the information given by G3LNP it is understood that the popular sideband frequency is 145·5 Mc/s. This would require an heterodyning frequency of 131·4 Mc/s obtained from a 14·6 Mc/s crystal with the 20m exciter tuned to 14·1

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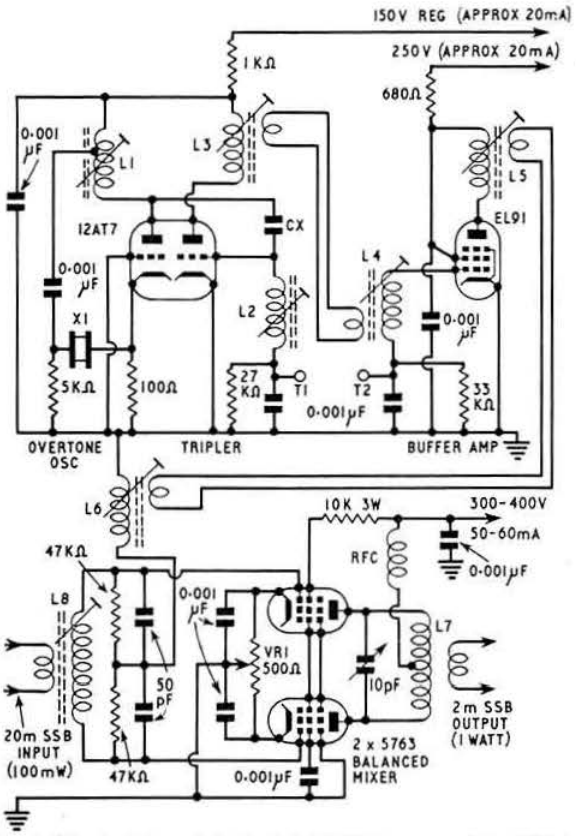


Fig. 1. Circuit of the unit designed by G3LNP for converting a 14 Mc/s s.s.b. signal to 144 Mc/s. L1, 2, 15 turns 36 s.w.g. enam. (L1 tapped at 1·5 turns from cold end); L3, 4, 5, 4 turns 26 s.w.g. enam. spaced wire diameter; L6, 3 turns 20 s w.g. enam. spaced wire diameter; L7, 3 turns 16 s.w.g. enam. 1 in. dia. self-supporting with 1 turn link of p.v.c. ins. wire; L8, 20 turns 24 s.w g. enam. on Aladdin ⅜ in. dia. dust iron core former with 4 turn link of p v.c insul. wire at centre. L1-4 are wound on Aladdin ¼ in. dia. formers with dust iron cores and L5-6 on similar formers with brass cores. The link windings for L3, 4, 5 and 6 are each 2 turns of p.v.c. insulated wire at the cold end of the coil.

Mc/s. A 14·5 Mc/s crystal would give an heterodyning output of 130·5 Mc/s and this would require the 20m s.s.b. exciter to be tuned to 15·0 Mc/s to give a final output of 145·5 Mc/s.

Finally, at the risk of being dubbed a bore by the experienced sideband operators, a word of warning for the newcomer. It is important that the 20m s.s.b. input signal be completely free from any other mixer products or v.f.o. harmonics, etc. Many exciters in use do not have a " clean " output by any means and rely on the additional attenuation of the following linear amplifier and aerial tuning circuits. This may be all right on 20m, but remember when the exciter is driving the 2m mixer these circuits will not be in use and any spurious outputs will be fed into the 5763 balanced mixer and will be heterodyned by the 130 Mc/s input and appear in the 2m output that is driving the linear amplifier. There is therefore the danger that the transmitter will be radiating several frequencies—and some of them could be outside the amateur band. An example of this would be a v.f.o. operating on 5·1 Mc/s, some of the third harmonic output of which on 15·3 Mc/s appears in the 20m exciter output. This would produce (with a 14·6 Mc/s crystal) a spurious output on 146·7 Mc/s. If the v.f.o. were on 6 Mc/s the third harmonic

(Continued on page 285

The MONTH ON THE AIR

A CHRONICLE OF EVENTS ON THE HF AMATEUR BANDS

By R. F. STEVENS (G2BVN)*

CONDITIONS during the past month have ranged from excellent to downright depressing and during the evening hours often there has been little to hear on the three h.f. bands, notwithstanding that earlier on the same day there may have been some good openings. For the operator working during normal hours this has meant that most of his activity has been concentrated at the weekends. However with a sunspot number of 105 conditions should at least be reasonable for some time ahead. Despite the indifferent periods there has been a good amount of DX worked and heard. If half the projected DXpeditions actually take place there will be plenty of interest through the winter months.

Details of certificates offered by various organisations throughout the world continue to arrive and the total number now available will soon be approaching the 600 mark. Unfortunately the worthwhile certificates offered by the national societies for many years have become submerged in the motley collection now available from clubs, societies and individuals. Your scribe considers that the time has come for the national societies to get together and agree a limited number of certificates to be available from their respective countries otherwise the whole business will become meaningless. Some order in the matter of certificates may help to lighten the load of the DX stations in so far as QSLs are concerned and perhaps the clock may be put back to the time when a QSL was considered to be the final courtesy of a QSO rather than the reason for the contact.

On the subject of QSLs, a system that has been used by a number of stations with above average results is to send to the DX station in question an envelope with mint stamps of the country attached in lieu of I.R.C. The number of coupons required for an air mail reply varies between countries but in all cases it will be found that stamps are cheaper, bearing in mind that the coupon encashment value is usually only half the purchase price. This procedure is not difficult for operators living in one of the big cities but may present problems for the country stations. Is there amongst our readers one with philatelic connections who could supply the stamps that might be required ?

News from Overseas

ZD2JKO, who is now in the U.K., mentions that **ZD2KHK** has run up against a snag in his efforts to operate from the Cameroons. His ZD2 licence is not valid in this country and the Nigerian P. & T. cannot issue licences now that the Cameroons are under U.K. Trusteeship. ZD2KHK has written to the U.K. to try to get a licence and it is hoped that his efforts will meet with success. Late news from ZD2JM and K9EAB informs us that **5N2** will be the Nigerian prefix w.e.f. 00.01 on January 1, 1961.

A personal QSO with **EP1AD** gave the writer the opportunity to acquire the background information regarding the position in Iran at the present time. In addition to the U.S. and German nationals already licensed it is hoped that we shall be hearing some Iranians on the air in the near future. Hal mentioned the difficulties of operating from a DXotic location, with the additional handicap of having so many U.S.S.R. stations audible all the time whatever the conditions. At present using a ground plane, EP1AD hopes to erect a Birdcage in the near future. The station transmitter is an Apache but a Collins 75S1 and 32S1 are at present held on loan. A new address is given in *QTH Corner*, and it is pointed out that via the A.P.O. the mail will be delivered by air without the usual surcharge. Hal has kindly offered to pass on any cards that are sent to him for any other of the EP stations.

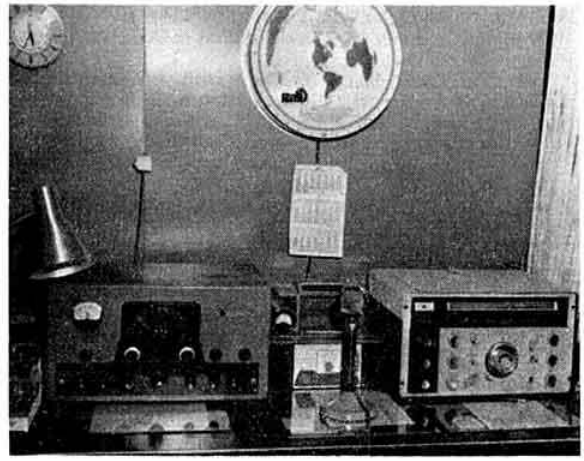
GW3ITD/MM on *H.M.S. Puma* will be closing down before Christmas and all QSLs and reports will be answered through the R.S.G.B. Bureau.

Following the demise of the Federation of Mali the territory has divided into the independent republics of Soudane and Senegal, which in due course, will probably be recognised as new countries.

W2ZX is sponsoring a project to allocate voluntarily a DX s.s.b. segment of 5 kc/s between 14,295 and 14,300 kc/s in which U.S. stations will not operate. DX stations are asked not to answer calls on their own frequency when operating in this portion, which will be extended if the idea catches on.

To assist in the identification of **U.S.S.R.** stations operating from **Zones 18** and **19** the following list of UA0 suffixes is provided by the Central Radio Club.

UA0 A–, O–, P–, S–, T–, and W– are in Zone 18, whilst UA0R– and Q– lies partly in Zone 18 and partly in Zone 19. UA0C–, D–, G–, F–, J–, L–, and K– lie in Zone 19, whilst UA0Y– is in Zone 23. Any of the above suffixes may be preceded by the letter K indicating a club station, i.e. UA0KYA would be Zone 23. A large number of the Russian stations now give addresses for direct QSLs and a considerable amount of information is available regarding oblasts, prefixes and club stations.



K2GHP of Neptune, New Jersey, has a Johnson Viking Valiant transmitter and a National NC303 receiver. Other equipment in this picture includes a Heathkit reflected power and s.w.r. meter and a Hy-gain rotator indicator for his Mosley TA33Jr. three band beam.

* *Please send all reports to R.S.G.B. Headquarters to arrive not later than December 19.*

G3MIU, now in Papua, has been allotted the call **VK9PJ** and hopes to be active from early January until April. G3MIU will be particularly keen to make contacts with G stations.

VS6BJ has closed down and is now operating from the U.K. with the call **G3KVU.** Any station requiring a VS6BJ confirmation should write to the address in *QTH Corner.*

9M2EB is back in the U.K. and operating under the call **G3IJU** from Upavon, Wiltshire. F/Sgt. Briggs reports that VS1KD is homeward bound for a spell of duty at Catterick.

ZD1AW, also now in the U.K., anticipates another tour abroad after a relatively short stay at 1A, Hamel Drive, Belfast, 6, Northern Ireland, to which address queries concerning QSL matters may be addressed.

ZC4CT, Colin Thomas (ex-B.R.S.22249) has at last received his licence and is active on c.w. on the h.f. bands. He is anxious to contact the U.K., especially GWs in the Newport (Mon.) area.

CR5AE closed down on November 29 for a holiday in Portugal but will be returning in July 1961 with a new three element beam for 14 and 21 Mc/s.

News from the Pacific

From **KH6DLF** it is learnt that **VR6AC** has left the Canal Zone for Pitcairn leaving his s.s.b. rig to follow. (QSLs for VR6AC should go via W6RCD.) He should be active very shortly. A KWM-1 was provided by KH6DLF for **KB6BH** on Canton Island, who is now very active, but will shortly be moving to the Western Carolines and operating under the call **KC6AX. VR3L** is still active, mainly on s.s.b. Conditions for the telephony section of the *CQ* contest were poor but KH6DLD (wife of KH6DLF) scored 109,000 points on 14 Mc/s. It was almost impossible to work Europe during the contest period.

DXpeditions

The projected trip by **W4BPD** and others was cancelled owing to extremely bad weather in the Indian Ocean, but as some consolation Gus operated as VQ1A and 6O1AA, with FL8 activity to follow.

The second half of the operation planned by **CR6CA** did not materialise and Joe has now returned to Angola but plans to visit Ajuda and Annobon at a later date.

The **San Andres** sojourn of YN1TAT and others produced signals in the U.K. on 28, 21 and 14 Mc/s but directional calls to Europe evinced little response, due partly to mediocre conditions.

MP4BBW mentions that there will again be activity from **AC5CQ,** probably in late January or early February, this time including s.s.b. Ian has received a QSL for his QSO during the previous trip.

For Top Band Dxers G3OCA will be operating as **GC3OCA/P** from **Sark,** Channel Islands during the period January 1 to 6. G3OCA asks that stations should call plus or minus 5 kc/s from his operating frequency. Schedules can be arranged upon request.

Marcus Island, it is reported, will again be heard after December 11 on 14,040, 21,040 and 28,040 kc/s c.w. only. QSL as before to W7PHO.

HK0TU will be the call used by W6HAW, HK5BZ and party who plan to operate from Malpelo Island during the period January 13 to 19.

Any late news regarding impending activity from DXotic locations will be included in the Society's News Bulletins.

On the subject of DXpeditions generally G3BHW feels that a vote of thanks is due to the hardy characters who make these rare ones available and hopes that the poor operating heard at times will not deter them in the future. Eric also makes the point that there are a number of stations who, having once contacted the rare one, then persist in working him again on succeeding days, providing at the same time full information regarding weather, rig and the colour of the operator's socks, much to the disgust of the waiting queue. Fortunately, such thoughtlessness is not general, which is a good thing for all of us.

Contests

The **A.R.R.L.** International DX Contest will be held during four weekends in February and March 1961. The telephone section will take place during the weekends of February 4 to 5 and March 4 to 5, and the telegraphy section during the weekends of February 18 to 19 and March 18 to 19. In all cases the starting time is 00.01 G.M.T. on the first date, and the finishing time 23.59 G.M.T. on the second date.

As in the past, certificate awards are offered to the top single-operator phone and c.w. scorers in each country. A special category recognises multiple-operator stations in those countries from which three or more valid multiple-operator entries are received. The complete rules will appear in *QST* for January 1961.

Map of Continental U.S.A. showing Call Areas.

W1— Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont.
W2—New Jersey, New York.
W3—Delaware, Pennsylvania, Maryland.
W4— Alabama, Florida, Georgia, Kentucky, N. Carolina, S. Carolina, Tennessee, Virginia.
W5— Arkansas, Louisiana, Mississippi, New Mexico, Oklahoma, Texas.
W6—California.
W7— Arizona, Idaho, Montana, Nevada, Oregon, Utah, Washington, Wyoming.
W8— Michigan, Ohio, W. Virginia.
W9— Illinois, Indiana, Wisconsin.
W0— Colorado, Iowa, Kansas, Minnesota, Missouri, Nebraska, N. Dakota, S. Dakota.

Log sheets are available on application from the A.R.R.L. Communications Dept., 38 La Salle Road, West Hartford, 7, Conn., U.S.A. Entries must be postmarked not later than April 29, 1961 to be eligible.

In the telephony section of the 1960 A.R.R.L. contest **GB2SM** amassed 178,059 points and collected what is believed the first ever Multi-Operator Certificate issued to a U.K. station. In the c.w. section **G4CP** was the leading European station with 394,200 points. Fine performances by all concerned.

Rules for the **W.A.E. DX** Contest on January 14/15, and the **CQ S.S.B.** Contest on January 28/29 are available from G2BVN on receipt of a s.a.e. Log sheets for the latter contest are also available.

Could we again make the plea that stations participating in a contest should send in their entries, even if they do not operate for the whole duration ?

DX Briefs

PY1BEO will probably be operating from **Trinidade** (a separate country for DXCC) during January and February as **PY0NF.**

FQ8AF, who has dispensed many contacts from Fort Lamy and Brazzaville, has now returned to France.

FF4AA/M is active on 21·2 Mc/s with 45 watts to a Gonset transmitter.

It is reported that the QTH in the 1960 *Call Book* for **FM7WU** is not correct.

VE3WX is the new call of VE3BSG; VE3EGK now signs **VE3FZ.**

K0SLD/KW6 and **K0TFP/KW6** have both been heard working Europeans contest style, and promise 100 per cent QSLs. If a direct air mail reply is required please enclose stamps or I.R.C.s. G3GJW received his QSL 15 days after the QSO. Both stations will shortly receive KW6 calls.

The following have been reported as unworthy of attention: AP5M, TA1DB/W1FFB, 9S4F, ZM7DA and KX6CA. The latter two have been heard on 21 Mc/s c.w. G3YF worked BY1PK who gave his QTH as Peking but the signals peaked with the beam due East. QSLs were received from BY1PK during 1958 and it will be interesting to see if the present user of the call will oblige in this way.

The following stations are active from **Crete:** SV0WC, 'WM, WO, WZ and the Base Club station SV0WT.

W3AYD reports that he has assumed QSL duties for **VP2DU** (from October 1, 1960) and **FY7YI** (from November 1, 1960). Mike regrets being unable to help with QSOs before the dates given, and asks for s.a.e. or I.R.C. if a direct reply is required.

W2CTN now handles QSLs for the following stations: CN8BK, CR4s AH, AV, AX, FK8s AI, AT, AW, FM7s WP, WU, HR2FG, JZ0s DA, HA, PO, KW6s CP, CU, OQ5s BC, IG, OX3s DL, RH, TG9AL, TI2s CMF, WD, VKs 2FR, 2PA, 9GK, 9NT, 9RN, VPs 2KH, 6PJ, 8AI, VQs 1HT, 1SC, 2EW, 3CF, 3HH, 4AQ, VR2s DA, DK, YS1IM, ZBs 1FA, 2I, ZD2DCP, ZP9AY, ZS7M, 9G1BQ, 9Q5s BC, IG. QSO details supplied should include precise time in G.M.T.

