# RSGB

AUGUST, 1959

# BULLETIN

2/6 Monthly

JOURNAL OF THE RADIO SOCIETY OF GREAT BRITAIN

VOL. 35, NO. 2

# CQ . . . CQ . . . CQ . . . HAMS

## QTR?

## Time you bought a

# MULTIMINOR

## OM!


THIS is an ingeniously designed yet inexpensive rectifier/moving coil instrument of pocket size and sturdy construction. It is extremely well made and simple to use.

Two models are available, Model 1 for use in temperate climates, and Model 2 for use under adverse climatic conditions.

It is fitted with a high-grade rotary selector switch of quite unique design, in which a series of 18 fixed silver-plated contacts, embedded in a moulded ring, are wiped by a double-contact rotor arm.

Full advantage has been taken of the latest printed resistor techniques to achieve compactness of size and economy of weight.

Specially designed extremely accurate test gear has been made to ensure that every Multiminor measures up to the prescribed standards of accuracy, and the final testing is of a particularly rigorous nature.

*List Price:* **£9 : 10s.** *complete with Test Leads and Clips.*

*Leather Case if required* 32/6

**Write for fully descriptive leaflet.**

Pocket Size: 5⅛ x 3⅛ x 1⅜ inches.
Weight: 1 lb. approx.

### RANGE SELECTION:

Range selection is by means of a substantial switch, there being only two connection sockets for any measurement. The instrument has 19 ranges, a single scale being provided for current and voltage measurements and another for resistance measurements.

| D.C. Voltage | A.C. Voltage | D.C. Current |
|---|---|---|
| 0 — 100 mV. | 0 — 10 V. | 0 — 100 μA |
| 0 — 2.5 V. | 0 — 25 V. | 0 — 1mA |
| 0 — 10 V. | 0 — 100 V. | 0 — 10mA |
| 0 — 25 V. | 0 — 250 V. | 0 — 100mA |
| 0 — 100 V. | 0 — 1000 V. | 0 — 1 A |
| 0 — 250 V. | | |
| 0 — 1000 V. | | |

**Resistance**
0 — 20,000Ω
0 — 2 MΩ

### Sensitivity:

10,000 ohms per volt on D.C. voltage ranges.
1,000 „ „ „ „ A.C.

### Accuracy:

On D.C. 3% of full scale value.
On A.C. 4% „ „ „

To meet special requirements, instruments can be supplied to a higher degree of accuracy for a small additional charge.

**AVO LTD** AVOCET HOUSE 92-96 VAUXHALL BRIDGE ROAD · LONDON · S.W.1
Telephone: VICtoria 3404 (12 lines)

*MM.9*

# Fatigue Testing

The proved reliability of the Brimar 'T' range of valves has been "built-in" as the result of experience gained from a continuous programme of examination and testing. One of these tests is illustrated. Valves are placed on a specially constructed vibration table which is operated at 170 cps continuous vibration for 100 hours. The plane of the vibration is across the axis of the valves which simulates motion or other vibration which occurs in military use. The information derived from this and other tests on valves for special applications is used to improve manufacturing techniques on commercial types: yet another reason for making Brimar the obvious choice when the demand is for a reliable valve.

**better make it**

**BRIMAR**

STC COMPONENTS GROUP

*Standard Telephones and Cables Limited*

*Registered Office: Connaught House, Aldwych, London, W.C.2*

**VALVE DIVISION:** FOOTSCRAY · SIDCUP · KENT · FOOTSCRAY 3333

# Kit prices down

Once again, big increases in demand have allowed us to make substantial reductions in price for our world-famous Oscilloscope and Voltmeter Kits. Based on printed circuits and easily assembled by anyone who can use a soldering iron, these instruments are professional in appearance and yield a performance equal to that of factory-assembled models.
Detailed and fully illustrated Instruction Books are provided.

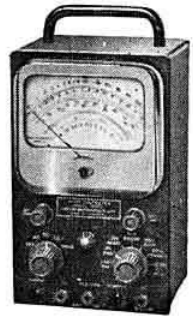
**1071K Double-Beam Oscilloscope**

An exceptionally versatile, double-beam instrument with identical amplifiers of bandwidth 0–3 Mc/s and in built pre-amplifier in channel 1 providing a maximum sensitivity of 5 mV/cm up to 350 k/cs. A wide range time-base and X amplifier are incorporated whilst voltage calibration and intensity modulation systems are available. Weight only 20¼ lbs.

**KIT PRICE £49. 17. 6**

*or factory assembled and tested £60.10.0*

**1044K Valve Voltmeter**

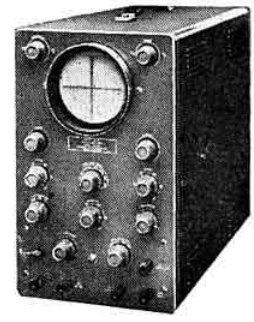


A comprehensive instrument comprising seven DC, seven peak and seven r.m.s. AC voltmeter ranges plus a seven-range electronic ohmmeter.

**KIT PRICE £15. 12. 6**

*or factory assembled and tested £22.5.0*

**1045K Single-Beam Oscilloscope**



Inexpensive yet very attractive in appearance, this Oscilloscope weighs only 18 lbs. and includes a Y amplifier of bandwidth 5 c/s to 3 Mc/s with a maximum sensitivity of 50 mV/cm, five time-base ranges with fly-back suppression on each and an X amplifier of gain 5 times. Facilities for calibration and intensity modulation are provided.

**KIT PRICE £35. 0. 0**

*or factory assembled and tested £45.2.6*

# COSSOR INSTRUMENTS LTD

*The Instrument Company of the Cossor Group*

COSSOR HOUSE, P.O. BOX 64, HIGHBURY GROVE, LONDON, N.5
Telephone: CANonbury 1234 (33 lines) Telegrams: Cossor, Norphone, London Cables: Cossor, London Code: Bentley's Second TAS/CI. 13

**Volume 35 No. 2**
**August 1959**

# R.S.G.B. BULLETIN

## CONTENTS



EDITOR:
*John Clarricoats, O.B.E., G6CL*

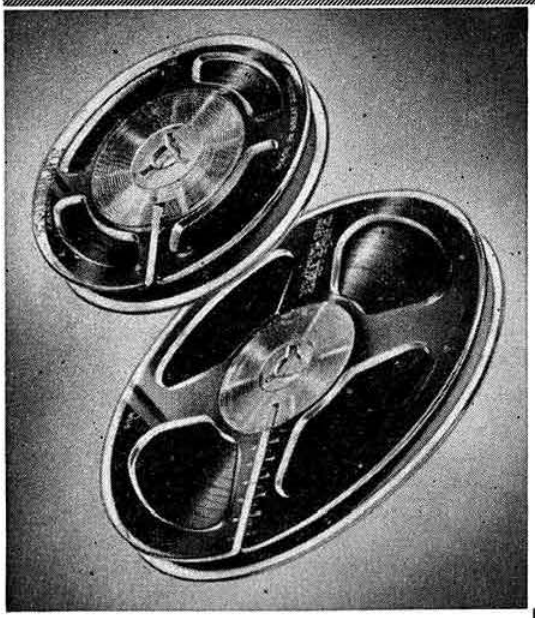
DEPUTY EDITOR:
*John A. Rouse, G2AHL*

EDITORIAL OFFICE:
*R.S.G.B. Headquarters, New Ruskin House, Little Russell Street, London, W.C.1*
*Telephone: HOLborn 7373*

ADVERTISEMENT MANAGER:
*Horace Freeman, The National Publicity Co. Ltd., 20-21 Red Lion Court, Fleet Street, London, E.C.4*
*Telephone: FLEet Street 0473-6*

*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.*  *The annual subscription rates to the R.S.G.B. are as follows: Home Corporate Members—30/-; Overseas Corporate Members—28/- ($4 U.S. or Canadian); Associate Members under 21 years of age—15/-. Application forms may be obtained from Headquarters on request.*

# Emitape



## the magnetic recording tape with the highest technical standards

- ✳ High sensitivity
- ✳ Low noise level
- ✳ Low 'print through' factor
- ✳ Anti-static
- ✳ Freedom from curl and stretch

**"88"** GENERAL PURPOSE

**"99"** LONG PLAY

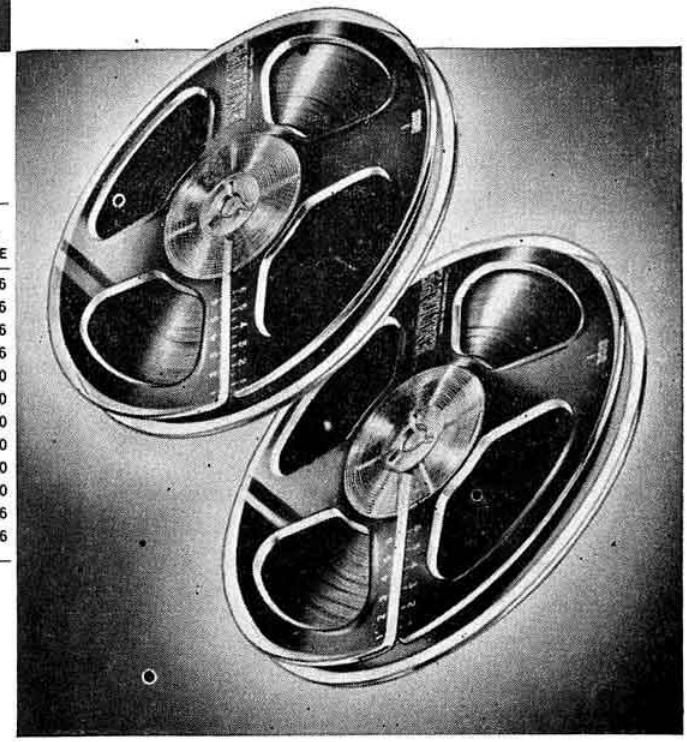
| Type No. | Title | Size | Length approx. | Price in EMICASE | Price without EMICASE |
|---|---|---|---|---|---|
| 88/3 | "Message" | 3" dia. | 175′ | — | 7 6 |
| 99/3 | | 3" dia. | 250′ | — | 9 6 |
| 88/3N | | 3½" dia. | 175′ | — | 7 6 |
| 99/3N | | 3½" dia. | 250′ | — | 9 6 |
| 88/6 | "Junior" | 5" dia. | 600′ | £1 3 6 | £1 1 0 |
| 99/9 | | 5" dia. | 850′ | £1 10 6 | £1 8 0 |
| 88/9 | "Continental" | 5½" dia. | 850′ | £1 10 6 | £1 8 0 |
| 99/12 | | 5½" dia. | 1200′ | £1 17 6 | £1 15 0 |
| 88/12 | "Standard" | 7" dia. | 1200′ | £1 17 6 | £1 15 0 |
| 99/18 | | 7" dia. | 1800′ | £2 12 6 | £2 10 0 |
| 88/18 | "Professional" | 8½" dia. | 1750′ | — | £2 17 6 |
| 99/24 | | 8½" dia. | 2400′ | — | £3 12 6 |

**Emicase**

*now available separately!*

the polystyrene container that solves tape storage problems, protects spools from dust and allows easy identification of leader tapes.

**7"—4s. 0d.; 5¾"—3s. 6d.; 5"—3s. 6d.**



**E·M·I** SALES & SERVICE LTD *(Recording Materials Division)*
HAYES · MIDDLESEX · Tel: SOUthall 2468

ES/R/46

# Current Comment

*discusses topics of the day*

## *QSL via R.S.G.B.*

THE R.S.G.B. QSL Bureau handles well over 1,000,000 cards every year and the collection and delivery of so vast a quantity of cards, to the reasonable satisfaction of members with due regard to the expense involved, is the constant problem facing the manager and his sub-managers.

From time to time, small organizations outside the Society offer attractive facilities for what appears to be a quicker service, free at first and then at a steadily increasing rate of payment, but when their business approaches about one tenth of our own, they seem glad to rid themselves of the self-made millstone around their necks! The R.S.G.B. is still one of the very few societies to offer a QSL Service free of all charge, except the stamped envelopes sent in for the collection of cards.

The Central Bureau at G2MI is supplemented by a number of sub-managers, each dealing with a call-sign series. These sub-managers hold the stocks of stamped and addressed envelopes which are sent in for the collection of cards and their function is to sort cards received from the central bureau for call-signs within the series for which they are responsible, and post them in the envelopes. Incidentally, the R.S.G.B. allows non-members to collect their cards but not to send cards via the Bureau. Members who want their cards sent to them at frequent intervals should put only 3d. stamps on their envelopes and should specify on them either the interval at which they are to be posted or the number of cards, e.g. " Wait six."

The average envelope carries about eight cards for 3d., stamping at 4½d. will cover about 16 cards and so on. THERE IS NO 4D. POSTAGE RATE, but despite this envelopes bearing 4d. stamps continue to be received.

Some members put only a 2d. stamp on their envelopes which must therefore be posted unsealed, with consequent danger of the cards slipping out. This makes them subject to considerable delay until the Post Office returns them to the Bureau through the " Dead Letter " Office. The P.O. always sends to G2MI any cards found loose in the post, a service for which many members have good reason to be thankful.

For some time the Bureau accepted packets on which excess postage had been levied by the Post Office. This steadily increased until it became a sizeable problem. Few people who had under-stamped their packets ever bothered to refund the postage and so instructions were given to Bromley Post Office to return to sender all mail upon which the proper postage had not been paid. Nowadays, therefore, the Bureau does not even see such packets. The onus is squarely on the sender to ensure that his packets are properly prepaid.

The Bureau does not pay postage on individual cards. Quite a lot of amateurs who receive listener cards from non-members, send a QSL bearing the listener's full name and address to the bureau, expecting the Society to pay the 2½d. or whatever it may be. We know for a fact that some of these listener cards originally had an International Reply Coupon with them and this has evidently been accepted as " payment " for the QSL and not for the return postage for which it was intended.

While on the subject of listener cards, listeners are urged to join the Society and so obtain a recognized identification, either a B.R.S. or an Associate number. " GSWL " is not an identification; cards so addressed have to be returned to the sender. A B.R.S. or " A " number should be prominently displayed on the sender's card so that the recipient is in no doubt how to send his reply.

QSL Bureaux have one big headache: the *unclaimed* card. QSL managers are a conscientious lot and hate to destroy cards but as about 40 per cent of all amateurs cannot be persuaded to collect their cards, even after several reminders, instructions have been given to the R.S.G.B. sub-managers to destroy unclaimed cards after two months. The cost of returning them to the senders would be an unwarrantable extra charge on the Society's funds.

When vast quantities of anything are handled in any system, the non-conformist always throws the system out of gear. Paramount among these is the outsize card. Each has either to be folded or otherwise dealt with separately. These very big cards, besides being somewhat ostentatious, are a nuisance all round, not least to the recipient into whose envelopes they will not go!

A few suggestions as to ways in which members can facilitate the working of the Bureau may be of interest.

Please put the addressee's call-sign also on the back of the card. Care should be taken to ensure that this is the same as appears on the other side! It is quite surprising how often, say G3AAA appears on one side and G2AAA on the other!

Please put *your* call-sign in the top left-hand corner of your envelopes, number the envelopes and write " Last " on the final one. You will then automatically know when to renew the supply.

The full address of the Bureau is simply G2MI, BROMLEY, KENT.

Don't forget to put your address on the envelope—many people do. Envelopes without an address or postage stamps are often received. One man even stamped his envelopes and his packet with savings stamps! The packet was, however, duly postmarked

(*Continued on page 46*)

# Television, Broadcast and Audio Interference†

## A New Approach

"WHEN in danger or in doubt—always cast your anchor out" may not seem an appropriate introduction to the problems besetting those unfortunate enough to suffer the vicissitudes of television and broadcast interference. It is, however, not uncommon to hear that transmission has been suspended or drastically curtailed because of difficulties in combating, overcoming, and, in some cases, investigating complaints of interference.

### History

For some long time it had been felt that the R.S.G.B. should adopt a more active role in making a full and careful study of interference, including the giving of advice and guidance to members who may in any way have cause to feel a sense of frustration or lack of procedural knowledge in dealing with actual cases.

It is noteworthy, therefore, that at the first meeting of the newly-constituted Council for 1958, proposals were made to bring into being a TVI/BCI Committee. This Committee in fact sat for the first time on April 2, 1958, and elected as its first Chairman the then Immediate Past President of the Society. The first action to be taken was the drafting of terms of reference for approval by the Council and these were, with minor amendments, published on page 523 of the May 1958 BULLETIN.

This, then, set the stage and indeed the pace for future activities and studies of the Committee. During seven meetings in 1958, and six in 1959 (up to July), 28 cases of amateur interference from all parts of the country have been studied and guidance given. In one case a solicitor's letter was promptly and effectively rebuffed; in another, co-operation in the form of the actual witnessing of an official investigation was undertaken, while several cases were concluded to the satisfaction of all concerned with the utmost goodwill apparent on all sides.

BULLETIN articles and notices [1, 2, 3, 4]* all help to play a part in the planned programme for the dissemination of information which demonstrates that the amateur is fully aware of his responsibilities to the society in which he lives but from whom he quite rightfully expects respect as a master of the science which is his hobby, and which he is seeking to pursue on equal terms and in fairness with his fellow citizens.

It might well be asked, what has this to do with TVI/BCI? to which the short answer must be "education." Not only education in techniques but, what is even more important, education in the administration of the radio services and how they affect each and every one of us: amateur, listener, viewer, manufacturer and the like.

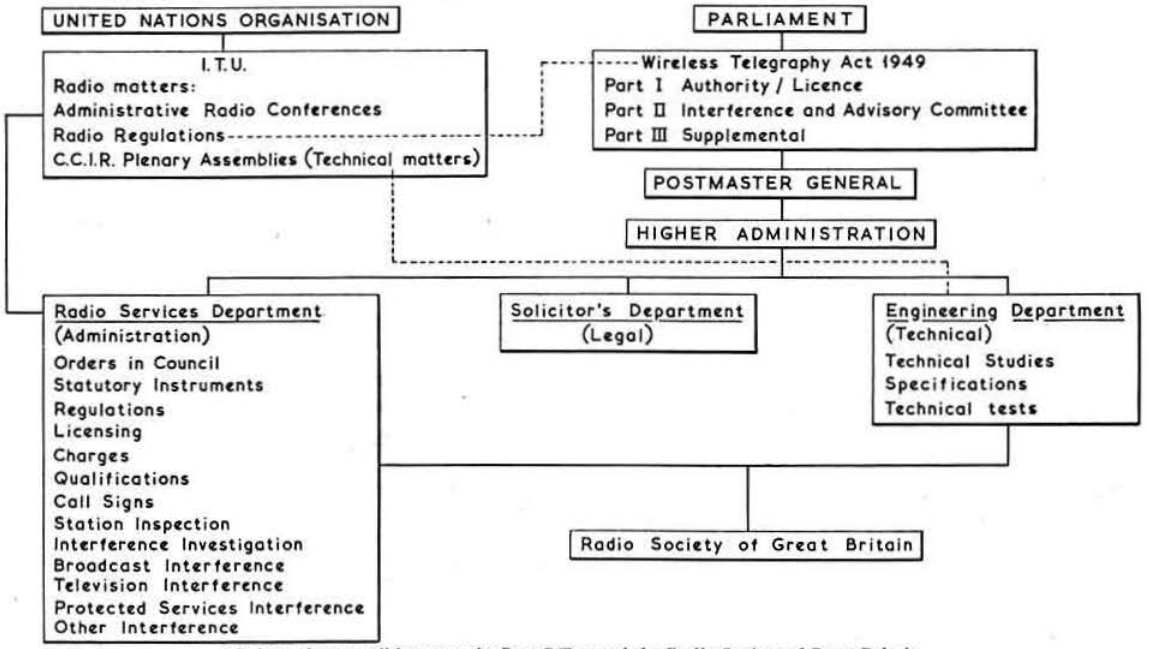
### The Aims

Indeed it became abundantly clear to the Committee that as a first step, it was imperative to approach the Post Office with a view to obtaining a statement of the current practices of the administration on a number of points concerning policy, interpretation of rules and regulations, licence clauses, etc. In other words, the Committee itself wished to be informed on up-to-date administrative practices relating to the rights of the amateur in this country.

The meeting requested took place on January 7, 1959, between representatives of the Society and various departments of the G.P.O. The discussions were marked by the co-operative attitude of the P.O. officials; so much so, that

† Prepared by the TVI/BCI Committee.

* [1] "Do you know the Radio Regulations?" September 1959.
[2] "Diagnosis of TVI" (BULLETIN Reprint).
[3] "Non-resonant Television Aerials," page 232, November 1958.
[4] "General Specification for Amateur Transmitters," April 1959.




*"Points of contact" between the Post Office and the Radio Society of Great Britain.*

the meeting must be considered as a major step forward on the road to complete and effective co-operation in dealing with every aspect of TVI/BCI and other comparable interference problems. The able chairmanship and considerate attention shown to the Society's representatives by the Assistant Secretary in charge of the Radio Services Department of the G.P.O. undoubtedly contributed much to the success of the meeting.

**Report**

What follows is a summary of the matters discussed and the answers given by the P.O. representatives, and is the policy of the Post Office as expressed at the meeting held on January 7, 1959, and confirmed in their letter to the Society of July 20, 1959.

(*a*) In order to be quite certain of the " channels of contact " between the Society and the departments of the Post Office, it was suggested that a chart might be made available. The chart was sent to the Society in February and is reproduced on page 42.

(*b*) The P.O. agreed to supply a précis of the procedure for investigating complaints of radio and television interference from amateur transmitters. (This is reproduced in the following article in this issue.—EDITOR.)

(*c*) The P.O. said that a " duly authorized officer " was one who held the P.M.G.'s authority in the form of a P.O. identity card.

(*d*) Reports of delays in investigating complaints of interference evoked some surprise from the P.O. representatives who agreed to take up the matter of such delays.

(*e*) The P.O. stated that if no previous interference complaint had been made in a district, the usual form must *normally*‡ be filled in. If there was a recurrence of interference or the source of the interference was apparent, an oral complaint might be followed up.

(*f*) The P.O. considered that so long as the investigating officer had reasonable grounds for thinking that an amateur station was the cause of an interference complaint there could be no objection to closing it down pending detailed investigation but agreed an investigation should follow as quickly as possible.

(*g*) The P.O. stated that complainants' receiving aerial installations were inspected. In areas of low signal strength, the P.O. would not deal with a complaint of interference unless the complainant used an efficient outside aerial if it was possible for him to install one. An aerial in the same room as the receiver would not be considered satisfactory in such areas, although an aerial in the roof space would be accepted in areas of good field strength.

(*h*) The P.O. reiterated that no amateur station would *normally*‡ be closed down without the receiving installation being properly inspected, unless there were a number of complaints from the same locality, or the complaint was obviously a repeat about which the essential facts were known.

(*i*) The P.O. promised to remind inspectors about the rules for dealing with interference from amateur transmitters.

(*j*) The P.O. stated that it was the intention that investigations, including the witnessing of interference by the P.O. and the inspecting of receiving installations, should be carried out as soon as possible in all cases.

(*k*) The P.O. stated that they would welcome the Society helping individual amateurs to learn more about interference problems and how to overcome them. Quite often, P.O. Engineers felt the amateur had little knowledge of how to deal with such problems.

(*l*) A suggestion from the Society's representatives that difficulties sometimes arise in the case of evening inspections brought a very firm reply from the Post Office administration that, as amateur interference cases are few, the time of inspection should not affect the issue.

(*m*) On the subject of the TVI policy announced in the R.S.G.B. BULLETIN for November 1956, the P.O. agreed that filters were mentioned as one example of a " cure "; there were also other methods. P.O. Engineers and B.R.E.M.A. had agreed some time ago on an i.f. which was satisfactory from the amateur point of view, and B.R.E.M.A. had said that all its members were now using it. (Unfortunately many receivers with unsuitable i.f.'s are still in use.—EDITOR.)

(*n*) On the subject of charges being made for interference investigations the following explanations were given:

(1) In the case of interference to broadcast and television services, the charge for investigation is recoverable from a part of the licence revenue.

(2) In the case of interference to amateur services, any investigations carried out will be charged for on a repayment basis (cash), because there is no contribution set aside for this service in the licence revenue.

It should be noted however, that, where an amateur reports a case of broadcast or television interference on behalf of a neighbour, any charges incurred are recoverable as for (1) above.

(*o*) With regard to interference by amateurs to audio equipment (such as tape recorders and hi-fi amplifiers), the P.O. stated that where a satisfactory amateur transmitter interfered with purely audio equipment, the amateur was not *normally*‡ responsible.

(*p*) The R.S.G.B. contended that as the Wireless Telegraphy Act 1949 always qualified the word " interference " by " undue," the same should apply in the amateur licences. (Clause 4 (a) (b) (i), (ii), (iii)). The P.O. agreed to consider making this amendment.

(*q*) With regard to wired TV on carrier frequencies embracing the amateur bands, the P.O. assured the R.S.G.B. representatives that their inspectors would tell complainants that they should refer to the relay company concerned in the first instance.

A written statement on this subject reads, *inter alia:*

" . . . should cases arise in which the amateur's transmissions are otherwise within the terms of his licence, we should normally look to the relay company to attend to their system to prevent the interference.

" Relay companies are required to take reasonable measures to prevent interference from their systems to other services, and we think that the chance of interference to amateur reception is small."

**Reflections**

This then is the result of the first meeting or, as the title of this article puts it, a new approach to the problems of interference, but further meetings are still needed both at the administrative and technical level to resolve several other points of issue.

The meeting established statements of *fact* where previously there was *conjecture*, but most of all it proved the benefits of discussion and demonstrated in full measure the resolve of the Society to tackle energetically the complexities of this particular problem.

Having progressed this far it is the earnest wish of the TVI/BCI Committee that with effort, determination and goodwill on all sides the stigma of TVI and BCI shall no longer persist as a menace to the pursuit of our hobby. Co-operation, education and enlightenment must be the watchwords. Feature articles on these and allied subjects in the BULLETIN, as well as letters to Headquarters from members in difficulty or in doubt, all go to prove that whatever the challenge, the amateur is capable of meeting and overcoming the vagaries attaching to TVI, BCI and radio interference problems generally.

‡ The implications of the word " normally " set in italics in this summary are not clear. The word was inserted in the TVI/BCI Committee's summary by the P.O.