QTH Corner

EP1AD	M.A.A.G., A.P.O. 205, U.S. Armed Forces.
FF8BF	Box 971, Dakar, Republic of Senegal.
FF8CU	P. Goriot Nosoco, Zuiguincho, Republic of Senegal.
FQ8AA	G. Henri, Base Aerienne 172, Fort Lamy, Tchad.
FQ8AE	Box 467, Brazzaville, Republic of Congo.
FQ8AF	via R.E.F.
FQ8AG	Box 138, Brazzaville.
FQ8AT	Box 12, Ati, Tchad.
FQ8AW	Box 298, Brazzaville.
FQ8HD	Box 894, Brazzaville.
FQ8HI	Box 235, Fort Lamy, Tchad.
FQ8HK	Box 919, Brazzaville.
FQ8HL	Box 449, Fort Lamy, Tchad.
FQ8HO	Box 138, Fort Archanbault, Tchad.
FQ8HP	Box 41, Brazzaville.
FQ8HT	Box 785, Bangui, Central African Republic.
FQ8HV	Box 2225, Brazzaville.
FQ8HW	2, Esema Faya, Largeau, Tchad.
FO8AN	via W8EWS.
FY7YI	via W3AYD.
MP4BBF	Box 655, Awali, Bahrain, Persian Gulf.
PY7LJ	Alvaro Pimentel, Cia Guardas, Fernando de Noronha, Brazil.
VP2DU	via W3AYD.
VP2VH	via W2YTH.
VQ1A VQ1B	via W4TO.
YN1JK	Box 1935, Managua, Nicaragua.
YU2AKL	Box 171, Solit, Yugoslavia.
ZC4CT	C. J. Thomas, c/o " A " Watch, 264 S.U., B.F.P.O. 53.
ZC5AE	D. Phillips, R.A.F. Detachment, Labuan, British N. Borneo.
ZD2DCB	D. C. Piccirillo, Senior Radio Officer, Radio Section, P. & T. H.O., Moloney Street, Lagos.
ZD2DFT	D. F. Taylor, P. & T. Training Centre, Private Mail Bag 2603, Lagos.
ZD2ESH	E. Sherlock, c/o John Holt (Nigeria) Ltd., Box 157, Lagos.
ZD2IND	D. H. Boyles, c/o G. B. Ollivant (Nigeria) Ltd., Box 114, Lagos.
ZD2JAH	A. Hewitt, First Comm. Officer, c/o Nigeria Police H.O., Lagos.
ZD2KHP	K. H. T. Perrin, c/o Glyndova (Nigeria) Ltd., Private Mail Bag 2094, G.P.O., Lagos.
ZD2LFS	L. Hamnett, P.O. Box 558, Lagos.
ZD2PIB	G. P. Brisbar, P.O. Box 556, Port Harcourt.
ZD9AM	Gough Island, c/o G.P.O. Cape Town.
ZS7R	Box 98, Mbabane, Swaziland.
6Q1AA	via W4TO.
OE Bureau	Box 999, Vienna 1/9, Austria.

* * *

R.S.G.B. QSL Bureau: G2MI, Bromley, Kent.

DXotic Showcase

Call-sign	kc/s	Mode	G.M.T.	Country
HK0HCA	28,640	s.s.b.	16.05	San Andres Is.
ZD9AM	21,205	a.m.	18.45	Gough Is.
KS6AK	21,400	s.s.b.	07.58	Samoa
CR5MA	14,025	c.w.	00.30	Sao Tome
HL9KT	14,012	c.w.	11.00	Korea
JT1KAC	14,095	c.w.	10.10	Mongolia
KM6BI	14,055	c.w.	06.52	Midway Is.
FL9(W4BPD)	14,118	s.s.b.	16.15	French Somaliland
HS1B	14,318	s.s.b.	16.42	Thailand
KW6CP	14,326	s.s.b.	18.24	Wake Is.
ZK1BS	14,312	s.s.b.	17.01	Cook Is.
YN4AB	7,010	c.w.	06.40	Nicaragua
VS9OC	7,090	a.m.	22.27	Oman

Band Reports

28 Mc/s

This band, which on many days has been producing very little on the east-west path, has nevertheless offered a good amount of DX coming from a southerly direction, and, even when apparently dead, will repay an occasional scrutiny. 9Q7ZZ, worked and heard on this band and on 21 Mc/s, may, according to PA0FX in the *DX'press*, not be located in Katanga but perhaps in Ramstein, Germany. Further definite information would be welcomed.

GM3OEV (Kinloss) enters the a.m. lists with YN1CA (12.10), TI2VMB (13.45), CR7CI (16.05), PJ3AJ (16.20) and KG4AO (18.35), followed by **G3MVV** (Romford) who worked 9U5PD (13.01), ZS3R (14.40), VE7BBG (19.00), and VQ2WR (14.47). **G3AAE** (Coulsdon) adds KG4AT (18.20), ZS7L (13.40), UF6KAF (12.00), 9Q7ZZ (15.00) and VQ8AV (12.10). From **ZD2JKO** (Zaria) we have CE3HL (18.50), FB8CM (12.15), TG9AD (15.15), 9U5DM (17.00), 9U5KU (16.20), KZ5TD (19.35), and HC1KA (19.20).

On c.w. **ZC4CT** (Cyprus) offers JA3AG (08.45), JA3VG (07.50), OA4ME/7 (08.22), VU2XG (09.40), and 7G1A (13.10). **G3IPV/MM** worked HK7ZT (18.00), VO1DZ (19.10), UN1AB (10.25) together with numerous Europeans and Ws.

G3NOF (Yeovil) had two-way sideband contacts with FS7RT (14.24), OA4ED (18.13), PZ1AX (14.40), VQ4RF (20.06), and ZS6OY (20.15).

From the following list it will be seen that the listeners have missed very little. Probably the most unusual station reported was FM7WQ (A.1980), whilst F.R.S. 309 submitted a list of 71 countries.

08.00 VU2BK; **09.00** ET2US, UO5AGA, VS9ADL; **10.00** EL4A, JA2AY, UA9KAA, UD6ABE, UL7HB, VK9XK, VU2BK; **11.00** 9K2AO; **12.00** CR7LU, FF7AG, KG4AT KG4AO, VP6EB, VU2PS, YS1IM, 9U5PD, **14.00** CT2AH, VP2AB, VP2GAO, VP3MC, ZL7L; **15.00** EA0AC, HH5LA, UP2ABA, VP9AK, ZD2FNX; **16.00** AP4M, CR6CB, FF7AB, K4SDC/CN8, OA4AL, PJ2AL, PZ1BK, VP2DA, VP2DO, VP1DX, XE2WC, ZS7L, 9G1DO; **17.00** CX1AK, KG4AO, VP3HAG; **18.00** FM7WQ, HI8GA, TG5HC; **19.00** CR4AX, HP1AP. (Thanks to A.1543, A.1792, A.1827, A.1859, A. 1980, A.2297, A.2389, A.2404, F.R.S.309, B.R.S.18876, B.R.S.20317, B.R.S.22282, B.R.S.22357 and B.R.S.22795.)

21 Mc/s

A.M.

G3YF (Chingford), making a welcome reappearance, lists

FF4AB (15.15), FF7AG (14.30), FR7ZD (16.15), FQ8HZ (19.15), HV1CN (10.30), VP9WB (14.40), VQ8AM (14.30) and 9K2BK (14.35). **G3MVV** offers ET2US (11.15), EP2AT (11.43), KA2JL (08.24), KR6IM (07.32), UD6KAB (07.12), VU2BK (08.14), ZS7R (17.14), 6O2GM (14.58) and 9U5PD (06.59). **ZD2JKO** worked CR7CH (19.15), FQ8HT (21.00), PZ1AP (21.05), VP4MM (20.35), KZ5TD (21.00), VP9AK (22.20) and XE2FL (20.10). **G8KS** (Farnborough) contacted ZD9AM (18.45, '205), FF7AG, VS1GZ, FR7ZD, UL7FA (11.35), UH8BN and FF8CU ('125, Senegal).

C.W.

G3BHW (Margate) commences with CR5AE (13.50), CR5AR (20.40, '010), FF8BF (14.25), HC8VB (19.14), VQ1B (12.35), and VQ8BM (14.00). **G3YF** adds K0SLD/KW6 (10.50), FB8XX (10.55), FQ8AC (16.09), and 9Q7ZZ (17.03). **ZC4CT** QSOd CR6BX (17.05), ET3AZ (13.00), FQ8HO (09.00), ST2AR (18.10), VQ1B (17.40), VS9MB (04.50), numerous ZSs and 3V8CA (16.45).

S.S.B.

G3NOF worked JA1ACB (08.54), K0SLD/KW6 (09.45), KG6AJB (11.10), KS6AK (07.58), UL7JA (09.52), VK9NT (11.10), ZL2AVA (10.04) and ZS5DN (18.24).

A.1543, A.1736, A.1859, A.1930, A.1965, A.1980, A.2122, A.2273, A.2297, A.2389, A.2404, B.R.S.18876, B.R.S.22357, B.R.S.22795, B.R.S.22844, and F.R.S.309 contributed towards the following list: **07.00** VR2DE; **08.00** FF7AG, VK0WH, VP8FF, ZD1AW; **09.00** KR6RN, KS6AK, LA2DE (Spitzbergen), UH8BN; **10.00** KG6AJB, MP4BBA, VK9NT, VK9XK, UD6KAB; **12.00** CR9AN, EP2AT, LJ3G, UO5KAA; **15.00** AP2Q, VP9AK, VS1KP, 3A2BG; **16.00** HV1CN, LA2DE, TF2WFK, VU2BK, YN1JB, 6O2GM, 9G1BA; **17.00** CR7AD, FB8CO, FF4AF, FR7ZD, OR4TX, VK0PM, VP6WR; **18.00** FF7AG, VP2DQ, 9Q7ZZ; **19.00** FQ8HR, HC1AGI, KZ5BA, VP8DW, YS1VW, ZP5LS; **20.00** FE8OR, VP2DA, VP2SL, VP8FF; **23.00** VP8DS.

Commonwealth Competition

	28 Mc/s	21 Mc/s	14 Mc/s	7 Mc/s	3·5 Mc/s	Total
VE3BWY	37	44	72	36	15	204
G3BHW	43	64	60	10	—	177
G3AAE	51	52	56	14	—	173
ZD2JKO	32	54	40	24	6	156
G8KP	21	35	39	28	18	141
VE7KX	14	38	29	32	27	140
G5VU	23	38	44	14	12	131
GB2SM	33	35	19	16	12	115
MP4BBW	1	20	67	—	—	88
VQ4HE	26	14	23	14	9	86
G8DI	12	11	21	14	18	76
G3LET	—	—	—	68	—	68
VO2NA	7	10	24	14	6	61
G3MGL	8	2	6	4	—	20
G3JFD	1	5	1	—	—	7

Band Leaders

28 Mc/s—G3AAE 21 Mc/s—G3BHW
14 Mc/s—VE3BWY 7 Mc/s—G3LET
3·5 Mc/s—VE7KX

	28 Mc/s	21 Mc/s	14 Mc/s	7 Mc/s	3·5 Mc/s	Total
B.R.S.20317	44	68	71	70	30	283
A.1859	46	74	59	10	9	198
B.R.S.22013	29	57	68	18	6	178
B.R.S.22249	32	64	46	26	9	177
B.R.S.18876	19	88	42	—	—	149
B.R.S.21008	38	58	48	4	—	148
A.1792	40	54	46	—	—	140
A.1583	25	62	28	—	3	118
B.E.R.S.195	—	—	47	30	12	89
A.1965	12	41	17	2	3	75
A.1980	30	37	7	—	—	74

Band Leaders

28 Mc/s—A.1859 21 Mc/s—B.R.S.18876
14 Mc/s—B.R.S.20317 7 Mc/s—B.R.S.20317
3·5 Mc/s—B.R.S.20317

14 Mc/s

A.M.

The sole reporter on this mode is **ZD2JKO** with CO8JK (05.02), HR2MT (04.45), KG4AO (04.40), VP5VI (03.15), XE1AAP (02.00), 3A2AV (02.15), and 9U5PD (03.10).

C.W.

G2FFO (Burnley) keyed with FQ8HP (18.30), LA2NG/P (19.55, Jan Mayen), TF5TP (00.15), VK0PM (19.10), VP8CC (19.35, Antarctica), VQ9A (19.35) and ZS7M (18.35). **G3MBN** (Bath) worked KH6IJ (18.38), KM6BI (06.52), KV4AA (20.16), OR4TX (18.52), UA0AZ and UA0BF (18.30, both on Dickson Island), UA1KAE (19.25) and VQ2TM (18.32). **GM3OEV** obtained reports from LA1NG/P (05.00), UA0OM (00.25), and DXpedition CR5MA (00.30). **G3BHW** contacted FQ8HP (17.55), KH6COB (18.40), PY7LJ (20.37), VP2VH (19.28), VQ1A (18.55), 6O2AB (20.07), 7G1A (19.37), and 9U5MC (20.28). **G3YF** submits a list including many of the above with, in addition, BY1PK (17.23, '060), FQ8HW (16.30), FQ8HO (15.50), FR7ZD (16.15), HL9KT (11.00), JT1KAC (10.10), VK0WH (10.40), VK9XK (10.00), VQ9BC (17.15), VS9ARP (17.00), XZ2TH (17.15), ZA1AC (16.50), and ZD9AM (20.15). **G3AAE** follows with SM5KV/9Q5 (19.05), VK0JM (21.00), VR2DK (08.50), VQ8BM (16.55) and VS9MB (17.40, Maldive Is.). **VE3AYE**, the second operator of VE3BWY, keeps us up to date with events in Toronto, and mentions VQ8BC (13.40), UM8FZ (13.00), CR5AE (05.57), OR4TZ (05.00 and 22.00), and CE3DV (03.15).

S.S.B.

G6UT (Gt. Hallingbury) worked EP1AD (15.55), EQ5X (15.59), LA1LG/P (10.36), PX1AX (11.30), UP2CG (16.50), VP9FR (16.29), YO3GK (10.26), XE1CV (09.53) and 9M2GA (15.10). **G3NOF** follows with FF4AK (19.48, d.s.b.), HZ1TA (17.59), KM6BO (08.05), KR6CS (15.58), PJ2AA (20.29), SV0WV (19.04, Rhodes), VE5MK/SU (16.53, Gaza Strip), VP2AB (21.24), ZS3AD (18.54), and ZD2PJB (17.49). **MP4BBW** (Bahrain), who is now up to 300 on s.s.b. WPX, again submits an exotic list even though the band has been dead as early as 16.00 in his part of the world. Stations worked include CR9AH (14.06), CX2AX (10.44), CE3HL (20.57), EL2X (17.39), EQ5X (13.14), EQ2AT (14.33), CR5MA (18.00), FB8CM (15.06), HS1B (16.42), KV4BQ (18.09), K6CQV/KS6 (17.20), KX6BQ (11.29), KC4USH (14.41), KW6CP (18.24), LX1DE (19.13), PZ1AX (06.03), PI1LS/MM (20.13), SL4ZH (18.26), TG9AD (12.58), UA9CM (16.02), UL7JA (14.25), VS1VJ (14.09), VO9TED (15.23), VR3L (13.53), XZ2AD (14.50), YS1MM (13.31), ZK1BS (17.01), 9M2DB (15.01) and 9O5AG (18.00). When mentioning 9N1SM ('283) and VU2NR ('320), **G8KS** queries the possibility of obtaining a QSL from VO2AB.

This band has produced some good reports both on s.s.b. and c.w. and B.R.S.22282 (Malava) sends a log including stations infrequently heard in the U.K. At home creditable logs came from A.1930 and B.R.S.20317 which have been amalgamated with reports from A.1543, A.1792, A.1859, A.1965, A.2111, A.2273, A.2297, A.2331, A.2389, A.2404, A.2457, F.R.S.309, B.R.S. 18876, B.R.S.22357, B.R.S.22795 and B.R.S.22844.

08.00 HL9KT, KA2IE, K8ONV/KL7, KM6BO, VK4DD, XE1RF; **10.00** FK8AH, KB6BH; **11.00** HL9KS, KX6BU, VR2DK, VR3L; **12.00** FM7WS, HH2JK, VP2DA, VP9AK; **14.00** CR9AY, EP1AD, FB8XX, UI8KNA, UJ8NNR, UL7KDR; **16.00** EA0AC, HS2A, KG6NAA, KW6CP, LA1LG/P; **17.00** KV4BU, VU2RM, ZS2MI; **19.00** HV1CN, SV0WL, VO5FS, VQ9A, ZS5QV, ZD9AM, 7G1A; **21.00** CR5MA, CX2CO, VK0JM, VP5RA, YV5ANE; **22.00** CR4AX, FF8AU, HP1BR, KG1BI, LU6AJ, SU1IM, VP2AR, ZP5AY; **23.00** ET2US, KG4AB, HP1JF, 4X7WP.

The Lower Frequencies

On **7 Mc/s** c.w. **G5JL** (Hayes) gave RST to CO5RV (04.45), EL4A (05.45), HC2VT (03.45), HK3AH (06.45), KP4ANJ (06.30), M1/W4BPD (07.40), PY7CY (06.15), VE7BAX/W7 (06.20), VP9BO (04.30) and YN4AB (06.40). **GM3OEV** worked UA0AG (22.30), UA9FI (03.00), JA1LZ (18.23), VS9OC (22.27) and ZL4OD (18.15). **G3BHW** adds LA8YB/P (22.50, Jan Mayen), and UH8BI (19.45), mentioning that conditions on this band are improving. **ZD2JKO** worked a number of JA districts between 20.00-21.00. **A.1930** logged EA6AF (22.50), KP4AK (22.25), UO5TI (22.45), VQ4DT (20.40) and ZD2JM (21.30), whilst **B.R.S. 20317** reports FY7YF (00.40), LU3DCJ (00.45), OD5LX (00.35), VP7BZ (23.30), VS1KQ (19.05), UA0AU (18.48), YV5GO (23.45), UM8KAB (18.00) and UH8BI (19.15).

On **3·5 Mc/s ZD2JKO** heard several Gs with G3NBP outstanding plus GC3HFE and GD3FBS. **B.R.S.20317** reports several VE and W stations and also UA6MK (00.40), and UO5AS (18.00). **A.2122** logged SP5PRG (22.19), CT1JB (23.34), I1DFB (00.10), UB5WF (00.13), UQ2AN (01.19) and UR2KAE (01.20) during the *CQ* Contest. On Top Band **G3MBN** reports a QSO with ZC4AK at 20.45 on 1827 kc/s.

In closing the band reports the writer offers his thanks to those that have taken the trouble to send in logs and in particular to the several who have rendered their offerings in alphabetical order. Please continue to keep the news items and reports rolling in; where there is only short notice of DXpeditions and similar events, particulars can be publicized through the weekly News Bulletin from GB2RS. Information from the *DX'press* (PA0FX), the *DXer* (K6CQM), and the *West Gulf DX Bulletin* has been most helpful.

The Commonwealth Competition

VE3BWY has now what appears to be a commanding lead but could still be overhauled by a last minute effort. We shall be pleased to receive from all participants a note of their scores as at December 31.

* * *

Your scribe offers his thanks to the contributors who have helped during 1960 and hopes that they will continue to support M.O.T.A. with redoubled vigour during the months ahead. To all, best wishes for the festive season and good hunting in the New Year.

Single Sideband (Continued from page 280)

would be 18 Mc/s and produce a spurious output on 149·4 Mc/s. While linear amplifier circuits operating on 14 Mc/s can discriminate against a spurious product 2 or 3 Mc/s away from the wanted output, they cannot possibly do so when they are operating at the high frequency of 145 Mc/s or thereabouts. Before putting the 2m s.s.b. transmitter on the air check carefully and make sure that the output is the one you want and that it is " travelling alone."