# The Investigation by the Post Office of Radio and Television Interference from Amateur Transmitting Stations†

SINCE the circumstances in which interference may occur vary a great deal, it is impracticable to lay down hard and fast rules for dealing with it, but the following paragraphs summarize the general action taken by the Post Office when it receives a complaint that radio or television reception is suffering interference from an amateur's transmissions.

**Initial action**

Before the Post Office will accept a complaint of interference, it requires from the person complaining either evidence of the source of interference or a record of the times at which the interference occurs over a period of two weeks. Where amateur interference is occurring it may well be that the person complaining can identify the amateur by hearing his call-sign. The Post Office also expects the person complaining to have, or to equip himself with, a receiving installation of a reasonable technical standard. This normally means a receiver of ordinary commercial standard and an efficient aerial of a type needed to give adequate reception in the particular situation. The Post Office may tell the amateur at the outset, possibly by telephone, that a complaint has been received, in case he wishes to avoid neighbourly friction by ceasing to transmit on a certain band during, say, evening viewing hours.

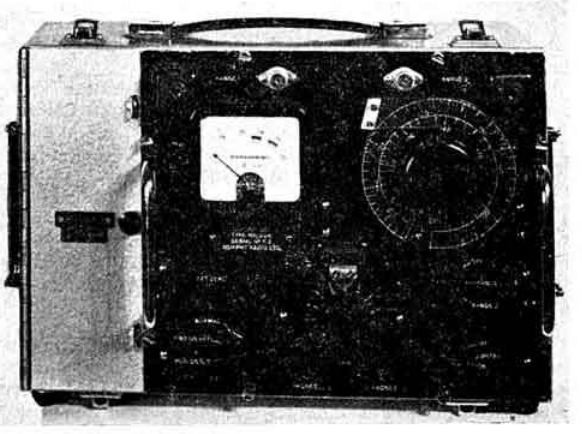
**Detailed investigation**

The aim is that a detailed investigation of the interference should be made as soon as possible after the complaint has been received. Since there are many different ways in which an amateur's transmissions may give rise to interference, tests have to be made to establish the mechanism by which the interference is occurring, the cure, and the responsibility for clearing the interference. This calls for the co-operation of the amateur and the people affected, and the work has normally to be done in the evenings. This part of the investigation usually takes some time, bearing in mind the many calls upon the Post Office interference service, and it may be hampered by the attitude of the parties to the case. Not infrequently, people complaining of amateur interference simply want the amateur closed down permanently and are most unwilling to accept that the trouble may lie in their own receiving installations. It is unfortunately Post Office experience that delay is sometimes caused by the failure of the amateur to deal promptly or effectively with trouble in his own equipment. If the investigation officer has reasonable grounds for thinking that an amateur's transmissions are causing interference, particularly where a number of people are affected, he may instruct the amateur to cease using specified amateur bands between certain hours pending detailed investigation. This is done by the most practicable means available. Usually it is during a visit to the amateur, but it may sometimes be done by letter or telephone. However, any oral instruction restricting the amateur's operations is confirmed in writing.

The investigation officer examines the transmitter and other equipment with the amateur to see if the interference is caused by such things as over-modulation or the generation of harmonics or spurious emissions, and, if so, whether the interfering signals are propagated by direct radiation or over the mains wiring. Assistance may be given in locating the stage in which unwanted signals are being generated, and advice about dealing with the matter, but the responsibility for finding out what is wrong and what is the remedy lies with the amateur, and modifications must be made by him. The investigation officer cannot normally spend more than a very limited amount of time on the case. The amateur is asked to let the investigation officer know when the modifications have been made, and is instructed, with confirmation in writing, not to use the transmitter in the meantime during sound broadcasting or television hours as the case may be. If tests with the investigation officer show that the modifications have been successful, the amateur is allowed, with confirmation in writing, to resume normal working.

When it has been checked that the interference is not being caused by the condition of the amateur transmitter or the way in which it is being used, and the receiving installation affected is of a reasonable technical standard, investigation is made at the receiving installation. The interference may occur for a number of reasons; for example, blocking, cross-modulation, i.f. breakthrough or image effect. If reasonable remedial action, such as the fitting of a filter in the aerial lead, can be demonstrated by the investigation officer, then the responsibility for abating the interference lies with the set owner, who is advised in writing to obtain a similar filter from his radio dealer or from the manufacturer of his set. A calendar month is allowed for him to obtain a filter, during which the amateur is instructed, with confirmation in writing, not to use the frequency band(s) in question during sound broadcasting or television hours as the case may be. At the end of the calendar month the amateur is free, in accordance with the instructions, to resume transmissions whether or not a filter has been fitted to the receiver. It may sometimes be possible to leave a demonstration filter in position for a trial period during which the amateur transmits normally. If so, he is advised to this effect, with confirmation in writing. It has been found that the amateur

*(Continued on page 46)*



***Receiver Radio No. 24A is typical of the type of equipment used by Post Office engineers in tracing sources of interference. The 24A has a frequency range of 95 to 220 Mc/s and uses sub-miniature valves wired directly into the circuit. The Receiver Radio No. 12, somewhat similar in appearance to the unit illustrated, covers 30-100 Mc/s.***

(By courtesy of H.M. Postmaster General).

† Communicated by the P.O. Radio Services Dept.

# GENEVA - 1959

## *The Curtain Rises—A First Report from the World Radio Conference*

By JOHN CLARRICOATS, O.B.E. (G6CL)*

NEARLY 70 Government delegations and representatives of upwards of 15 international bodies were present at the opening of the Seventh International Administrative Radio Conference organized by the International Telecommunication Union. The Conference is being held in the Bâtiment Electoral, Geneva, with committee meetings there and at the Palais des Expositions. The Radio Conference, which opened on August 17, is scheduled to run for four months, with a Plenipotentiary Conference running in parallel for the last two months.

The International Amateur Radio Union was represented at the opening ceremony by the Secretary of the I.A.R.U. Region I Committee (Mr. John Clarricoats, O.B.E., G6CL) and Major Per-Anders Kinnman, SM5ZD, Vice-Chairman of the Committee. Mr. L. E. Newnham, B.Sc. (G6NZ), Immediate Past President, R.S.G.B., was present at the opening ceremony as a member of the United Kingdom delegation, the leader of which is Capt. C. F. Booth, C.B.E., an Assistant Engineer-in-Chief of the Post Office.

Among the other international bodies represented at the Conference are the International Committee of the Red Cross, the International Astronomical Union and the newly-formed Committee on Space Research.

* *General Secretary*

### Plenary Meetings

After preliminary speeches by the Chairman of the I.T.U. Administrative Committee (Mr. Alfred Langenberger) who welcomed the delegates present, and by the Dean of the Conference (Commissioner Charles J. Craven of the United States) who replied, the Acting General Secretary of the I.T.U. Mr. Gerald C. Gross (HB9IA) outlined how the Conference would operate. He announced that eight main committees would be set up. (The most important of which, from an Amateur Radio point of view, is the Frequency Allocation Committee.—J.C.) Other Committees deal with Frequency Registration Procedure and International Frequency List Problems, Technical Problems and Operations. Steering, Credentials, Finance Control and Drafting Committees would be established to assist in the smooth running of the Conference.

During his speech to the delegates Mr. Gross stated that more than 4,000 proposals had been received to date and that these occupied more than 800 pages of printed text. A further large batch of proposals would be issued to delegates that day.

By acclamation Mr. Charles J. Acton of Canada was elected Chairman of the Conference and Mr. Juan Autelli (Argentina) and Dr. M. B. Sarawate (India) Vice-Chairmen.

Throughout the Conference a simultaneous translation

*A general view of the Radio Conference in session at the Batiment Electoral, Geneva. This picture was taken from halfway up the meeting room—some 300 further delegates and observers were behind the camera. Note the simultaneous translation equipment.*
(Photo by G. G. Vuarchex, Geneva).

*From left to right, Major Per-Anders Kinnman (SM5ZD), John Clarricoats, O.B.E. (G6CL) and Leon Newnham (G6NZ) at the opening of the Administrative Radio Conference in Geneva on August 17, 1959. SM5ZD and G6CL are representing the I.A.R.U. at the Conference. G6NZ is a technical adviser on Amateur Radio matters attached to the United Kingdom delegation.*

(Photo by J. J. Cadoux, Geneva).

system in the three official Conference languages (French, English and Spanish) is in operation; the delegates are thus able to follow the deliberations easily and accurately.

**Committees**

At the second Plenary meeting held on August 18, Chairmen and Vice-Chairmen were elected for the various committees. The Chairman of the all-important Frequency Allocation Committee is Mr. Gunnar Pederson of Denmark who has as his Vice-Chairmen Mr. E. J. Stewart of Australia and Mr. Oltuskiy Ozaki of Cuba.

**From Atlantic City to Geneva**

*The Morning Electron*, made famous at the Atlantic City Radio Conference 12 years ago, reappeared on the opening day of the Geneva Conference to the obvious pleasure and surprise of those who had seen or contributed to the earlier issues. The *M.E.* is intended to offer delegates a brief account, fresh every morning, of what has happened the day before in committees and working parties. It was planned that an early issue should carry an invitation to radio amateurs attached to Government delegations to contact either the General Secretary of the R.S.G.B. or the General Manager of the A.R.R.L., Mr. A. L. Budlong (W1BUD), who is attending the Conference as a member of the United States delegation. Other amateurs present at the Conference include Mr. John Huntoon (W1LVQ), Assistant General Manager of the A.R.R.L., Mr. Alex. Reid (VE2BE), General Manager of the Canadian Section of the A.R.R.L., and Mr. John Moyle (VK2JU) who is representing the Wireless Institute of Australia whilst serving on the Australian delegation. It is hoped to publish next month a list of the amateurs present at the Conference together with an account of the work which has been done by those Committees in which amateurs generally are interested.

**Proposals**

At this early stage it is not possible to say, or even surmise, what is likely to happen when the various proposals affecting amateur bands come up for discussion, but readers of this brief report, written the day after the Conference opened, may rest assured that every delegation present at Geneva is fully aware of the value and importance of the Amateur Radio movement.

IGNORE RUMOURS

## Current Comment

(continued from page 41)

and delivered to G2MI without delay. Incoming cards are sent for disposal to the sub-managers. Cards received at G2MI for overseas are sorted and filed into country order or U.S. and Canadian districts and are cleared to the overseas bureaux as soon as a packet of reasonable size has accumulated. Some discrimination has to be exercised between cards for countries such as Germany, Sweden, Australia etc., where the numbers sent are high, and places like ZK1, PJ, CR7 where the numbers are comparatively small, so that a reasonably frequent service is available to all.

The postage charges come, of course, from R.S.G.B. Members' money and it would be quite easy to give a slightly better service at a considerable increase in cost. As it is, everything is done to give good service without spending money wantonly.

A leaflet, giving full details of how the Bureau works is available on request from R.S.G.B. Headquarters and a copy is sent automatically to every new member. If you do not have one, please write in for it, enclosing a 2d. stamp.

We take great care of your cards and do our best to see that they reach their destinations. The R.S.G.B. Bureau, the first in the world, has served the Society for over 30 years, virtually without complaint. We aim to keep it that way.—A. O. M.

## Post Office Interference Investigation

(continued from page 44)

himself sometimes provides a filter or other remedy to ensure an amicable settlement.

With superheterodyne broadcast receivers it may be possible to tune an amateur's transmissions in and out from one end of the receiver tuning scale to the other. Provided that reception of the local B.B.C. stations is not affected, the case is not treated as one of interference.

Occasionally amateur transmissions are picked up by some electrical apparatus, such as a tape recorder or public address system, or by a wired television system. Provided tests show that the amateur is operating within the terms of his licence, the Post Office does not give protection to the apparatus in question, and action is normally limited to giving advice on means of reducing the susceptibility of the apparatus to interference.

**Difficult Cases**

It sometimes happens that reasonable remedial action such as the fitting of a filter has little or no effect on the interference. Such cases have to be dealt with on their merits, all the known circumstances of the case being taken into account. The Post Office has to recognize the existence of some television receivers that are rather susceptible to amateur interference, and to give them reasonable protection for the time being. Public opinion would not support a policy of telling the owner of a television set of ordinary commercial standard that he must write it off because of amateur interference. The amateur can quite often avoid the interference by using other amateur bands. The Post Office has no control over the manufacture of television sets, but it has impressed on the radio industry the need to make receivers that are less liable to suffer interference by, for example, i.f. breakthrough or image effect. New television sets have standard i.f.'s, so the problem should largely disappear in time.

# A Single Sideband Receiver for the Amateur

## Design Considerations and a Practical Example

By G. B. HORSFALL (G3GKG)*

Home-construction of receivers has been considered a dying art for some years but in recent months, prompted no doubt by a desire for equipment really capable of dealing with the present congestion of the h.f. amateur bands and the rapidly increasing use of s.s.b. by stations all over the world, many thoughtful radio amateurs have been turning their attention once more to the problems of producing up-to-date receivers. This article describes one member's approach to the problem and is worthy of the closest study by all who have ever said to themselves, "I wish I had a better receiver."

*Front view of the receiver.*

MANY Amateur Radio operators would like to make the change to single sideband (suppressed carrier) operation but are deterred from so doing by their experiences in attempting to receive this type of signal, particularly on the h.f. bands. Koster [1] summed up this difficulty recently and, although one feels that he somewhat overstated the problem, his experiences with s.s.b. reception are identical with those of many amateurs known to the writer. The prompt reply to his article by Lear [2] provided one solution, and this article constitutes an attempt to provide another.

Much of the trouble arises because most receivers in use by amateurs in Britain are entirely unsuited to the reception of s.s.b. This includes nearly all the surplus type receivers, most of the pre-war American "luxury" models and, although many sideband operators use them, even the AR88 and similar models. This is not to say that these receivers are not very good in the application for which they were intended—as *general coverage* communications receivers. It is strongly felt that if a receiver is to be used solely on the amateur bands, then a waveband coverage in which the particular amateur band occupies a very few degrees on the dial and, more important, a very small degree of rotation of the tuning knob is destined to lead to frustration. If one must have general coverage for non-amateur applications the sensible approach is to use a separate receiver for the purpose.

The other major drawback to many of these receivers is their poor stability, generally of the local oscillator, which may manifest itself other than as frequency drift with time. Even in receivers which are blameless in this respect, poor mechanical stability, particularly in connection with the wavechange switching, and frequency modulation of the local oscillator are responsible for a great many troubles. S.s.b. reception is not difficult if one has a receiver of good stability and with really good bandspread. Many other features are desirable but these two are essential.

* *56 Cambridge Road, Macclesfield, Cheshire.*

It is realized that to describe a receiver which will fulfil the needs of every amateur without much complication would be a hopeless task. It is therefore emphasized that, although the receiver to be described fully satisfies the writer's somewhat restricted requirements, an exact copy would not suit all operators. Whenever possible alternative arrangements will be suggested.

### General Description and Basic Considerations

The modern tendency to treat receiver construction as a job which is too difficult for the average amateur without specialized equipment is largely due to the mass of coils and switching which is usually much in evidence in the front end of a receiver. In the present design, which has gradually been evolved over a period of about three years (some sections have been rebuilt several times) this complication is largely avoided without sacrificing performance at all. This is accomplished by the use of the double superhet principle with a tunable first i.f. and a simple converter which is built into the receiver. Besides simplicity this has the following additional advantages:

(*a*) Only the local oscillator in the tunable i.f. section needs to be variable. There is no switching involved in this circuit and the oscillator operates on a relatively low frequency. Stability is thus readily achieved by care in construction and temperature compensation. The other oscillators (i.e. local oscillator in the converter and the b.f.o., here called the carrier reinsertion oscillator or c.i.o.), are crystal controlled.

(*b*) Ganging and tracking of tuned circuits is reduced to the minimum and no compromise in circuit constants is involved.

(*c*) The tuning rate is constant for each band.

A double-superhet receiver fulfilling the above requirements can be conveniently described in two parts, the converter and the main receiver. The main receiver is a complete receiver, albeit a rather insensitive one, and this will be described first.

## Main Receiver

A common mistake in receivers of this type (and also in surplus combinations such as the Command Receiver plus RF24 Unit) is to employ far too much gain between the aerial and the part of the receiver which confers the greatest selectivity. The result of this is cross modulation—a general mixing up of signals which are then impossible to sort out [3].

The first stage of the main receiver is therefore the mixer of the tunable i.f. section which is the heart of the complete

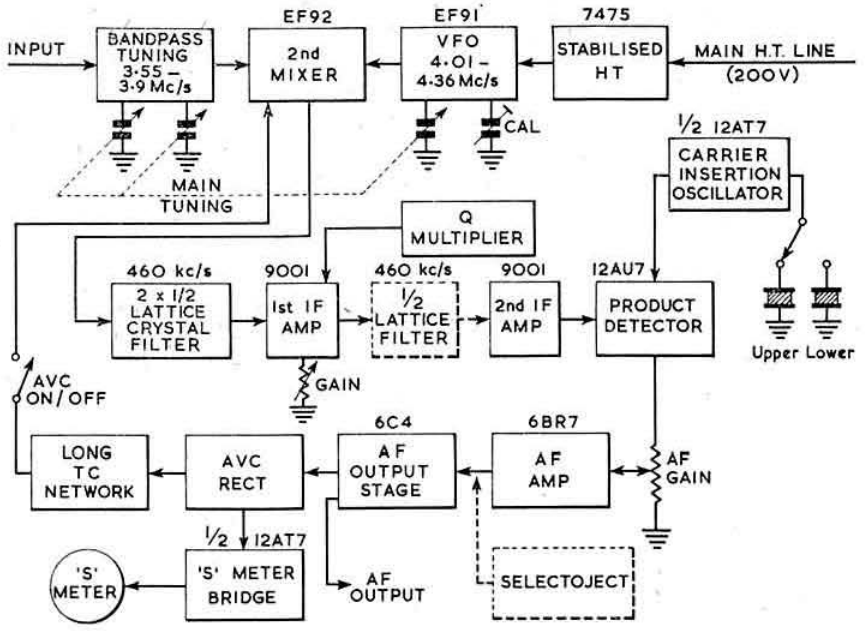



*Fig. 1. Block diagram of the main receiver.*

equipment. Poor design or construction here can ruin an otherwise excellent job. The choice of both intermediate frequencies and the range to be covered is a matter of individual requirements in respect of bands, and parts of bands, on which operation is contemplated. The first i.f. must be high enough to avoid image interference on the higher frequency bands and at the same time not so high as to create similar difficulties in the second i.f. stage, or to make stabilization of the local oscillator difficult. If advantage is to be taken of the current availability of FT241A crystals, the second i.f. will be in the range 370-500 kc/s. The tunable first i.f. is then best in the range 2-4 Mc/s. Another consideration is that of "birdies," or spurious signals due to local oscillator harmonics. An obvious choice is to tune the first i.f. through one of the amateur bands and for this 1·8 and 3·5 Mc/s are the bands of choice. As the writer has no interest in 1·8 Mc/s it was decided to use 3·5 Mc/s for the first i.f. thus obviating the need for separate conversion to that frequency. The oscillator operates on the high side of the signal and is still on a low enough frequency to be readily stabilized.

A block diagram of the main receiver is shown in Fig. 1.

Having decided roughly the operating frequency of the main receiver we are left with the question of range to be covered. It is in this connection that the one drawback of the system becomes evident and some compromise is indicated. If complete coverage of each band is desired and really good bandspread is still to be obtained the different coverage, in terms of frequency spread, of the various bands is a problem. Ten metres is the most difficult, covering as it does more than four times as much of the spectrum as any other h.f. band. If one were to attempt to cover a range of 2 Mc/s in the tunable i.f. section for the sake of 10m the bandspread on the other bands (as well as on 10) would suffer. In the present case the question was greatly simplified because the writer is rather bigoted in his attitude. S.s.b. is the only mode of operation in use and other parts of the band are not required. Coverage is therefore restricted to a range of 350 kc/s—from 3·55 Mc/s to 3·9 Mc/s to allow for the North American s.s.b. stations between 3·8 and 3·9 Mc/s. For the higher frequency

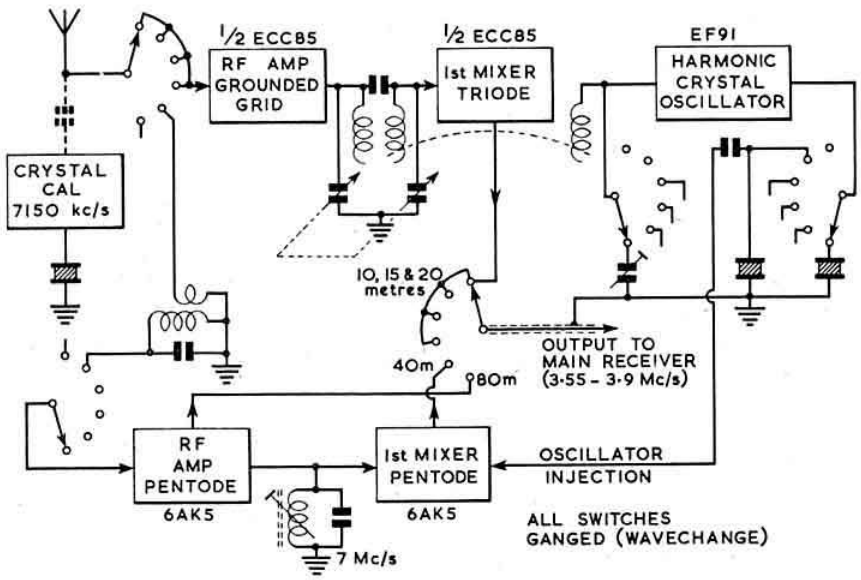



*Fig. 2. Block diagram of the r.f. section.*

bands the crystals are chosen to enable the sideband sections to be covered. (If the time ever comes when s.s.b. is the universal system of 'phone working, something will have to be done about " 10.")

A rather better compromise, for the man who hesitates to deprive himself of parts of our already meagre allocation, would be to tune from, say, 3·5 Mc/s to 4 Mc/s and use four bands to cover 10m. Alternatively the thing could be carried to its logical conclusion by tuning a range of, say, only 100 kc/s using a large number of crystals to obtain complete amateur band coverage. This is not so complicated as it sounds, as will be seen when the " front end " is described. It is not a great drawback in practice as, during any session, the operator is more often than not only concerned with one section of the band.

The writer was gratified to see from the brief description recently published [4] that the latest Collins receiver (the 75S-1) incorporates many of the features of his own receiver. Doubtless Collins have made a rather better job of construction!

The line-up of the tunable i.f. section consists of an EF92 mixer (a 6DC6 would be better if available), with bandpass tuning in the grid circuit, using an EF91 in an electron-coupled Hartley circuit (with an h.t. supply of 100 volts regulated by a 7475 neon stabilizer) as oscillator. The oscillator is provided with a small, panel-mounted trimmer used in conjuction with the crystal calibrator to set the frequency. Here the only problem concerned with the tracking of gang-tuned circuits is encountered but as this is confined to one band and three tuned circuits it is not very serious. It is overcome with the aid of a grid-dip oscillator having reasonably accurate calibration. If the reader is intending to undertake any construction at all and has not yet provided himself with a g.d.o., the writer would suggest that this should be the next item he constructs.

Immediately following the mixer is the crystal filter which comprises two half lattice sections in a back-to-back arrangement—a modification of that described by Jordan [5]. This utilizes FT241-A crystals [3] with 1·85 kc/s spacing, in this case channels 49 and 50. The filter is followed by two stages of i.f. amplification using 9001s (any similar type, e.g. 6BJ6, would be suitable). The crystal filter gives a very good passband shape but it may be considered worthwhile to back it up with a further half lattice filter used as the coupling between the first and second i.f. stages.

The first i.f. stage is the only part of the receiver where manual gain control is applied. This may seem rather undesirable but is the result of much experiment and gives the best results. Only one local station overloads the part of the receiver prior to this point and detuning the aerial trimmer is satisfactory.

The next stage is the product detector and this is the only type required for s.s.b. (or c.w.) reception. As the input to this type of detector must be restricted to 0·5 volts or less the i.f. stages provide quite sufficient gain. However, it may be desired to incorporate alternative s.s.b./c.w. and A3 detectors using an envelope detector of the diode or infinite impedance type. In this case (or if a third half-lattice filter is used) more gain will be required from the i.f. section and it may prove necessary to provide another stage of amplification. It is possible of course to receive A3 signals with the product detector, in a similar manner to the " exalted carrier " mode of demodulation. To do this the received signal must be fairly stable; the owners of many so-called " stable " A3 signals would have a shock if they heard them being received in this way. If frequency modulation is used (intentionally or otherwise) it is impossible to decipher the signal.

The product detector used is the double triode version using a 12AU7. Carrier insertion is by a crystal oscillator

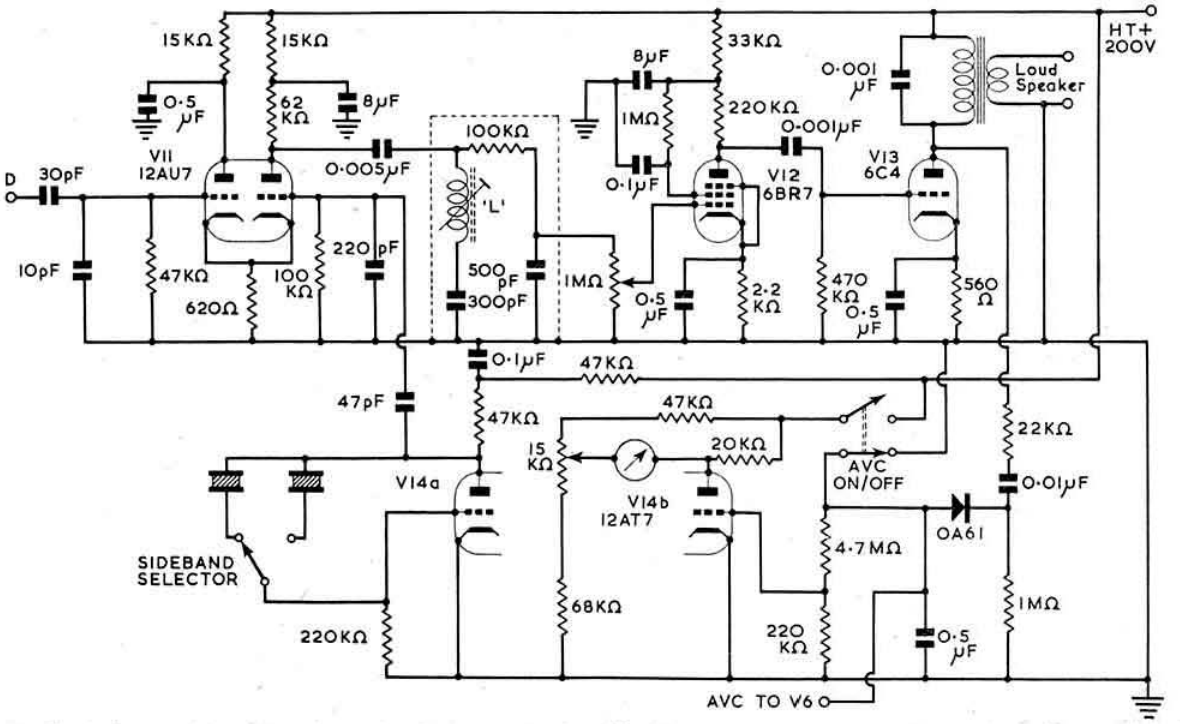



*Fig. 3. Circuit diagram of the a.f. section. Product detector (V11), a.f amplifier (V12), output stage (V13), carrier insertion oscillator and signal level indicator bridge valve (V14). The inductance L and the mounting of its associated components is described on page 53.*

(one half of a 12AT7) with alternative crystals for upper and lower sideband. These are again of the FT241-A series, one of which is plated and the other edge-ground [6] so that the frequency of oscillation is about 800 c/s higher or lower than the frequency of the nearest filter crystal. This method of sideband switching requires the main tuning of the receiver to be simultaneously reset, by an amount equal to the difference in frequency of the two crystals, so that the received sideband signal will be on the correct side of the (inserted) carrier. A refinement sometimes suggested is to arrange to reset the local oscillator the required amount by means of a trimmer brought into circuit by another switch section ganged to the c.i.o. crystal selector. In this case it was not considered desirable to introduce switching into the local oscillator (having taken pains to avoid the necessity) merely to obviate the very slight effort involved in retuning.

The a.f. stages of the receiver are conventional except for having more gain than usual because of the low output of the product detector. At present a 9001 is used as the voltage amplifier but this is due to be replaced by a 6BR7 or EF86. The last valve is a 6C4 which provides more than enough power for a comfortable audio output to a 6 in. loudspeaker.

As carriers of various types still abound, even in the s.s.b. sections of the bands, a Q Multiplier circuit is incorporated. The shunt type of circuit is employed, connection being made to the anode of the first i.f. stage, and is only used to provide a " null " response. This will reduce any *stable* heterodyne well below the threshold of audibility, without affecting readability of speech. Where c.w. operation is contemplated alternative " peak " or " null " switching is desirable [7]. It is not necessary to switch the Q Multiplier out of circuit as, left in the " null " position, adjusting the frequency to the edge of the passband steepens the slope of the response curve.

There are many occasions when more than one carrier causes interference. Where the resultant heterodynes are of different frequencies, a second Q Multiplier is felt to be required. As an alternative to this a " Selectoject " [8] may be tried.

Automatic volume control is somewhat difficult to incorporate in a s.s.b. receiver but is very useful where stations of different signal strengths are operating in the same net. Circuits using a quick-acting, slow release system of a.g.c. have been described but are complex and not considered worthwhile for the occasional need. At G3GKG a very simple system is used which does all that is required. The audio voltage at the output stage anode is rectified and applied, via a long time constant circuit, to the mixer grid only.

There was a rather blank-looking space left on the front panel, so a signal level indicator was added. This utilizes the other half of the c.i.o. 12AT7 in a bridge circuit. Provided no attempt is made to calibrate the meter in terms of decibels or " S " points, and the operator does not become addicted to giving signal strength reports from it, its incorporation should do no harm.

Some form of muting of the receiver during periods of transmission is essential. At present this is accomplished by returning the cathodes of the r.f. valves and the tunable i.f. mixer to a common line which is raised to about 50 volts positive by the opening of a pair of auxiliary contacts on the aerial relay when on transmit. The value of the blocking bias is variable by a front panel control to enable the receiver to be used for monitoring the transmitted signal. The aerial connection of the receiver is earthed by the relay when on transmit. This is the only relay involved in transmit/receive switching and full break-in is used. A system of purely electronic switching is envisaged but this will involve modifications to the receiver to allow for muting with a negative bias voltage to the grids of the valves.

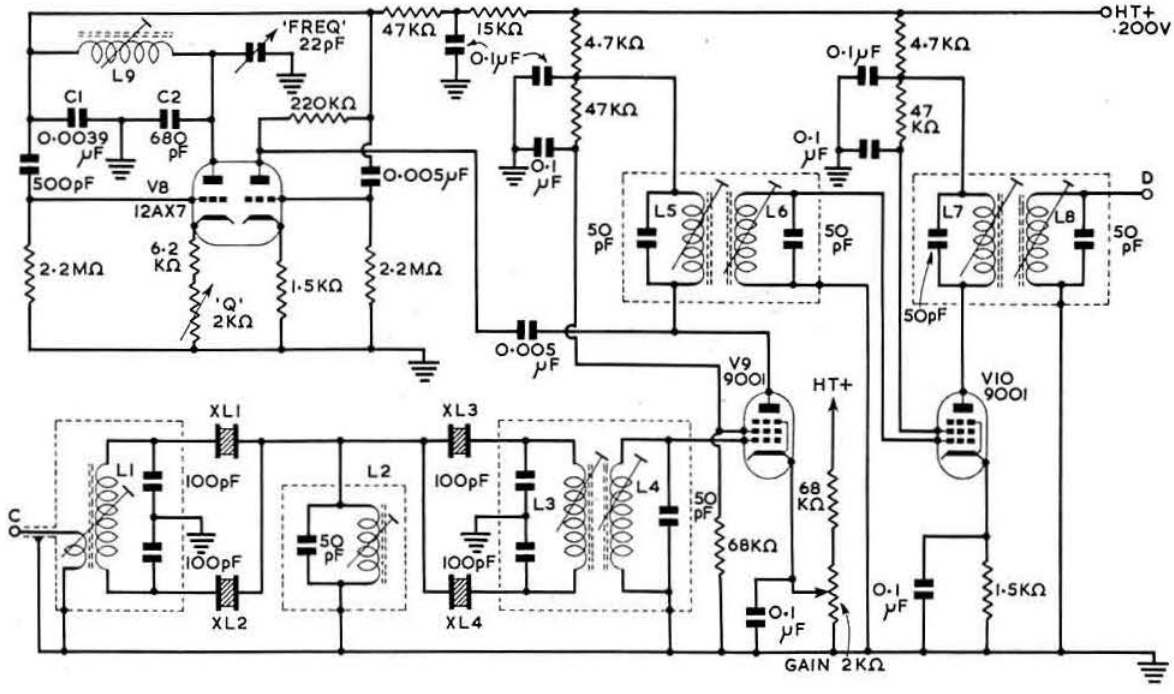



*Fig. 4. Circuit diagram of the 460 kc/s i.f. section. First i.f. amplifier (V9), second i.f. amplifier (V10) and Q Multiplier (V8). A modified Osmor QA5-300 coil specially wound for Q multiplier use is suitable for L9. XL1 and XL3 are Channel 49 and XL2 and XL4 Channel 50 FT241 type crystals.*

### R.F. Section

The requirement of this part of the receiver is not high gain but only sufficient to mask the mixer noise without making too much of its own; in other words, moderate gain but good signal-to-noise ratio. As regards the latter, there is nothing to choose between triodes and pentodes at frequencies of 20 Mc/s and lower. At 30 Mc/s, however, triodes have a definite advantage. Fig. 2 shows the block diagram of the arrangement adopted.

The usual broad-band converters are prone to passing on to the main receiver two types of spurious signals. One of these is caused by lack of selectivity in the r.f. stage and is usually worst at the higher frequencies. The other is due to cross modulation where high slope pentodes of the 6AC7 or EF91 variety are used. These types are particularly prone to this complaint and, in the writer's opinion, their use as signal amplifiers is undesirable in amateur band receivers. The 6DC6, and to a lesser extent the EF85, are better types where pentodes must be used.

In order to maintain high selectivity and signal-to-noise ratio without undue complication it was decided to use a separate converter for the h.f. bands. The r.f. section, therefore, comprises two different front ends on the one chassis. For the 10, 15 and 20m bands both the r.f. amplifier and the mixer are triodes, an ECC85 (which was developed for just this purpose) serving both functions. There is an internal screen between the two sections of this valve which enables one half to be used as a grounded grid r.f. stage and the other as an additive mixer.

There are only two coils in these stages and these are tuned to the required frequency by a two-gang variable capacitor which is used exactly like an aerial trimmer. The purists may frown at this variation of L/C ratio from band to band but, by keeping stray capacities to a minimum, the total capacity in each tuned circuit is only 70-80 pF at the lowest frequency. This is lower than in the majority of general coverage receivers. On 10m the capacity is less than 20 pF and it is here that the high Q is really needed.

Oscillator injection to the mixer is by inductive coupling from the only other coil in the h.f. bands converter. This is in the anode circuit of an EF91 used as a harmonic generating crystal oscillator. The anode coil forms part of a tuned circuit which is resonated at the desired harmonic frequency by one of a series of switched trimmers. Thus the only band switching required is a two bank switch, of which one bank selects the crystal and the other the trimmer in the anode circuit.

For 40m the converter comprises a 6AK5 r.f. amplifier, a 6AK5 mixer and a crystal oscillator using the same EF91 as the h.f. bands converter. On 80m the 6AK5 r.f. amplifier is used alone.

This arrangement entails three more switch banks—one to switch the aerial, one to select the 6AK5 r.f. grid coil and the other to switch the main receiver input into three different positions, viz., anode of either the ECC85 mixer, the 6AK5 mixer or the 6AK5 r.f. amplifier. Possibly fortuitously, no retrimming of this tuned circuit appears to be necessary.

The choice of crystal frequencies will depend of course on the decision arrived at as regards tuning range and frequency of the tunable i.f. One point to be considered is which side of the signal frequency is the oscillator injection frequency to be? As it is very difficult to align half lattice crystal filters to give a perfectly symmetrical passband, it was decided to arrange matters so that the upper or lower sideband positions of the selector switch (in the c.i.o. circuit) should be modified to read " conventional " and " unconventional " sideband (convention is to use upper sideband above and lower sideband below an operating frequency of 10 Mc/s). Thus the filter is aligned to give best response when receiving lower sideband in the main receiver. By selecting the oscillator frequency to be *above* signal frequency on the h.f. bands a sideband inversion is obtained, whereas the oscillator for 40m operates *below* signal frequency and no inversion takes place. In " normal " use the sideband switch is not, therefore, required. By using

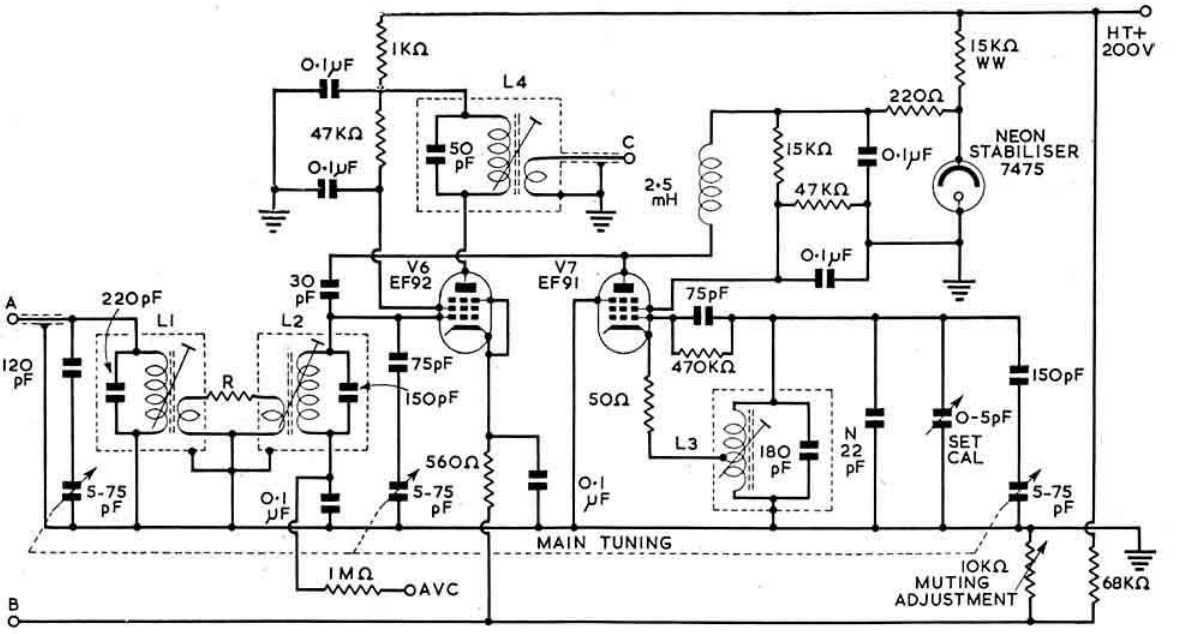



*Fig. 5. Circuit diagram of the tunable i.f. section. Second mixer (V6) and local oscillator (V7). The value of R is best found by experiment. In the writer's receiver the value used was 68 ohms.*

" high-side " injection there is less liability to encounter spurious responses due to oscillator (or crystal) harmonics.

Due to the restricted range of the main receiver the crystals used in the original version are, with one exception, on awkward frequencies. Surplus FT243 crystals were therefore carefully etched [9] to the required frequencies.

If a more reasonable compromise is made as regards main receiver coverage—say from 3·5 to 4 Mc/s—requirements are less exacting and etching is not required. It is a great beauty of this circuit that the number of bands available is governed solely by the number of crystals and switch positions, no extra coils being needed.

Also located in the r.f. section is the crystal calibrator which in this case utilizes an FT243 crystal on 7,150 kc/s. The frequency is adjustable to a slight extent allowing it to be set against an external standard. Coupling into the r.f. stages is " incidental," by virtue of its placement on this chassis, and is sufficient to provide a strong marker in the s.s.b. section of all bands except 80m.

## Construction

The writer was fortunate in having in his possession a BC348 receiver which had already been extensively modified before the decision to plunge into s.s.b.-only operation was made. When it was realized that the receiver as it then was would not fulfil the more exacting requirements it was subjected to a critical appraisement. Here was a solidly made, die-cast chassis lending itself admirably to reconstruction as all the various sub-chassis could be removed and a completely fresh start could be made. The dial assembly and drive mechanism for the tuning are of far better quality than could be made with the writer's limited workshop facilities. The decision was made and work commenced.

The BC348 was completely stripped, including the front panel and the whole tuning and dial assembly. This part of the receiver was given a thorough cleaning and oiling before being replaced, together with the mechanism for wavechange switching. A new front panel was made from 16 s.w.g. dural and the addition of a heavy brass tuning knob of the flywheel variety resulted in a framework with a " £200 receiver " feel in the tuning mechanism, and nothing behind it.

The die-cast framework of the original receiver suggested a form of construction in which separate sub-chassis could be assembled individually and then connected together to form a complete receiver. This would also allow for future development. Although the existing sub-chassis in the receiver are not the ones originally built all the sections fulfil the same functions as the originals. A receiver of the double-superhet type with a tunable first i.f., as outlined, can be conveniently divided into four parts with very few interconnections, as indicated in Figs. 3, 4, 5 and 6. (This type of sub-division of the circuit could be made to suit many government surplus chassis with different numbers of sections available.)

In the top view of the receiver the disposition of the various assemblies can be seen. The discerning reader will notice that the Q Multiplier is on the a.f. chassis and, in fact, it and the product detector are transposed in the photograph. This is due to the fluid state of the receiver's development mentioned previously.

Study of the circuit diagrams will reveal nothing so com-

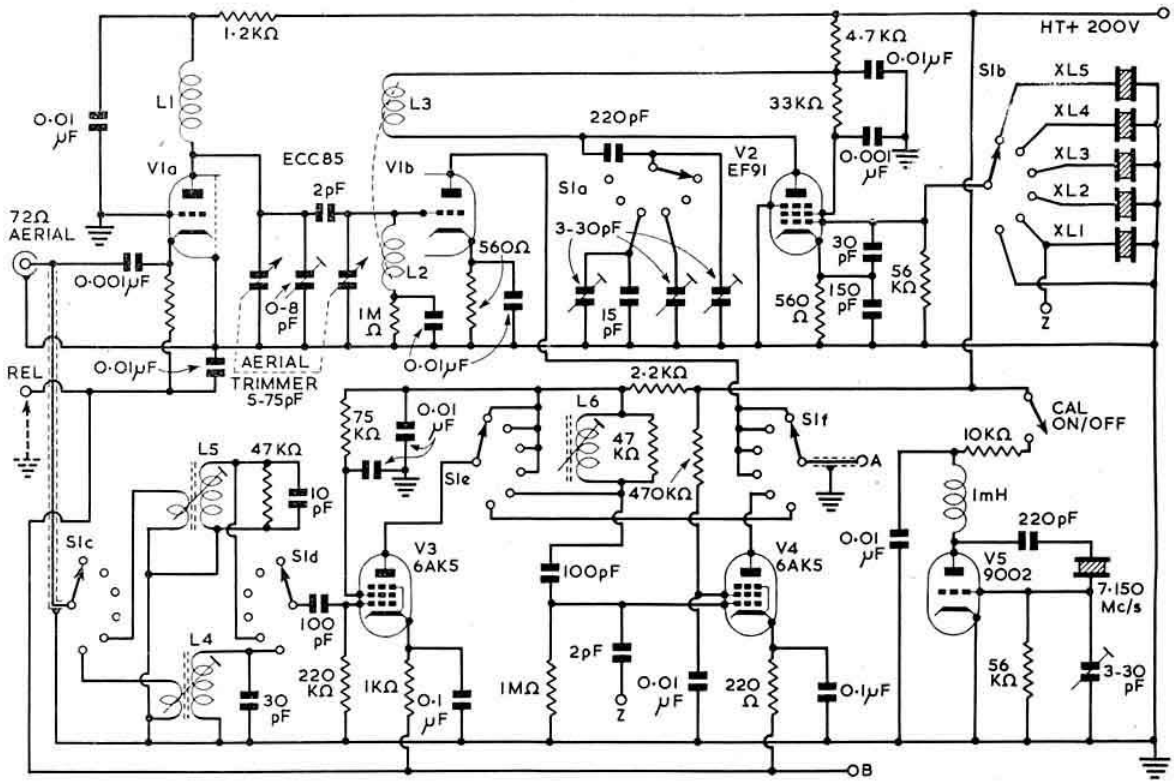



*Fig. 6. Circuit diagram of the r.f. section. For the h.f. bands: r.f. amplifier and mixer (V1) and crystal oscillator (V2). For 40m: r.f. amplifier (V3), mixer (V4) and crystal oscillator (V2). For 80m: r.f. amplifier (V3). Crystal calibrator (V5). Crystals XL1-5, see text.*

plicated as to be beyond the scope of the average amateur. There are, however, several points worthy of discussion or explanation and it is proposed to deal with each section separately. Sections of this type could be built one at a time and introduced into an existing receiver so that the job of reconstruction took place gradually and the receiver was not inoperative for long periods. If the construction of a complete receiver on these lines is contemplated it is suggested that work commences with the a.f. section and continues backwards through to the r.f. section so that each part can be aligned and tested as it is completed.

### Constructional Details

**A.F. Section** (Fig. 3)

The audio output and amplifier stages, V13 and V12, are conventional except for the low values of coupling and cathode bypass capacitors used to restrict the bass response. Owing to the high gain of V12 great care must be taken to keep hum pickup to a minimum. The filter in the anode circuit of the product detector, V11, removes i.f. and c.i.o. signals which would otherwise overload V12. Inductance L was chosen to resonate at 460 kc/s with a capacity of 300 pF. Part of the winding of an i.f. transformer was removed and then the remainder of the filter components mounted inside the screening can as indicated. H.t. voltage to the c.i.o., one half of V14, is reduced by the 47 K ohm decoupling resistor and the oscillator injection to the product detector adjusted to approximately 5 volts by the capacitive potential divider in the coupling. Trouble was originally experienced with microphony associated with the product detector. This was eventually traced to the FT241A crystals, which, due to the method of suspension inside the holders, were free to vibrate. It was cured by making the mounting more rigid by means of a large blob of polystyrene dope between the suspending wires.

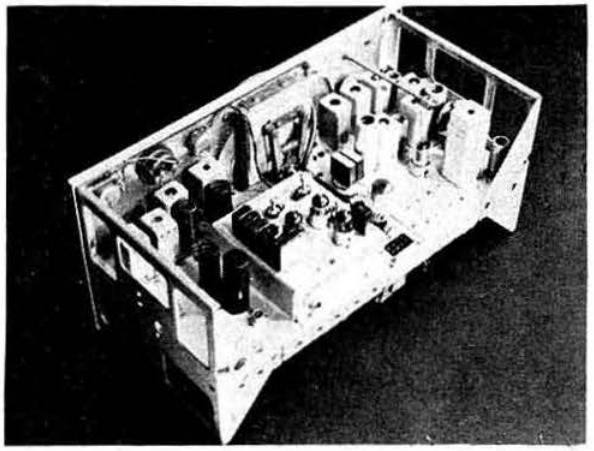
The meter in the signal level circuit is 500 $\mu$A f.s.d., shunted to give full scale deflection on the strongest signals received. Note that the meter only operates with the a.v.c. on when both gain controls are normally at full.

**460 kc/s I.F. Section** (Fig. 4)

The i.f. amplifier stages themselves are again quite conventional, standard i.f. transformers being used throughout. The types chosen have high inductance (i.e. parallel capacity 50-100 pF); those associated with the crystal filter required modification. For L2 one winding was removed altogether and the remaining one rewired so that one end connects to all four tags and the other to the screening can. As link coupling was required between this chassis and the tunable i.f. section the input transformer, L1, also had one winding removed. The link winding, consisting of about 20 turns, was then scramble-wound ¼ in. from the remaining winding. For those windings which required a capacitive centre tap the original fixed capacitor was replaced by two of double the capacity in series. These are the silvered mica type of 1 per cent tolerance. All the filter transformers were mounted so that the tags project through the chassis at the correct spacing to allow the crystals to be soldered directly to them.

As the attenuation at the edges of the passband is of the order of 60-70db stray pickup could very easily impair the operation of the filter. Great care was therefore needed in screening, especially between the input and output of the filter. One screen is mounted so that a channel is formed between it and the front panel on the underside of the sub-chassis. A transverse screen between the two pairs of crystals divides this channel into two parts and screens the input from the output. The additional screen, visible in the photograph of the underside, is to prevent pickup by the filter from the sideband selector switch below it.

Although the Q Multiplier is actually located on the a.f. chassis it is mentioned here because it is drawn in this part of the circuit. The inductance L9 is of pot-core construction and should, in any case, be of the highest Q obtainable. Performance of the circuit depends on having the correct ratio between C1 and C2. The values indicated were chosen by experiment to suit the inductance. The value of the frequency trimmer which will just tune the notch through the passband depends on the values of C1 and C2, as does the total value of resistance in the cathode circuit. As the settings of both controls are very critical for absolute rejection it pays to experiment with values until the coverage of each is enough and no more. The frequency control is provided with a 6:1 reduction drive and a flexible coupling to the front panel.



*Top view of the complete receiver showing the disposition of various sub-chassis.*

**Tunable I.F. Section** (Fig. 5)

All components in this section are mounted rigidly onto either the die-cast chassis itself or the front panel, occupying the space which, in the original BC348, was taken up by the r.f. and mixer valves above the chassis and by the four-gang tuning capacitor below. The coils L1, L2 and L3 are wound on formers from a type 373 i.f. strip (which, incidentally, is excellent value, less valves) and are mounted in the original screening cans, together with the main fixed capacitors. L1 has fewer turns than L2 so that the total capacity across it, which includes that of the coaxial line to the front-end as well as the switches, etc., is high enough to offset slight differences in strays on the various bands. Coupling between L1 and L2 is by link coils wound over the earthy ends. The links were purposely made larger than necessary, being of five turns each, and the value of resistor R adjusted, on the completed assembly, until the bandpass characteristic was indicative of critical coupling. The oscillator coil L3 consists of 36 turns of 20 s.w.g. enamelled wire with the cathode tap 12 turns from the earthy end. L1 and L2 are determined by "cut and try".

The variable capacitors used for the main tuning are similar to those used in the surplus RF26 and RF27 units. They are not entirely suitable as, apart from having rather narrow spacing of the vanes, they are of straight-line capacity characteristic resulting in non-linear frequency calibration. Values of parallel and series padding capacity required to give the necessary coverage were determined initially before assembly using the g.d.o. in conjunction with a BC221. Accurate tracking is readily achieved if each tuned circuit is treated separately and final adjustment made on the completed assembly.

Temperature compensation of the oscillator was effected experimentally by adjustment of the proportion of negative temperature coefficient capacity, N, to the total (if this is of the type marked N750K the proportion will be very close to one tenth). All the other fixed capacitors associated with the tuned circuits are the silvered mica type. Adjustment of calibration is by the 0-5 pF trimmer in the oscillator tuned circuit. In the original, this is the " antenna trimmer " from a Command receiver cut down to two fixed and two moving vanes. L4, in the anode of the mixer, is identical to L1 of the 460 kc/s i.f. section so that together they form the primary and secondary of a normal i.f. transformer.

**R.F. Section** (Fig. 6)

The photographs show that this chassis was formed to accommodate the shaft of the wavechange switch in its original position. V1 and V2 are adjacent to the two-gang " aerial trimmer " and positioned so that the switch wafer which selects the crystal and its associated trimmer is near to the oscillator V3.

Coils L1 and L2 consist of 20 turns of 30 s.w.g. enamelled wire close-wound on a short length of $\frac{1}{4}$ in. diameter polystyrene rod which is drilled to take two lengths of 18 s.w.g. tinned copper wire as connecting and supporting leads. They are mounted self-supporting using leads as short as possible. Partial screening between L1 and L2 is provided by the disc ceramic bypass capacitors across the valveholder. The oscillator anode coil L3 is similar to the others but consists of only 18 turns. Oscillation of all crystals is on their fundamental frequencies, the desired harmonic being selected by L3 tuned by the appropriate trimmer. The trimmer which is permanently in circuit serves for both 10m bands (harmonic frequencies of 32·05 and 32·4 Mc/s); for each of the other bands an additional trimmer is switched into circuit. The crystals for 10m are in the 8 Mc/s range and the fourth harmonic is used, whereas for 15 and 20m the crystals are in the 8 Mc/s and 6 Mc/s region respectively and the third harmonic is used. By employing fairly tight coupling between L2 and L3 optimum injection is obtained with low oscillator power, thus reducing risk of trouble with spurious radiation.