Alignment

The alignment of the G3LNP unit should be carried out in the following order:

(1) Adjust the dust cores of L1 and L2 for maximum voltage at test point T1.
(2) Adjust Cx to give about negative 40 volts at T1. (Capacitor value will be about 1 pF.)
(3) Adjust the cores of L3 and L4 for maximum voltage at test point T2.
(4) Adjust the core of L5 for *minimum* voltage across the 680 ohm anode resistor.
(5) Adjust the core of L8, L3 and the 10 pF tuning capacitor across L7 for maximum s.s.b. output at 144 Mc/s.
(6) Set VR1 for *minimum* 130 Mc/s output with no 14 Mc/s drive.

R.A.E.N. Notes and News

BY E. ARNOLD MATTHEWS (G3FZW)*

A RECENT informal request from a Civil Defence Corps communications officer for information concerning R.A.E.N./C.D. Corps co-operation prompts the thought that Civil Defence is not in the hands of any one organization but is a joint effort on the part of many military, civil, official, and voluntary services; and in particular the Police forces, St.J.A.B. and B.R.C.S. have their part. In serving these bodies R.A.E.N. also serves some peacetime functions of Civil Defence. This will have already been recognized by members of groups working regularly with police at disaster relief exercises in which they and all other services involved will have come under the orders of a police incident officer.

Around the Groups

The recent floods brought no calls for R.A.E.N. services although many groups were prepared to act if necessary. **Hampshire**, for instance, making last minute checks in connection with Exercise " Speedy " at Fleet on October 9 got over-the-air reports of flooding in that area and were placed on " Amber Alert " by the C.C. After checking with Police, who said that there was no serious call on emergency services, and St.J.A.B., who had been unable to get through by telephone to the area, it was arranged to proceed. The exercise developed around a story of a crashed aircraft and required the setting-up of a casualty clearing station at Pyestock by St.J.A.B., and R.A.E.N. links from there to Fleet Pond and Winchester, via a relay at Lasham. Apart from an initial difficulty with the Pyestock-Lasham link, communication was good and traffic was very heavy. Summarizing, after a welcome drink of tea provided by a W.V.S. canteen, the incident officer said that it would have been impossible to run such a scheme without radio. Among the observers were the **Surrey** Controller, G3VK.

Discussions concerning Hampshire/Surrey and Hampshire/Dorset links are in progress. Some difficulties have to be overcome before such links can be considered effective but it is felt that these may be overcome by the use of one band throughout, since much delay is caused by band-switching requirements at present.

The new **Middlesbrough** A.C., G3ISV, reports that recruiting is proceeding well. It appears that there is the possibility of a group being formed in **Manchester.**

Another " aircraft crash " exercise was held on October 30, this time by **Suffolk** Group with G3NDA, G3FVP, G3AGN, G3DPH, G3LWC, G3LWO and G2CPL participating. The latter states that he is now operational on 2m after an absence of 10 years.

The **Lincolnshire** C.C., G2ATS, is going ahead with winter schemes, and it is hoped that the formation of a new radio society at Grantham will bring an extension of R.A.E.N. to this area.

Useful publicity for the Network in the Midlands was obtained from an article in a recent issue of the *Birmingham Post* published under a photograph of some of the **Birmingham** group officers.

Norfolk groups are now studying the results of the exercise reported last month, aided by the C.C.'s report which includes a map detailing signals strengths logged between all participants.

A general situation report from **Essex** gives the county mobile strength as 27. In addition to the many fixed stations the group holds equipment available for installation at Police and B.R.C.S. H.Q.s. About three exercises are held per annum—this being a satisfactory balance between too much and too little activity. This is a rather important point. It is found that too much activity kills groups far quicker than too little. "The encouraging state of the Essex group reflects much credit on the A.C.s.", says the C.C., G8TL.

In those groups having liaison with Police the word " security " is often heard, and it is often considered that the use of v.h.f.'s is a decided asset in this respect. Recently, there appears to be an increasing interest in the potentialities of RTTY, which is probably the most secure mode of communication available to amateurs. At present it is known that members in five areas are interested in RTTY, but with increasing quantities of equipment becoming available it is expected that more groups will soon be similarly equipped.

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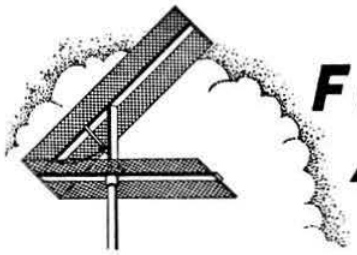
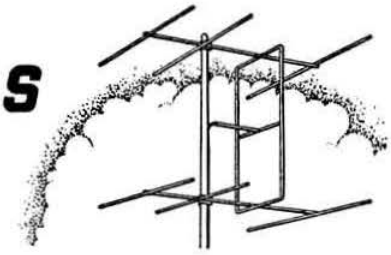
* *1 Shortbutts Lane, Lichfield, Staffs.*



FOUR METRES AND DOWN



By F. G. LAMBETH (G2AIW)*

THE results of the 1959 I.A.R.U. European V.H.F. Contest have recently been received, together with certificates for the various leading stations. Judging took a long time because all the distances were carefully and individually checked for the correct assessment of points at 1 per km.

The overall winner was PA0YZ/A with a total of 36,688 points. The total of logs submitted from all countries was 491, the largest national entry being from Czechoslovakia (126) followed by Italy (82), West Germany (81). The British entries and results were as follows:

Section 1		*Section* 2		*Section* 3	
1. G5YV	21,580 points	1. G2DTO/P	28,956 points	1. G3AYC	821 points
2. G3MED	20,495 points	2. GW3KMT/P	23,861 points	2. G5MR	326 points
3. G3HBW	19,831 points	3. GM3KYI/P	6,205 points	3. G3FAN	262 points
4. G3LTF	17,043 points				
5. G3FAN	15,541 points				
6. G6LI	9,113 points				
7. G3BDQ	6,588 points				
8. G5MR	4,277 points				
9. G3AYC	2,192 points				
10. G3LTN	622 points				

Two Metre News

The period under review, apart from a little aurora on October 25 and another on November 12-13, appears to have been one of the most discouraging for a very long time. There has been little or no tropospheric news and the aurora was apparently a very limited one, although the visual manifestation was much more southerly than usual, being noted in Northern England.

Auroral Report from G4LX

Further reports have now been received concerning the major auroral openings during October. In the north of Sweden, **SM3AKW**, who often finds himself too far north, worked SM5CGL and UR2BU on October 1 (10.00-15.00 G.M.T.). Aurora returned at 21.30 G.M.T. when SM5BQZ was heard. On October 2, he worked SM4CSK, SM4AAS and SM7ZN at midday. On October 4 auroral conditions returned at 18.10 G.M.T. and between 22.30 and 23.55 G.M.T. he worked 14 different SM stations. Further south, SM6PU had less success, only making six QSOs. At this time G4LX heard G3ILD and GM3EGW via aurora, but no other reports have been noted.

On October 5, SM6PU worked LA4RD and OZ7WA, and heard LA4YG and SM7ZN between 22.00 and 22.40 G.M.T.

On October 6 SM6PU heard DL1RX as early as 18.00 G.M.T., and during the first phase of the opening, OZ8ME, OZ4OL, DM2ADJ, DM2AUI, SP3GZ and various SMs were also heard. SM6PU worked OK1VDM. During this phase SM3AKW only heard SM stations. SP3GZ found that auroral preparation began at 15.00 G.M.T. He had QSOs with DL1PS, DL1RX, DL6MH, DL6SS, DJ5HG, OZ3NH, OZ5BK, SM5AAS, SM5AKP, SM5ANR, SM6QP, SM7ANB, SM7ASN and SM7ZN. The second phase of this opening lasted until 01.40 on October 7. SM6PU heard over 50 different stations in DJ, DL, DM, G, GM, LA, OK, OZ, PA0, SM, SP and UR. Included in his log are G3CCH, G3ILD, G5YV, G6XA, GM2FHH, GM3BDA, GM3EGW and GM4HR. SP3GZ also found the second phase better than the first. His log shows G3CCH, GM3BDA and GM3EGW.

A recurrence at 16.00 G.M.T. on October 7 brought another QSO between SM3AKW and UR2BU. This opening seemed to last from 14.50 to 17.20 G.M.T. and was reported upon by SM3AKW, SM6PU, and G3HBW.

LA9T reports auroral conditions on October 4, 6, 7, 24 and 25 during which LA4YG, LA9T, LA4VC and LA4RD worked many stations in OZ, SM, DL, DM, OK, ON, with GM3EGW and GM4HR worked by LA4VC on October 6 and GM3BDA, G3ILD and GM3FGJ heard by LA9T on the same date. On October 25 LA4RD worked GM3BDA with several DL and SM stations.

After a quiet spell, SM3AKW heard SM5AAS and SM7YO between 15.25-16.15 on October 20. No other reports of this opening have been received. On October 24, SM3AKW worked three SM stations between 16.00 and 17.00 G.M.T. SM6PU observed aurora between 17.35 and 18.50 G.M.T., and he managed to effect one QSO with SM5BIU, hearing several other stations including DL6QS. On October 25, SM6PU found signals between 16.00 and 17.44 and worked into LA, DL and SM, hearing OZ and GM3BDA among some 15 calls in his log. The second phase of this opening was noted by SM3AKW with five SM stations worked and another five heard. SM6PU worked GM3FGJ, GM3GUI and heard GM2FHH, DL1FF and many SMs. This opening died away just after midnight but reappeared for a few minutes at 16.00 G.M.T. when SM6PU heard SM4KW and at 22.20 G.M.T. when SM3AKW heard SM5AAS.

Between 14.15 and 16.50 G.M.T. on October 28 both SM3AKW and SM6PU had several SM contacts and at 16.19 G.M.T. on October 29 SM6PU worked LA4YG. Surely a memorable month for Sweden. What is November showing? On November 12 a major solar disturbance began to effect radio propagation. Auroral conditions were observed by G4LX on European TV signals, and these lasted intermittently from November 12 to 16. However, G4LX was unable to obtain auroral responses on 144 Mc/s. HB9RG was heard from 00.45-01.00 on November 13 and G3HBW and G2FAN were heard at 15.45 G.M.T.

GM2FHH (Aberdeen) reports a fair auroral opening on November 12-13 with lots of Gs, GMs, a few SMs and DLs but nothing outstanding.

GM3GUI (Friockheim) keeps a nightly watch between 22.30/23.30 and at other times when auroral conditions seem indicated. During these nightly periods it is always possible to work Edinburgh (80 miles) and Aberdeen (40 miles). As regards aurora, B.B.C. Channel 4 is used as a guide; this is extremely reliable because the TV aerial beams 019° true and when the patterning gets severe there are usually signals on 2m. On October 25 watch was commenced at 18.00 G.M.T. and almost immediately G3LTF (57A) and G3ILD (57A) were heard and G3LTF was then worked. This phase disappeared abruptly. At

* *R.S.G.B. V.H.F. Manager, 21 Bridge Way, Whitton, Twickenham, Middlesex.*

22.30 GM3DIQ, GI5AJ, G3ILD and G3HBW were heard, with G5YV worked at 23.38 and SM6PU at 23.50. On November 12 between 18.20 and 19.30 DJ5HG, DL6TU and ON4CP were worked with an SM station, DL9ARA, G3HBW, and GI5AJ all heard. At 21.35 watch was again kept. DL1RX was worked and G5YV, G6GN and G3GWL heard. DL6QS was noted working SM6QP. On November 13 at 22.10 G3BA and G3FZL (working GM3HLH/A) was heard. There were also auroral indications on October 23 (18.30-19.30 and 19.25-19.50) but no signals were heard on 2m. On November 15 between 18.05-19.10 there were again auroral symptoms but no replies to many calls.

There was another aurora on the night of November 21 when G3HBW and G6NB worked GM3BDA. At first sight this aurora appears to have been of limited effect, only GMs being heard by the southern stations.

G3LTF (Galleywood) reports that skeds with G3ILX and GW3MFY appear to be successful on most nights, but is hoped this will improve when a new aerial is ready. G3LTF, of course, also caught the aurora of October 25, and worked GM3BDA (58A, 17.36), GW2HIY (54A, 17.52), GM3GUI (55A, 18.19), GM3EGW (54A, 18.27) and G3ILD (56A, 18.35). This first phase ended at 18.45. Then at 23.37 GM3DIQ (44A) was worked with fade out at midnight. The next time there was anything of real interest was on November 12 when G2NY was heard working GI5AJ. G2NY was 59A at 19.30 approximately. No other signals were heard at all. G3HBW reports that the November 12/13 aurora appeared to be limited largely to GMs although G3JAM reported hearing HB9RG on the Saturday night, and a GM station was heard calling an SM7.

Miscellany

G2HCJ reports his new QTH as 822, Warrington Road, Rainhill, Liverpool, which should be a great improvement on the previous location but G2HCJ will not be heard much (except mobile) for a while.

GM2CHN (Glasgow, S.1) reports that there are two new local stations now on 2m: GM3KXM (Barlanark, east of Glasgow) and GM6MS (Kings Park, South Glasgow). The latter is temporarily an 144·72 Mc/s until he obtains a crystal for the correct zone. GM3FYB (Dunfermline) moved to a new QTH recently and puts a much improved signal across to Western Scotland. It is doubtful whether the recent auroral conditions were manifest in West Scotland as nobody appears to have heard or worked anything spectacular lately. GM2CHN gave a 2m lecture/demonstrations on November 11 to the Glasgow R.S.G.B. Group and it is hoped that several new stations may come up on the band as a result.

GM3DWX and GM6IZ are quite active and have both worked GM3GUI.

G5QA (Pinhoe, near Exeter) has now worked 22 counties on 2m since September 1, 1960, and the sked with GW3ATM continues three times weekly. They have also hooked up on 70cm, although only at RST439 so far.

GW3MFY (Bridgend) who keeps the flat flying in the worst possible conditions, has suggested that a certificate should be issued for c.w. working. It seems to G2AIW that this could be covered by an endorsement on the certificate already approved. What do other members think about this? Comments would be appreciated.

V.H.F. QSY

Members who wish to acquire or dispose of crystals in connection with the British Isles Two Metre Zone plan announced in March 1959 are invited to send details to " V.H.F. QSY," R.S.G.B. *Bulletin*.

Crystals Offered

By G3JTK, 83 Huntsmoor Road, Tadley, near Basingstoke, Hants. 12,083 kc/s (B7G type).

Crystals Required

By G3JTK, as above. B7G type crystal between 12,008 and 12,020 kc/s.

LONDON U.H.F. GROUP
will meet at the Bedford Corner Hotel, Bayley Street, Tottenham Court Road,
at 7.30 p.m. on Thursday, January 5, 1961
All v.h.f. and u.h.f. enthusiasts welcome.

G8LM is now active on 145·8 Mc/s every lunch time from 1.30-2 p.m., operated in turn by G3AAZ, G3GGK, G3HKK, G3LZW and G5UM.

B.R.S.21476 (Penarth) has been experimenting with converters for 435 Mc/s and 1250 Mc/s and a receiver is now under construction for the latter band, of which more news will be welcome when the results have been assessed.

GM2CHN reports that GM3FYB (Dunfermline) is running tests on 4m with GM5VG and GM3EGW.

Late News.—Experimental transmissions from the Society's beacon station, GB3VHF, at B.B.C. Wrotham (Kent) have commenced on 144.5 Mc/s. GB3VHF is scheduled to be on the air from 06.30-08.30, 12.0-14.00 and 18.30-23.59 G.M.T. daily, beaming due north.

* * *

Good wishes to you all for the coming Festive Season. Remember that postal arrangements are somewhat difficult around now, so if you have reports for this column, please send them right away!

R.S.G.B. Radio Hobbies Exhibition **(Continued from page 271)**

The R.A.F. Amateur Radio Society used a Heathkit DX100U and a Racal receiver in conjunction with a Mosley vertical aerial under the call-sign GB3RAF. Home-built equipment on show included G3OAT/T's 2·5 watt 70cm transmitter using a QQV02/6 in the p.a. Radio controlled model aircraft gear was also shown.

Exhibition Committee

The members of the Exhibition Committee are Messrs. C. H. L. Edwards (G8TL, Chairman), P. Matthews (G3BPM), G. W. Norris (G3ICI), F. F. Ruth (G2BRH), G. M. C. Stone (G3FZL), P. Thorogood (G4KD), C. Waterman (G3NKX) and E. W. Yeomanson (G3IIR).

Tail Piece

The competition for the Hallicrafters SX111 receiver was won by M. Palmer of Catford, London, S.E.6.

The President, Mr. W. R. Metcalfe (G3DQ), with Mr. R. G. Shears (G8KW), Managing Director of K.W. Electronics Ltd., who received the Silver Plaque for the most interesting piece of new manufactured equipment with his K.W. Viceroy s.s.b. exciter.

(Photo by Tella Co. Ltd.

Society News

R.S.G.B. Recorded Lecture Library

THE following new recorded lectures are now available on loan to R.S.G.B. Groups and Affiliated Societies.

"*Tape Recording*" (1960) by F. C. Judd, A.Inst.E. (G2BCX). 7½ i.p.s. Playing time, 70 minutes.

This new lecture covers briefly the latest developments in tape recording and contains demonstrations of wow and flutter, effects of incorrect a.c. bias and head azimuth adjustment, superimposing, mixing and artificial echo. Examples of editing are included and the lecture ends with excerpts of "musique concrete" and electronic music.

"*Radio over the Years*" (1955) by Capt. P. P. Eckersley, M.I.E.E. 7½ i.p.s. Playing time, 65 minutes.

This talk by Capt. Eckersley, who was the first chief engineer of the British Broadcasting Company, has recently been re-recorded and edited and contains interesting and amusing anecdotes from the early days of radio told in Capt. Eckersley's own inimitable way. It can be recommended to Groups and Clubs in search of a light-hearted change for one of their meetings.

The lecture "*V.H.F.*" by Sir Noel Ashbridge is now out of date and has been withdrawn from the Library.

St. Pierre and Miquelon Islands DXpedition

ON behalf of Bill Loeffler (W1PFA), Arthur Yates (G3LB) has presented to the Society a recorded lecture, illustrated with 35mm. colour slides, describing W1PFA's trip to St. Pierre and Miquelon.

The recording lasts for approximately one hour and is available on loan to R.S.G.B. Groups and Affiliated Societies from the Hon. Curator of the Society's Recorded Lecture Library. Applications to borrow the lecture should be made as far in advance as possible.

Impersonation at R.A.E.—Successful Prosecution

AT the Guildhall Magistrates' Court, London, on November 22, 1960, T. E. E. Roberts of 86 Russell Road, Birmingham, 28, and K. H. Potter of 4 Trevelyan Road, Seaton, Devon, both pleaded guilty to a joint charge of attempted fraud arising from Roberts' impersonation of Potter at the Radio Amateurs' Examination held in London on October 1, 1960. Roberts was fined £25; Potter was fined £50 and ordered to pay 15 guineas costs.

G.P.O. Morse Tests

MORSE Tests will be held at the Head Post Offices in Birmingham, Cambridge, Derby, Leeds and Manchester during the first week in January 1961, provided there are sufficient candidates. Application forms may be obtained from the Radio Services Dept., Radio Branch, G.P.O. Headquarters Building, St. Martin's-le-Grand, London, E.C.1.

Completed application forms, to which the entrance fee of 10s. must be affixed in stamps, must be posted to the Radio Services Dept., Wireless Telegraphy Section, Union House, St. Martin's-le-Grand, London, E.C.1 **to arrive not later than December 31, 1960.**

News Bulletin Service

IN the Annual Report of the Council published last month reference was made to the fact that Mr. Arthur Milne (G2MI) had read the London News Bulletin with very few breaks every Sunday morning since the service began five years ago. Whilst Mr. Milne has been the chief London news reader for several years it is also a fact that the R.S.G.B. News Bulletin Service was inaugurated in 1955 by Mr. Frank Hicks-Arnold (G6MB) who acted as chief news reader for about two years.

Society Trophies

THE Council has awarded the Braaten Trophy for 1960 to Mr. C. R. Perks (G4CP), leading English R.S.G.B. member station in the 1960 A.R.R.L. DX Telegraphy Contest. The Milne Trophy for 1960 has been awarded to Mr. R. Jones (GW3JI), leading U.K. R.S.G.B. member station (other than English) in the 1960 A.R.R.L. DX Telegraphy Contest.

I.A.R.U. Calendar

THE *Calendar* of the International Amateur Radio Union for June 1960 congratulates the Wireless Institute of Australia on the completion of a half-century of service on March 10, 1960, and reports that the Liga dos Amadores de Radio de Angola has been elected a member society of the Union. The *Calendar* also reports on emergency work carried out by amateurs in the Congo and during the Chilean earthquake.

Mr. H. F. Knott (G3CU) Honoured

ON November 15, 1960, Mr. H. F. Knott (G3CU) received from the Lord Prior, Lord Wakehurst, the Insignia of a Serving Brother in the Most Venerable Order of St. John of Jerusalem at an investiture held at the Grand Priory Church of the Order. The dignity was conferred on Mr. Knott by H.M. the Queen in recognition of service to the Order during the last 24 years.

73 Magazine News Service

THE *73 Magazine* news service for the editors of radio club newsletters works on a co-operative basis, those taking part sending copies of their journals to Mr. M. D. Lipton (VE3DQX) each month. Interesting items are extracted from these newsletters and included in a compendium which is sent to each participant. In this way, there is an exchange of material.

Full details of the service, for which there is no charge, are available from Mr. Lipton at 311 Rosemary Road, Toronto 10, Ontario, Canada.

The President, Council and Headquarters Staff

send Christmas and New Year Greetings to all

Members of the Society

Council Proceedings

AUGUST 1960 MEETING

Résumé of the Minutes of the Proceedings at a Meeting of the Council of the Radio Society of Great Britain, held at the Kingsley Hotel, Bloomsbury Way, London, W.C.1, on Monday, August 29, 1960, at 6 p.m.

Present: The President (Mr. W. R. Metcalfe in the Chair), Messrs. H. A. Bartlett, D. Deacon, C. H. L. Edwards, K. E. S. Ellis, R. C. Hills, E. G. Ingram, J. D. Kay, A. O. Milne, L. E. Newnham, F. K. Parker, F. A. Russell, G. M. C. Stone, P. H. Wade, A. C. Williams, E. W. Yeomanson (Members of the Council) and John Clarricoats (General Secretary).

Apologies for absence were submitted on behalf of Mr. N. Caws and Dr. R. L. Smith-Rose.

* * *

Membership

Resolved (i) to elect 98 Corporate members and 32 Associates. (ii) to grant Corporate membership to 5 Associates who had applied for transfer.

Applications for Affiliation

Resolved to grant affiliation to the Bridlington and District Radio Society, and the English Electric Aviation Ltd. (Warton) Amateur Radio Society.

Council Elections 1961

Society Trophies 1960

These matters were reported upon in the September 1960 issue of the R.S.G.B. BULLETIN.

Society Advertising

It was reported that for reasons of health Mr. H. Freeman had been compelled to resign as the Society's Advertisement Manager.

Resolved to instruct the Secretary to convey to Mr. Freeman the warm thanks of the Council for his unremitting efforts on behalf of the Society during the past 35 years.

It was formally proposed that Mr. Freeman be elected an Honorary Vice-President of the Society in recognition of his past services to the Society as Advertisement Manager from 1925 to 1960.

(Mr. Freeman was subsequently elected an Honorary Vice-President at the September meeting of the Council.—ED.).

It was reported that as the result of Mr. Freeman's retirement National Publicity Co. Ltd. would no longer be in a position to undertake the duties of Advertisement Managers to the Society.

Resolved to invite Sawell & Sons Ltd. to handle the Society's advertising with effect from October 1, 1960, on the same terms and conditions as have applied between the Society and National Publicity Co. Ltd.

Special Call Signs for Handicapped Amateurs

Resolved to take no action on a suggestion that the Post Office should be asked to issue special call signs to handicapped amateurs.

Reports of Committees

The Minutes of meetings of the following Committees were submitted as Reports.

V.H.F.—July 18; Finance and Staff—July 22 and 23; Headquarters Housing *ad hoc*—July 23; V.H.F. *ad hoc*—August 5; Exhibition—July 19 and August 8.

Resolved to receive the Reports and to adopt the recommendations contained therein.

The recommendations dealt with, *inter-alia*, the v.h.f. beacon station at Wrotham Hill; staff increments; the drafting of an advertisement for a senior administrative assistant; the Society's participation in the Earls Court Radio Show and the Radio Hobbies Exhibition.

Mr. Deacon asked to be recorded as voting against a Recommendation of the V.H.F. Committee that the band 432–434 Mc/s should be adopted for crystal controlled narrow band communication (as agreed at the I.A.R.U. Region I Conference held in Folkestone). He considered crystal control was more appropriate to band edge operation.

Intruders

It was reported that at a recent meeting of the P.M.G's Frequency Advisory Committee the General Secretary had drawn the attention of the Committee to the difficulties which amateurs are experiencing due to the continued operation of intruders in exclusive amateur bands. The Post Office representative on the Committee had agreed to look into the points raised by the General Secretary.

The meeting terminated at 10 p.m.

SEPTEMBER 1960 MEETING

Résumé of the Minutes of the Proceedings of a Meeting of the Council of the Radio Society of Great Britain, held at New Ruskin House, Little Russell Street, London, W.C.1, on Monday, September 26, 1960, at 6 p.m.

Present: The President (Mr. W. R. Metcalfe in the Chair), Messrs. N. Caws, D. Deacon, C. H. L. Edwards, K. E. S. Ellis, R. C. Hills, E. G. Ingram, J. D. Kay, A. O. Milne, L. E. Newnham, F. K. Parker, F. A. Russell, G. M. C. Stone, E. W. Yeomanson (Members of the Council) and John Clarricoats (General Secretary).

Apologies for absence were submitted on behalf of Messrs. H. A. Bartlett, R. L. Smith-Rose, P. H. Wade and A. C. Williams.

* * *

Annual Accounts

The draft annual accounts of the Society for the year to June 30, 1960, were submitted by the Honorary Treasurer.

Mr. Caws gave information on various aspects of the Accounts after which it was

Resolved to accept the accounts as prepared by the Honorary Treasurer and to place on record the thanks of the Council to Mr. Caws for the informative manner in which he had drafted the accounts.

Report of the Council

The draft annual Report of the Council for the year to June 30, 1960, was submitted by the General Secretary.

Resolved to approve the Report for publication.

Earls Court Radio Show

It was reported that the sum of £630 19s. had been taken on the Society's stand during the 10 days of the Earls Court Radio Show.

Membership

Resolved (i) to elect 137 Corporate Members and 67 Associates; (ii) to grant Corporate membership to nine Associates who had applied for transfer.

Election of Honorary Vice-President

Mr. Ellis having formally proposed at the meeting of the Council held on August 29, 1960, that Mr. Horace Freeman be elected an Honorary Vice-President in recognition of his past services to the Society as Advertisement Manager from 1925 to 1960, a ballot, as required by Article 12 of the Society's Articles of Association, was conducted.

Resolved that Mr. Horace Freeman be elected an Honorary Vice-President of the Society.

The Secretary was authorized to have made a suitable certificate for presentation at a later date to Mr. Freeman.

I.A.R.U. and Amateur Frequencies

It was agreed to write to the Secretary, I.A.R.U., drawing his attention to the concern experienced by the Council of the R.S.G.B. that the International Amateur Radio Union as such—although a specialized international agency of the International Telecommunication Union—was not represented at the Geneva Radio Conference 1959; that the Constitution of the Union requires that Member Societies generally shall be represented at such Conferences and that the Amateur Service in Regions I and III has suffered serious losses compared with the Amateur Service in Region II. (Member societies in Europe were represented at the Geneva Conference by a team of I.A.R.U. observers but their responsibilities concerned Region I only.—Ed.)

National Convention

After consideration had been given to various aspects of the recently held National Convention in Cambridge it was

Resolved that a letter of thanks be sent to the Chairman of the Convention Committee (Mr. T. A. T. Davies, G2ALL) thanking him and his colleagues for the excellent arrangements that had been made.

Woburn Abbey Mobile Rally 1961

Resolved (i) to set up a Committee consisting of Messrs. G. M. C. Stone, E. W. Yeomanson and J. A. Rouse, to organize the Woburn Abbey Mobile Rally 1961; (ii) to give the Committee power to co-opt; (iii) to thank the Amateur Radio Mobile Society for an offer to help in the work of organizing the Rally; (iv) to pass on the offer of help from the Amateur Radio Mobile Society to the Mobile Rally Committee.

R.S.G.B. Mobile Section

It was agreed to consider at the October meeting a suggestion that the Society should form a Mobile Section.

The Morse Code for Radio Amateurs

Resolved to accept an estimate from Bentley & Co. (Printers) Ltd. for printing 5,000 copies of an enlarged and revised edition of *The Morse Code for Radio Amateurs.*

Northern Rhodesia

Resolved to grant permission to the Northern Rhodesia Amateur Radio Society to use a badge, car sticker and signal post notice similar in basic design to that used by the Radio Amateur Emergency Network sponsored by the R.S.G.B.

Reports of Committees

The minutes of meetings of the following Committees were submitted as Reports:

Contests—August 18: V.H.F.—September 5: R.A.E.N.—September 3: Exhibition—September 6.

Resolved to receive the Reports and to accept the Recommendations contained in the Reports of the Contests and V.H.F. Committees.

The Recommendations dealt with various Contest matters and with the introduction of new certificates for v.h.f. and u.h.f. achievements.

The meeting terminated at 10.15 p.m.

Rules for the Twenty-fourth B.E.R.U. Contest March 11-12, 1961

RADIO amateurs throughout the British Commonwealth and Empire are invited to take part in the Twenty-fourth B.E.R.U. Contest to be held on March 11-12, 1961. The Contests Committee is again arranging to secure the maximum amount of overseas publicity but solicits the assistance of members in bringing the dates and rules to the notice of all operators.

1. **Sections.** — The contest is divided into two sections: (a) High Power—maximum licensed power; (b) Low Power—maximum input 25 watts.
2. **Duration.** The contest (both sections) will start at 00.01 G.M.T. on Saturday, March 11, and end at 23.59 G.M.T. on Sunday, March 12, 1961.
3. **Eligible Entrants.** The contest is open to all fully paid-up corporate members of the R.S.G.B. resident within the United Kingdom and to all British subjects outside the U.K. but within the British Commonwealth and British Mandated Territories. All entrants agree to be bound by the rules of the contest.
4. **Operator.** Only the entrant will be permitted to operate his station for the duration of the contest.
5. **Entries.** Entries must be set out, as shown in the example, on **ONE SIDE ONLY** of foolscap paper. **Entries must be postmarked not later than April 1, 1961,** and must be addressed to the Contests Committee, Radio Society of Great Britain, 28/30 Little Russell Street, London, W.C.1, England.

B.E.R.U. CONTEST, MARCH 11-12, 1961

Claimed Score.....

Section: (High or Low Power).....

Name ..... Call-sign.....

Address .....

Transmitter.....Power input.....watts

Receiver..... Aerial(s).....

DECLARATION: I declare that this station was operated strictly in accordance with the rules and spirit of the contest, and I agree that the decision of the Council of the R.S.G.B. shall be final in all cases of dispute. I certify that the maximum input to the final stage of the transmitter was.....watts.

Date..... Signed.....

Failure to sign the declaration may involve disqualification of the entry.

Date	Band Mc/s	Time GMT	Call-sign of station worked	My report on his signals	His report on my signals	Leave blank	Bonus Points	Points Claimed
11	14	0005	G3XXX	569001	559002		20	5
11	14	0009	VK2ZZZ	579002	569004		20	5
12	14	0012	GM3YYY	569113	579112		—	5
12	21	0730	GW8XXX	589114	589154		20	5
Total (Points Claimed + Bonus Points) 20 + 60 = 80								

6. **Bands.** Operation is restricted to the following bands: 3·5, 7, 14, 21 and 28 Mc/s. Transmission must be of type A1 (pure c.w.) only, and frequent tone reports of T8 or less may result in disqualification.
7. **Licence Conditions and Power Input.** Entrants must operate within the terms of their licences. The input to the valve, or valves, delivering power to the aerial must not exceed 25 watts in the Low Power section.
8. **Contacts.** Contacts may be made with any station using a British Commonwealth call-sign except within the entrant's own call area. British Isles stations may not work each other for points. Contacts with unlicensed stations will not count for points. The decision as to whether or not a contact is valid will rest with the R.S.G.B. Contests Committee. Only one contact on each band with a specific station will count for points. Duplicate contacts should be logged, but no points claimed.
9. **Scoring.** Each completed contact will score 5 points. In addition a bonus of 20 may be claimed for the first contact with each new Commonwealth call area (as defined in the Appendix) on each band. All British Isles stations (G, GC, GD, GI, GM and GW) count as only one call area.
10. **Contest Exchanges.** Serial numbers must be exchanged and acknowledged before a contact can count for points. The serial number of six figures will be made up of the RST report plus three figures **starting with 001 for the first contact** and increasing by one for each successive contact, e.g. 559001 for the first and 439002 for the second contact, etc.
11. **Awards.** At the discretion of the Council, a trophy or miniature will be awarded to the winner of each section, and certificates will be awarded to the first three entrants in each section. In addition a certificate will be awarded to the leading entrant in each call area regardless of the number of entrants in his call area provided that his score exceeds 1,500 points in the High Power section or 750 points in the Low Power section. A certificate will be awarded in each call area in which there are ten or more entrants to the runner-up, provided his score exceeds 1,500 points in the High Power section or 750 points in the Low Power section.

Appendix

The following call areas are recognized for the purposes of scoring in the B.E.R.U. Contest:—

G, GC, GD, GI, GM, GW—as one call area.
MP4 (Bahrein).
MP4 (Qatar).
MP4 (Trucial Oman).
VE1
VE2
VE3
VE4
VE5
VE6
VE7
VE8
VK0 (Australian Antarctica).
VK0 (Heard Island).
VK0 (Macquarie Island).
VK1
VK2
VK2 (Lord Howe Island).
VK3
VK4
VK4 (Willis Island).
VK5
VK6
VK7
VK9 (Admiralty Island).
VK9 (Christmas Island).
VK9 (Cocos Island).
VK9 (Norfolk Island).
VK9 (Papua).
VK9 (New Guinea and Bismarck Island).
VO
VP1
VP2 (Anguilla).
VP2 (Antigua and Barbuda).
VP2 (British Virgin Islands).
VP2 (Dominica).
VP2 (Grenada and Dependencies).
VP2 (Montserrat).
VP2 (St. Kitts and Nevis).
VP2 (St. Lucia).
VP2 (St. Vincent & Dependencies).
VP3
VP4
VP5 (Jamaica).
VP5 (Cayman Islands).
VP5 (Turks & Caicos Islands).
VP6
VP7
VP8 (Falkland Islands).
VP8 (Grahamland).
VP8 (Sandwich Islands).
VP8 (South Georgia).
VP8 (South Orkney Islands).
VP8 (South Shetland Islands).
VP9
VQ1
VQ2
VQ3
VQ4
VQ5
VQ7 (Aldabra Island).
VQ8 (Chagos).
VQ8 (Agalega).
VQ8 (Rodrigues).
VQ8 (St. Brandon).
VQ8 (Mauritius).
VQ9
VR1 (Gilbert & Ellice Islands).
VR1 (British Phoenix Islands).
VR2
VR3 (Christmas Island).
VR3 (Fanning Island).
VR4
VR5
VR6
VS1
VS4
VS5
VS6
VS9 (Aden)
VS9 (Maldive Islands)
VS9 (Muscat and Oman).
VU2
VU4 (Laccadive Islands).
VU5 (Andaman and Nicobar Islands).
ZB1
ZB2
ZC4
ZC5
ZD1
ZD2
ZD3
ZD6
ZD7
ZD8
ZD9 (Gough Island).
ZD9 (Tristan da Cunha).
ZE
ZK1 (Cook Islands).
ZK2
ZK3 (Tokelau Island).
ZL1
ZL1 (Kermadec Island).
ZL2
ZL3
ZL3 (Chatham Island).
ZL4
ZL4 (Auckland & Campbell Islands).
ZL5 (N.Z. Antarctica).
ZM6
ZS1
ZS2
ZS2 (Marion Island).
ZS3
ZS4
ZS5
ZS6
ZS7
ZS8
ZS9
AP (West Pakistan).
AP (East Pakistan).
4S7
9G1
9K2
9M2

CONTEST NEWS

— RESULTS — REPORTS — RULES —

Rules for the B.E.R.U. Contest, Receiving Section, 1961

1. **Eligible Entrants.** The contest is open to all fully paid-up members of the R.S.G.B. resident within the United Kingdom and to all British subjects outside the U.K. but resident within the British Commonwealth and British Mandated Territories. All entrants agree to be bound by these rules. Only the entrant may operate his receiving station for the duration of the contest. Holders of amateur transmitting licences are **not** eligible to take part.