Normal precautions regarding the wiring of h.f. stages were observed, such as using shortest possible leads and returning all earths for each stage to a common point.

For 80m the input is connected via L4 to the r.f. stage V3 which then has the input tuned circuit of the tunable i.f. section in its anode circuit. V4 is brought into circuit for 40m only and oscillator injection to the grid is via the 2 pF capacitor from the appropriate crystal. Coils L4, L5 and L6 are slug-tuned and the 40m coils L5 and L6 are damped by 47 K ohm resistors to broadband the response. As the writer is only interested in the sideband section of 80m L4 is not similarly damped but, in fact, the sensitivity does not noticeably deteriorate over the range 3·6-3·9 Mc/s.

### Alignment

The alignment of half-lattice crystal filters has been adequately described in the BULLETIN many times and is in any case easier to do than to describe. Reference 3 in the general discussion will prove very helpful in this respect. No neutralizing capacity is used across the h.f. crystals because the writer does not like sidelobes even when they are 50db or so down.

The tracking of the circuits in the tunable i.f. section has already been mentioned and only slight adjustments were necessary before final calibration.

R.f. section alignment was commenced with 10m and consisted of setting the "aerial trimmer" to peak a signal from the BC221 frequency meter, adjusting the trimmer in the anode circuit of V2 for maximum and finally peaking the signal again with the 0-8 pF Phillips trimmer across L1. (Tracking over the range of the " aerial trimmer " depends on L1 being identical to L2.) Signals on each of the other h.f. bands were then peaked, with the " aerial trimmer " set to the correct frequency, by adjusting the oscillator trimmer for maximum. Coupling between L2 and L3 was adjusted by moving them closer together until no increase in signal strength occurred. No difference has been observed in this adjustment from one band to another. This is probably because the lower capacity across L3 on 10m results in a higher Q, which offsets the reduced output on the fourth harmonic as compared to the third for other bands. When the coupling is adjusted for optimum conversion gain, as described above, the setting of the trimmers is quite broad and does not in any case affect frequency.

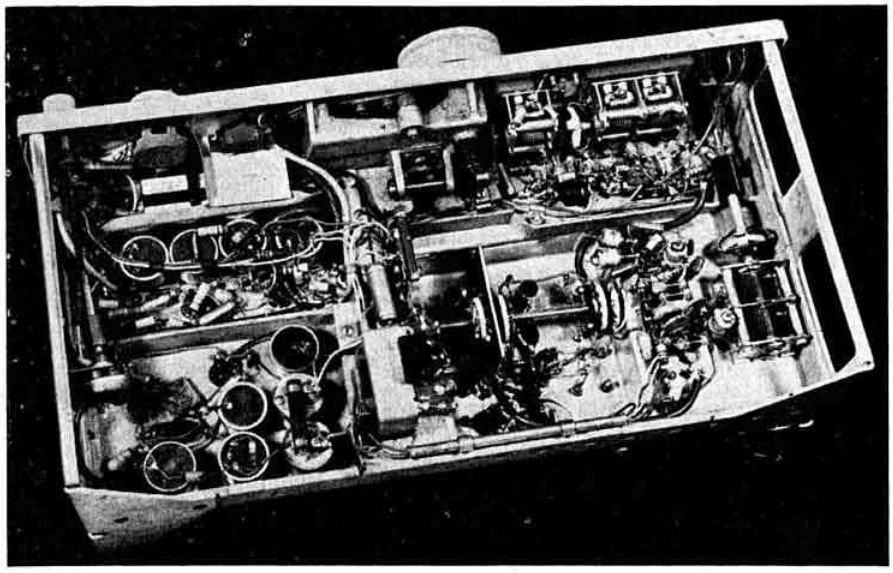
On the lower frequency bands the alignment consists of merely peaking the iron-dust cores at the centre of the respective bands.

### Calibration

Although the tuning rate is constant for all bands the frequency scale is reversed on the h.f. bands due to the local oscillator frequency being above the signal frequency. Consequently individual calibration was done for each band, against the BC221 frequency meter, with the " set calibration " trimmer in the mid-position.

### Performance

The writer regrets that, due to lack of suitable testing



*Underside view of the receiver showing details of the construction.*

facilities, no accurate figures are available for many of the criteria of performance. Information that is available is as follows:

**Bandspread**

Due to the type of variable capacitors used in the tunable i.f. section this varies over the band. The full range of 350 kc/s is covered by exactly 100 turns of the tuning knob. In the s.s.b. section of 20m, where bandspread is about the average, 10 kc/s occupies ½ in. of the scale and is tuned by four turns of the knob. There is no backlash in the BC348 tuning drive and only a fraction, equivalent to about 100 c/s at the worst, in the drive to the dial.

**Stability**

Figures for stability were determined for the purpose of this article by checking against the 1 Mc/s crystal oscillator in the BC221. It is with some trepidation and at the risk of being accused of inaccuracy that they are quoted here.

In the first 15 minutes after switching on the drift was about 500 c/s; after one hour it had reached 800 c/s and after a further two hours was less than 1·5 kc/s*. At this stage the receiver was lifted off the table and subjected to some rather rough handling. No change in the beat note was detected. To check on any possible pulling of the variable oscillator, a very strong signal was tuned in whilst listening to the beat note of the oscillator on the BC221. Once again no change was detected, even when a very low frequency beat note was used.

For the above tests the receiver was tuned to 7·0 Mc/s but the stability is, of course, the same on all bands.

**Signal-to-noise Ratio**

No signal-to-noise ratio figures are available but, even on 10m, if the receiver is tuned to a clear frequency and the aerial is then removed there is a very marked drop in the noise level. As regards absolute sensitivity, the weakest readable signals produce an adequate audio output in either 'phones or loudspeaker.

**Selectivity**

The response at the 6db points is about 2·5 kc/s and is something over 60db down at the 5 kc/s points. In time one becomes accustomed to the way signals " plop " in and out of the passband when tuning slowly over the band. As the carrier is inserted at a frequency where the response is approximately 25db down, a beat note is heard on one side of " zero-beat " only when tuning across a steady carrier.

**Image Rejection**

By mistuning the " aerial trimmer " on the h.f. bands it is possible to tune to the image signal to the exclusion of the desired frequency. On resetting this control the image signal disappears. Again no figures are available but as even image signals in the broadcast bands are rendered inaudible the rejection must be pretty good.

In general it can be said that the performance of the receiver is such that there are no difficulties involved in receiving s.s.b. One can forget about all the involved techniques and tune a s.s.b. signal accurately and faster than an A3 signal can be tuned in on an AR88. Once set to a sideband net on 80m one can retire to the fireside and spend the evening " reading the mail."

## Conclusion

In writing this article the object has been to attempt to dispel some of the " mysterious black boxes " attitude towards receiver construction current amongst radio amateurs. It is hoped that, by splitting the description of a seemingly complex undertaking into several relatively simple parts, some of the mystery has been dispelled. The " black boxes " are now open and the reader can set about providing himself with a receiver which will do *all* that *he* requires of it in the only way possible—building it himself.

Although the receiver has been described as complete it is realized that this is but a fond hope and the writer has no doubt that its evolution will continue as new developments take place. Possibly a " progress report " will be submitted several years hence.

Acknowledgments are due to Norman Harrison (aspiring to a transmitting licence) for the photography, to Dr. E. H. P. Young (G3ATK) for assistance in editing the manuscript, and to D. W. Brough (G3HUR) whose idea it was to write it.

## References

[1] Koster, A. H., R.S.G.B. BULLETIN, August 1958, p. 69.
[2] Lear, L. A., R.S.G.B. BULLETIN (*Letters to the Editor*), October 1958.
[3] Rogers, B. J., R.S.G.B. BULLETIN, April 1957, p. 444.
[4] Hawker, P., R.S.G.B. BULLETIN, September 1958, p. 113.
[5] Jordan, F. C. B., R.S.G.B. BULLETIN, November 1957, p. 217.
[6] Rogers, B. J., R.S.G.B. BULLETIN, April 1957, p. 444 (Appendix).
[7] Edwards, A. C., *Short Wave Magazine*, September 1957, p. 344.
[8] Mathews, J. W., R.S.G.B. BULLETIN, June 1958, p. 561.
[9] Bennett, H. E., R.S.G.B. BULLETIN, September 1950, p. 94.

* The power supplies to the receiver are derived from a power pack which is common to all the gear in the station. Because of this the valve heaters must be allowed to warm up for about two minutes before h.t. is applied and the calibration set. The figures quoted are not, therefore, of drift from cold but are a measure of the stability in actual operation.

## SIMPLE MICROPHONE REST

FIG. 1 illustrates an easily-made stand for a hand microphone which allows it to be turned to any desired position, yet prevents it being knocked off the table. The microphone is readily available for normal hand use by lifting the rest out of the small hole in the edge of the table top.—G2BSA.

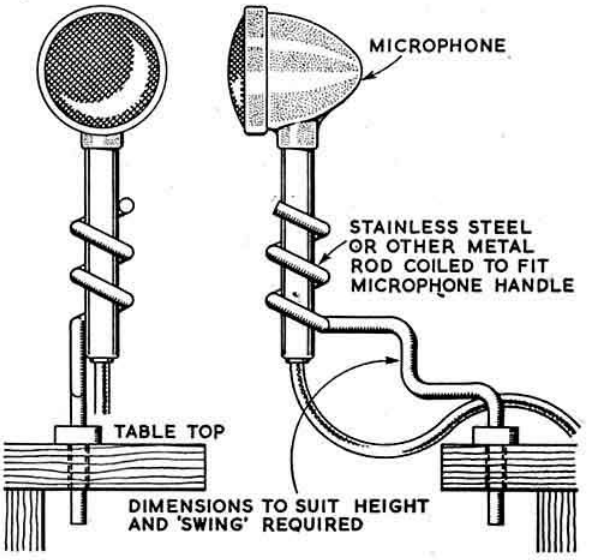



*Fig. 1. An easily-made stand for a hand microphone.*

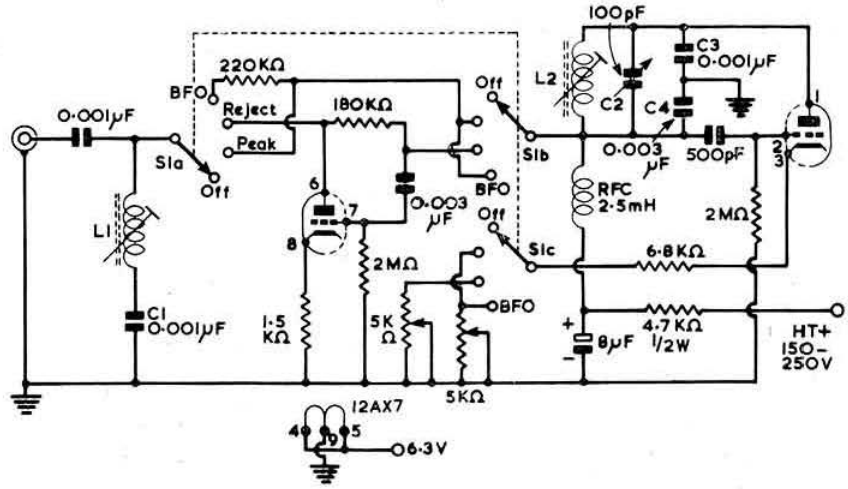



*Fig. 1. Circuit diagram of a Q Multiplier. Fixed condensers, with the exception of C3 and C4, can be of the disc ceramic type. C3 and C4 should be close tolerance silvered mica type. Resistors, except where otherwise annotated, may be of ½ watt rating. The constants shown against L1, L2, C3 and C4 are for an intermediate frequency in the range 450 to 470 kc/s. Values for other intermediate frequencies are given in Table I. The function switch is a 3 pole 4 way Yaxley type. A suitable miniature r.f. choke is manufactured by the Teletron Co. Ltd.*

# Better Selectivity with the Q Multiplier

## Easily-built Electronic Filter

By R. F. STEVENS (G2BVN) *

A RECEIVER designed for amateur communication must have selectivity considerably greater than that normally provided by i.f. tuned circuits operating at 465 kc/s. Until recent years this additional selectivity was usually provided by a piezoelectric crystal in a series resonant circuit with a bridge configuration. This arrangement, known as a crystal filter, permits the pass band of the i.f. amplifier to be made very narrow, but its use has certain disadvantages, i.e. (i) there is an insertion loss, and as a result it is usually necessary to have an additional stage of i.f. amplification; (ii) unless the receiver has an exceptionally slow tuning rate the placing of the desired signal in the centre of the pass band calls for very careful adjustment; (iii) the crystal "rings" at maximum selectivity thus making signals difficult to copy.

Following articles in U.S. journals† a device known as a "Q multiplier" has been incorporated in numerous communication receivers of American manufacture, the latest examples being the Hammarlund HQ-160 and the Cosmophone 35. The Q multiplier is a tunable electronic filter by means of which extreme degrees of selectivity may be obtained in an i.f. amplifier, and a signal may be either peaked or rejected. When the device is used to boost a signal it may be likened to a high Q parallel resonant circuit connected across the i.f. transformer. At the point of resonance the impedance is high and a signal at that frequency will pass unattenuated. At other frequencies the incoming signal will be attenuated by an amount which will depend on the Q of the circuit and the frequency separation from the point of resonance.

Q multiplication is obtained by a triode positive feed back circuit which increases the original circuit Q by a factor of between 20 and 40. The basic circuit of the Q multiplier is shown in Fig. 1. By utilizing a coil of the ferrite pot type for L2 the initial circuit Q can be made in the region of 200 to 300. Assuming a figure of 200 and a multiplication factor of 20, the final Q will be 4,000 which is comparable to that of a crystal filter.

* *Member of the Technical Development Sub-Committee, 51 Pettits Lane, Romford, Essex.*

† Electronics, *April 1952; CQ, January, March, April 1955.*

### Advantages of the Q Multiplier

Advantages which are obtained from the use of a Q multiplier to peak a signal are:

(i) The resonant frequency of the feedback circuit may be varied by C2 and thus can be tuned across the i.f. amplifier bandpass, allowing signals to be peaked without alteration of the main receiver tuning, resulting in easier adjustment.

(ii) There is no insertion loss.

(iii) The circuit is simple to construct and align, connection to a receiver requires only one lead (in addition to the provision of h.t. and l.t. power), and no alterations need be made to the receiver's original circuitry.

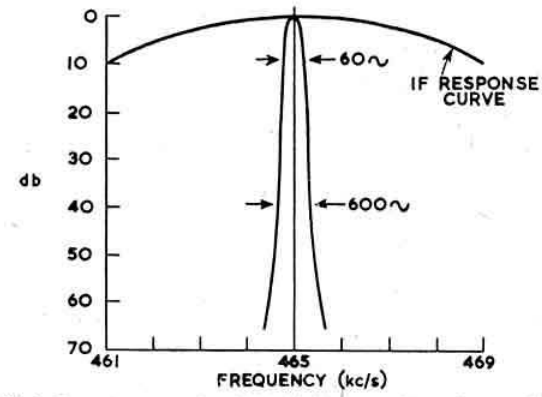



*Fig. 2. Resonance curve for a Q Multiplier centred on an intermediate frequency of 465 kc/s.*

The response curve for an i.f. stage with a Q multiplier is shown in Fig. 2.

The Q multiplier can also be used to reject an unwanted signal by the provision of a second triode in a negative feedback circuit. The high Q circuit is switched to a series resonant condition and provides a narrow " notch " at any desired point in the i.f. amplifier passband, thus allowing the unwanted signal to be attenuated by as much as 60db whilst adjacent signals are unaffected. It should be noted that the notch is not sufficiently broad to attenuate a complete a.m. signal, but beat notes or unwanted sidebands can readily be rejected.

**Inductances**

The heart of the Q multiplier is the coil L2, which, as previously mentioned, is of ferrite pot construction, and should have an inductance of between 120 and 150 microhenries for intermediate frequencies in the range 450 to 470 kc/s. To retain the high Q of this coil it should be mounted at least 1½ in. away from any ferrous metal. The condensers C3 and C4 should be of good quality, and close tolerance silvered mica types are to be preferred.

The coil L1 is used to tune out the capacitive reactance of the coaxial cable connecting the Q multiplier to the receiver i.f. transformer, which would otherwise be detuned. The inductance of L1 together with the capacity of the coaxial cable should be such that the resonant frequency is that of the i.f. amplifier. Assuming the use of not more than 30 in. of good quality semi-air-spaced or cellular coaxial cable of 72 ohms impedance having a capacitance of approximately 17 pF per foot, L1 will need to have an inductance of 1·5 to 3 millihenries at 450 to 470 kc/s. Alternatively the input coil and C1 may be omitted and compensation for the cable reactance may be made by retuning the i.f. transformer to which the connection is made.

**TABLE I.**

Values of L1, L2, C3 and C4 for the popular intermediate frequencies.

| Intermediate Frequency | L1 | L2 | C3 | C4 |
|---|---|---|---|---|
| 85 kc/s. | 15–60 mH | 0·5–2·5 mH | 2500 pF | 7500 pF |
| 465 kc/s | 1·5–3·0 mH | 120–150 μH | 1000 pF | 3000 pF |
| 735 kc/s. | 750–1000 μH | 70–100 μH | 750 pF | 2250 pF |
| 915 kc/s. | 250–500 μH | 60–90 μH | 500 pF | 1500 pF |
| 1600 kc/s | 50–120 μH | 40–60 μH | 250 pF | 750 pF |

Values of L1, L2, C3 and C4 for various popular intermediate frequencies are shown in Table I.

The value of the oscillator coil (L2) at its centre point may be obtained from the following formula:

$$L \text{ (microhenries)} = \frac{25350}{f^2 \text{ (Mc/s)} \times C \text{ total (pF)}}$$

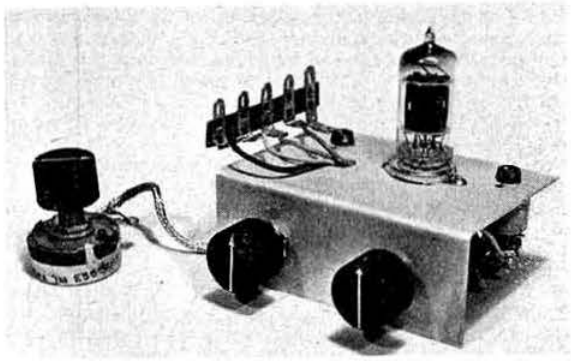
$$\text{where } C \text{ total} = \frac{C^3 \times C^4}{C^3 + C^4} + \frac{C2}{2} \text{ (in pF)}$$

Coils wound to the above specifications are not generally available from retail sources, and few readers will possess the necessary equipment to enable them to construct the coils themselves. However where this can be done it is suggested that Gecolite two piece cores type GA118C be used with a type M120 bobbin. If these components are employed then a Q of 400 can be expected at a frequency of 465 kc/s.

To assist constructors, the Minimitter Co. Ltd. have agreed to make available a Q multiplier for 450-470 kc/s built on a small L shaped chassis which can be used either as part of a separate unit or built into a receiver. The photograph shows the layout of this unit, which is similar to that incorporated in the MR 37/38 receivers*.

For readers who may wish to construct units for other values of i.f., or who wish to build on an existing chassis,

* R.S.G.B. Bulletin, *February 1958, p. 368.*



*Q Multiplier suitable for incorporation in existing receivers, and which can be obtained from the Minimitter Co. Ltd.*

Osmor Radio Products, Ltd., have agreed to supply coils of their types QA5/6·300 modified to the required inductances. These coils are of the pot type and have been found to give good results.

If it is desired to make use only of the peaking properties of the device then one half only of the 12AX7 valve need be employed, with a consequent simplification of the switching arrangements. The simplified circuit is shown in Fig. 3. A further reduction in the components necessary can be made when the Q multiplier is built into a receiver by making the connecting lead to the mixer anode as short as possible, and retuning the first i.f. transformer to resonance. Under these conditions L1 and C1 can be dispensed with but if the Q multiplier is removed at any time then the i.f. transformer will require retuning.

**Construction**

The Q multiplier may be made as a separate outboard unit or be incorporated in an existing receiver. There are no unusual mechanical considerations, but leads should be as short as possible, and wiring associated with the tuned circuit should be rigid. In view of the modest power requirements (150 to 250 volts at 8 mA and 6·3 volts at 0·6A) the most economical approach is to obtain the necessary voltages from the receiver, but if desired a completely self-contained unit can be made by utilizing a metal rectifier in conjunction with a small mains transformer of the type used for television preamplifiers or converters. A Westinghouse type 16RA rectifier and a Norman type B.3 mains transformer are suggested as a suitable combination.

**Installation, Alignment and Operation**

The centre of the coaxial cable lead from the Q multiplier

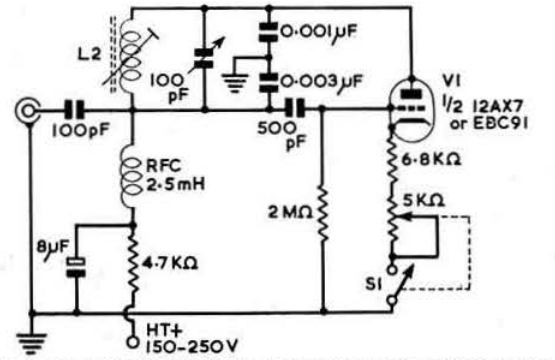



*Fig. 3. Simplified Q Multiplier which will provide additional selectivity but does not incorporate the reject or b.f.o. functions.*

should be connected to the anode pin of the mixer valve in the receiver and the shielding earthed. Although this lead may be connected to any of the i.f. transformers it is preferable to use the first transformer to avoid the possible overloading of following stages by strong adjacent signals. To obtain the best results from the unit the receiver i.f. stages should be in alignment.

With the receiver on and the Q multiplier connected, turn the function switch (S1a, b, c in Fig. 1) to the OFF position and tune in a steady signal. Tune the receiver to ensure that the signal is centred in the i.f. bandpass, and then adjust the core of coil L1 for the highest S meter reading or maximum audio output. If the coil does not peak then the cable will have to be shortened or lengthened. If the highest signal strength is obtained with the coil slug fully out then obviously less capacitance (and less cable) is required. Once correctly set this adjustment will not have to be changed.

To adjust L2 turn the function switch to "PEAK," the selectivity control to maximum resistance and the tuning control (C2) to half capacity. Adjust the slug in L2 until the steady signal is peaked, and then slowly rotate the potentiometer towards minimum resistance repeaking the slug when necessary. As the control is advanced the signal level will rise and the peak will become sharper until a point is reached where the circuit will break into oscillation. The point of maximum selectivity will be just below the point at which this happens. With the Q multiplier peaked the tuning may be varied to boost any signal within the i.f. bandpass and attenuate all others, without having to reset the receiver tuning control. It will be found that the bandwidth at the point of maximum selectivity (Fig. 2) will be so narrow that a.m. signals will be unintelligible and it will be necessary to slightly back off the selectivity control.

Should it be found that the circuit will not go into oscillation at the minimum resistance setting of the selectivity control the value of the 6·8 K ohm cathode resistor should be reduced, but not more than is absolutely necessary. If this value has to be greatly reduced then this may be an indication that the Q of the coil L2 is poor. The cathode connection of the resistor should be made directly to pin 3 on the valve base.

To obtain the best results from the "REJECT" function of the unit, some practice will be necessary as the adjustment is critical. A steady carrier should be tuned in and the b.f.o. adjusted to give a beat note of roughly 1000 c/s. C2 and the "REJECT" potentiometer should then be alternately

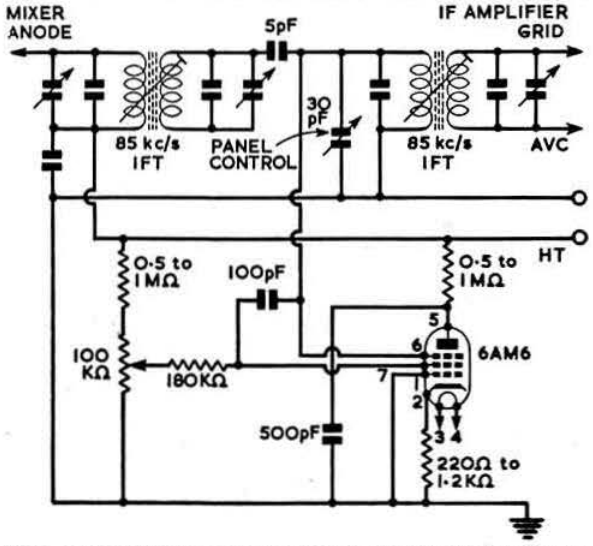



*Fig. 4. Q Multiplier based on a transitron circuit and developed by John Gazeley (B.R.S.20533).*

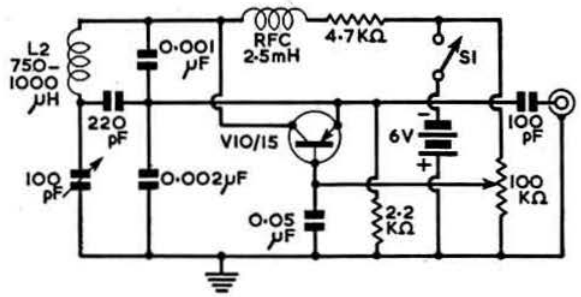



*Fig. 5. Circuit of transistorized Q Multiplier.*

adjusted until the best null is obtained, at which point the tuning will be found to be extremely sharp.

**S.S.B. Reception**

The Q multiplier can greatly assist in the reception of s.s.b. signals and the following procedure is suggested. Turn the function switch to "OFF" and adjust the receiver b.f.o. control to the point of lowest pitched background noise. Then tune in the s.s.b. signal for the greatest intelligibility, turning the r.f. gain control down and advancing the audio gain control. Now turn the Q multiplier switch to "PEAK" and rotate the tuning control for the position of greatest signal level and natural voice response. As the tuning control is adjusted to the position giving reception of the correct sideband the audio frequency response will change due to the narrow bandwidth. It will be seen that with this method the tuning of the main receiver does not need to be altered, nor does the setting of the receiver b.f.o., which leads to considerable simplification in the reception of s.s.b. signals.