2. **Duration.** The contest will commence at 00.01 G.M.T. on Saturday, March 11, 1961, and end at 23.59 on Sunday, March 12, 1961. The B.E.R.U. Contest for transmitting amateurs will take place during the same period.

3. **Entries.** (*a*) To count for points, a station outside the entrant's own call area must be heard in a contest contact and the following details logged in columns headed as follows: (i) Date/Time (G.M.T.); (ii) Call-sign of Station Heard; (iii) Report and Serial Number sent by Station Heard; (iv) Call-sign of the Station being worked; (v) Band in Mc/s; (vi) Bonus Points Claimed; (vii) Points Claimed. CQ or Test calls will **not** count for points.

(*b*) Entries must be set out on ONE SIDE ONLY of foolscap or quarto paper. Entries must be postmarked not later than **April 1, 1961,** and must be addressed to the Contests Committee, Radio Society of Great Britain, 28-30 Little Russell Street, London, W.C.1.

(*c*) All entries must contain the following declaration:

I declare that this receiving station was operated strictly in accordance with the rules and spirit of the contest and I agree that the decision of the Council of the R.S.G.B. shall be final in all cases of dispute. I do not hold an amateur transmitting licence.

Date..... Signed.....

4. **Scoring.** Each complete log entry will score 5 points. In addition, a bonus of 20 points may be claimed for the first station heard in each new Commonwealth call area (as defined in the Appendix on page 290) on each band. The British Isles (G, GB, GC, GD, GI, GM and GW) count as one call area only as indicated in the Appendix to the rules of the Transmitting Section. A station may be logged only once on each band for the purposes of scoring. Where both stations in a contact are heard, they should be logged separately; points may be claimed for both entries.

5. **Awards.** At the discretion of the Council a trophy or miniature will be awarded to the winner and a certificate of merit to the runner-up in each of the I.A.R.U. continents.

Low Power Field Day 1960

FOR the third year in succession it was " as you were " for the two leading positions in the Low Power Field Day held on September 25, 1960. These places are again taken by David Alexander (G3KLH/P) and John J. Yeend (G3CGD/P) respectively.

Both scored a few points less than last year—108 and 79. The reason for the drop in points scored cannot be blamed entirely on conditions: the fact is that support has unfortunately dropped for this event. With 11 entrants in each of the two previous years, the number of entries was only 8. It is a pity that other /P stations known to be operating could not be persuaded to submit an entry.

Conditions were generally reported to be fair but heavy QRM on 7 Mc/s restricted the number of completed contacts. Several participants consider it is a waste of time to attempt contests on this band with low power. Despite this, it is interesting to note that the winner made 13 contacts on 7 Mc/s in districts ranging from Dartmouth to Birmingham and Newcastle.

Power inputs ranged from 0·8-3·5 watts and all competitors managed to keep within the allowance of 20 lb. for equipment, G3CWL/P claiming seventh position with 14¾ lb.

The Contests Committee are grateful to G3IIU/P, G8KL/P and GW3NWQ/P for check logs which were of considerable value.

Posn	Call-sign	Location	Contacts	Points
1.	G3KLH/P	2 m. south of Deddington, Oxon	44	108
2.	G3CGD/P	Cheltenham, Glos.	33	79
3.	G3BZM/P	High Wycombe, Bucks.	33	69
4.	GW3GHC/P	Cardiff	24	60
5.	G8NN/P	Bradfield, Yorks	19	42
6.	G3BY/P	Marple, nr. Stockport	14	34
7.	G3CWL/P	Headley, Surrey	8	24
8.	G3NMO/P	Boston, Lincs.	5	20

144 Mc/s C.W. Contest, 1961

RULES for the 144 Mc/s C.W. Contest to be held on January 29, 1961, are substantially the same as for the two previous events.

When: 10.00 G.M.T. to 22.00 G.M.T. on Sunday, January 29, 1961.

Sections: (*a*) High Power (up to 150 watts input to the p.a. stage); (*b*) Low Power (up to 30 watts input to the p.a. stage).

Eligible Entrants: All fully paid-up members of the R.S.G.B. resident in Region 1.

Contacts: May be made on A1 only.

Scoring: For each completed contact within the United Kingdom 10 points may be claimed; in addition a bonus of 25 points may be claimed for the first contact in each new county in accordance with the list on page 373 of the February 1960 issue of the R.S.G.B. *Bulletin*. The whole of the London Postal Districts will count as one county only. For contacts outside the United Kingdom, a flat rate of 25 points for each completed contact may be claimed.

Contest Exchanges: RST reports followed by the band identification letter A, the contact number, location of station and county (e.g. RST-559A001 SNE Luton, Beds. or RST579A002 Hendon, London).

Logs: (*a*) Must be tabulated in columns headed (in this order) " Date/Time (G.M.T.)," "Call-sign of Station Contacted," "My report on His Signals and Serial Number Sent," " His Report on My Signals and Serial Number Received," " Location of Station Contacted," " County," " Points Claimed."

(*b*) The cover sheet must be made out in accordance with R.S.G.B. Contests Rule 5 and the declaration signed. The address of the station must include the county.

(*c*) Entries must be postmarked not later than Monday, February 13, 1961.

Awards: At the discretion of the Council of the R.S.G.B., certificates of merit will be awarded to the leading station in each section.

The General Rules for R.S.G.B. Contests apply to this contest.

National Field Day 1960

TWO errors occurred in the tabulation of results for National Field Day 1960 published on pages 224 and 225 of the November BULLETIN.

The scores of the Cardiff and Penarth Groups should have been combined to give a total of 1,241 points, so placing the jointentry in 17th place with York Amateur Radio Society.

In the details of the Stoke-on-Trent Amateur Radio Society, the call-sign of the B station, G2AMN/P, which operated on 14 Mc/s, was inadvertently omitted.

CONTESTS DIARY

1961

January 29	- 144 Mc/s C.W. Contest
February 4-5	- Affiliated Societies' Contest
February 4-5	- A.R.R.L. DX Contest (Phone Section)
February 18-19	- A.R.R.L. DX Contest (C.W. Section)
February 25-26	- First 1·8 Mc/s Contest
March 4-5	- A.R.R.L. DX Contest (Phone Section)
March 4-5	- 144 Mc/s Open Contest *
March 11-12	- B.E.R.U. Contests
March 18-19	- A.R.R.L. DX Contest (C.W. Section)
April 8-9	- Low Power Contest
April 16	- D/F Qualifying Event
April 23	- 420 Mc/s Contest
April 30	- D/F Qualifying Event (London)
May 7	- First 144 Mc/s Field Day *
May 14	- D/F Qualifying Event (South Manchester)
May 28	- D/F Qualifying Event
June 3-4	- National Field Day
June 10-11	- 1250 Mc/s Tests
June 17-18	- 70 Mc/s Contest
June 25	- D/F Qualifying Event
July 2	- Second 144 Mc/s Field Day *
July 9	- D/F Qualifying Event
September 2-3	- I.A.R.U. Region 1 V.H.F. Contest
September 2-3	- National 144 and 420 Mc/s Contests *
September 10	- D/F National Final
September 17	- Low Power Field Day
October 8	- R.A.E.N. Rally
November 11-12	- Second 1·8 Mc/s Contest
December 2-3	- R.S.G.B. 21/28 Mc/s Telephony Contest
	R.S.G.B. 21/28 Mc/s Telephony Receiving Contest

* *To coincide with dates of I.A.R.U. Region 1 v.h.f. contests.*

Letters to the Editor . . .

Neither the Editor nor the Council of the Radio Society of Great Britain can accept responsibility for views expressed by correspondents. Letters for inclusion in this feature should be concise and preferably not more than 200 words in length.

Intruder Watch—A Call for Volunteers!

DEAR SIR,—Several members who have given valuable assistance to the R.S.G.B. Intruder Watch for a number of years have now ceased to send in reports. This is bound to happen as people either lose interest or collect duties in other directions. The result of this is that we shall be unable to give full cover to the four " exclusive " bands in question, unless more help is forthcoming. About eight additional stations in the United Kingdom are required to give proper monitoring cover on a shared basis. At least one of these should be in Scotland and one in Northern Ireland.

May I again appeal for assistance, but in so doing request that offers should only come from active amateurs who have a good receiver to cover 7, 14, 21 and 28 Mc/s, have an accurate frequency meter, can copy c.w. at 25 w.p.m. plus and, above all, are prepared to give a few hours a week for at least two years. My reason for saying this is that I have sent details to at least 20 volunteers in the past year, only to find, with regret, that they lack time, qualifications or equipment.

Yours faithfully,

3 Norris Gardens, Grange Estate, Havant, Hants.

D. W. J. HAYLOCK (G3ADZ), *Hon. Organizer, R.S.G.B. Intruder Watch.*

Mullard Award

DEAR SIR,—As the first recipient of the Mullard Award I am interested to know why no mention has been made of the winner for 1959. I can only assume that no one was nominated. If this is correct then I think it is most unfortunate because it shows a lack of interest on the part of members.

The Mullard Award was offered to and accepted by the Society, and was to be made annually in accordance with conditions published in the January issue of the R.S.G.B. BULLETIN each year. Surely if there had been real interest in the Award at least a few members would have been nominated for 1959.

Perhaps this letter will help to draw attention to the Award—which I can assure your readers is well worth winning—so that when the terms and conditions for 1960 are announced a number of nominations will be forthcoming.

Yours faithfully,

PETER S. ODELL (Twinkletoes) (G3MUM).

Mullard Award Winner 1958.

There were no nominations for the Mullard Award for 1959.—Editor.

A Bouquet for the Post Office

DEAR SIR,—May I, through the medium of the BULLETIN, express my thanks to the examination and licensing departments of the G.P.O., who by the use of the telephone and express delivery letters enabled me to become licensed in such a short time, thereby allowing me to leave for Singapore to join the ranks of the VS1s as a fully qualified radio amateur? Their courteous and prompt action speaks highly of their interest in Amateur Radio and the individual.

Yours faithfully,

Wolverton, Bucks. G. F. QUANTRILL (G3OPF).

Netting Facilities on Transmitters

DEAR SIR,—It is more than 20 years since " netting " came into amateur use and today the majority of operators net on the other fellow's frequency. This being so, one might imagine that the operation of netting would be a simple job—just throw the net switch, adjust the v.f.o. to zero beat, put the net switch to normal and go ahead. If the change in frequency were small this would be all that was required—a larger change would quite reasonably require a slight touch of the other controls for maximum output.

With such thoughts—and a new transmitter—in mind I had a look round the 1959 Exhibition but what did I find? In only one transmitter did I see such a facility incorporated, but for some queer reason it was incorrectly labelled " Tune! " On the other two transmitters in which I was interested—up to then!—I was told there was no such switch. It certainly seems that netting facilities are very much an afterthought and whilst my grouse especially applies to commercial designs (where the designers could and ought to do better) it also applies to many published articles.

It may very well be that much of the bad netting on the amateur bands is due to the lack of adequate netting facilities and I shall be very interested to hear what the 1960 Exhibition brought forth.

Yours faithfully,

Upper Nazeing, Essex. T. L. FRANKLIN (G2ARN).

Phone During N.F.D.

DEAR SIR,—The letter, in the August BULLETIN, from the Honorary Secretary of the Grimsby Amateur Radio Society has caused considerable comment among the members of this Society.

We consider that the introduction of phone into National Field Day, as the band planning is at present, would be an act of the utmost folly. It would, as stated by G3LOP, make the contest much less enjoyable due to the lack of contacts to be made and also the fact that, even on the higher frequency bands, very few contacts would be made with other countries in Europe. Contacts with countries outside Europe would, with the present conditions on the h.f. bands, be virtually impossible using the present low input power. Should the power level be increased it would give some groups a very unfair advantage over their neighbours with less financial backing.

The only way in our opinion that phone could be introduced into National Field Day would be to bring v.h.f. bands into the contest. Phone operation on 144 Mc/s, 420 Mc/s or even 70 Mc/s (although difficult to use the latter band due to restricted operation in certain areas), would not upset any of the normal N.F.D. procedure. Operation on these bands could be by a " C " Station. Entries could be classified as being in the (*a*) Single Station; (*b*) Two Station and (*c*) Three Station section of the contest. All other rules could remain unaltered.

Yours faithfully,

M. PHARAOH (G3LCH), *Honorary Secretary.*

Mitcham & District Radio Society.

The Council has already decided that telephony will not be used in the 1961 N.F.D. event.—EDITOR.

Reciprocity and Third Party Message Handling

DEAR SIR,—In answer to G3JMT (September " Letters ") may I spring to the defence of G3FPK? The words used by G3FPK indicated (to me at least) that it would be a start if reciprocity could be finalised between NATO countries.

In 1957 I was granted a mobile licence by the German Post Office to wander as I would through Western Germany, as was also G3KZI, but a Germany National is not permitted to hold a British Isles licence because our law states that the holder of such a licence must be of British Nationality.

Although G3JMT is correct about the F.C.C. not permitting general " foreign " licensing, the U.S.A. has a reciprocal agreement with Canada. This has the effect of permitting " G " licence holders to creep-in through the back door, since Great Britain and Canada also have reciprocal arrangements. Once a person holds a VE licence he can operate in the U.S.A.

The old argument, often quoted, that our U.S. friends, if licensed to operate in the U.K. would wish to run kilowatts and phone patches could be quite easily overcome, by making it a condition that they be governed by exactly the same regulations as ourselves and that would include visits, inspections and loss of licence in the event of abuse.

The first and obvious step is the promotion of a Parliamentary Bill to annul the requirement of British nationality in order to qualify for an Amateur licence. The G.P.O. are in no position to do this but why cannot the R.S.G.B. try? It would enhance the Society's status by virtue of having tried and even more so if it was successful.

With reference to third party traffic handling I would suggest that since a Mobile Licence costs an extra £1 a year those keen enough to want to handle messages might like to pay extra for the privilege. It sounds silly but remember that many R.A.E.N. members giving service to the community with their mobile gear are paying for the right to do so.

Yours faithfully,

London, S.E.3. V. A. FRISBEE (G3KVF/DJ0AF/M).

420 Mc/s Contest

DEAR SIR,—I read the letter from Mr. Hills (G3HRH) with considerable surprise as I had always assumed that the majority of 70cm operators supported the views expressed by G2XV on the question of 420 Mc/s contest dates.

While appreciating the Society's wish to support I.A.R.U. contests, the number of entries shows that the support is " on paper only " as far as 420 Mc/s is concerned.

The fact is that even the most enthusiastic and well equipped 70cm operator is unwilling to exchange the many QSOs obtainable on 2m during a contest period, for the much more doubtful chance of QSOs on 70cm.

We are therefore left with only one useful 420 Mc/s contest each year and that at a time of the year not likely to produce the best of conditions. I would welcome an additional " 420 Mc/s only " contest held during the last weekend of June or the second weekend of July. If plenty of publicity was given to this contest with the other European I.A.R.U. members I feel that I could look forward with some optimism to my first 70cm European QSO!

Yours faithfully,

Leamington Spa. H. J. WITHERS (G6XA).

DEAR SIR,—As one of the regular users of the 420 Mc/s band both for television and sound transmissions I would like to put forward my views regarding the question of the National 420 Mc/s contest referred to by Mr. R. C. Hills (G3HRH) in his letter in the November BULLETIN.

I feel from my experience of this year's National 420 Mc/s Contest that the present arrangement of running this contest concurrently with the National 144 Mc/s Contest is a mistake since all that appears to happen is that people take the " easier " band and completely ignore 70cm.

You will of course be aware that broadcasting organizations are now well advanced with their plans for u.h.f. broadcasting of television in bands IV and V and it will not be many years before " pressure " is brought to bear on our amateur frequency allocations in the 420 Mc/s band. In view of this the importance of more people using the 420 Mc/s band cannot be overemphasized. As a contest on any single band seems to attract more stations, it would seem logical to run the 420 Mc/s contest in 1961 on a separate occasion so that all the available 420 Mc/s stations can take part without feeling that they are missing something on 144 Mc/s.

I sincerely hope that the above suggestions can be adopted for the next National 420 Mc/s Contest.

Yours faithfully,

Saffron Waldon, Essex. JEREMY ROYLE (G3NOX/T).

(*Letters expressing similar views have been received from a number of other members.*—EDITOR.)

DEAR SIR,—I was very pleased to learn from the response to my letter published in the November BULLETIN, that, as had previously appeared the case, the views expressed by G2XV were not, as I suggested, without support.

I am quite sure that with the appearance of these many views, for such a long period latent, the Contests Committee will now have ample evidence to justify a reconsideration of the position in regard to the disputed contest. But a word of warning is, I think, not out of place. Reference to back issues of the BULLETIN shows that the support for the Spring 420 Mc/s Contest has been less than 15 entries for the past two years, although I am sure that by virtue of the scores claimed, a much larger number of stations were active. One contest a year is hardly justified for 15 entries, and two could be considered by non-u.h.f. enthusiasts an extravagance. It is therefore surely up to those who have written to you so vigorously, to ensure that their fellow enthusiasts support the separate contests which are arranged for them.

Mr. Jeapes is then to be congratulated on persisting in his efforts to draw attention to the question of the National 420 Mc/s Contest, knowing that he was not receiving *open* support from other 70cm operators, and thus appearing to express an entirely individual view, which it is now clear is not the case.

Yours faithfully,

Digswell, Herts. R. C. HILLS, B.Sc.(Eng.) (G3HRH).

Radio Amateurs' Examination

OF the 274 candidates who sat for the G.P.O. Radio Amateurs' Examination on October 1, 1960, 182 (66 per cent) were successful.