If the oscillator of the receiver is on the high frequency side of the incoming signal (as is usually the case) then the Q multiplier will peak the upper sideband when the tuning control is rotated towards maximum capacity.

With the function switch set to "B.F.O." the Q multiplier can be used to receive c.w. signals.

**Transitron Q Multiplier**

The circuit of a unit employing the negative resistance property of the transitron oscillator is shown in Fig. 4. This experimental circuit was devised by John Gazeley (B.R.S. 20533) and has been successfully used in conjunction with a "Q5'er" having an i.f. of 85 kc/s.

There is considerable variation in the transitron characteristics of the 6AM6 (and equivalent types) as between different valves, and some adjustment of the anode and cathode resistors may be necessary in order to obtain the smoothest control. A trimmer has been placed across the i.f. coil to which the Q multiplier connection is made, and if this is brought out as a panel control then the "PEAK" may be shifted over the pass band of the i.f. amplifier.

**Transistorized Q Multiplier**

If the valve shown in the circuit of Fig. 4 is replaced by a transistor, the size of the unit may be greatly reduced. The circuit of a Q multiplier for "peaking" only, which has been used with a 455 kc/s i.f. amplifier, is shown in Fig. 5. It will be seen that the configuration of the tuned circuit has been altered, and the amount of feedback is controlled by varying the bias on the base of the transistor which can be a Newmarket V10/15 or similar type.

**Conclusion**

The Q multiplier is a flexible device of no great complexity, and one which is invaluable during operation on the present crowded h.f. communication bands. In view of its simplicity, the device deserves to be far better known in amateur circles and it is hoped that this article will encourage many members to build units for their own receivers.

# A Top Band Aerial for Restricted Spaces

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

MANY operators have been discouraged from operation on 160m by the lack of space in which to erect a reasonably efficient aerial system. While it is appreciated that very short, loaded aerials (such as those used by mobile operators) can be made to radiate well, these are useful only for relatively local communication as a rule. The design described in this article was used to obtain the maximum possible efficiency from a wire 67 ft. long, which can be erected by most amateurs, even if it has to be bent in the middle.

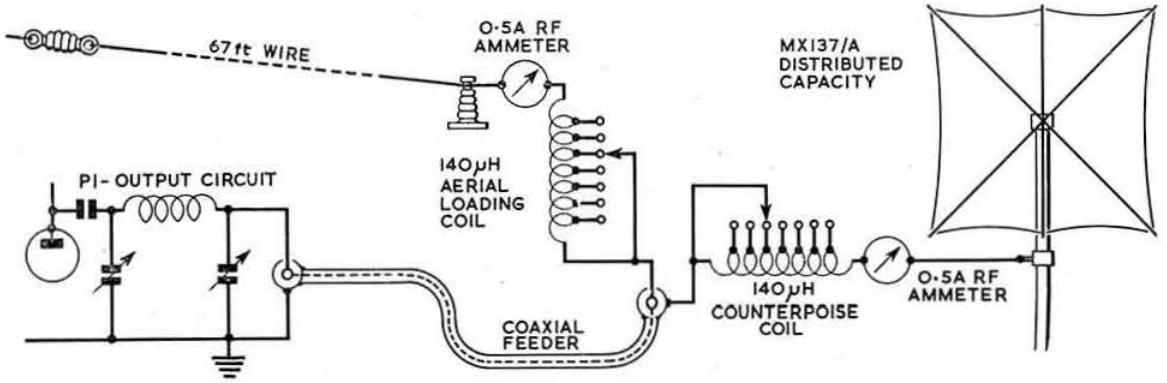



*Fig. 1. Arrangement of the Top Band aerial for restricted spaces. Details of the loading coils are given in the text.*

## A Review of the Problem

The 67 ft. wire was considered to be a good basis for experiment, being in common use for the higher frequency bands. Those employing tuned or untuned feeders will have the additional advantage of an extra length of radiator by strapping together the ends of the feeders and energizing the system at that point. However, the author used an end-fed wire and so had only the bare 67 ft. length. Practically any reasonable length can be loaded by means of a pi-network in the p.a. stage, but for lengths less than a quarter wave long, it is desirable to use a loading coil to cancel out the capacitative reactance and to use a very good earth system. In such a system, the power generated by the transmitter is dissipated in the capacity, the loading coil, the radiation resistance and the earth resistance. Of these, only the radiation resistance is responsible for power being radiated. For practical purposes, the capacitative component dissipates negligible power and the r.f. resistance of the loading coil can be made quite low, so that the power generated is actually divided between the radiation resistance and the earth resistance.

If an average earth connection to a mains plug or water pipe is used, the earth resistance may be high, up to about 20 ohms for example, especially if the transmitter is in an upstairs room and there is a long path to earth containing a number of joints. The loaded wire may have a radiation resistance of only about 15 ohms, so clearly it is quite possible for more than 50 per cent of the transmitter power to be dissipated uselessly in the earth resistance.

These conclusions were supported by the author's experience in trying to use a loaded 67 ft. wire against earth. Two undesirable features were apparent: signal strength reports were not good and there was some r.f. pick-up in the modulator, presumably due to the r.f. current flowing in the chassis on its way to earth. The simplest solution appeared to be for the earth return for r.f. to be eliminated by using some variation of the counterpoise system.

* *3 Sandgate Avenue, Tilehurst, Reading, Berks.*

## The Design

It was therefore decided to use a resonant counterpoise, with a distributed capacity and loading coil. The distributed capacity was obtained ready-made in the form of an ex-U.S. Air Force MX-137/A Corner Reflector aerial. This unit, designed for erection on a life-saving dinghy or raft to act as a good radar target, consists of a 4 ft. high telescopic mast, supporting six telescopic arms about 3 ft. long, between which are connected sheets of fine wire mesh. As the unit did not appear to be constructed for long exposure to the weather, it was erected in the roof space of the house, and a length of wire run down through the ceiling to the loading coil. The length of connecting wire was not important, as any variations were taken up in the adjustment of the loading coil.

The complete assembly is shown in Fig. 1. The two loading coils are identical, and consist of about 70 turns of insulated 22 s.w.g. wire, closely wound on a 2 in. diameter former, the winding length being about 3½ in. giving an inductance of approximately 140μH. The coils are tapped every five turns to enable adjustments to be made for various lengths of aerial and counterpoise. It is useful to have at least one 0·5 amp. r.f. ammeter for tuning up the system, although it is possible to work with a field strength meter and by watching the loading of the p.a. stage. A length of coaxial cable can be used to connect the transmitter to the aerial tuning unit.

## Tuning

The p.a. stage is tuned in the usual way, adjusting the main tuning capacitor for resonance and the loading capacitor to give the best match possible. Various tappings are tried, first on the aerial loading coil, until maximum aerial current is obtained. The tap on the counterpoise coil is then adjusted until maximum current is also flowing in the counterpoise system. It is not absolutely essential to have an r.f. ammeter in the counterpoise circuit, as it should be found that the aerial current also peaks up when the best tapping is found on the counterpoise coil. Final adjustments can then be made to the p.a. tuning and loading capacitors. If an r.f. ammeter is placed in the earth lead to the transmitter, it will be found that when the system is correctly tuned the earth current falls to a low value. A small, continuously variable inductance has been tried

in series with the main aerial loading coil for fine adjustment when tuning from one end of the band to the other, but adjustment of the tapping on the main loading coil, together with the final capacitor of the pi-network, was found to be nearly as good. Alternately a 500pF series variable capacitor could be used for fine tuning. This might be a little more efficient but the loading coil would require a slightly greater number of turns.

As a guide to initial adjustment, there are 25 turns in circuit on the aerial loading coil and 55 turns on the counterpoise coil: the aerial current is about 0·25A for a power input of 10 watts to the p.a. when operating on 1900 kc/s. The aerial is 67 ft. end-fed and a 15 ft. wire is used for the connection to the MX137A distributed capacity.

**Advantages of the System**

The method of loading described removes the r.f. currents previously flowing in the " lossy " earth system and transfers them to a low-loss counterpoise which is tuned to resonance. Greater efficiency is thereby obtained, as the aerial current rises and some radiation takes place from the counterpoise system. The arrangement thus resembles an unsymmetrically loaded dipole. Better field strength and a great reduction in r.f. pick-up by the modulator are obtained. While this arrangement cannot be expected to compete with half-wave or longer aerials, contacts have been made with the north of Scotland from southern England, which show that a fair amount of energy is being usefully radiated.

**Suggestions for Further Experiments**

The system described has suited the author's requirements for using the 67 ft. wire on the higher frequency bands by connecting it to another tuning unit. However, greater efficiency could probably be obtained by placing the main aerial loading coil about 20 or 30 ft. from the far end of the wire (when more turns would be needed) and adjusting for resonance, using a small inductance near the transmitter for fine adjustment. This would bring a section of the aerial carrying greater current into use. It would also be interesting to experiment with shorter lengths of wire, using ferrite beads for loading.

The 67 ft. wire used is practically horizontal and 30 ft. high at the far end, but better ground-wave radiation would no doubt be obtained if all, or part of this length at the transmitter end, were vertical or even sloping at an angle. Those operators with centre-fed aerials will be able to take advantage of the feeder section to give a vertical radiating portion to the system.

# " CQ - 34 - 26 - 38 "

By SYLVIA

I WANT to tell you why I have decided not to become a ham.

Amateur Radio erupted into our lives 18 months ago when, one Enchanted Evening, we watched *Race for Life* on TV. My husband realized there and then that he and Amateur Radio had always been waiting for each other. It was most touching.

There followed a period which you will know all about and which, I pray, will end with the next R.A.E. Meanwhile he joined the R.S.G.B. and became a " listener." So far so good. I was quite unmoved, for this was merely another in a long list of hobbies which had enslaved him in our 11 years of marriage.

You must understand that my husband is an eccentric. Therefore I have doggedly supported all his hobbies, in the belief that the more rope I gave the brute, the sooner he would tire of them. This had worked until now. We had run the gauntlet of photography, cine-photography, radio-controlled model boats, caravanning, wood-turning (that was a nasty one—is anybody in the market for six sets of wooden piano castors?) and a particularly sticky period when we ran a boxing tournament for a local charity.

But three months ago things began to hot up. A young friend, already licensed, installed his equipment in our shack, because of our beautiful antenna. So our way of life drastically changed. Gerry spends every spare minute here and we lead a blissful, hectic, dedicated existence, in a charming *ménage à trois*. And we are all, me included, devoted to the SCIENCE AND ADVANCEMENT OF AMATEUR RADIO!

For I, poor muggins, determined to make the best of a bad job, have fallen in love. I even sit in trains and study the gloomy, bored, constipated faces of other people and think—" Of course you look miserable. You know nothing about Amateur Radio. You haven't had the message! "

I am completely infatuated by the bigness, the infinity of this marvellous thing, at the ever-changing, never-changing wonder of it, when you can pluck people out of the air and speak to them on the other side of the world. Not that they let me talk, but Gerry occasionally allows me to send 88. This brings me to Top Band.

Now, 88 to a man in Leningrad only serves to convince him further that the decadent democracies practise free love. I have a date in Leningrad whenever I happen to pass through.

But 88 on Top Band is a different cup of tea. For Top Band, girls, is inhabited exclusively by the most delightful young men who, after the initial shock, blithely reciprocate my 88—with reservations because my husband weighs 15 stone and had his nose broken boxing. These honeys gather in our shack and I give them Tea, but no Sympathy. They say I make wonderful cakes.

Problems arise, naturally. I have bought the sweetest nylon nightie to wear on National Field Day when, it seems, we are all going to sleep in tents and work c.w. But the local R.A.E.N. exercise is a bit awkward. Just what does one wear for a National Disaster?

It all goes to demonstrate my contention, borrowed from the French, that everything is motivated by two forces—food and sex. That this applies, in the case of food, to Amateur Radio is proved by the number of cups of tea I made on Sunday. As for the other force—you should have heard those six policemen in Cyprus, when I sent them 88. That was the old monster rearing his ugly head, bless him!

The natural result of all this enthusiasm would be for me to take my own ticket. I have a vision of unfed children, unwashed shirts, unmade beds. Never would I call " CQ-20," but " CQ-34-26-38 and only just h.f. of 30." Being strictly an orchid-and-mink girl, my rig would be fitted with h.f. chokes in platinum and diamond, by Cartier. I'd operate in a sweater and tight black trews. . . .

Only one obstacle frustrates me and that is what I started to write about—why I am not going to be a ham. Because I know I could never pass the R.A.E.

Can any nice young man on Top Band explain to me exactly what is an Ohm?

## V.E.R.O.N. Address

THE address of the Dutch national society, V.E.R.O.N., has been changed to Postbox 9, Amsterdam-C. The address of the Dutch QSL Bureau continues to be Postbox 400, Rotterdam.

# The MONTH ON THE AIR

A CHRONICLE OF EVENTS ON THE HF AMATEUR BANDS

By J. DOUGLAS KAY (G3AAE) *

LISTENING on the bands the other day VP8EP was a good signal on 21 Mc/s around 18.00 G.M.T., while later in the evening VP8DL on 14 Mc/s was heard to say that he was hearing and working Europeans for the first time since the beginning of his winter. Yes, there is no doubt that we are now approaching the very interesting equinoctial period when 28 Mc/s begins to open during the day, and 21 Mc/s starts to fade out late at night, and both 14 and 21 Mc/s are blessed by a marked decrease in short skip sporadic *E* propagation. The 7 Mc/s band is less noisy and begins to come back into its own during the lengthening hours of darkness. It is a rosy picture at present, and the fullest possible use should be made of it as there is no doubt that sunspot activity is markedly on the wane, and each successive winter until about 1964 will continue to see a considerable worsening of propagation conditions.

There are quite a number of the more newly licensed amateurs who have never known what it is like to try to work DX during sunspot minimum, and it may be a good idea—and an added incentive to make the most of the coming winter—if just the briefest outline is drawn now of what will happen a few years hence.

In summer-time 28 Mc/s is completely dead, while 21 Mc/s is open on very rare occasions and then on the north-south path only. 14 Mc/s is probably better than it is now due to the absence of short skip QRM, but it is open for a much shorter period of each day. 7 Mc/s and 3·5 Mc/s are almost dead for long distance work.

In winter-time 28 Mc/s continues to be completely dead, while 21 Mc/s is also dead across the North Atlantic path. In fact 21 Mc/s can be expected to open on the north/south path and to the Near East only and then but very infrequently. 14 Mc/s may open to North America during the afternoon and early evenings, while the Middle East, Far East, Africa and Australia may be workable between mid-morning and early afternoon. In fact, 14 Mc/s can be expected to be completely devoid of DX signals between 18.00 G.M.T. and 10.00 G.M.T. each day. Not very encouraging for the 9-to-5 workers!

The above outline is not meant to depress but rather to remind the majority of the brethren and warn the newer additions to the flock that the days of three band beams and easy 'phone DX are numbered. So make the most of the present, but take the long term view and start now to plan that aerial system that will give relatively as good an account of itself on 3·5, 7 and 14 Mc/s as the present one does on 14, 21 and 28 Mc/s.

The advent of sunspot minimum is a challenge: DX may be harder to work then, but the satisfaction derived is much greater than at present when anyone with a 50 per cent efficient rig can work a heap of DX provided he has enough time to devote to it. Sunspot minimum is, in fact, the time when the men stand out from the boys.

## News from Overseas

In the course of a long and most interesting letter Eric Trebilcock **B.E.R.S.195** of Melbourne gives the following breakdown on the locations of the various VK0 stations. VK0s CC and DS are on Macquarie Island (separate country for DXCC), VK0TF and RT are at Davis Base, VK0RH, AF, JV and HA are at Wilkes and VK0EM, AW, MC and VH at Mawson. Davis, Wilkes and Mawson all count as Antarctica for DXCC. Eric also says that ex-VK0RO has just mailed all the QSL cards for his operation from Mawson last year via the R.S G.B. Bureau. If anyone wants to contact him directly his address is in *QTH Corner*. Finally Eric says that it would be most welcome if more European stations competed in the annual VK/ZL contest which this year takes place on October 3/4 (10.00-10.00 G.M.T.) c.w. and on October 10/11 'phone (see page 70 for details).

From **G3FXB** comes news that **VS9OM** (Sultanate of Oman) has official permission from the Sultan, and has commenced operating on 21 Mc/s 'phone. Until now his operation has been confined to 5 watts on 14 Mc/s c.w. but even with this low power he appears to have worked a terrific number of DX stations. It is not the power that counts—it is the prefix!

## DX Gossip

Jack Lambert **G3TA** has recently flown over to Tobago (island off the coast of Trinidad) where he will remain until Christmas. The writer was able to fix him up with a B2 transceiver (thanks to G3YF) and he hopes to be on the air with a VP4 call-sign in the very near future. Jack has promised to keep *M.O.T.A.* informed of his activities and operating schedule. Tobago used to issue its own stamps, and the writer has never heard of any previous activity from this island, so it may well be that A.R.R.L. will consider giving it country status.

Ian Turner **VE2BAT** (ex-VS7IT and G3DGN) is on the air from Quebec running 60 watts on a.m. and 90 watts on c.w. He sends 73 to all old friends and is on the look-out for them on 14 Mc/s.

From **GW3AHN** comes news that **VQ8AP** will shortly be operating /B from St. Brandon. According to **G3YF**, YA1PB has suffered a leg injury and has had to return to the U.S.A.

**B.R.S.20317** says that **UA1KR/0** is supposed to be on

### DXotic Showcase

| | kc/s | | G.M.T. | |
|---|---|---|---|---|
| **KX6BB** | 14,266 | s.s.b. | 12.45 | Marshall Is. |
| **VS4JT** | 14,265 | s.s.b. | 14.00 | Sarawak |
| **JT1AB** | 14,060 | c.w. | 14.00 | Mongolia |
| **ZS5RD/ZS7** | 14,088 | c.w. | 18.05 | Swaziland |
| **FR7ZD** | 14,017 | c.w. | 17.45 | Reunion Is. |
| **ZP9AY** | 3,500 | c.w. | 21.55 | Paraguay |
| **ZS9P** | 14,050 | c.w. | 20.00 | Bechuanaland |
| **VS9OM** | 21,240 | a.m. | 12.55 | Sultanate of Oman |
| **KC6JA** | 21,120 | a.m. | 19.45 | E. Caroline Is. |
| **VQ1HE** | 14,075 | c.w. | 21.45 | Zanzibar |
| **VK9AD** | 14,050 | c.w. | 06.00 | Norfolk Is. |
| **FU8AG** | 14,055 | c.w. | 07.00 | New Hebrides |
| **LA3SG/P** | 21,020 | c.w. | 18.00 | Jan Mayen Is. |
| **CE0AC** | 14,050 | c.w. | 06.00 | Easter Is. |
| **FB8CD** | 21,130 | a.m. | 17.30 | Comoro Is. |
| **VQ1TW** | 14,022 | c.w. | 23.50 | Zanzibar |
| **KM6BT** | 21,050 | c.w. | 08.20 | Midway Is. |
| **VS5AD** | 21,060 | c.w. | 16.10 | Brunei |
| **VQ9AIW** | 14,020 | c.w. | 19.00 | Seychelles |

* *40 Fryston Avenue, Coulsdon, Surrey.*

*Nasin Hussain Khan, 9K2AN, of Kuwait works all bands 7-28 Mc/s running 90 watts to a Bandmaster transmitter into a dipole aerial. His receiver is a SX101.*

**(via G3AAE).**

Wrangel Island, one of the extremely few DXCC countries which has so far seen no activity.

### WGDXC Titbits

**9N1AC** (Nepal) plans to operate on 14,307 kc/s at approximately 02.00 and 14.00 G.M.T. each day, and will be running 800 watts to a three-element beam.

VP1EP is believed to be a pirate. The only genuine VP1s that QSL at present are OLY, EE, GLG, EK and HA.

A broadcasting station is being set up on Tonga, and applications for personnel to staff it are now being accepted. Let us hope that at least one licensed amateur will be successful!

### The Competitive Element

Since taking over this column the writer has received several suggestions about introducing a competitive element, and it does seem that such a feature might be popular. By now almost everything has been done before, but there is one exception that appears to be most appropriate to this feature. Each year a list of Commonwealth call areas is published in connection with the B.E.R.U. Contest and it is proposed to base a new competitive table on this list.

The table would be on an annual January 1 to December 31 basis and would include sections for both licensed amateurs and B.R.S. members. B.E.R.U. will obviously be *the* time for getting a good start in this competition.

Members' comments on the idea will be appreciated.

### 28 Mc/s

Ten metres is awakening after the summer lull, and the first report of trans-Atlantic working comes from **G3MVV** who worked W1ZBZ on August 14. The next few months will see a great increase in the amount of DX reported worked, but in the meantime the file is thin.

**G3BID** (Hampstead) reports a.m. contacts with VO2HW (21.43, '420), CX5BR (20.30, '260) and KP4ANS (20.44, '500) while **G3MVV** (Romford) used the same mode for ZS3U (15.45, '500), VQ3GC (11.05, '500) and VQ4RF (18.33). **G6ZO** (Edgware) used sporadic *E* to work PX1PF (17.00).

### 21 Mc/s

Mainly the domain of the phone man but equally capable of producing a very delectable brand of c.w. DX, this band has continued to live up to its reputation as witnessed by the following reports.

A welcome is extended to Al Slater **G3FXB** (Southwick) who worked CR5AR (10.45, '060), FP8BF (18.44, '050) and VP8EP Halley Bay (17.35, '050) on c.w. and HH2Z (01.35, '200), MP4QAO (10.50, '200), PXIPF (14.15), UL7FA (12.25, '180), VP8CX Falklands (22.15, '200), VQ5EZ (12.10, '140) and VS9OM in the Sultanate of Oman (12.55, '240) on a.m. **G3BHJ** (Norwich) exchanged c.w. reports with PX1PF (18.30, '060), UO5SM (17.30, '060), VS1EB (17.20, '050), 7G1A (18.35, '050), and phone reports with FM7WU (21.00, '180), KC6JA (19.45, '120), MP4QAO (13.00, '180), PZ1AG (21.45, '180), XW8AL (19.20, '240) and VP3HAG (22.30, '200).

**G3FPQ** (Elstead) used a.m. for I5GN (17.40, '170), KB6BN (09.50, '320), VR2AZ (07.30, '140), VR2BC (08.00, '190), YA1IW (18.20, '160) and ZK2AB (07.50, '160) while on c.w. he found the delectable VS5AD (16.10, '060). **G8KS** (Farnborough, Kent) logs c.w. from curious XR2A (19.00, '050), 7G1A (10.30, '050), VP7BT (15.20, '012), FP8BF (17.00, '050) and VQ6AB (21.20, '050) and on phone VR2AZ (19.20, '178), HS1E (17.30, '120), VP8DG (17.15, '112), 9M2DN (17.30, '120), ZS9G (20.00, '280), ZD1EO (19.50, '215), FB8CD (17.30, '130), VS9OM (17.45, '163), VS9AZA in Quati State (18.10, '180) and VQ8AH (18.15, '180).

**G6ZO** reports c.w. signals from DU6IV (21.30, '080), VS5AD (21.30, '050), PX1PF (10.45, '035), ZD7SA (22.30, '030), ZE8JJ/ZD6 (17.45, '045), DU1FM (17.45, '065), YA1IW (17.00, '015), FP8BF (17.30, '090), 7G1A (10.15, '050), VQ6AB (13.30, '030), VK9XK (12.00, '035) and XZ2TH (17.00, '035). Incidentally G6ZO uses an AR88 receiver and a Mosley TA33JR beam, while the transmitter has a 4-65A in the final.

**GW3AHN**, the QRP king, on c.w. worked CR5AR (18.00, '070), FP8BF (18.35, '055), FQ8AJ (18.25, '060), KM6BT (08.20, '050), LA3SG/P of rare Jan Mayen Is. (18.40, '025), PX1PF (18.30, '050), UL7GL (14.05, '050), VQ3CF (19.00, '035), XE1PJ (13.40, '030), ZE8JJ/ZD6 (19.15, '070), 4S7FJ (18.55, '050), 7G1A (19.10, '050), 9K2AD (14.55, '045) and VP7BT (19.40, '003), while on phone MP4QAO (17.25, '190), UL7FA (17.50, '215), VP5DM (21.20, '210), VQ8AD (17.25, '130), VR2CC (09.10, '210), VR2DF (10.10, '200), VU2NR (19.35, '165), XW8AL (18.10, '210) and 7G1A (11.45, '050).

**G3YF** (Chingford) used a.m. for KC6JA (14.00, '150), YA1IW (13.45, '150), 9M2DB (15.00, '140) and 9M2CL (15.10, '160). **G3FPK** (London) reports c.w. signals from CR6CA (17.10, '085), OA3D (23.20, '041), OR4RW Antarctica (17.55, '060), VS9AAH (12.30, '057), ZP9AY (23.55, '060) and VS1BB (18.00). **G3IMV** (Bletchley) reports A3 signals from FM7WU (01.50), KG6AIM (15.00), 9M2DW (15.30), and sundry other 9M and VK stations. **G3MVV** spoke with VP9EN (23.50, '170), MP4QAO (12.57, '120), PZ1AA (23.44, '155) and UL7FA (18.11, '170).

**B.R.S.2292** logged c.w. signals from PX1PF, ZE8JJ/ZD6, VQ5EZ, WP4ARR (a novice in Puerto Rico), VS9OM, and KL7OOT. **B.R.S.20317** found c.w. FP8BC (17.03, '050), ZD1EO (20.00, '085), UL7GL (12.27, '050), SU1OM (13.33, '060), VK9XK (10.18, '050), 7G1A (16.20, '050), ZE8JJ/ZD6 (16.00, '050) with FE8AH (11.45, '260), VQ8AD (15.43, '215), MP4QAO (13.30, '175) on a.m. Bill has been listening for five years and has 202 countries confirmed, which proves that most amateurs *will* confirm a listener report, provided it is carefully compiled and contains useful information.

### 14 Mc/s

At present this band is to the c.w. enthusiast what 21 Mc/s is to the phone man, and despite the ever present U, YU, DL and SP brethren a great amount of DX is still worked by those who are prepared to dig deep below the QRM.

**G6XL** (Pudsey) worked PX1PF (13.10, '015), EA9IA (12.45,

### QTH Corner

**EAAD95.** Carlos Urdazpal, Transmisiones 1, Ceuta, North Africa.
**FK8AU.** P.O. Box 63, Noumea, New Caledonia.
**FP8BF.** via W4PAA.
**ex-VK0RO.** Bob Oldfield, 4 Jessie Street, Pascoe Vale, W8, Victoria, Australia.
**VP7CA.** Detachment 3-1, Mobile Construction, Battalion 7, F.P.O., N.Y., N.Y.
**VQ1HE.** Box 2387, Dar es Salaam, Tanganyika.
**VQ8AQ.** Georges D. Wilson, c/o Cable & Wireless Ltd., Port Louis.
**VQ9AIW.** via W0DVN.
**VQ9ERR.** via W4IYC.
**VS9OM.** R.A.F. Detachment, Masira Is., B.F.P.O. 69.
**XZ2BB.** P.O. Box 449, Rangoon.
**ZB1HB.** H. Biltcliffe, 19 Flat, NATO Building, Floriana, Malta G.C.
**ZC4BC.** P. J. Crosbie, 73 Clyde Road, East Croydon, Surrey.

'075), UPOL8 (North Pole, 17.00, '050), VK9AD (Norfolk Is., 06.10, '130, a.m.) and VQ1HE (21.45, '076). He also mentions UA0OM is in Buryat Mongolia, which is in Russia, not Mongolia, and is in Zone 18 not Zone 23. **G3YF** reports c.w. from KR6GH (13.45, '320), FB8XX (15.20, '055), VP8DL/P (06.35, '025), YA1IW (15.30, '065), XZ2GM (18.00, '036), XZ2TH (16.15, '055), FB8ZZ (16.20, '040), VQ1TW (23.50, '022), LA3SG/P Jan Mayen (15.15, '040), UA0KQB (09.00, '060), FY7YF (23.55, '005), FG7XE (23.57, '005), VP8ET (20.18, '085) and 7G1A (22.43, '050) and on phone KW6CGA (08.45, '250), BV1USB (17.40, '305).

**G8KS** reports c.w. from EA0AC (18.10, '060), CE0AC (06.00, '050), VK0RH (06.10, '040), VK9AD (00.50, '050), FY7YF (08.30, '305), PX1PF (18.10, '010), KC6KR West Carolines (20.55, '060), UM8AD (23.00, '050), CR4AX (23.10, '050) and s.s.b. signals from KR6GF (16.20, '310), EL6E (20.46, '315), BV1USC (18.18, '330) and OY7ML (18.20, '305). **G6ZO** heard c.w. signals from the following: DU1PAR (Scout Jamboree, 21.15, '015), FR7ZD (17.45, '018), FB8ZZ (17.30, '025), VS9MC (18.00, '015), ZS3T (18.30, '085), VP2GAK (22.15, '055), K6GNL/KW6 (19.00, '055), DU6IV (21.30, '090), EA9IA (17.30, '090), XE1AAI (05.45, '060), XZ2BB (16.00, '060), 9M2FO (16.30, '075), FB8CK (17.00, '070), VQ6LQ (17.15, '025), XZ2GM (19.30, '060), ZD1FG (19.00, '045), VK0RH (07.00, '040), ZK1AK (06.45, '020), FK8AI (06.45, '070), FB8CE (17.30, '050), FU8AG (07,00, '055), DU1OR (19.30, '080), VP8DL (20.15, '045), PZ1AA (00.30, '090), FB8XX (17.00, '030), UM8AD (17.15, '015), VQ6LQ (20.00, '025), VK9AD (06.00, '050), LA1VC/G Antarctica (18.00, '065), VS9OM (20.15, '090), UM8KAB (18.00, '080) and KG6AIF (18.30, '070).

**G2PL** (Wallington) worked EA0AF (18.00, '070) and PX1PF (18.50, '020), while **G3GMY** found the PX, EA9IA (20.11, '070) and VK7TR (08.40, '150). Your scribe worked EAAD95 Ceuta (21.55, '042), 7G1A (21.53, '048), DU1OR (22.05, '096), FQ8HA (07.10, '040), EA9IA (18.50, '086), VP2GAK (22.30, '057), FB8CE (17.30, '050), FO8AC (0658, '100) and, just before changing QTH, VQ9AIW (19.00, '020).

**B.R.S.20317** (Bromley) logged SM5WN/LA/P Spitzbergen (14.05, '008), UA0IK (Arctic, 15.15, '030), EA0AF (18.00, '056), ZS3AC (18.30, '050), SU1MS (16.00, '080), XZ2TH (15.00, '038), JT1AB (14.00, '061), AP2AC (15.00, '034), VP5ME Turks (22.45, '015), ZD1FG (23.05, '050), PJ2ME (23.00, '100), ZS5RD/ZS7 (18.04, '088), ZS3T (19.00, '013), FY7YF (20.10, '005), VQ6LQ (14.35, '032), ZE3JO/ZD6 (16.15, '028), KX6CO (18.07, '085), CP3CD (23.10, '010), VS4BA (14.25, '088), FR7ZD (17.45, '017), UM8AD (19.45, '010), DU1OR (20.00, '086) and ZS9P (20.00, '050), while on s.s.b. he heard KX6BB (12.45, '266), KL7FLA (13.28, '275), VS4JT (14.00, '265), BV1USC (17.50, '312) with a.m. from HV1CN (12.05, '085), and YA1IW (14.55, '312). **B.R.S.2292** (Hounslow) logged c.w. from EL4A, KV4BQ, UI8AD, UH8AK, XZ2BB, 4S7FJ, CR7IZ, VQ3CF, CR4AX, FO8AC, VK9AD, ZP5CF and SU1MS.


*Gil Carrieiro, CT2BO, operates exclusively on c.w. and is very active on all bands from 3.5 to 28 Mc/s. The rig runs 50 watts to a home-built transmitter, while the receiver is a S40A.* (via K2UYG).


*CE3AG uses the Collins equipment shown in this picture with a 3-element tri-bander "W3DZZ" beam for 14, 21 and 28 Mc/s. He has worked 286 countries and has 285 confirmed. Operation is principally on c.w. and s.s.b.*

## The L.F. Bands

**B.E.R.S.195** (Melbourne) heard the following on 7 Mc/s c.w.: DU7SV, GB2AC (Ailsa Craig), GI2AFW, G2BB, VR2DA and VR2DK plus sundry others' **B.R.S.20317** logged FP8BC (23.32, '012), ZS5JM (21.15, '010), while **G3FPK** worked CX2TF (01.20, '003), FP8BC (01.45, '002), KP4AKB (00.45, '010), PY and 4X4. **G3IMV** worked VQ4HT (18.53), and TF3AK, while he found a good one in ZP9AY (21.56) on 3·5 Mc/s where **B.R.S.20317** logged UD6KEA (21.30, '504).

## Late News

From **GW3AHN** comes news that although VK5BV made the trip to Portuguese Timor (CR10) the local authorities refused him permission to operate, due to some internal administrative trouble, so he next day returned to Darwin. It is also rumoured that CR10AA has had his licence withdrawn. Let us hope it will not be long before licences for CR10 operation are again obtainable.

**G2MI** has the logs for **G3FYR/VS9** and **VS9AI** operation between 15/4/56 and 6/9/57 and a supply of blank QSL cards. Anyone still lacking confirmation from this operation can obtain one by applying to G2MI.

Further details of G3FAU/P's operation in Rutland over the weekend of September 19/20 show that they intend to be active on Top Band between approximately 1900/2300 and 0700/1600. The station, operated by G3FAU, G3HVQ, G3JLA, G3JTF, G3LJK and G3NGN will also be on 7 and 14 Mc/s.

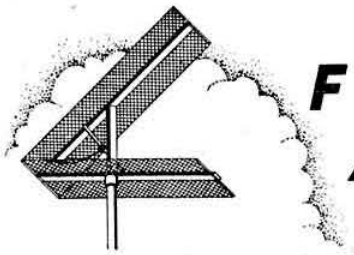
From West Gulf DX Club comes news that certain 4X4 QSLs count as Palestine for DXCC. It appears that provided the QTH is in new or old Jerusalem credit will be given for Palestine (formerly ZC6). If the same card has already been submitted for Israel credit and passed, the state of affairs arises where the same card has counted as two countries: or has 4X4DK's card never been admitted as proof of contact with Israel!

K4ASR/4 has the logs of **SV0WAE**, who until recently was active from Rhodes. QSL enquiries should be sent to 2414 Cone Street, Mobile, Alabama. SV0WB is now the only representative of Rhodes as SV0WE has also returned to the U.S.A.

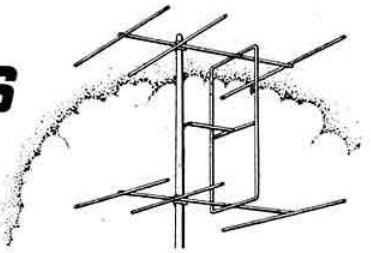
OH2XK and OH2YV are returning to Åland Island for another foray. They will be signing /0 between September 17 and 22, and will use 3·5, 7, 14, 21 and 28 Mc/s c.w. and 'phone.

G3IEW (3A2DA) and G3FPK (3A2BT) will be operating from Monaco from September 27 to October 10. Operation will principally be on 14 Mc/s, with some activity on 3·5, 7, 21 and 28 Mc/s.

Well, that just about winds it up for this issue. With the BULLETIN coming out about every three weeks for the rest of this year,the usual deadline of the 18th of the month has gone by the board for the time being. Contributors are asked therefore to note the following dates by which copy should reach the writer: September 16, October 9, October 31 and November 21.



# FOUR METRES AND DOWN



## *Meteor Scatter Propagation Brings Results—High Burst Rate Forecast for Giacobinids in October*

**BY F. G. LAMBETH (G2AIW) ***

METEOR scatter propagation is not the easiest way of working v.h.f. DX but it does hold great promise for those with the skill and patience to experiment with it. G3HBW is taking a particular interest and was very active during the Perseids period and had some promising results from his various skeds. SM3AKW was heard in a long burst on August 13 at about 1,040 miles. I1ACT was heard on August 12/13; during one period he was heard to give a report of RS22, but no QSO resulted. Another near miss was with OE1WJ (Vienna) on the evening of August 14—only the report was missed. OE1WJ was actually heard on the 12th, 13th and 14th. YU2HK received G3HBW during the latter's sked with I1ACT on August 13 at S7 but regrettably nothing was heard by G3HBW from the Yugoslav station.

**YU2HK** reports that HB9RG worked OK2VCG during the Perseids on August 12/13 but this has not yet been confirmed by the participants. If confirmed this is the fourth meteor scatter QSO in Europe.

It is also reported that G3KEQ heard SM1JA (Gothland) during the same period, almost certainly by meteor scatter.

### Future Prospects

On October 9 the Giacobinids will occur and the burst rate is forecast as the phenomenal one of 400 per minute. G3HBW intends to operate from about midnight on October 8 until 3 a.m. on October 10, a supreme effort of 27 hours. He will alternately call CQ and listen.

The sked times for October 9 are as follows:

09.00/12.00 G.M.T. CQ with the beam South to South-South-East.
13.00/16.00 G.M.T. CQ with the beam South-East to East-South-East.
16.00/18.00 G.M.T. CQ with the beam East.
18.00/21.00 G.M.T. CQ with the beam East to North-East.

During the odd minutes in each hour (00/01, 02/03, etc.), G3HBW will call CQ on 144·892 Mc/s. During the even minutes (01/02, 03/04, etc.) he will keep watch between 144/144·2 Mc/s on a Panadaptor. Any well-equipped stations between 500/1,400 miles distance from London are invited to participate. Skeds may be arranged by writing to A. L. Mynett (G3HBW), 52 The Rutts, Bushey Heath, Watford, Herts. The transmitter at G3HBW is running 800 watts input and feeds a 28-element beam.

### Two Metre Station Reports

**G6OX** (Englefield Green) worked **SP6CT** (Snezka) on August 27/28 at 00.30 B.S.T. on 144·13 Mc/s. SP6CT's signals were RST599 and G6OX received reports of RST599 and RS59 phone. Just before this contact G6OX worked DL3NQ and DL6WUA. G8GP and G3KEQ also worked SP6CT.

**A.1491** (Palmers Green) says conditions have peaked well at times, but a sudden fall to a low point recently did not prevent G3DVU working G3EJO (Birmingham) giving him S9+. It is pleasant to hear F8MX again from St. Valery, a consistent signal as always. His nightly sked with G6NB sometimes runs well over S9. On July 4 North/South conditions were good: G2FJR, G3AYJ, G3BA, G3AQX, G5YV, G2FTS, G3BDQ and G6ZP were the best heard following an exceptionally hot day. Conditions on July 5 were mediocre during the Second 144 Mc/s Field Day. It is ironic that many contacts made before the Contest started but were not followed by contest QSOs! A.1491 heard 66 stations, the best being G3AYT/P (Staffs), a new county. G3EEO/P (Derby), G5YV and G3EHY were also heard at over 100 miles. F3LP was the only Continental logged and his signals were much weaker than on the previous day. Five GW stations were heard, with GW3MED/P the outstanding one.

G3MED came through consistently from July 6-10 as did G2HOP (Lincs), G3MNQ (Leics) and often G3JWQ. On July 16 G3EHY was again heard peaking S9. North/South conditions were again good on July 20, when G5YV, G3JWQ and G3MED were all up to S9 with two new ones G3DJU (Sutton Coldfield) and G3GSO (Derby). On the 22nd A.1491 was surprised to hear c.w. from DL1RX (Hamburg) who was working London stations. F8MX was heard off the side of the beam working a Yorkshire station. On August 13 G3FIJ was heard well on the R.A.E.N. sked and G2HCG was very good while working G3FAN. In all, 28 counties have now been heard.

**B.R.S.3856** (Petts Wood) heard his first two F stations, F3LP and F8MX, on July 23. This was after being alerted by G3IWL, who on the previous evening had heard his first ON and PA. Both B.R.S.3856 and G3IWL use RF26 converters.

**G3DIV** (Eastbourne) has been active with a transmitter/receiver-converter/power supply unit working from 12 volt d.c. and has had some late nights particularly July 20/23 when he was operating from near Brightling Needle in Sussex. Together with G2FTS operation was possible for fairly long periods from the car accumulator. Conditions were fairly good and it is thought the best time was in the early hours of the 23rd and during the evening of that day. A number of PA0 stations was worked and at 00.55 on the 23rd OZ4OL (Bandholm) was contacted. He was followed by OZ9JK (Padborg), OZ5AB (Copenhagen) and DL1RX (Hamburg). The evening of the 23rd brought contacts with DL3ZJ (Flensburg, S9+) and OZ9JK. The transmitter comprises a 12AT7 c.o. (24 Mc/s), f.d. to 48 Mc/s, 12AT7 tripler to 145 Mc/s and a QQV03/10 p.a., with which series gate modulation is used. The input is about 15 watts average rising to about 30 watts on peaks. The converter uses a 6AJ4 neutralized r.f. stage into a 6BQ7A as a grounded grid r.f. and mixer with a 6J6 crystal oscillator and multiplier. The aerial is 5-element Yagi on a 12 ft. pole beside the car. A pair of Delco 2N278 transistors and a

* *V.H.F. Manager, 21 Bridge Way, Whitton, Twickenham, Middlesex.*

surplus high cycle transformer with a multitude of tappings are used in the power supply which delivers 200 volts for the converter, 400 volts for the transmitter and 100 volts negative for the series gate modulator valve (a 12AU7).

**G3JGJ** (Moretonhampstead) is now at a new QTH 1,000 ft. a.s.l. No mains supply is available so G3JGJ is still looking for an a.c. plant. The receiver side of the 2m rig has been fixed up with a 4-element Yagi at about 20 ft. and G3JGJ hopes to be on every evening between 18.00 to 19.15. His frequency is 144·1 Mc/s.

**Two Metres News from France**

**F9ND** reports that during the contest on July 4-5, stations in Paris, Northern France and Normandy had contacts with HB and DL. F3YX (Ballon d'Alsace) was also worked. F3YX worked a number of German stations during the Saturday night and Sunday morning. Conditions on the Sunday afternoon were poor and F9ND called CQ every 5 minutes but heard nothing beyond 50/60 miles. On the Sunday evening there was a good path between the North-West/South-East and South; F9AJ (Le Mans) worked F8TP (Vichy), F2TJ (Mont de Marsan) and F3AS (Clermont Ferrand). ON4, HB1 and PA0 stations were heard.

F9ND suggests rotating beams according to the position of the minute hand of a watch, which seems quite a useful idea, and indeed something very similar was suggested at a V.H.F. Managers' Conference some time ago.

On July 5 **F3YX/P** on the Ballon d'Alsace worked **OK1DO** for the first F/OK contact on 2m.

**Auroral Opening**

**DL3FM** (Mülheim-Ruhr-Ickten) reports an important auroral opening on August 16, when SM7BZX and GI3GXP were worked for new countries. Contact was also made with GM3HLH/A.

**G3FZL** (Forest Hill), was active during this afternoon period (the aurora faded out about 17.40 G.M.T.) and worked DL3FM and a DJ station. He was heard by GM3HLH/A. G3FZL himself also heard DL9SH.

**G3HBW** (Bushey Heath, Herts), who had SM6BTT in the shack at the time, took tape recordings of the auroral signals. Strong auroral reflections were observed even on local G stations.

**Seventy Centimetres**

**EI2W** (Foxrock, Dublin) had a 70cm phone QSO with G6NB at 22.43 G.M.T. on August 17, a distance of 255 miles. EI2W is looking for other QSOs, particularly with stations in the Home Counties and Lancashire. The operating frequency is 435·7 Mc/s and time between 19.00/20.00 and 22.00/23.00 G.M.T. most evenings when the conditions appear favourable.

**I1XD** reports that on July 5 **I1WAL** (Genoa) worked **FA9UP** (Algiers) the distance being 612 miles, somewhat short of the world record at present held by G3KEQ and SM6ANR. This contact was incorrectly reported last month as having taken place on June 16.

**Four Metres**

**G5MR** (Hythe, Kent) reports further ionospheric QSOs with Algeria. On July 21 FA3JR was worked by G2JF and G5MR and on the 30th FA9VN was worked by G5MR. FA stations were heard on July 20 and 22. No North African amateur signals were heard during August although there was evidence of DX propagation on several days. The " Voice of America " f.m. station at Tangier on approximately 70·5 Mc/s was heard strongly from time to time.

On July 20 at 21.45 G.M.T. on 70·15 Mc/s G5MR was startled to hear I1BAY at RST579, with irregular QSB, working American and Icelandic stations on c.w.! A short search on the main receiver revealed that the Italian was really on 14,030 kc/s; G5MR had been receiving his fifth harmonic! It is not clear what propagation mode was involved but there is no reason to doubt the genuineness of the signal; there was fading on both the fundamental and the harmonic, and on the latter he peaked up well when the beam was in the right direction. There was an ionospheric opening that evening, of course, but tropospheric conditions were also good with many French stations coming in at excellent strength with no fading.

In the Department of Eure, F2RL (nr. Evreux) and F3FX (nr. Bueil) are now tuning the British band and both were worked by G5MR for the first time on August 8. Several new French stations, mainly in Normandy, have been heard. G3CLW has made a welcome re-appearance and was worked again on July 19.

* * *

**Belgian Society's V.H.F. Station**

ON4BK has sent a photograph of the new U.B.A. v.h.f. station, ON4UB. The Belgian Society has been fortunate in obtaining the site of a former broadcasting station for the permanent intallation. The Louvain "gang" (ONL831, ON4CP, and ON4UD) built the transmitter which is equipped with push-pull Philips equivalents of the 4X150A, forced air cooled, running 300 watts input. The operating frequency is 145·045 Mc/s. The aerial is a five-over-five on top of a 100 ft. mast. The receiving equipment used for the first trials comprised a two-stage broadband r.f. preamplifier and a cascode converter feeding into an HRO tuning 4 to 6 Mc/s as the variable first i.f. Stations within a radius of 120 miles were worked with a consistent report of S9. Reports indicate that stations much farther away, in Denmark and East Germany, were calling them, but they could not be heard.

ON4BK hopes to be back on the air himself very soon, with a QQE06/40 in the final.

The deadline for reports for the October issue will be October 10 and for the November issue October 31. However, if you have reports ready before these dates please post them immediately.

*The Belgian Society's new v.h.f. station, ON4UB, at Louvain. From left to right, ONL831, ON4CP, Mrs. ON4BK, ON4BK (at the receiver), ON4XA (station manager) and ON4DF (aerial engineer).*

# Society News

### Election of Council 1960

IN accordance with Article 55 of the Society's Articles of Association the Council have nominated the following Corporate members to fill the vacancies in the Council which will occur on December 31 next.

*Officers:*

President: Mr. W. R. Metcalfe (G3DQ).
Executive Vice-President: Mr. N. Caws (G3BVG).

*Ordinary Members:*

Mr. David Deacon (G3BCM).
Mr. C. H. L. Edwards (G8TL).
Mr. A. O. Milne (G2MI).
Mr. G. M. C. Stone (G3FZL).

Not later than October 24 next any 10 Corporate Members may nominate any other Corporate Member to serve on the Council by delivering their nomination in writing in a single document to the Secretary, together with the written consent of such nominee to accept office if elected but each nominator shall be debarred from nominating any other person for this election.

**Zonal Representation**

Not later than October 24 next any 10 Corporate Members resident in Zone B (Regions 3 and 4) and Zone D (Regions 6, 9 and 17) may nominate any other duly qualified Corporate Member to serve as a Zonal Representative on the Council by delivering their nomination in writing in a single document to the Secretary together with the written consent of such nominee to accept office if elected, but each such nominator shall be debarred from nominating any other person for this lection.

Candidates for Zonal Representative must be resident within the Zone for which they are nominated and the nominators must be resident in that Zone.

The present Zone B Representative is Mr. H. W. Mitchell (G2AMG), Highfield, Levedale, Dunston, nr. Stafford, Staffs.

The present Zone D Representative is Mr. W. J. Green (G3FBA) who has informed the Council he will be retiring at December 31, 1959, as he will be moving out of the Zone.

### Council Proceedings and New Members

ACTING on the advice of the Publications Committee, the Council has authorized the Editor of the Society's journal to publish résumés of *Council Proceedings* and lists of New Members as a quarterly supplement to the R.S.G.B. BULLETIN.

### Changes of Address

MEMBERS are requested to give Headquarters at least three weeks' notice of change of address.

### Radio Amateurs' Examination

COMPREHENSIVE revision notes for the use of members who are preparing for the City and Guilds of London Institute examination on Saturday, October 3, are available from Headquarters, price 1s. per set, post paid.

**R.S.G.B. QSL Bureau—Important Notice**

The R.S.G.B. QSL Bureau will be closed from Thursday, October 1, to Saturday, October 17, inclusive. Members are asked not to send cards or correspondence to the Bureau which would normally be delivered between these two dates. Envelopes for the collection of incoming cards should be sent direct to the appropriate Sub-Managers as usual.

### Society Trophies and Premiums

THE Council has made the following awards for 1959:

**ROTAB Cup:** Mr. J. A. Mann (G3AAM) in recognition of his consistent DX work over a period of many years.

**Courtenay Price Trophy:** Mr. H. F. Smith (G2DD) for outstanding technical development especially in connection with miniaturized v.h.f. and u.h.f. equipment.

**Founder's Trophy:** Mr. C. E. Newton (G2FKZ) in recognition of his distinguished services to the Society in connection with the I.G.Y.

**Calcutta Key:** Mr. F. G. Lambeth (G2AIW) in recognition of his outstanding services to the cause of international friendship through the medium of Amateur Radio.

(Mr. Lambeth is Hon. Secretary, I.A.R.U. Region I V.H.F. Committee, R.S.G.B. V.H.F. Manager and v.h.f. contributor to the R.S.G.B. BULLETIN).

**Ostermeyer Trophy:** Messrs. P. J. H. Matthews (G3BPM) and H. T. Rogers (G3NHR) for their description of a "Versatile V.F.O./Transmitter" published in the June 1959 issue of the R.S.G.B. BULLETIN.

**Bevan Swift Memorial Premium:** Messrs. R. C. Hills (G3HRH) and P. M. Elton (G3GOZ) for their description of a cubical quad array for the 144 Mc/s band published in the April 1959 issue of the R.S.G.B. BULLETIN.

**Norman Keith Adams Prize:** Mr. C. F. Hubbard (G5OX) for his description of "A 72 Mc/s V.F.O. for 144 Mc/s Drive" published in the September 1958 issue of the R.S.G.B. BULLETIN.

### Maitland Trophy

THE Council has awarded the Maitland Trophy to W. G. Cecil (GM3KHH) who was the Scottish contestant with the highest aggregate score in the Second 1·8 Mc/s Contest 1958 and the First 1·8 Mc/s Contest 1959.

### Index to Volume 34

THE Index to Volume 34 (July 1958 to June 1959) is enclosed with this issue of the BULLETIN The Index is intended to be placed at the front of bound copies.

### Single Sideband

MR. DICK THORNLEY (G2DAF) 5 Janice Drive, Fulwood, Preston, Lancs., has accepted an invitation to contribute a bi-monthly feature dealing with single sideband operation. Notes and news, DX worked, hints, tips and ideas will be welcomed.

The first of the new series of single sideband articles will appear in the October 1959 issue of the BULLETIN. Copy for that issue should reach G2DAF not later than September 30.

Mr. Thornley was engaged on signals duties with R.A.F. Coastal Command during the 1939-45 war. His main radio interest is design and construction, particularly of receivers. He has used the s.s.b. mode of transmission for the past two years.

## Silent Key

**JOE BURNLEY (GI3AXD)**

We record with sorrow the death of Mr. Joe Burnley (GI3AXD) of Knock, Belfast. A keen amateur, whose interests ranged from the l.f. to the v.h.f. bands, he will be sadly missed by those who had the pleasure of speaking to him on the air and particularly by members of the local R.S.G.B. Group, of which he was a staunch supporter.

Our deepest sympathy is extended to his wife in her great loss.