The paper was as follows:

Candidates leaving the room before the completion of the examination will not be re-admitted.

The use of log tables and slide rules is permitted.

Part 1

Both questions in this part MUST be answered.

1. With reference to an amateur sending and receiving station, what is meant by:
   (a) " the temporary alternative address or location "?
   (b) " the alternative address "?

   What are the conditions laid down as to the use of the station call-sign in the cases of (a) and (b) above?

   In general, when must the call-sign of an amateur station be sent and, in the case of Morse transmissions, at what speed should it be sent? (*15 marks*)

2. Describe and explain a method of ensuring that the voltage of the h.t. supply to a transmitter remains stable within close limits. Describe and explain the undesirable effects that can arise when an unstabilized h.t. supply is used for a transmitter. (*15 marks*)

Part 2

Answer SIX of the eight questions in this part.

3. Describe the construction of an r.f. pentode valve and state the purpose of each electrode. (*10 marks*)

4. Why is neutralization necessary when a triode valve is used as an r.f. amplifier? Show by a diagram how it is applied and explain the action of the circuit. (*10 marks*)

5. Describe, with the aid of diagrams, one method of demodulation suitable for use in a receiver for amplitude modulated waves. (*10 marks*)

6. Explain what is meant by an " artificial aerial " and describe a type suitable for use with an amateur transmitter. Explain its use. (*10 marks*)

7. Describe fully a three stage tuned radio frequency receiver for the reception of modulated and unmodulated high frequency waves in the range 2 Mc/s to 28 Mc/s. (*10 marks*)

8. Describe the paths taken by electro-magnetic waves:
   (a) at 2 Mc/s over a distance of 150 miles.
   (b) at 14 Mc/s over a distance of 3,000 miles.
   (c) at 144 Mc/s over a distance of 30 miles.
   (*10 marks*)

9. What is meant by:
   (a) mutual induction?
   (b) self-induction?

   Define the unit of self-inductance. (*10 marks*)

10. What is the total heater power dissipated in a receiver having four valves, all with their heaters joined in series. The ratings of the heaters are as follows: V1 = 12 volts 0·3 amp, V2 = 12 volts 0·3 amp, V3 = 15 volts 0·3 amp, V4 = 25 volts 0·3 amp. (*10 marks*)

Forthcoming Events

Details for inclusion in this feature should be sent to the appropriate Regional Representatives. T.R.s and club secretaries are reminded that the information submitted must include the date, time and venue of the meeting and, whenever possible, details of the lecture or other event being arranged. Regional Representatives are requested to set out copy in the style used below.

DATES FOR YOUR DIARY

December 16—Annual General Meeting at Over-Seas House, London, S.W.1.
January 20, 1961.—Presidential Address at I.E.E., London, by Major-General E. S. Cole, C.B., C.B.E.
March 24, 1961.—Lecture Meeting at I.E.E., London. Speaker: G. Storey (G3HTC).
April 23, 1961.—Region 1 O.R.M. at Blackpool.
June 18, 1961.—Longleat Mobile Rally (tentative).
August 12-13.—Derby Mobile Rally and Hamfest.
August 23-September 2.—National Radio and Television Show, London.
September 17.—Lincoln Mobile Rally and Hamfest.

REGION 1

Ainsdale (A.R.C.)—Wednesdays, 8 p.m., 37 Hawthorne Grove, Southport.
Blackburn.—Fridays, 8 p.m., West View Hotel, Revidge Road.
Blackpool (B. & F.A.R.S.).—Tuesdays, 8 p.m., Squires Gate Holiday Camp.
Bury (B.R.S.).—January 10 (" My First Year on the Air " by G3NNW), The George Hotel, Kay Gardens.
Chester.—Tuesdays, 8 p.m., Y.M.C.A.
Crosby.—Tuesdays, 8.30 p.m., Colonsay, Crosby Road South, Waterloo.
Liverpool (L. & D.A.R.S.).—December 20 (" Bring your own Beer "), Tuesdays, 8 p.m., Gladstone Mission Hall, Queens Drive, Stoneycroft. (No meeting on December 27.)
Macclesfield.—January 10, 24, 42 Jordangate.
Manchester (M. & D.R.S.).—January 9, 7.30 p.m., Wellington Hotel, Nicholas Croft, High Street, off Market Street.
Manchester (S.M.R.C.)—Fridays, 7.30 p.m., Ladyburn House, Mauldeth Road, Fallowfield.
Morecambe.—January 4, 125 Regent Road.
Preston (P.A.R.S.).—January 10, 24, 7.30 p.m., St. Paul's School, Pole Street.
Southport (S.R.S.)—Thursdays, 8 p.m., The Esplanade.
Stockport (S.R.S.).—December 21, January 4, 8 p.m., The Blossoms Hotel, Buxton Road.
Wirral (W.A.R.S.).—December 16, January 6, 20, 7.45 p.m., 4 Hamilton Square, Birkenhead.

REGION 2

Bradford (B.A.R.S.).—December 20, Social Evening at Mechanics' Institute Café. January 10 (" Transistors," by G. N. Patchett, Ph.D., M.I.E.E.). January 24 (" Amateur Receiver Alignment," by D. Millard, G3OGV), 7.30 p.m., Cambridge House, 66 Little Horton Lane, Bradford 5.
Cleckheaton (S.V.A.R.S.).—January 4 (" Scope Interpretation " by T. C. Isaac), January 18 (" Tape Recording " by Phillips Electrical), 7.30 p.m., Labour Rooms, Railway Street, Cleckheaton.
Halifax (H. & D.A.R.S.).—December 20 (Informal). January 3 (" Interlaken Holiday," by G6BX). January 17 (Annual Dinner), Sportsman Inn, Ogden.
Leeds (L.A.R.S.).—January 4, 11 (Junk Sale). January 18 (Visit to G.P.O. Parcels Office), 7.30 p.m., Swarthmore Education Centre, 3 Woodhouse Square, Leeds 3.
Scarborough (S.A.R.S.).—Thursday, 7.30 p.m., Chapman's Yard, North Street.
Sheffield.—January 11, 7.30 p.m. Annual Dinner at Brincliffe Oaks Hotel.

REGION 3

Birmingham (Bourneville).—Fridays, 8 p.m., Council House, Cadbury's, Bourneville. **(M.A.R.S.).**—December 20 (Christmas " Bring and Buy " Sale), January 5 (Film Show), January 11-13 (Annual Conversazione: " Fifty Years of Amateur Radio "), Midland Institute, Paradise Street, Birmingham. **(Slade).**—December 16 (" Fun and Games "), December 30 (" The Human Machine as a Radio Operator " by " Dud " Charman, G6CJ), 7.45 p.m., Church House, High Street, Erdington. **(South).**—January 19, 7.30 p.m., Friend's Meeting House, Moseley Road, Birmingham.
Coventry.—January 10 (" V.H.F. Aerials "), 7.30 p.m., Works Canteen, A.W.A. Aircraft Plant, Bagington.
Stourbridge.—January 10, 8 p.m., Foley College, Stourbridge.
Wolverhampton.—December 19, 8 p.m., Nechells Cottage, Tettenhall.

REGION 4

Derby (D. & D.A.R.S.).—December 21 (Open Evening), January 4 (Surplus Sale), January 11 (Demonstration of American Equipment by James Scott Ltd.), January 18 (Film Show: " The Inquisitive Giant ", " Out among the Stars " and supporting " shorts "), 7.30 p.m., Room No. 4, 119 Green Lane Derby.
Derby (D.S.W. Exp. S.).—Fridays, 7.30 p.m., Sundays, 10.30 a.m., Club Rooms, Nunsfield House, Boulton Lane, Alvaston, Derby.
Grimsby (A.R.S.).—December 22, January 5, January 19, 8 p.m., R.A.F.A. Headquarters, Abbey Drive West, Grimsby.
Leicester (L.R.S.).—Mondays, 7.30 p.m. (Morse Tuition 7.30-8.30 p.m.), December 19 (" Transistors in F.M. Transmitters " by M. Kind, G3GXZ), Club Rooms, Old Hall Farm, Braunstone Lane, Leicester.
Lincoln (L.S.W.C.).—December 21 (A.G.M.), January 18 (Talk by Mr. Charlesworth), R.A.E. Lectures on intermediate Wednesdays, 7.30 p.m., Room No. 19, Technical College, Cathedral Street, Lincoln.
Melton Mowbray (A.R.C.).—January 5 (Discussion on Aerials led by H. Grice, G3NBA, D. W. Lilley, G3FDF and R. Winters, G3NVK), 7.30 p.m., St. John Ambulance Hall, Asfordby Hill. January 12, 8 p.m., Annual Dinner at Blue Bell Inn, Hoby.
Newark (N. & D.A.R.S.).—January 3, 7.15 p.m., Northgate House, Newark.
Newark (Magnus Grammar School.)—Tuesday evenings and Friday afternoons in Junior Physics Lab.
Nottingham (A.R.C.).—December 20 (Film Show of South Pole Expedition), December 22 (Christmas Party), January 3, 10, 17 (Thursday evenings reserved for R.A.E. Class by Alan Davies, G3LXL), 7.30 p.m., Community Centre, Woodthorpe House, Mansfield Road, Sherwood, Nottingham.
Peterborough (P. & D.A.R.S.).—January 6 (Mini-Hamfest & working demonstration of American Built Equipment by James Scott Ltd.), Tuesdays and Thursdays, R.A.E. Classes, 7 p.m., Peterborough Technical College.
Northampton (N.S.W.R.C.).—Thursdays, 7.0 p.m., Allen's Pram Works, 8 Duke Street, Northampton.
Retford & Worksop (N.N.R.S.).—Tuesdays (Construction and Beginners Night, including Morse tuition), December 15 (Quiz Night—Quizmaster: E. Prince, G3KPU), December 22 (Social Evening), December 29 (Closed), January 5, 12, 7.30 p.m., Club Room, Victoria Hall, Eastgate, Worksop, Notts.
Wellingborough (W.R.C.).—December 15 (Annual Dinner), December 22 (Closed) December 29 (Open) January 5 (A.G.M.) January 12 (Open), 7.30 p.m., Silver Street Club Room, above W.I.C.S. Fruit Shop.

REGION 6

Cheltenham.—First Thursday in each month, 8 p.m., Great Western Hotel, Clarence Street.
High Wycombe.—December 22, 7.30 p.m., G3BZM, 7 The Quadrant, Totteridge. **(C.A.R.C.)** December 29 (" This and That,") 8 p.m., British Legion Hall, St. Mary Street, High Wycombe.
Stroud.—Wednesdays, 8 p.m., Subscriptions Rooms, Stroud.

REGION 7

Acton, Brentford and Chiswick.—December 20 (" Transistorized Equipment," by G3BBL), 7.30 p.m., A.E.U. Rooms, 66 High Road, Chiswick.
Barnet.—No meeting in December. January 31, Red Lion Hotel, Barnet.
Bexleyheath (N.K.R.S.).—January 12, 8 p.m., Congregational Hall, Bexleyheath (nr. Clock Tower).
Croydon (S.R.C.C.).—January 10, 7.30 p.m., " Blacksmith Arms ", South End, Croydon.
Dorking (D. & D.R.S.).—Second and fourth Tuesdays in each month, 8 p.m., Star and Garter Hotel, Dorking.
Ealing.—Sundays, 11 a.m., A.B.C. Restaurant, Ealing Broadway, W.5.
East London.—December 18 (A.G.M.), January 15 (" Series Gate Modulation " by P. Matthews, G3BPM) The Lambourne Rooms, Town Hall, Ilford, Essex.
Enfield and District.—December 15 (A.G.M.), 7.30 p.m., George Spicer School, Southbury Road, Enfield.
Guildford (G. & D.R.S.).—Fourth Friday in each month, 7.30 p.m., " The Cannon," Portsmouth Road, Guildford.
Harlow and District.—Tuesdays, 7.30 p.m., rear of G3ERN (G. E. Read), High Street, Harlow.
Holloway (G.R.S.).—Mondays, Tuesdays and Wednesdays (R.A.E. and Morse), Fridays (Club), 7 p.m., Montem School, Hornsey Road, N.7.
Ilford.—Thursdays, 8 p.m., 579 High Road, Ilford (nr. Seven Kings Station).
Kingston.—Lectures alternate Thursdays, Theory and Morse Classes weekly), 7.45 p.m., Y.M.C.A., Eden Street, Kingston (Morse at 2 Sunray Avenue, Tolworth).

LONDON MEMBERS' LUNCHEON CLUB

will meet at the Bedford Corner Hotel, Bayley Street, Tottenham Court Road.

at 12.30 p.m. on Friday, December 16, 1960.

Telephone table reservations to HOL 7373 prior to day of luncheon. Visiting amateurs especially welcome.

Mitcham (M. & D.R.S.).—December 16 (Christmas Draw and Constructional Contest), 8 p.m., " The Cannons ", Madeira Road, Mitcham.
New Cross (C.A.R.S.).—Fridays, 7.30 p.m., Sundays, 11.30 a.m. (Audio Section last Tuesday in each month), Wednesdays (Morse Practice), December 16 (Constructional Contest), December 30 (" The Telex Service " by G3IWL), 225 New Cross Road, London, S.E.14.
Norwood and South London (C.P. & D.R.C.).—December 17 (Junk Sale), January 3 (Morse Class and Practical Work), 8 p.m., Windermere House Annexe, Westow Street, Crystal Palace.
Romford (R. & D.R.S.).—Tuesdays, 8.15 p.m., R.A.F.A. House, 18 Carlton Road, Romford.
Southgate, Finchley and District.—January 12 (Film Show on Group Activities), 7.30 p.m., Arnos School, Wilmer Way, N.14.
South Kensington (C.S.R.S.).—January 3 (" V.H.F. Techniques " by J. Hum, G5UM of Murphy Radio Ltd.), 6 p.m., Science Museum, South Kensington.
Welwyn Garden City.—January 12 (" Tapes and Tape Recording " by Geoff Watts of the Electronics Design Lab., Murphy Radio Ltd.), 8 p.m. Murphy Radio Recreational Club, Bessemer Road, Welwyn Garden City.

REGION 8

Crawley.—December 22 (A.G.M.), January 12 (Informal), " The Brewery Shades," Crawley High Street.
Tunbridge Wells (W.K.A.R.S.).—December 21 (Christmas Party), 7.15 p.m., Culverden House, Culverden Park Road, St. John's, Tunbridge Wells.

REGION 9

Bath.—January 16, 7.30 p.m., Committee Room, Bath Technical College.

Bideford.—First Thursday in each month, 7.30 p.m., alternately at T. G. Ward (G2FKO), 38 Clovelly Road (phone Bideford 964) and G3BO (D. H. Jones), Rosebank, Westcombe (phone Bideford 550).

Exeter.—Second Thursday in each month, 8 p.m., Y.M.C.A., St. David's Hill, Exeter.

Falmouth.—First Wednesday in each month, Y.M.C.A., Falmouth.

Torquay.—Second Saturday in each month, 7.30 p.m., Y.M.C.A., The Castle, Torquay.

Weston-super-Mare.—Second Wednesday in each month, 7.15 p.m., Technical College, Lower Church Road, Weston-super-Mare.

Yeovil (Y.A.R.C.).—Wednesdays, 7.30 p.m., Grove House, Preston Road, Yeovil.

REGION 10

Cardiff.—January 9 (Discussion on the use of the Amateur Bands), January 19 (Demonstration of Hallicrafters, Dow-Key and Hy-gain equipment by James Scott Ltd. of Glasgow), 7.30 p.m., T.A. Centre, Park Street, Cardiff.

Port Talbot.—January 10, 7.30 p.m., Railway and Transport Working Men's Club and Institute.

Penarth.—January 30 (Talk by GW2XZ), 7.30 p.m., R.A.F.A. Club, Windsor Road, Penarth.

REGION 12

Aberdeen (A.A.R.S.) —December 16 (" Noises on the bands "), December 23 (" Ham Sandwich "), December 30 (Ragchew), January 6 (Grand Junk Sale), January 13 (R.S.G.B. Recorded Lecture), 7.30 p.m., 6 Blenheim Lane, Aberdeen.

REGION 13

Edinburgh (L.R.S.).—December 22 (" Cabinet Construction " by George Douglas, GM3NIO), January 12 (Informal), 7.30 p.m., Y.M.C.A., 14 South St. Andrew Street.

REGION 14

Glasgow.—Second Friday in each month, 7.30 p.m., Woodside Halls, Clarendon Street, N.W. (near St. George's Cross Underground).

Prestwick.—Third Sunday in each month, 7.15 p.m., Royal Hotel, Prestwick.

REGION 16

Chelmsford.—First Tuesday in each month, 7.30 p.m., Marconi College, Arbour Lane, Chelmsford.

Norwich.—Second Friday in each month, 8 p.m., " Golden Lion," St. John Maddermarket (near City Hall), Norwich. **(N. & D.R.C.)**—Fridays, 8 p.m., " Golden Lion," St. John Maddermarket.

REGION 17

Aldershot (A. & D.R.S.).—Fridays, 7.30 p.m., Signals Wing, No. 4 Training Regiment, Gibraltar Barracks, Aldershot.

Newbury (N. & D.A.R.S.).—December 30 (Judging of Home Constructed Equipment), 7.30 p.m., Elliott's Canteen, West Street.

Portsmouth.—Tuesdays, 7.30 p.m., Scarrs, 183A Albert Road.

Southampton.—First Saturday in each month, 7 p.m., Prospect House (back of Gas Board Showrooms), Above Bar.

Regional and Club News

Acton, Brentford and Chiswick Radio Club.—Meetings are now held on the first (Morse class and discussion) and third Tuesdays in each month at the A.E.U. Rooms, 66 High Road, Chiswick. Prospective members will be most welcome. *Hon. Secretary:* W. G. Dyer (G3GEH), 188 Gunnersbury Avenue, Acton, London, W.3.

Aldershot and District Radio Society.—Classes in preparation for the next R.A.E. are being held on Fridays at the Signals Wing, No. 4 Training Regiment, Gibraltar Barracks, where the club station G3OBK is installed. Details of future activities are given in *Forthcoming Events*. *Hon. Secretary:* A. M. Laidler (G3OJY), " Pondside," Sandy Lane, Churt, near Farnham, Surrey.

Barnet and District Radio Club.—Recent lectures have been on " Transmitters " by S. Iles (G3BWQ) and on " Radio Amateur Interference " by F. Turner of the G.P.O. Arrangements for the third Christmas Party are well advanced and a record attendance is expected. *Hon. Secretary:* E. W. Brett (G3LUY), 28 Edward House, Edward Grove, New Barnet.

Bristol.—Over 50 members were present at the November meeting when R. E. Griffin, M.I.R.E. (G5UH) concluded his lecture on "Television Servicing" with a number of practical demonstrations. A visit to the G.P.O. Telephone Exchange to see the Subscriber Trunk Dialling equipment and the TV Repeater installation was arranged for December 12. Local members who have not yet received a copy of the Group's 1961 programme are invited to write to the *Hon. Secretary:* D. F. Davies (G3RQ), 51 Theresa Avenue, Bishopston, Bristol 7.

British Amateur Radio Teleprinter Group.—There was an attendance of 22 at the Group's first Dinner held in London on November 26. Details of membership may be obtained from the *Hon. Secretary:* A. C. Gee (G2UK), " East Keal," Romany Road, Oulton Broad, Lowestoft.

Chelmsford Amateur Radio Club.—Provided there is sufficient demand, it is planned to run a course of instruction for the R.A.E. Further particulars may be obtained from R. D. May (G3KTF), 46 Stansted Close, Chelmsford.

Civil Service Radio Society.—In the Phone Section of the 1960 A.R.R.L. DX Contest, GB2SM, operated by members, scored 178,059 points from 973 contacts, making the station the leading G entrant. The society scored first place amongst DX multi-operator entrants and third place amongst all multi-operator entrants. On January 3, Jack Hum (G5UM) will lecture on " V.H.F. Techniques ", the emphasis being on the practical beginning to 2m work. Visitors will be most welcome but should telephone G. Voller (G3JUL) at Kensington 6371 prior to the meeting. A special invitation is extended to prospective members who may obtain details of membership from the *Hon. Secretary:* G. Lloyd-Dalton, 2 Honister Heights, Purley, Surrey.

Cornish Radio and Television Club.—At the November meeting at the Y.M.C.A., Falmouth, G3AET gave a talk on the uses and operation of the Sonar Buoy and the TF2D aerial. The Annual Dinner was held at the Hotel St. Michael, Falmouth, on November 5. A bouquet was presented to Miss Enid Bottomley (G3OHG), the first YL to be licensed in Cornwall. Information regarding future activities may be obtained from the *Hon. Secretary:* W. Gilbert, 7 Poltair Road, Penryn.

Crawley Amateur Radio Club.—The club's first A.G.M. will be held at " The Brewery Shades," Crawley High Street, on December 22. A full programme of lectures has been arranged and visitors and prospective members are invited to attend meetings. *Hon. Secretary:* R. G. B. Vaughan (G3FRV), 9 Hawkins Road, Tilgate, Crawley.

Crystal Palace and District Radio Club.—Meetings are now held on the first Tuesday and third Saturday in each month at the Windermere House Annexe, Westow Street. A Junk Sale is arranged for December 17. *Hon. Secretary:* G. M. C. Stone (G3FZL), 10 Linhook Crescent, Forest Hill, London, S.E.23.

Derby and District Amateur Radio Society.—In connection with the fiftieth anniversary of the foundation of the Derby Wireless Club in 1911 the 1961 Mobile Rally and Hamfest will be held on August 12 and 13 and a three-week Exhibition at the Derby Art Gallery during August covering Fifty Years of Amateur Radio. Details of other activities are given in *Forthcoming Events*. *Hon. Secretary:* F. C. Ward (G2CVV), 5 Uplands Avenue, Littleover, Derby.

Halifax and District Amateur Radio Society.—Recent events have included a lecture on s.s.b. by G3LGS. On January 3, G6BX is to give a talk entitled " Interlaken Holiday " while a Pea and Pie Supper is arranged for January 17. Meetings are held at the Sportsman Inn, Ogden, on the first and third Tuesday in each month, commencing at 7.30 p.m., *Hon. Secretary:* A. Robinson (G3MDW), Candy Cabin, Ogden, Halifax.

Harrow, Radio Society of.—A kit for a new transmitter is being obtained and will be assembled on Practical Nights, the next being on December 23. Other meetings will be held at Roxeth Manor Secondary School, Eastcote Lane, South Harrow (buses nos. 114 and 158 pass the door) on December 16 (" Measuring Things " by R. Ray G2TA), and December 30 (Junk Sale). Visitors are cordially invited to attend. *Hon. Secretary:* S. C. J. Phillips, 131 Belmont Road, Harrow Weald.

Hastings and District Amateur Radio Club.—The November issue of the club's newsletter, *Natter-Net-Notes*, contains an excellent review of progress during the past year. It is an inspiring account of how interest has been revived and finances improved. Details of future activities may be obtained from the *Hon. Secretary:* W. E. Thompson (G3MQT), 8 Coventry Road, St. Leonards-on-Sea.

Lichfield Amateur Radio Club.—The officers of this new club, the inaugural meeting of which was held on November 7, 1960, are as follows: *President*—John Beamand (G3DZT); *Chairman*—R. J. Campbell (G3NLV); *Hon. Treasurer*—V. Hickman (G3LXR); *Hon. Secretary*—T. L. Painter (G3NEU), " Lyndhurst ", 98 Gaia Lane, Lichfield.

Llanelly and District Amateur Radio Club.—The club has recently obtained new headquarters at the Brynea Steelworks, Llanelly. Information on activities may be obtained from the *Hon. Secretary:* H. J. Hughes, 4 Pen-y-morfa, New Dock, Llanelly.

Lothians Radio Society.—Recent talks have been on TVI by GM3AKN and on transistors by GM3LAV. On December 22, GM3NIO will be giving some useful information on cabinet

construction. Meetings are held at the Y.M.C.A., South St. Andrew Street, on the second and fourth Thursday in each month. Visitors will be most welcome. *Hon. Secretary:* L. Lumsden (B.R.S.22359), 33 Hillview Drive, Edinburgh 12.

Newark and District Amateur Radio Society.—Attendance at meetings is increasing and after a lapse of five years the society's newsletter *The Voice of Newark* is again being produced by P. C. Wendels (G3JNL) and his wife. Monthly meetings are held—see *Forthcoming Events.* Visitors are always most welcome. *Hon. Secretary:* R. Clayton, 160 Wolsey Road, Newark, Notts.

Northampton Short Wave Club.—At the recent A.G.M. the following were elected: *President*—B. Sykes (G2HCG); *Chairman*—P. L. Hunt (G3FWB); *Vice-Chairman*—M. A. Perry (G2ANS); *Hon. Treasurer*—S. Haddon; *Committee Members*—R. F. Perrett (G3HWE) and C. F. Robinson (G3HZF). Meetings are held on Thursdays from 7 p.m. to 10 p.m. in the Club Rooms at Allen's Pram Works, 8 Duke Street, Northampton. *Hon. Secretary:* S. F. Berridge (G3ITW), 20 Ethel Street, Northampton.

Norwich and District Radio Club.—Meetings are held on Fridays at 8 p.m. at the " Golden Lion," St. John Maddermarket, near the City Hall. Lectures and other specially organized events are held once a month.

Peterborough and District Amateur Radio Society.—At the November meeting a beautifully constructed all-band s.s.b. rig was shown to members by Ken Pugh (G3HES) who explained the working of single sideband transmitters and told of the many problems he had to overcome whilst building his equipment. On January 6 commencing at 7 p.m., a Mid-winter Rally is to be held at Peterborough Technical College at which working demonstrations of the latest U.S.A. equipment will be given. G3KPO/A on 1960 kc/s and G3ARS/A on 2m will act as talk-in stations. *Hon. Secretary:* Douglas Byrne (G3KPO), Jersey House, Eye, Peterborough.

Reigate Amateur Transmitting Society.—At the November meeting G3JDN gave a talk on aerials for the listener while members demonstrated their own receivers at the December meeting. Five members who sat for the R.A.E. in October were successful. The society participated in the *Short Wave Magazine* contest and is planning to take part in the Affiliated Societies' Contest in February as part of the training for N.F.D. 1961. The A.G.M. will be held at The Tower, High Street, Redhill, on January 21 and the Annual Dinner at Laker's Hotel, Redhill, on February 11. *Hon. Secretary:* F. D. Thom (G3NKT), 12 Willow Road, Redhill.

Royal Air Force Amateur Radio Society.—The Society's stand at the R.S.G.B. Radio Hobbies Exhibition received very favourable comments. A full report in the A.G.M. should reach members in the winter issue of *QRV* later this month. G8FC is on the air most weekday evenings and on Saturday mornings.

Royal Naval Amateur Radio Society.—Since its inauguration three months ago, 66 members have been enrolled. Overseas members include VK3AST, VQ4HE and ZL4OP. Membership is open to all serving or past members of the R.N., R.M., W.R.N.S., Reserves and Commonwealth navies. The Headquarters station (G3BZU) is active on 7 Mc/s and on the DX bands. Further information may be obtained from the *Hon. Secretary:* M. J. Matthews (G3JFF), Royal Naval Amateur Radio Society, *H.M.S. Mercury*, Leydene, Petersfield, Hants.

South Manchester Radio Club.—Members recently inspected the Manchester City Police Radio headquarters during a visit arranged by Superintendent Ian Auchterlonie (G6OM). Other activities have included a Hot Pot Supper. Details of the future programme may be obtained from the *Hon. Secretary:* F. Nicholls (G3MAX), 125 Rochdale Road, Manchester 4.

South Shields and District Amateur Radio Club.—Meetings are held at Trinity House, Laygate Lane, South Shields, on Fridays commencing at 6.30 p.m. A meeting is also held on the last Wednesday in each month. The names of the club's officers were given incorrectly in the November issue of the BULLETIN and should have read as follows: *President*—Capt. E. Clark (G8AO); *Vice-President*—M. E. Glenwright; *Chairman*—D. I. Forster (G3KZZ); *Hon. Treasurer*—J. Tyzack (G3ELP); *Hon. Secretary*—R. Ray (G3NCL), 16 Holystone Avenue, Gosforth, Newcastle 3.

Stoke-on-Trent Amateur Radio Society.—Participation in the *Short Wave Magazine* contest brought to an end an exceptionally active year, most of the events undertaken being in connection with the city's Jubilee celebrations. Meetings are held on Mondays (constructional work) and Thursdays (lectures) from 8-10.30 p.m. in the clubroom at the rear of the Cottage Inn, London Road, Oakhill. The transmitting site for G3GBU is at Hulme. *Hon. Secretary:* V. J. Reynolds (G3COY), 90 Prince's Road, Hartshill, Stoke-on-Trent.

Stevenage and District Amateur Radio Club.—After several years of meeting at members' homes, a clubroom has been obtained at 114a High Street, Stevenage, where meetings are held at 8 p.m. every Tuesday. Visitors will be made most welcome. *Hon. Secretary:* C. A. Kenny (G3LJK), 290 Chertsey Rise, Stevenage.

Wirral Amateur Radio Society.—Recent activities have included a Top Band and 2m expedition to Cardiganshire, a D/F contest won by G8BM, with J. Wess in second place, and participation in the Jamboree-on-the-Air. At the A.G.M., all the officers were re-elected unopposed. *Hon. Secretary:* A. Seed (G3FOO), 31 Withert Avenue, Bebington.

County Representatives

THE following is a list of Corporate Members who have been duly nominated to serve as County (or District) Representatives for two years as from January 1, 1961:

REGION 1—NORTH WESTERN
CHESHIRE
L. N. GOLDSBROUGH (G3ERB), 54 Kings Lane, Bebington.

REGION 4—WEST MIDLANDS
DERBYSHIRE
T. DARN (G3FGY), 44 Laurel Avenue, Ripley.
LINCOLNSHIRE
H. BELLAIRS (G3LXX), 118 Albert Street, Grimsby.
NORTHAMPTONSHIRE
H. BONE (G3EHQ), 104 Montagu Road, Walton, Peterborough.

REGION 7—LONDON
LONDON SOUTH
W. D. GILMOUR (G2VB), 35 Grangecliffe Gardens, London, S.E.25.

REGION 8—SOUTH EASTERN
SUSSEX
R. G. B. VAUGHAN (G3FRV), 9 Hawkins Road, Tilgate, Crawley.

REGION 9—SOUTH WESTERN
BRISTOL
C. N. CHAPMAN (G2HDR), Yeovil, Stoke Hill, Stoke Bishop, Bristol 9.
DORSET
A. A. BARRETT (G5UF), " Glenelg," P.O. Radio Station, Bridport Road, Dorchester.

REGION 10—SOUTH WALES
GLAMORGANSHIRE
H. G. Hughes (GW4CG), " Clyne," Austin Avenue, Newton, Porthcawl.

REGION 13—SCOTLAND SOUTH EASTERN
EAST, MID AND WEST LOTHIAN
REV. WALTER M. FERRIER (GM3BDA), Manse of St. Andrew, North Berwick, East Lothian.

REGION 17—SOUTHERN
HAMPSHIRE
L. SOUTHWELL (G3JLS), 189 Hollybank Crescent, Hythe.

Representation

THE following is an amendment to the list of Town Representatives published in the December 1959 issue.

REGION 14—(CITY OF GLASGOW)
GLASGOW AREA AND POSTAL DISTRICTS
A. Barnes (GM3LTB), 7 Southpark Terrace, Glasgow, W.2.

Vacancy

Mr. A. J. Mourton (G8QU) has resigned from the position of Area Representative for Finsbury Park. Nominations for his successor should be made in the prescribed form and sent to reach the General Secretary, by not later than January 31, 1961.

Affiliated Society Representatives

THE following is a list of Corporate Members who have been duly nominated to serve as Affiliated Society Representatives for one year as from January 1, 1961:

ACTON, BRENTFORD & CHISWICK RADIO CLUB: W. G. Dyer (G3GEH), 188 Gunnersbury Avenue, Acton, London, W.3.

CLIFTON AMATEUR RADIO SOCIETY: C. H. Bullivant (G3DIC), 25 St. Fillans Road, Catford, London, S.E.6.

LIVERPOOL & DISTRICT AMATEUR RADIO SOCIETY: R. Halhead (G3KOR), 102 Waldgrave Road, Liverpool 15, Lancs.

NORTH KENT RADIO SOCIETY: C. J. Leal (G3ISX), 1 Deepdene Road, Welling, Kent.

REIGATE AMATEUR TRANSMITTING SOCIETY: K. J. Wheatley (G3BBR), 2 Hazel Road, Reigate, Surrey.
SOUTH MANCHESTER RADIO CLUB: C. M. Denny (G6DN), 18 Willoughby Avenue, Didsbury, Manchester 20, Lancs.
STOURBRIDGE & DISTRICT RADIO SOCIETY: F. A. Bills (G3CLG), 29 High Street, Kinver, near Stourbridge, Worcs.
YEOVIL AMATEUR RADIO CLUB: B. J. Clark (G3BEC), 107 Eastland Road, Yeovil, Som.

Fifty Years of Radio

THE Midland Amateur Radio Society's Annual Conversazione at the Midland Institute, Birmingham, from January 10-13, 1961, will be devoted to "Fifty Years of Radio (1910-1960)." Members in a position to loan suitable equipment made during the period are asked to communicate with T. Talboys (G2ATK), 6 Bramley Croft, Shirley, Solihull, Warwickshire.

"Can You Help?"

ON page 248 of the November issue of the BULLETIN, Mr. R. N. Hedges' call-sign should have read G2HCV. The call G3HCV is held by Mr. C. F. Atkins of Bourton-on-the-Hill, Glos.

Can You Help?

● D. Earnshaw (G3LHP), Gerharden, Alkington Road, Whitchurch, Salop, who requires the circuit diagram and any other information regarding the ex-A.M. Oscilloscope Type 11 (Reference No. 10S/562)?

● K. Gould (A.2037), "Woodcroft," Hughenden Valley, High Wycombe, Bucks, who requires the circuit of the pre-war Mullard oscilloscope type GM3152/3 ?

● J. T. Jones (G3JTJ), Brantwood, Hall Grounds, Rolleston-on-Dove, near Burton-on-Trent, who requires information on the Transmitter Type 75C?

● D. M. Willoughby (A.2062), Bygot House, Dittons Road, Pevensey, Sussex, who requires the manual and other information on the R.1392D v.h.f. receiver ?