J. T. McM.

# R.S.G.B. Technical Development Programme

FOR some time it has been felt that the R.S.G.B. should sponsor the development of equipment designed especially to meet amateur requirements. There are many advantages to be gained in that the efforts of individuals can be co-ordinated and the very limited resources available to most amateurs can either be augmented or deployed to the maximum advantage. New developments are continually occurring and many of these can be applied to amateur requirements with a certain amount of development effort. These ideas have been discussed by the Technical Committee and as a result a Technical Development Sub-Committee has been formed to be responsible for the development programme. The members of this sub-committee are Messrs. D. Deacon (G3BCM), G. C. Fox (G3AEX), J. A. Rouse (G2AHL), R. F. Stevens (G2BVN) and G. M. C. Stone (G3FZL).

The sub-committee has had several meetings to implement the programme. The first requirement is to build up a body of supporters as follows: (a) Engineers; (b) Technical writers; (c) Technical translators.

An appeal for volunteers to assist in the programme was made recently through Society representatives and as a result a number of members offered their services. Although the results of this appeal were good, more volunteers are still required.

It is intended to put technical writers in touch with engineers, the ultimate aim being to produce equipment to meet amateur needs which will be described in future issues of the BULLETIN. Certain equipment already in a late stage of development or even completed will be published in the BULLETIN under the aegis of the Technical Development Programme and the first of, we hope, many similar articles appears in this issue of the BULLETIN.

The programme has been divided into the following basic groups: Test Gear, Mobile, Single Sideband, V.H.F./U.H.F./S.H.F., Technical Problems of Interference (TVI/BCI), New Ideas and Systems Design, A.M./F.M. H.F. Transmitters, Receivers, Aerials, Transistorization, Technical Vetting and Technical Writing. Specialist organizers have been appointed to be responsible for some of the groups (called Technical Development Co-ordinators) whilst Co-ordinators have yet to be found for the remainder.

If you have a flair for development or constructional work, technical writing or technical translation, please write to G. M. C. Stone (G3FZL), Technical Development Sub-Committee, at R.S.G.B. Headquarters where arrangements will be made to include you in the programme. Suggestions and ideas for development work will be welcomed as we wish the organization to be live with a rapid interchange of ideas between members and the Sub-Committee.

---

### R.S.G.B. International Radio Hobbies Exhibition 1959

MORE than 75 per cent of the available space at this year's R S.G.B. International Radio Hobbies Exhibition was booked within a few days of applications being invited. Among the firms exhibiting will be Avo Ltd., Collins Radio Co. (Great Britain) Ltd., Data Publications Ltd. (*Radio Constructor*), Daystrom Ltd. (Heathkits), Enthoven Solders Ltd., Home Radio (Mitcham) Ltd., Iliffe Press Ltd. (*Wireless World* and *Electronic and Radio Engineer*), Jason Motor and Electronic Co. Ltd., KW Electronics Ltd., Minimitter Co. Ltd., Norman Price (Publishers) Ltd., Relda Radio Ltd., Short Wave Magazine Ltd. The Services will be represented by the Royal Navy, Army Territorials and the Royal Air Force.

### Jamboree-on-the-Air

RADIO amateurs who have present or past association with the Boy Scout Movement are invited to take part in this year's Jamboree-on-the-Air on October 24-25. The event is not a contest but is being expressly organized by the Boy Scouts International Bureau, Ottawa, to further the bonds of international friendship and brotherhood which unite the Scout Movement. The special call-sign VE3JAM will be used by the Bureau during the Jamboree.

The organizer for the United Kingdom is Leslie R. Mitchell (G3BHK), Plot 5, Tyneham Close, Sandford, Wareham, Dorset.


*The Society's stand at the National Radio and Television Show, Earls Court, London, from August 25 to September 5, 1959, was as usual the rendezvous for all members and radio enthusiasts. Among the representative selection of home-built equipment on display were receivers for the beginner, a Q multiplier, v.h.f. gear, transistorized power packs, continuously loaded mobile whips and high fidelity equipment. A particularly effective display was the complete mobile installation mounted below the crash bar of a typical car. Those on the stand when this picture was taken were Messrs. W. R. Metcalfe, G3DQ (Executive Vice-President), C. H. L. Edwards, G8TL (Member of Council and Chairman of the Exhibition Committee), F. F. Ruth, G2BRH (Stand Manager), D. J. Hobbs (A.1908) and M. A. R. Young (A.1924).*

# Regional and Town Representation 1960-1961

**Regional Representatives**

THE undermentioned Corporate Members have accepted an invitation from the Council to serve, if elected, in the office of Regional Representative for the period from January 1, 1960, to December 31, 1961.

| Region | Name | Call-sign |
|---|---|---|
| 1 | B. O'Brien | G2AMV |
| 2 | J. R. Petty | G4JW |
| 3 | W. A. Higgins | G8GF |
| 4 | Dr. E. S. G. K. Vance | G8SA |
| 5 | T. A. T. Davies | G2ALL |
| 6 | L. W. Lewis | G8ML |
| 7 | F. G. Lambeth | G2AIW |
| 9 | R. E. Griffin | G5UH |
| 10 | C. H. Parsons | GW8NP |
| 11 | F. G. Southworth | GW2CCU |
| 12 | A. G. Anderson | GM3BCL |
| 13 | G. P. Millar | GM3UM |
| 14 | D. R. Macadie | GM6MD |
| 15 | J. W. Douglas | GI3IWD |
| 16 | H. H. Lowe | G2HPF |
| 17 | M. P. Nicholson | G2MN |

Mr. E. R. Dolman (G2DCG) was invited to stand for election as Region 8 Representative but had to decline.

Not later than October 31 next, any five Corporate Members resident in a particular Region may nominate any other duly qualified Corporate Member resident in that Region for the office of Regional Representative, by delivering their nomination in writing to the General Secretary, together with the written consent of such person to accept office if elected. Each such nominator shall be debarred from nominating any other person for the current election of Regional Representatives.

**Town and Area Representatives**

Not later than October 31 next, any five Corporate Members resident in a particular Town or Area may nominate any duly qualified Corporate Member resident in the particular Town or Area for the office of Town or Area Representative, by delivering their nomination in writing to the General Secretary, together with the written consent of such person to accept office if elected.

In the case of the City and County of London, Area Representatives may be nominated for groups of Postal Districts. In the case of certain other large towns, Area Representatives may be nominated on a geographical basis, viz., North Birmingham, South-East Manchester.

Town or Area Representatives will only be confirmed in their appointment if the total membership in the Town or Area they propose to represent is at least 10.

**Vacancies**

In the event of no nomination being received prior to November 1, 1959, from the Corporate Members resident in any Region, Town, or Area, the Council reserves the right to make an appointment.

**Ballots**

In the event of more than one person being nominated for a particular office a Ballot will be conducted, details of which will be published in the November 1959 issue of the R.S.G.B. BULLETIN.

**Resignations**

If for any reason an elected Representative wishes to resign his office, he should notify Headquarters who will advertise the vacancy. *Local members cannot automatically appoint another member to undertake the duties of a representative who has resigned.*

The Council reserves the right to call upon any representative to resign his office if, in their opinion, he is considered to be unsuitable or unsatisfactory.

**Period of Office**

Regional, Town and Area Representatives will hold office for a period of two years as from January 1, 1960.

**Regions and Counties**

The following is a list of the Regions and Counties (or Districts) forming them:

**Region 1** (North Western).—Cheshire; Cumberland; Lancashire (East); Lancashire (West) and the Isle of Man, Westmorland.

**Region 2** (North Eastern).—Durham; Northumberland; Yorkshire (East); Yorkshire (North); Yorkshire (West).

**Region 3** (West Midlands).—Herefordshire; Shropshire; Staffordshire; Warwickshire; Worcestershire; Birmingham (Postal Area).

**Region 4** (East Midlands).—Derbyshire; Leicestershire and Rutland; Lincolnshire; Northamptonshire; Nottinghamshire.

**Region 5** (Eastern).—Bedfordshire; Cambridgeshire; Hertfordshire (outside London Region); Huntingdonshire.

**Region 6** (South Central).—Buckinghamshire (outside London Region); Gloucestershire (excluding the Bristol Area); Oxfordshire.

**Region 7** (London).—London North; London South; London South-East; London South-West; London East; London West.

*Notes.*—(1) In the London Region the six Representatives concerned are known as District Representatives.

(2) The London Region covers the whole of Middlesex and Surrey and all other territory within 25 miles radius of Charing Cross.

**Region 8** (South Eastern).—Kent (outside London Region); Sussex.

**Region 9** (South Western).—Bristol; Cornwall; Devonshire; Dorset; Somerset.

**Region 10** (South Wales).—Brecknockshire; Carmarthenshire; Pembrokeshire and Cardiganshire; Glamorgan; Monmouthshire and Radnorshire.

**Region 11** (North Wales).—Anglesey and Caernarvonshire; Denbighshire; Flintshire; Merionethshire and Montgomeryshire.

**Region 12** (North Scotland).—Aberdeen, Banff and Kincardine; Angus and Perth; Moray and Nairn; Inverness, Ross, Sutherland, Caithness, Orkney and Shetland.

**Region 13** (East Scotland).—Berwick; Peebles; Roxburgh and Selkirk; East, Mid- and West Lothian; Fife and Kinross.

**Region 14** (West Scotland).—Argyll and Dumbarton; Ayr, Bute, Dumfries, Kirkcudbright and Wigtown; Clackmannan and Stirling; City of Glasgow (Postal Area), Lanark and Renfrew.

**Region 15** (Northern Ireland).—Antrim; Armagh; Down; Fermanagh; Londonderry, Tyrone.

**Region 16** (East Anglia),—Essex (outside London Region); Norfolk; Suffolk.

**Region 17** (Southern).—Berkshire (outside London Region); Hampshire, Wiltshire, the Channel Islands.

**Affiliated Society Representatives, 1960**

In accordance with the announcement published on page

418 of the March 1957 issue of the R.S.G.B. BULLETIN, every society affiliated to the R.S.G.B. is invited to nominate one of its members to serve as an Affiliated Societies' Representative for the year 1960.

Societies who wish to take advantage of this arrangement are requested to forward a nomination paper, duly signed by five members of the society, who are themselves Corporate Members of the R.S.G.B. to the General Secretary so that it arrives not later than October 31, 1959. In the event of more than one person being nominated as the representative of a particular society a ballot will be conducted, details of which will be published in the November 1959 issue of the R.S.G.B. BULLETIN.

Nominees for the office of A.S.R. must be Corporate Members of the R.S.G.B. A.S.R.s will enjoy the same privileges and have the same status as T.R.s.

# Radio Amateurs' Examination May 1959

THE question paper set by the City and Guilds of London Institute for the Radio Amateurs' Examination on May 8, 1959, was as follows.

*Eight questions in all are to be attempted, as under:*

*Both questions in Part 1 (which are compulsory) and six others from Part 2.*

*Failure in either part will carry with it failure in the examination as a whole.*

**Part 1**

1. List four of the frequency bands available to amateurs showing in each case, (*a*) the width of the band, (*b*) the class or classes of emission permitted, and (*c*) the maximum d.c. input power to the final amplifier permitted. How is the d.c. input power to the final amplifier measured? (15 *marks*)

2. What precautions should be taken, in designing an h.f. transmitter suitable for use in an amateur station, to ensure that the frequency of the radiated wave remains satisfactorily stable? What form of frequency-measuring equipment would be required to ensure that a variable-frequency oscillator-controlled transmitter at an amateur station is operating with emissions within the authorized frequency bands? (15 *marks*)

**Part 2**

3. A coil having 1·59 millihenrys inductance and 10 ohms resistance is connected in turn to the following sources of e.m.f.:

(*a*) 12 volts d.c.

(*b*) 12 volts 1 Mc/s a.c.

What current flows through the coil in each case? Explain why the current differs in each case. (10 *marks*)

4. Describe the structure of a low-power thermionic valve of the indirectly-heated triode type. Explain how the anode volts/anode current characteristic is measured and plotted. (10 *marks*)

5. Describe two methods by which receivers can be made to receive either radiotelephony or c.w. telegraphy at will. What are the advantages and disadvantages of each method? (10 *marks*)

6. Draw a circuit diagram of a crystal oscillator and explain its action. (10 *marks*)

7. In order to maintain 24 hour contact between two stations 3,000 miles apart more than one frequency of transmission is usually required. Why is this? Describe the paths which might be followed by the radio waves between the two stations. (10 *marks*)

8. Describe with diagrams a method of coupling a transmitter to an aerial when transmitting on a frequency in the h.f. range so that the radiation of harmonics of the fundamental frequency is reduced to a minimum. (10 *marks*)

9. Describe the construction of a moving coil loudspeaker. Why is a field magnet necessary? (10 *marks*)

10. Draw a circuit diagram of the r.f. amplifier stage of a receiver. If the tuning capacitor has a maximum value of 100 micromicrofarads and a minimum value of 40 micromicrofarads, what frequency range would it cover if the tuning coil had a value of inductance of 63·5 microhenrys? (10 *marks*)

### Examiners' Report

The general standard of the work was noticeably lower than in previous years although in some individual cases quite excellent papers were received.

The chief causes of failure was the superficial treatment given to the paper as a whole. For example, in Question 5, a very great number of candidates, instead of describing two methods of c.w. reception, offered little more than the bald statement that the use of (*a*) a beat frequency oscillator and (*b*) a stage employing reaction, were suitable methods.

The following comments are made on individual questions:

*Question* 1. Generally well done; the failures were quite simply due to lack of knowledge of this part of the licence conditions.

*Question* 2. A few very good answers were received to this question, but the superficial treatment mentioned above was very much in evidence in both parts of the question.

*Question* 3. Quite well done by nearly all candidates who attempted it, although quite a large proportion did not appreciate the difference between impedance and reactance.

*Question* 4. The main weakness here was the very sketchy description of the construction. Some candidates appeared to be confused between the grid volts/anode current curve and the anode volts/anode current curve.

*Questions* 5 *and* 6. To both of these questions the criticism of weak and sketchy answers applies.

*Question* 7. Very poorly answered. A large number of candidates attempted the question, but only in a very few cases was a simple and reasonable answer given. Most candidates made comments on the existence of the ionospheric layers and their powers of refraction but failed to show that they understood the application to the case in question.

*Question* 8. Some good answers were received, but too many candidates relied on diagrams with no explanatory description whatever.

*Question* 9. Many good answers received. The failures were due to superficial treatment of the question.

*Question* 10. Most candidates attempting this question gave very satisfactory answers.

The total number of candidates who took the Examination was 1,116 (14 overseas). Of the home entrants 657 passed and 445 failed. Eight of the overseas candidates passed and six failed.

## SOUTHERN REGIONAL MEETING

**Royal Hotel, Cumberland Place, Southampton**

**Sunday, September 20, 1959**

*Programme:*

| | |
|---|---|
| **Assemble** | **2 p.m.** |
| **Photograph** | **2.15 p.m.** |
| **Business Meeting** | **2.30 p.m.** |
| **High Tea** | **4.30 p.m.** |
| **Films and Raffle** | **5.30 p.m.** |
| **Informal Discussion** | **7 p.m.** |

*Tickets, price 10/- each, are available from G. Allcock (G3ION), 29 Granby Grove, Southampton, or D. Metcalf (G3GHQ), 80 Kings Road, Southsea. Individual lunches can be booked at the hotel on request. The Council will be represented by Messrs. N. Caws, G3BVG (Honorary Treasurer), L. E. Newnham, G6NZ (Immediate Past President) and C. H. L. Edwards, G8TL (Member of Council).*

*A coach tour (duration four hours) through the New Forest visiting Beaulieu Abbey and Motor Museum is being arranged for non-radio friends. Tickets, price 10/- each (children half-price), are available from G3ION or G3GHQ but do not include tea at the Abbey.*

# CONTEST NEWS

RESULTS — REPORTS — RULES

### NATIONAL FIELD DAY 1959

**Leading Stations**

**Overall Leaders and winners of the N.F.D. Trophy for the second year in succession:** Gravesend Amateur Radio Society.

**Runners-up:** Stourbridge & District Group, followed by Wirral Radio Society.

**Scottish N.F.D. Trophy:** Aberdeen Town Group.

**Bristol Trophy:** Brentwood Group.

**Band Winners: 1·8 Mc/s**—Stourbridge & District Group; **3·5 Mc/s**—Chelmsford Group; **7 Mc/s**—Gravesend Amateur Radio Society; **14 Mc/s**—Wirral Radio Society; **21 Mc/s**—Stamford and District Group; **28 Mc/s**—Croydon Group.

**All subject to re-scrutiny**

### VK/ZL DX Contest, 1959

THE New Zealand Association of Radio Transmitters and the Wireless Institute of Australia invite all amateurs to participate in this year's VK/ZL contest. Rules for overseas stations may be summarized as follows:

**Sections. Phone:** 24 hours from 10.00 G.M.T. Saturday, October 3, to 10.00 G.M.T., Sunday, October 4. **C.W.:** 24 hours from 10.00 G.M.T., Saturday, October 10, to 10.00 G.M.T., Sunday, October 11.

**Scoring.** Five points will be scored for each contact on a specific band with a VK or ZL district (ZL1, 2, 3 and 4, VK0 (zero) 1, 2, 3, 4, 5, 6, 7 and 9). In addition, a bonus of 50 points will be scored for each new call area worked.

**Serial Numbers** will consist of six figures (five for phone), made up of the RS(T) report plus three figures which may begin with any number between 001 and 100 for the first contact, increasing by one for each successive contact.

**Log** columns must be headed (in this order) "Date," "Band in Mc/s," "Time G.M.T.," "Station Worked," "Serial Sent," "Serial Received," "Points Claimed," "Bonus Points," "Leave Blank." Page 1 must show the name, address and call-sign of the entrant, section of the contest, total claimed score, score on each band (3.5-28 Mc/s), transmitter input power, aerials, and the following signed declaration "I hereby certify that I have operated in accordance with the rules and spirit of the contest."

**Awards.** Attractive certificates will be awarded to the highest scorer in each country, and in each VE, W/K and ZS call area. Other certificates will be awarded depending upon the number of logs received from each country and the activity on each band.

**Listeners' Section.** To count for points a VK or ZL station must be heard in a contest QSO, and the following details noted in the log—date, time in G.M.T., call of the station heard, call of station being worked, RS(T) of the station heard, serial number sent by the calling station, band. Scoring is on the same basis as for the transmitting section and the log should be similarly set out.

Entries must be addressed to the Federal Contest Committee, W.I.A., Box 2611W, G.P.O., Melbourne, C.1., Victoria, Australia, and postmarked not later than **October 31, 1959.**

### CQ World-wide DX Contest 1959

THE following is a résumé of the rules for this year's World-wide DX Contest arranged by *CQ* Magazine.

**Phone Section:** 02.00 G.M.T., October 24 to 02.00 G.M.T., October 26.
**C.W. Section:** 02.00 G.M.T., November 28 to 02.00 G.M.T., November 30.

**Serial Numbers** to be exchanged will consist of the RST (or RS) report followed by the number of the Zone in which the competitor is located. Stations in Zones 1 to 9 will prefix their Zone numbers with zero, i.e. 01, 02, etc.

**Contacts** may be made in any band from 1.8 to 28 Mc/s.

**Scoring.** Three points will be scored for contacts between stations in different continents and one point for contacts with stations in the same continent. Contacts between stations in the same country score no contact points but may be made for the purpose of Zone and/or country multipliers. Only one contact with the same station on one band will count for points. A multiplier of one is allowed for each Zone contacted on each band and a multiplier of one for each country worked on each band.

**Type of Competition.** The contest will be divided into the following sections: (a) Single operator phone; (b) Multi-operator phone; (c) Multi-operator, multi-transmitter phone; (d) Single operator c.w.; (e) Multi-operator c.w.; (f) Multi-operator, multi-transmitter c.w.; (g) inter-club. Single operator contestants must show a minimum of twelve hours operating time to be eligible for an award. Multi-operator stations must show a minimum of twenty-four hours operating time.

Entries, which must be postmarked not later than **December 1, 1959,** for the **Phone Section** and **January 15, 1960,** for the **C.W. Section,** should be sent to the Contest Committee, *CQ* Magazine, 300 West 43rd Street, New York 36, N.Y., U.S.A. Copies of the Zone map, log sheets and report forms are available from *CQ* on receipt of a self addressed envelope and I.R.C.s to cover postage. The number of log sheets required should be stated.

## CONTESTS DIARY

| | |
|---|---|
| September 19-20 | Scandinavian Activity Contest (C.W. Section) |
| September 20 | Low Power Field Day (see page 25, July issue) |
| September 26-27 | Scandinavian Activity Contest (Phone Section) |
| September 27 | R.A.E.N. Rally (See page 26, July issue) |
| October 3-4 | VK/ZL DX Contest (Phone Section) |
| October 10-11 | VK/ZL DX Contest (C.W. Section) |
| November 7-8 | Second 1·8 Mc/s Contest |
| November 21-22 | R.S.G.B. 21/28 Mc/s Telephony Contest |
| November 21-22 | R.S.G.B. 21/28 Mc/s Telephony Receiving Contest |
| December 6 | OK C.W. DX Contest |

## R.S.G.B. INTERNATIONAL RADIO HOBBIES EXHIBITION

ROYAL HORTICULTURAL SOCIETY'S OLD HALL, VINCENT SQUARE, LONDON, S.W.1

**November 25-28, 1959**

The Exhibition Committee invites members all over the country to offer for display equipment of every type from gadgets to complete transmitters and receivers. A Silver Plaque will again be presented in connection with the Constructors' Competition. **Offers *only* in the first instance should reach the Committee at R.S.G.B. Headquarters by September 31, 1959.** Offers to do stand duty at the Exhibition should be sent direct to G. W. Norris (G3ICI), 134 Meads Lane, Ilford, Essex.

*Enquiries regarding stand space should be addressed to the Exhibition Organizer, P. A. Thorogood (G4KD), 35 Gibbs Green, Edgware, Middlesex.*

# R.A.E.N. Notes and News

**By E. ARNOLD MATTHEWS (G3FZW)***

THE **Kent** C.C., G6NU, reports that two small-scale exercises have been held during August. The first had the co-operation of a Sussex A.C., G3GVM, and comparative tests between that station and G3LID of the Medway Group showed that 40m gave better results than 160m. Messages originated by G3GVM were circulated round the net and finally checked by the C.C. and Medway A.C., G3MC. The second exercise was run on similar lines, but outside contact was maintained with an Essex mobile station.

**Hull** A.C., G4LH, reports that excellent relations have been established with the police, who give every facility for exercises which are held every two or three months. Practical assistance in the provision of batteries, transport, message pads and good accommodation for a station at police headquarters shows that the police have great interest in this compact but enthusiastic group. Regular weekly net schedules on 160m are in operation.

G4XC, the **Grimsby** A.C., has recently been contacted by the County Commissioner, St.J.A.B., who has asked for R.A.E.N. co-operation in a most interesting exercise. As this will need the co-operation of other groups a considerable amount of planning is required.

Following a visit by Birmingham officers G3CNV and G3LNN, the formation of a group in **Rugby** is progressing well, and G3IKL has been appointed A.C. In **Birmingham** itself a recent officers' meeting decided to re-allocate members into four groups. G3BA has been charged with the development of v.h.f. operations and hopes to arrange links to Rugby and Staffordshire. Several v.h.f. mobile stations are now available. **London** v.h.f. activity is being extended by a projected link with Hampshire.

The W.T.R. Midlands Section, managed by G3BMY, is operating well. The Northern Section requires some re-routeing as tests have not been as successful as was anticipated.

**Cheshire** C.C., G3ERB, has recently acquired and modified a TR1986. Signals were reported RS57 in Northwich by A.C. G3GYV, when using an input of 3 watts.

The organization of a group in **South Dorset** has been undertaken by G2HCD. Amateurs interested in fostering R.A.E.N. activity are asked to contact him.

**Operational Frequencies**

R.A.E.N. Committee policy concerning the choice of operating frequencies is that the choice of bands, etc. shall rest with local officers, who, having detailed local knowledge of the equipment available and the propagation characteristics of the terrain, are in the best position to decide which bands will be most suited to their R.A.E.N. tasks.

**R.A.E.N. Rally 1959**

Members wishing to enter this event to be held on September 27 should apply for their test phrase without delay if they have not already done so.

**Personnel**

F. C. P. Flanner (G3AVE), 91 Blackrock Road, Birmingham 23, has been appointed Hon. Registrations Secretary.

Lt. Cdr. W. Stockburn (G2TG), formerly Sunderland A.C., has been appointed C.C., Co. Durham.

The following have been appointed A.C.s.:—

J. L. Tiptaft (G3MVT), 42 Hutton Road, Birmingham 23, (Birmingham, N.W.).

T. P. Douglas (G3BA), 141 Russell Bank Road, Four Oaks, Sutton Coldfield.

G. S. C. Udall (G2HCD), Field View, Albert Street, Blandford Forum, Dorset.

J. M. Appleyard (G3JMA), 46 Ladyshott, Harlow New Town, Essex (Essex North and Hertfordshire).

D. G. Blake (G3MWV/T), The Flat, 9 Mount Street, Cromer.

F. McMurray (G2FM), 176 Manor Drive North, Worcester Park, Surrey.

R. I. Clews (G3CDK), 1 Ingleby Way, Wallington, Surrey.

A. Mears (G8SM), 4 Broadfields, East Molesey, Surrey.

W. R. Steverson (G3JEQ), Merry Dawns, Meadowside, Great Bookham, Surrey.

R. Craxton (G3IKL), 103 Clifton Road, Rugby, Warwickshire.

Mr. G. Lancefield (G3DWQ) has resigned as C.C. Lancashire, but retains his appointment as Section Manager, Northern Section W.T.R. Mr. A. R. Mee has resigned as A.C., Royston, Herts.

** 1 Shortbutts Lane, Lichfield, Staffs.*

---

**Courses of Instruction for the Radio Amateurs' Examination**

IN addition to the centres listed in the July BULLETIN, courses in preparation for the Radio Amateur's Examination and the G.P.O. Morse test will be held at the following institutes.

**Birmingham: Brandwood Institute of Further Education, Sanderton Road, Kings Heath.** R.A.E. and Morse classes will be held on Mondays from 7.15-9.15 p.m., commencing September 14. The instructors will be Messrs. W. V. Shepard (B.R.S.19176) and G. Palmer. A beginners' class will be held on Wednesdays at the same time. Further information may be obtained from the Principal, Mr. G. R. Wells, Wheelers Lane School, Kings Heath, Birmingham 14.

**Birmingham: St. Thomas's School, Granville Street, Holloway Head.** Courses in preparation for the R.A.E. will be held on Mondays (Instructor: Mr. M. A. Brett, G3HBE) and Wednesdays (Instructor: Mr. H. B. Bligh, G3HBB) from 7 to 9.30 p.m. Classes will begin during the week commencing September 14.