Slow Morse Practice Transmissions

Time	Call-sign	kc/s	Town
Sundays			
09.00	G3BHS	1810	Southampton
09.30	G3HNJ	1980	Doncaster
	G3HNJ		
	G3OFP		
11.00	G3GZE	1840	Blackburn
11.00	G2FXA	1900	Stockton-on-Tees
11.00	G3HZM	1860	Manchester
12.00	G3LP	1850	Cheltenham
12.00	G15UR	1860	Belfast
18.30	G3OGO	1925	Croydon
20.00	G3MRA	1915	Southampton
20.30	G3HTA	1850	Exeter
Mondays			
18.30	G3NC	1825	Swindon
19.00	G3KTP	1850	Heanor, Derby
19.00	G3LMT	1850	Exeter
20.00	G3BMY	1838	Birmingham
20.00 †	G3EWE	1975	Woking
	G3IAF		
20.00	G3GZE	1840	Blackburn
20.00	G3MDH	1915	Southampton
20.30	G3AGN	1875	Felixstowe
20.30	G3MXI	1910	Derby
21.30 †	G3IRM	1981	Bury St. Edmunds
	G3MWO		
21.30 †	G3LGK	1980	Ilkeston, Derbys.
	G3MXI		West Hallam, Derbys.
21.30	G3NOE	1900	Bradford
Tuesdays			
17.30	G2AAM	1875	Swanwick, Derbys.
18.00	G3GZE	1840	Blackburn
18.30	G2FXA	1900	Stockton-on-Tees
20.00	G2FCI	1850	Exeter
20.00	G3IBI	1915	Southampton
20.00	G3NHR	1900	Hounslow
20.15	G2AYQ	1875	St. Agnes, Cornwall
20.30	G3MEH	1900	Sutton, Surrey
20.30	G3NKX	1875	Loughton
21.00	G3EFA	1855	Southport
21.00	G3LSC	1875	Poole
	G3MKN		
	G3NUN		
21.15	G2CPL	1875	Felixstowe
21.45	G2UK	1875	Lowestoft
22.00	G2CZU	1900	Bath
Wednesdays			
19.00 †	G3MCJ	1845	Exeter
	G3FLK		
	G2FCI		
	G3HTA		
19.00	G3LZC	1830	Heanor, Derby
19.00	G8RQ	1850	Chesterfield
19.30	G3NQR	1875	Harrow Weald
19.45	G3KFE	1950	Stevenage
20.00	G3BHS	1915	Southampton
20.00	G3GZE	1840	Blackburn

Time	Call-sign	kc/s	Town
Wednesdays			
20.00 †	G2FYT	1910	Bristol
	G2HDR		
	G3IZM		
	G3OLB		
20.00	G3INZ	1920	High Wycombe
	G3KRR		
	G3LSK		
	G3MGH		
20.00	G3NFV	1900	Ashtead, Surrey
20.15	G2AYQ	1875	St. Agnes, Cornwall
20.30	G3MXI	1910	Derby
21.00	G3LSC	1875	Poole
	G3MKN		
	G3NUN		
21.00	G3AGX	1920	Hull
22.00			
21.30	G3HNJ	1980	Doncaster
21.30	G3NOE	1900	Bradford
22.00 †	G3LGK	1980	Ilkeston, Derbys.
	G3MXI	1980	West Hallam, Derbys.
Thursdays			
17.30	G2AAM	1981	Swanwick, Derbys.
18.30	G3NC	1825	Swindon
20.00	G3NBV	1915	Southampton
20.00	G3NHR	1900	Hounslow
20.15	G2AYQ	1875	St. Agnes, Cornwall
20.00 †	G3EWE	1975	Woking
	G3IAF		
21.30	G3HMY	1850	Exeter
21.30 †	G3IRM	1981	Bury St. Edmunds
	G3MWO		
22.00	G2CZU	1900	Bath
Fridays			
18.30	G3DMN	1880	Ipswich
	G3FVP		
19.00	G3JKY	1900	Beckenham
19.30	G3FUA	1850	Kilburn, Derby
19.30	G3MHR	1850	Swanwick, Derbys.
20.00	G3JQS	1915	Totton
20.00	G3NYB	1980	Doncaster
	G3NXZ		
20.00	G3INZ	1920	High Wycombe
	G3KRR		
	G3LSK		
	G3MGH		
20.15	G2AYQ	1875	St. Agnes, Cornwall
20.30	G3ICX	1915	Sutton Coldfield
20.30	G3KGU	1915	Theydon Bois, Essex
21.30 †	G3NPO	1900	Bradford
	G3KSS		
22.00 †	G3LGK	1980	Ilkeston, Derbys.
	G3MXI	1980	West Hallam, Derbys.
Saturdays			
13.00	G2FXA	1900	Stockton-on-Tees
20.00	G3MCL	1915	Southampton

† *Alternately*

New Members

THE following have been elected to membership.

APRIL 1960

Corporate Members, Home (Licensed)

G2FQR †N. W. Austin, 20 Worcester Close, Reading, Berks.
G3MP D. J. G. Legge, 61 Sunnydale Road, Bakersfields, Nottingham.
G3ABU E. J. Hayman, 113 Barton Road, Torquay, Devon.
G3CCF †R. Clarke, 7 Stretton Avenue, Wallasey, Cheshire.
G3EMW †R. D. J. Leslie, 108 Breakspear Road, S. Ickenham, Middx.
G3ETY G. H. Lang, 5 Coldstream Avenue, Higher Blackley, Manchester.
G3KXV V. Johnston, 64 Bradhope Road, Berwick Hills, Middlesbrough, Yorks.
G3LVA D. J. Simpson, 126 Wellington Place, R.A.F. Hullavington, Chippenham, Wilts.
G3MAX †F. Nicholls, 29 Rectory Road, Abbey Hey, Manchester 18.
G3NIY E. C. Emerson, 3 Church Walk, Winslow, Bucks.
G3NNR J. G. McLoughlin, 23 Wayville Close, Mossley Hill, Liverpool 18.
G3NPH A. M. Deacon, 158 Hawksford Crescent, Bushbury, Wolverhampton.
G3NVH R. A. Clement, 85 Green Lane, Coventry.
G3NWJ A. R. Porter, 111 Evington Drive, Leicester.
G3NYH †S. R. Climas, 70 Aldershot Road, Fleet, Hants.
G3NZL H. S. Chapman, The Pantiles, 20 Wanlip Road, Syston, Leics.
G3NZS H. W. Parkes, 75 St. Stephens Road, Smethwick 40, Staffs.
G3NYZ *A. F. Stafford, The Roundlets, Cockshutt Lane, Melbourne, Derbys.
G3OBV P. H. Harris, 34 Valley Walk, Croxley Green, Rickmansworth, Herts.
G3OBU *D. J. Goodman, 11 Morden House, London Road, Morden, Surrey.
G3OCB C. Bowden, Tretheague House, Stithians, Truro, Cornwall.
G3ODB A. E. Pritchard, 8 Hollyshaws, Longmeadow, Stevenage, Herts.
G4LA †J. G. Wardhaugh, 20 Hallgates, Hexham, Northumberland.
G5LB †L. G. Blundell, 113 Tower View, Shirley, Croydon, Surrey.
GI3JEX †D. Butler, 21 Inverleith Drive, Sydenham, Belfast 4.
GM3GUO A. A. Johnston, 39 Gladstone Street, Glasgow C4.
GM3HHB †W. Brown, 7 Broomage Avenue, Larbert, Stirlingshire.
GM3JCY R. Forsyth, 35 Allanbank Street, Allanton, Shotts, Lanarks.
GM3NVT A. Grassam, 5 Bantaskine Gdns., Falkirk, Stirlingshire.
GM3NYY *W. A. F. Davidson, Netherkirk, Galston, Ayrshire.
GM3OBG P. Bridges, 11 Mitchel Street, Rutherglen, Lanarks.
GW2AP †G. H. Bowden, 77 Elgar Crescent, Llanrumney, Cardiff, Glam.

Corporate Members, Overseas (Licensed)

K4HDR Dennis C. B. Freeman, Jr., Route No. 7, Macon, Georgia, U.S.A.
K8JBN A. D. Yager, 151 West Maple Street, Clyde, Ohio, U.S.A.
VE3BOU †W. Edgley, 12 Burnhamthorpe Blvd., Islington, Ontario, Canada.
VP3MC †T. A. E. Tibbits, 113K Campbellville, Demerara, British Guiana.
W1ACB Charles F. Anderson, 106 Hobart Street, Quincy 70, Massachusetts, U.S.A.
W3DSN T. J. Tourish, 6055 N. Camac Street, Philadelphia 41, Pennsylvania, U.S.A.
W3HUG G. H. H. Garrison, P.O. Box 11, Delaware, U.S.A.
W3VTT Samuel J. Hunter, 1822 Marsh Road, Wilmington 3, Delaware, U.S.A.
W4AGE William C. Jones, Jr., 508 Crestwood Drive, Greensboro, North Carolina, U.S.A.
W6PGM J. P. Michaels, 3102 Lomina Avenue, Long Beach 8, California, U.S.A.
W7CIH Axel B. Tyle, 1022 S. W. Salmon Street, Portland 5, Oregon, U.S.A.
W9JFJ Howard G. Campbell, 3013 Oak Street, Evansville 14, Indiana, U.S.A.
W9UM M. W. Macy, P.O. Box 25, Syracuse, Indiana, U.S.A.
W0KFA Clair R. Miller, 625 Memorial Drive, S.E., Cedar Rapids, Iowa, U.S.A.
ZS1TA Rod van der Merwe, Rooikrans, P.O. Noblesfontein, Cape Province, South Africa.
ZS5JF J. Foye, 19 Powell Road, Stamford Hill, Durban, Natal, South Africa.
ZS5MR F. S. Lee, 98 Willowvale Road, Durban, South Africa.
ZS6OF †R. Faber, P.O. Box 69, Bedfordview, Transvaal, South Africa.
ZS6AVP C. B. Bean, 503 Tenth Avenue, Gezina, Pretoria, South Africa.

Corporate Members, Home (British Receiving Stations)

22750 W. Gilroy, 13 Foxglove Close, Weston Coyney, Longton, Stoke-on-Trent, Staffs.
22751 J. O. Minks, Millow, Daines Way, Thorpe Bay, Essex.
22752 W. G. Ruff, 60A Avenue Road, Highgate, London, N.6.
22753 A. S. Ludlow, 13 Ley Top Lane, Allerton, Bradford, Yorks.
22754 J. A. Jeal, 173 Villiers Road, Kingston-on-Thames, Surrey.
22755 N. A. Croft, 12 Highfield Close, Gainsborough, Lincs.
22756 P. S. Burson, 53 Foxon Lane, Caterham, Surrey.
22757 K. J. E. Field, 4 Minworth Road, Water Orton, Warwicks.
22758 B. Bowers, 147 Tickhill Road, Maltby, Rotherham, Yorks.
22759 A. Vinnels, 29 Pelham Road, Bexleyheath, Kent.
22760 G. R. W. Foster, 31 Dene Road, Headington, Oxford.
22761 F. F. Whitehead, 91 Blackpool Road, Ansdell, Lytham St. Annes, Lancs.
22762 J. S. Goundrill, Firs Ridge, Muston Lane, Hunmanby, Filey, East Yorks.
22763 A. Jameson, 75 Poplar Avenue, Pemberton, Wigan, Lancs.
22764 W. Campbell, 7 Silverstream Park, Bangor, Co. Down, Northern Ireland.
22765 F. Wright, 1 Fox Covert Rise, Misterton, via Doncaster, Yorks.
22766 J. R. Briggs, 19 Church Street, Cromer, Norfolk.
22767 D. C. Brown, 38 Gobions, Kingswood Estate, Basildon, Essex.
22768 B. Walsh, 27 Linacre Road, Willesden, London, N.W.2.
22769 J. P. O. Bushell, Park East, Clarbeston Road, Pembs., South Wales.
22770 W. Butler, 39 Mollington Avenue, Liverpool 11.
22771 P. J. N. Norris, 7 Foxbourne Road, Upper Tooting, London, S.W.17.
22772 J. V. Pearson, 43 Belle Vue, Wordsley, nr. Stourbridge, Worcs.
22773 U. C. N. Fernando, 55 Queensborough Terrace, London, W.2.
22774 J. O'Hagan, 2 Pickett Croft, Stanmore, Middx.
22775 D. J. Hoy, 171 Palatine Road, Didsbury, Manchester 20.
22776 †R. A. Sweet, 201 Naish Court, Pembroke Street, King's Cross, London, N.1.
22777 R. I. Cotterill, 287 Reddish Road, Reddish, Stockport, Cheshire.
22778 W. J. Perkins, 181 South Street, Romford, Essex.
22779 D. A. Amore, 52 Collinwood Gardens, Ilford, Essex.
22780 D. F. Marshall, 16 Saville Street, Gainsborough, Lincs.
22781 H. Bowers, Wrekin View, Common Lane, Meir Heath, Stoke-on-Trent, Staffs.
22782 †L. Harbin, 10 Queensway, London, W.2.
22783 J. R. Jackson, Langleeford Hope, Wooler, Northumberland.
22784 H. St. John Mansbridge, Devonshire House, Station Road, Addlestone, Surrey.
22785 D. Wain, 91 High Street, Biddulph, Stoke-on-Trent, Staffs.
22786 H. Redfern, 22 Rosslyn Road, Moston, Manchester 10.
22787 1853598 M/Sig. Coleman, R. G., Sgts. Mess, R.A.F. Station, Ballykelly, Limavady, Londonderry, Northern Ireland.
22788 A. A. Matthews, 9 Thorngrove Road, Plaistow, London, E.13.
22789 C. J. Devon, 32 Mersey Lane South, Rock Ferry, Cheshire.
22790 T. Hughes, 27 Hawkhurst Road, Coldean Estate, Brighton 6, Sussex.
22791 W. F. Craine, 110 Rocky Lane, Liverpool, 16.
22792 M. J. Viccary, 27 Spring Close, Little Baddow, Chelmsford, Essex.
22793 *G. E. Williams, 11 Beverstone Road, Thornton Heath, Surrey.
22794 *A. W. Ralls, 13 Rokeby Gardens, Woodford Green, Essex.
22795 P. J. Wooden, 102 Barnfield Avenue, Kingston-on-Thames, Surrey.
13110 †J. E. Davison, 357 Havant Road, Farlington, Cosham, Hants.
18175 †J. C. Tarrant Price, Nether Whitacre Rectory, nr. Coleshill, Warwicks.
19581 †J. Riley, 103 Durham Street, Rochdale, Lancs.
19989 †E. C. Jones, 8 Daymerslea Ridge, Leatherhead, Surrey.
21439 †F. J. F. J. Martin, 198 Dover Road, Walmer, Kent.
21442 †F. Halls, 54 Victoria Avenue, Redfield, Bristol 5.
21750 †S. C. Clarke, 29 Leighinmohr Avenue, Ballymena, Co. Antrim, Northern Ireland.
21751 †L. G. Crawford, 68 Galgorm Road, Ballymena, Co. Antrim, Northern Ireland.

Corporate Members, Overseas (British Empire Receiving Station)

1054 T. E. Kennedy, 7 Beaconsfield Road, Hawthorn, Victoria, Australia.

Corporate Members, Overseas (Foreign Receiving Stations)

313 R. L. MacMullen, 606 Fremont, Laramie, Wyoming, U.S.A.
314 L. O. J. Theys, P.O. Box 1456, Teheran, Iran.

Associates

2296 D. J. Ruddell, 24 Swaylands Road, Belvedere, Kent.
2297 R. J. Matthews, 14 Vicarage View, Redditch, Worcs.
2298 R. G. M. Rowe, 15 Home Park Avenue, Peverell, Plymouth, Devon.
2299 G. J. McNeil, 1 Craigmount Grove, Edinburgh 12.
2300 C. Stringer, The Nest, Maenporth, nr. Falmouth, Cornwall.
2301 G. Daley, 156 Seven Sisters Road, London, N.7.
2302 B. G. Gaydon, 43 Surbiton Hill Park, Surbiton, Surrey.
2303 P. T. Plant, Fieldway, Dennington, Woodbridge, Suffolk.
2304 M. Cockerill, 9 Charlton Avenue, Whitby, Yorks.
2305 G. E. Myers, 132 St. Andrews Road, Felixstowe, Suffolk.
2306 P. E. Lonsdale, 46 Anthony's Avenue, Parkstone, Poole, Dorset.
2307 B. Sweeny, 170 Worsley Road, Winton, Eccles, Lancs.
2308 S. J. Emary, 12 Newcombe Road, Westbury-on-Trym, Bristol.
2309 G. Clark, 45 Halliford Road, Sunbury-on-Thames, Middlesex.
2310 R. L. Pope, 7 Ridley Road, London, N.W.10.
2311 B. W. Godwin, 20 Pembury Road, Bexleyheath, Kent.
2312 W. G. Horwood, Bramble Hurst, Bramble Hall Lane, Daws Heath, Thundersley, Essex.
2313 B. Wadsworth, 13 Summerfield Road West, Todmorden, Lancs.
2314 J. E. Dunnett, Oxgrove, Hesketh Road, Meadfoot, Torquay, South Devon.
2315 P. H. Masterman, 87 Gledhow Lane, Leeds 8, Yorks.
2316 D. J. Harvey, The Vicarage, Looe, Cornwall.
2317 C. S. Whitaker, 4 The Crest, Goff's Oak, Waltham Cross, Herts.
2318 N. Pryor, 27 Maesarddafen Road, Llwynhendy, Llanelly, Carms, South Wales.
2319 C. P. Cadle, 76 Elmstead Lane, Chislehurst, Kent.

2320 A. W. Bucknall, 35 Freehold Street, Newcastle-under-Lyme, Staffs.
2321 D. W. Bowers, 271 Crackley Bank, Chesterton, Newcastle-under-Lyme, Staffs.
2322 L. A. Payne, 110 Wood Lane, West Bromwich, Staffs.

MAY 1960

Corporate Members, Home (Licensed)

G2AAM †J. S. Gingell, 21 High Street, Swanwick, Derbys.
G2BGG †J. S. H. Garner, Barbon, Aigburth Hall Road, Liverpool, 19.
G3FUA †W. Berresford, 17 Brickyard Lane, Kilburn, Derbys.
G3HAO E. H. Webster, 83 Tudor Court North, Wembley Hill, Middlesex.
G3HRW H. W. Hunt, 32a Cheriton High Street, Folkestone, Kent.
G3HSV †D. E. Alesbury, 154 Victoria Road, Swindon, Wilts.
G3INP †R. W. Blincoe, 5 Green Lane, Redcar, Yorks.
G3JPN †P. West, 24 Bloomfield Road, Moseley, Birmingham 13.
G3KFZ J. Pye, Athlone House, Dock Road, Tilbury, Essex.
G3KOE E. P. Parry, 22 Rosebery Avenue, South Harrow, Middlesex.
G3LED H. Riding, 11 Bank Crest, Baildon, Shipley, Yorks.
G3MBN B. C. Gibbs, 4 Yew Terrace, Claverton Down, Bath, Somerset.
G3MHN B. J. Hitchens, 74 Christ Church Lane, Lichfield, Staffs.
G3MZG G. Mason, 52 Arncliffe Terrace, Lidget Green, Bradford 7.
G3NBI R. Smith, 3 Hunter Hill Road, Mixenden, Halifax, Yorks.
G3NIE C. R. Bell, 211 New Village Road, Cottingham, Yorks.
G3NQN *M. D. Hartung, 4 Westcourt, Inderwick Road, Crouch End, London, N.8.
G3NWI T. H. Horsley, 103 Warren Road, West View, Hartlepool, Co. Durham.
G3NWX K. A. Morgan, 21 Cavendish Avenue, Woodford Green, Essex.
G3NXI K. H. Schau, Blanchworth House, Stinchcombe, nr. Dursley, Glos.
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(Continued on page 304)

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Printed in Great Britain for the RADIO SOCIETY OF GREAT BRITAIN, New Ruskin House, Little Russell Street, London, W.C.1 by Loxley Brothers Limited, Letchworth, Hertfordshire

IF UNDELIVERED Return to:— R.S.G.B., NEW RUSKIN HOUSE, LITTLE RUSSELL STREET, W.C.I