Morse classes arranged by the Midland Amateur Radio Society are held at Red Cross Headquarters, Highfield Road, Edgbaston, Birmingham, on Thursday evenings.

**Bognor Regis Technical Institute, Southway, Bognor Regis.** Courses in preparation for the R.A.E. and the Morse Test will be held on Mondays and Fridays from 7 to 9 p.m. The lecturer will be Mr. E. J. Pearcey (G2JU). Enrolment will take place on September 14, 15 and 16 from 5.30 to 8.30 p.m. Courses in radio and television servicing are also available.

**SOUTH WALES REGIONAL MEETING**

**Park Hotel, Cardiff**

**Saturday, September 26, 1959**

*Programme:*

| | |
|---|---|
| **Assemble** | **2 p.m.** |
| **Trade Exhibition opens** | **2 p.m.** |
| **Business Meeting** | **2.30 p.m.** |
| **High Tea** | **5 p.m.** |
| **Raffle** | **6 p.m.** |
| **Lecture by R. W. White, B.Sc., F.Inst.P., M.I.E.E., "Some Aspects of Forward Scatter Propagation"** | **6.15 p.m.** |

*The Council will be represented by Messrs. W. R. Metcalfe (G3DQ), A. C. Williams (GW5VX) and E. W. Yeomanson (G3IIR).*

*Inclusive cost 13/6. Cost for ladies accompanying members 7/6. Last date for bookings, September 19, 1959. Applications for tickets should be sent, with the appropriate remittance, to D. C. J. Green, GW3MRI, 36 St. Augustine Road, Heath, Cardiff.*

# Letters to the Editor . . .

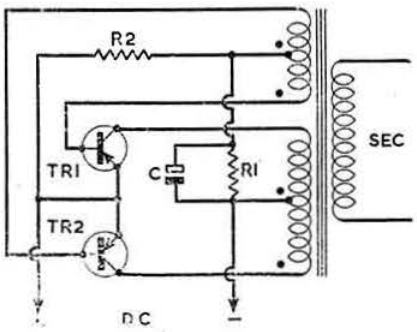
Neither the Editor nor the Council of the Radio Society of Great Britain can accept Responsibility for views expressed by correspondents.

### Transistorized Power Supplies

DEAR SIR,—I was very interested in the description of a circuit for a transistorized power unit by G2AHL/M in his *Mobile Column*, May issue, particularly as his notes appeared at a time when I had gathered some literature on the subject for study. In this connection I would suggest to others who may wish to look into the theory of transistor d.c. converters that the article by T. R. Pye in the March issue of *Electronic and Radio Engineer* is well worth seeing, and that there is considerable interest in the extensive treatment of both ringing choke and transformer-coupled d.c. converters in the Mullard *Technical Communications* for February 1956.

There is an aspect of the circuit given by G2AHL/M upon which I would like to offer comment. It is important that the primary and feedback windings of the transformer are properly connected so that the senses of the windings are correct. This is usually indicated on circuit diagrams by placing a dot against the start of each winding, assuming that all windings are in the same direction. I append a diagram showing the transformer connections for the circuit given by G2AHL/M.

On the question of heat sinks, it does seem that the minimum area suggested by manufacturers is fairly liberal. Personal experience with a power transistor in the output stage of a hybrid mobile receiver I have made leads me to the conclusion that the




*Transistorized power supply circuit. The dots indicate the beginning of each winding on the transformer.*

heat sink could quite safely be reduced to half its surface area. For this reason I agree with the figure of about 25 sq. in. given in the BULLETIN article; it certainly seems to be adequate for the mode in which the transistors are used and the non-continuous periods of operation met with in mobile transmitters. It is perhaps of some interest to note that in the article by T. R. Pye referred to above it is stated that for a push-pull transformer-coupled circuit with p-n-p type transistors capable of delivering up to 100 watts output the surface area for each sink need not be more than some 4 to 5 in. square. I believe that this particular circuit is intended for continuous rating, too.

Another point to be considered with transistorized d.c. converters is this bogie of the heat sinks being at a negative potential with respect to chassis and the positive-earthed electrical system in the car. This becomes important when, as recommended by G2AHL/M, the fuse is rendered inoperative after the initial adjustments to the power unit have been completed. Any accidental short circuit between heat sinks and an earthed body in the car will, in the absence of a fuse, cause an excessive and possibly damaging collector current to flow. This risk can be reduced by insulating the transistors from the heat sinks by means of very thin mica washers, and using bushing washers in the holes accommodating the mounting screws. The heat sinks can then be mounted directly on to the chassis, thereby extending the surface area for cooling, and so leaving only the metal cases of the transistors exposed as negative-potential surfaces.

However, the mica washers will reduce the heat-conductivity to some extent and lower the safe operating temperature of the transistors, though the extra cooling area obtained from the chassis itself may largely compensate for this. Information on this aspect of transistor heat dissipation can be gathered from a study of data sheets for the Mullard OC.16 power transistor. Incidentally, this particular transistor is normally supplied complete with mica insulators and a bushing for the mounting pillar, both of which items can be discarded when it is desired to mount the component in direct contact with its heat sink.

Yours faithfully,

St. Leonards-on-Sea, Sussex. W. E. THOMPSON (G3MQT/M)

*(In a typical case, the use of mica washers as suggested by Mr. Thompson reduces the permissible dissipation from 10 watts to 2 watts*—EDITOR).

### S.S.B. Reception

DEAR SIR,—I have been following with great interest the recent correspondence prompted by the article " Some Thoughts on S.S.B." by Dr. Koster. The author has put forward the commonly-held view that receiving problems are the main reason why more operators do not convert to single sideband.

During the past two years I have personally answered several hundred letters from would-be s.s.b. operators and I can assure Dr. Koster that this is only part of the story. Transmitter design and construction are also major deterrents in these days of readily available commercial-type c.w./a.m. equipments and it is often this side of the problem that frightens off the newcomer.

It is quite significant that by far the largest number of complaints about single sideband reception appear to originate from those operators who seldom, if ever, operate seriously on c.w. I believe this is due to two main causes; first that reception techniques, other than bandwidth and b.f.o. settings, are very similar for both systems, and secondly the c.w. operator tends to keep his receiver in much better working order than the average amateur who works wholly on A3.

It is surprising how much a receiver can be out of adjustment and still produce excellent results on A3 type signals; local oscillator stability, hum modulation, tuning backlash and a.v.c. faults are typical, and in many cases the " A3 only " operator does not realize that anything is wrong with his receiver (and would be highly offended if this was suggested).

By far the worst offender is, however, the b.f.o. because in order correctly to insert the carrier for s.s.b. reception the b.f.o. *must* tune several kc/s above or below the i.f. depending on which sideband is being transmitted. This is a point which is often overlooked by the newcomer who attempts to resolve the incoming signals by simultaneous adjustment of both the main tuning and b.f.o. controls.

Assuming that the receiver is in good working order, a few minutes spent in checking the frequency swing of the b.f.o. control and, if necessary, re-setting the coil slug or the bandset condenser, will usually pay dividends. Once the pitch control has been correctly set for either upper or lower sideband reception, no further b.f.o. adjustment is necessary to resolve any s.s.b. signal being transmitted on the same sideband.

As lower sideband is normally used on the two low frequency amateur bands, with upper sideband as the standard for the other frequencies, it is possible to pre-calibrate the b.f.o. knob so that it can be quickly positioned for reception of either sideband.

Although receiver overload and bandwidth characteristics play an important part in obtaining optimum s.s.b. reception it is fair to say that the majority of receivers in current use by U.K. amateurs are capable of exhibiting a good performance on s.s.b. without modification. Reception of double sideband suppressed-carrier transmissions is not, however, so easy and it is often difficult or impossible to " clean-up " d.s.b. signals received on unmodified equipment.

Before condemning s.s.b., it is worthwhile making sure that the received signal is true single sideband (and not d.s.b.) and that the operator or receiver is not at fault.

Yours faithfully

Croydon, Surrey. R. L. GLAISHER (G6LX-DJ0BM).

## Labgear Wide-band Couplers

DEAR SIR,—We have read an article by your contributor, Mr. C. T. Stagg, entitled " Modifications for Increased Drive from the Labgear Wide-Band Coupler " in the March, 1959 issue of the R.S.G.B. BULLETIN. These modifications essentially follow the design of the special Wide-Band Multiplier unit which we employ in our well known LG300 transmitter. When the Labgear Wide-Band Multiplier E5026 was originally designed, we had to bear in mind that a large number of different circuit layouts and valve combinations would be employed. This dictated the design which has been marketed. If the multiplier is to be used with the type of layout and valve combination used in the LG300, then the modified multiplier, which is incorporated in that transmitter, does represent an advantage. It may not, however, represent an advantage with other valve combinations or using a different type of layout.

We think that your readers may find the foregoing information of value in case it is accidentally assumed that the modifications will yield an improvement in all cases.

Yours faithfully,
S. R. KHARBANDA, Director.

## Series Gate Modulation

DEAR SIR,—I have read the article " Series Gate Modulation " published in the May 1959 BULLETIN with unusual interest. Since the article appeared I have taken an opportunity to peruse Bauer's paper which appeared in *Electronics*, November, 1957. Bauer's approach is quite sound, and his circuitry seems to contain features that have apparently been missed by G3BPM. Several workers have been tackling the problem of carrier controlled modulation quite independently, with varying amounts of success. [1], [2] The writer produced a prototype equipment using this principle [3] based on a feasibility study by D. H. Mix (W1TS). [4]

The equipment at G3AST employed the bootstrap principle [5] and judging by ensuing correspondence both from the Continent and America, it seems to be enjoying a considerable measure of popularity. Three features are claimed with reference to the prototype model:

(i) The stage preceding the unbiased " control " stage is of low impedance to minimize distortion caused by onset of grid current at audio peaks (a feature of grid leak bias).
(ii) The output stage feeding the r.f. screen load can never be driven into grid current, by virtue of the bootstrap principle.
(iii) By substituting the triode driver for a pentode, gains of several thousands may be achieved, and pre-amplifier stages proportionally reduced.

With reference to Fig. 4, May BULLETIN, it will be seen that if the right hand half of the 12HB7 is cut off, the left hand section will run into grid current. A voltage divider at anode pin 1 is imperative. The right hand half of the 12BH7 is required to move its operating point over quite wide limits, requiring the 0·005 $\mu$F capacitor to charge and discharge through the grid leak. This power is being drawn from a very high impedance source which is undesirable.

Experience has shown, incidentally, that a modulator h.t. rail as low as 350 volts is quite inadequate in conjunction with both 813 and 807, although valves with low screen voltages *viz.* 6146 will work satisfactorily with this rail voltage for the modulator.

The writer completed a series of tests using the bootstrap system in conjunction with G3KAZ.

Yours faithfully,
JOHN A. PLOWMAN,
Yeovil, Somerset. A.M.Brit.I.R.E. (G3AST).


[1] " Screen Modulation with Limited Carrier Control " Grammer, *QST*, April, 1951.
[2] " Controlled Carrier Constant Modulation " VQ4GF, *Short Wave Magazine*, August, 1957.
[3] " Controlled Carrier Modulation Unit " Plowman, *Short Wave Magazine*, June, 1958.
[4] " Carrier Control with Self Biased Clamp Tube Modulator," Mix, *QST*, November, 1952.
[5] " The Bootstrap Circuit," *M.I.T. Radiation Laboratory Series*, Vol. 19, page 35.


DEAR SIR,—I recently had an opportunity to study Mr. Plowman's article " Controlled Carrier Modulation Unit," and consider it to be a very effective way of obtaining the same end as is achieved by " Series Gate Modulation." The fact that Mr. Plowman has advocated the same method of modulation and has found it equally effective does show that this method can give very satisfactory results, even when quite different circuit arrangements are employed.

With regard to Mr. Plowman's remarks in paragraph 6 of his letter, the use of a potential divider at the anode of the d.c. amplifier is not in fact imperative at all. The driving of the modulator from a high impedance source introduces no observable distortion on an oscilloscope.

Since the original article was prepared tests have been carried out on a 5B/254M valve operating with 1200 volts on its anode and a residual input of 20 mA and a peak input of 100 mA; this arrangement has been used for some time very successfully.

Yours faithfully,
Sunbury-on-Thames, P. J. H. MATTHEWS (G3BPM).
Middlesex.

## Cubical Quad Aerials

DEAR SIR,—In recent years a number of articles have appeared in amateur publications describing various forms of the cubical quad and in almost every article there appears a different value for the gain of this type of array. A letter from G3KBH in the April issue of the BULLETIN has drawn my attention to the gain figures given by VE3IT in his recent article on the Tri-Square array (March issue).

I think that VE3IT has unintentionally given a misleading impression of the measured gains of the model arrays described. The type of field strength indicator used in his experiments tends to have a square law characteristic [1] (i.e., the output current is proportional to the received power). This means, for example, that the square driven element alone has a power gain of 2 (or 3db). Similarly the Tri-Square gain should be approximately 9db. This is perhaps a little low, but it is in better agreement with the figure of 8db normally quoted for the simple cubical quad. [2, 3].

Yours faithfully,
C. W. DAVIDSON, B.Sc. (GM3LAV).

**References:**


[1] *The Radio Amateur's Handbook*, A.R.R.L. (1959), p. 527.
[2] *The Radio Amateur's Handbook*, A.R.R.L. (1959), p. 374.
[3] " Trends in Aerial Design " (Letter), R.S.G.B. BULLETIN p. 536, May 1958.


### LINCOLN MOBILE RALLY AND HAMFEST

**Technical College, Cathedral Street, Lincoln**

**Sunday, September 20, 1959**

Attractions include lectures and demonstrations, a talk on beauty culture for the YLs and XYLs, a junk sale and high tea. Talk-in stations on 80 and 160m. Tickets, price 8/- each, may be obtained by sending a remittance and s.a.e. to R. W. Sadler, 14 Hainton Road, Lincoln.

*Organized by Lincoln Short Wave Club.*

### 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 | 10 a.m. | London |
| | 12 noon | Yorkshire |
| 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 London area |
| | 12.15 p.m. | Beaming west from London area |

# Regional and Club News

**Bradford Amateur Radio Society.**—On September 22, H. D. Kitchin will give a talk on " The Interpretation of Valve Data " while members will be attending a Mullard film show at St. George's Hall on October 6. Further information regarding the society's activities and meetings, which are held at Cambridge House, Little Horton Lane, Bradford 5, may be obtained from the *Hon. Secretary:* David M. Pratt (G3KEP), " Glenluce," Lyndale Road, Eldwick, Bingley, Yorkshire.

**Bristol.**—Nearly 60 members attended the July meeting at which H. L. Ranson and E. H. Price (G3JPP), of Daystrom Ltd. (Heathkit) gave a talk entitled " Electronic Kit Sets—Old and New." About 35 members were present at the August meeting when R. E. Griffin, M.I.R.E. (G5UH), recently appointed Region 9 Representative, gave " An Introduction to Tape Recording," illustrated with demonstrations. On September 18, D. H. Collins (B.R.S.19638) and G. E. Thompson (B.R.S.20190) will lecture on " Atoms and the Amateur." *Hon. Secretary:* D. F. Davies (G3RQ), 51 Theresa Avenue, Bishopston, Bristol 7.

**Clifton Amateur Radio Society.**—Recent events have included a Junk Sale and the A.G.M. A Low Power transmitting field day is arranged for September 20 and a social for October 16. A club net is held on Top Band on Wednesdays at 21.00 B.S.T. Meetings are held at 225 New Cross Road, London, S.E.13, on Fridays at 7.30 p.m.

**Cornish Radio and Television Club.**—At the August meeting it was decided to offer a certificate to stations working 25 or more Cornish stations during the 12 months commencing October 1, 1959. The winners of the club's recent contest for s.w.l. members were: *Phone Section*—W. B. Gilbert, followed by N.Farrell; *Phone and C.W.*—J. Share. At the August meeting there was a film show arranged by G3CZZ. A field day was due to be held on September 6 to gain experience for N.F.D. 1960. Members recently visited GLD (Lands End Radio). *Hon. Secretary:* G. Hubber, 9 Cardrew Terrace, Redruth, Cornwall.

**Crawley.**—Efforts are being made to form a radio club in the Crawley area and those interested are invited to communicate with either R. G. B. Vaughan (G3FRV), 9 Hawkins Road, Tilgate, Crawley, Sussex (Crawley 3359) or R. F. Fautley (G3ASG), 123 Ashdown Drive, Tilgate.

**Cray Valley Radio Club.**—Home-built equipment was displayed at the meeting at the Station Hotel, Sidcup, on August 25. A G8KW trap aerial has been installed at the Hotel. Information regarding future activities may be obtained from the *Joint Honorary Secretaries:* H. W. F. Miles (G2NK), 59 Amherst Drive, St. Mary Cray, Kent, and S. W. Coursey (G3JJC), 49 Dulverton Road, New Eltham, London, S.E.9.

**Leeds Amateur Radio Society.**—Commencing September 23, meetings will be held every Wednesday at 7.45 p.m. at the Swarthmore Educational Centre, 4 Woodhouse Square, Leeds 3. A programme of lectures, demonstrations, film shows, junk sales and visits to places of interest is being arranged. Prospective members are invited to attend any meeting or to contact the *Hon. Secretary:* D. Dinsdale, 8 Quarry Mount Street, Leeds 6.

**Liverpool and District Amateur Radio Society.**—More than 300 contacts with stations in 34 countries were made by GB3AHD during the Liverpool Show. Apart from the many society members who helped, assistance was also given by members of the Crosby Amateur Radio Society. Other activities have included a field day event for short-wave listeners. *Hon. Secretary:* A. D. H. Looney (G3LIU), 149 Page Moss Lane, Knotty Ash, Liverpool 14.

**Newbury and District Amateur Radio Society.**—On October 2 G3CU is to give a talk on Single Sideband at Elliotts of Newbury Canteen, West Street, Newbury, while the Annual Hamfest is to be held at the same address on Sunday, October 11. Tickets will be available in due course from the *Hon. Secretary:* J. A. Gale (G3LLK), " Wild Hedges," Crookham Common, near Newbury.

### Midland Societies' Meeting

THE date of the meeting of Midland radio societies meeting at Sutton Park, Warwickshire, announced on page 29 of the July BULLETIN, has been changed to Sunday, October 4. The talk-in station on 1925 kc/s will be G3ICX. The meeting is being arranged by Sutton Coldfield Radio Society (*Hon. Secretary:* K. H. Varney (G3DMV), 149 Whitehouse Common Road, Sutton Coldfield).

# 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.**

### REGION 1

**Blackpool (B. & F.A.R.S.).**—Tuesdays, 8 p.m., October 6 (" Receivers " by H. Fenton, G8GG), Squires Gate Holiday Camp.
**Bury (B.R.S.).**—October 13 (" 150 watt TVI-proof Transmitter " by G2AKR), George Hotel, Kay Gardens.
**Crosby (C.A.R.S.).**—Tuesdays, 8.30 p.m., " Colonsay," Crosby Road South, Waterloo, Liverpool, 22.
**Liverpool (L. & D.A.R.S.).**—Tuesdays, 8 p.m., Gladstone Mission Hall, Queens Drive, Stoneycroft.
**Macclesfield (M. & D.R.S.).**—September 22, October 6, 20, The Bruce Arms, Crompton Road.
**Manchester (M. & D.R.S.).**—September 14, October 12, 7.30 p.m., The Wellington Hotel, Nicholas Croft, High Street, off Market Street.
**Manchester (S.M.R.C.).**—Fridays, 7.30 p.m., Ladybarn House, 17 Mauldeth Road, Fallowfield.
**Preston (P.A.R.S.).**—Wednesdays, 7.30 p.m., 145 Hammond Street.
**Stockport (S.R.S.).**—September 23, October 7, 21, 8 p.m., The Blossoms Hotel, Buxton Road.
**Wirral (W.A.R.S.).**—September 18, October 2, 16, 7.45 p.m., No. 4 Hamilton Square, Birkenhead.

### REGION 2

**Scarborough (S.A.R.S.).**—Thursdays, 7.30 p.m., Chapman's Yard, North Street.

### REGION 3

**Birmingham (Slade).**—September 19 (Members' Apparatus Exhibition), September 25 (" Non Destructive Testing Techniques," by L. T. Perrian of I.C.I. Ltd.), 7.45 p.m. The Church House, Erdington.
**Coventry.**—September 25 (" Radio Theory " by J. Boyce), 7.30 p.m., Vine Street Schools.
**Stourbridge (St. A.R.S.).**—September 25, 8 p.m., " White Horse," Amblecote; October 6, 8 p.m., Brotherhood Hall, Scotts Road, Stourbridge.
**Sutton Coldfield.**—October 4, " Midlands Get Together," Sutton Park.

### REGION 4

**Derby (D.S.W.Exp.S.).** — Sundays, 10.30 a.m., September 17, 24, October 1, 8, 15, 7.30 p.m., Club Room, Nunsfield House, Boulton Lane, Alvaston, Derby.
**Derby (D. & D.A.R.S.).**—September 16 (Direction Finding Practice Run); September 23 (Medium Wave DX, B. J. C. Brown, G3JFD); September 30; October 7 (Auction Sale of Surplus Items), October 19, 7.30 p.m., Room No. 4, 119 Green Lane, Derby.
**Leicester (L.R.S.).**—September 14, 21, 28; October 5, 12, 19, 7.30 p.m., Old Hall Farm, Braunstone Lane, Leicester.
**Lincoln (L.S.W.C.).**—September 23, October 14, 28, 7.30 p.m., Technical College, Cathedral Street.

### REGION 6

**Cheltenham.**—First Thursday in each month, 8 p.m., Great Western Hotel, Clarence Street
**Newbury (N. & D.A.R.S.).**—October 2 (" Single Sideband " by H. F. Knott, G3CU), October 11 (Hamfest), October 30 (Lecture by Racal Engineering Ltd.), Elliotts of Newbury Canteen, West Street, Newbury.

**LONDON MEMBERS' LUNCHEON CLUB**

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

**at 12.30 p.m. on Fridays, September 18, October 16 and November 20, 1959**

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

### REGION 7

**Acton, Brentford and Chiswick.**—September 15 (" Oscillators " by G3IGM), October 20 (" Panadaptors " by G4LS), 7.30 p.m., A.E.U. Rooms, 66 High Road, Chiswick.
**Barnet (B. & D.R.C.).** — September 29 (A.G.M.), 8 p.m., The Red Lion Hotel, High Barnet.
**Croydon (S.R.C.C.).**—October 13, 7.30 p.m., " Blacksmith's Arms," South End, Croydon.
**Ealing.**—Sundays, 11 a.m., ABC Restaurant, Ealing Broadway, London W.5.
**East London.**—October 11, 2.30—8 p.m., Hamfest in the Lambourne Rooms, Town Hall, Ilford. Tickets from local T.R.s.
**East Molesey (T.V.A.R.T.S.).**—October 7 (" Carnarvon " Trophy and Junk Sale), Carnarvon Castle Hotel, Hampton Court.
**Enfield and District.**—September 20, 3 p.m., George Spicer School, Southbury Road, Enfield.
**Harlow and District.**—Thursdays, 7.30 p.m., rear of G3ERN (G. E. Read), High Street, Harlow.
**Ilford.**—Thursdays, 8 p.m., G2BRH, 579 High Road, Ilford.
**Kingston.**—Lectures alternate Thursdays, Theory and Morse Classes weekly. September 17 (" Amateur Radio in its early days " by Maurice Child, ex-NWX and 2DC), 7.45 p.m., Y.M.C.A., Eden Street, Kingston-on-Thames.
**New Cross (C.A.R.S.).**—Fridays, 7.30 p.m., 225 New Cross Road, London, S.E.13.
**Purley (P. & D.R.C.).**—September 18 (Talk by Ron Duggan, VS9AD), October 16, 8 p.m., Railwaymen's Hall, Whitecliffe.
**Romford (R. & D.A.R.S.).**—Tuesdays, 8.15 p.m., R.A.F.A. House, 18 Carlton Road, Romford.
**Slough.**—October 5, 8 p.m., " Stag Hotel," Wexham Street, Wexham.

### REGION 9

**Bristol.** — September 18 (" Atoms and the Amateur," by D. H. Collins, B.R.S. 19638, and G. E. Thompson, B.R.S. 20190), 7.15 p.m., Carwardine's Restaurant, Baldwin Street, Bristol.

### REGION 10

**Cardiff.**—October 12 (Talk by R. A. Stevens, GW3GQM), 7.30 p.m., The British Volunteer, The Hayes, Cardiff.
**Penarth.**—September 28 (Members' Equipment Display), Y.M.C.A., Penarth.

### REGION 11

**Prestatyn (F.R.S.).**—October 5 (Junk Sale), 7.30 p.m., Railway Hotel, Prestatyn.

### REGION 13

**Edinburgh (L.R.S.).**—September 24 (" Mobile on Two Metres,") October 8 (" Marine Radio Communications,") 7.30 p.m., Y.M.C.A., 14 St. Andrew Street, Edinburgh 2.

### REGION 14

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

**DATES FOR YOUR DIARY**

**September 12.**—Glasgow O.R.M.
**September 13.**—Ayr O.R.M.
**September 13.**—National Mobile Rally at Woburn Abbey.
**September 20.**—Lincoln Hamfest and Mobile Rally.
**September 20.**—Southampton O.R.M.
**September 26.**—Cardiff O.R.M.
**September 27.**—Meeting of Midland radio societies at Sutton Park, Sutton Coldfield.
**November 25-28.**—R.S.G.B. International Radio Hobbies Exhibition, London.

## "A Variable Output Power Supply"

A NUMBER of errors occurred in the article " A Variable Output Power Supply " published in the July issue. In Fig. 1 on page 6, the designations for resistors R1 and R3 were transposed. The 8 ohm resistor should be marked R1 and the 1 ohm resistor to the left of R2 should be designated R3. In the components list on page 7, R1 should be 8 ohms and R1 and R3 1 ohm. On page 9, under the sub-heading " Smoothing Chokes L1-L2 " the dimension for the air gap in line 8 should read 7 mils.

## "The Theory and Application of Transistors"

A COURSE of 20 lectures under the general title of " The Theory and Applications of Transistors " is to be given on Tuesdays from 7 to 9 p.m. at the South-East Essex Technical College, Longbridge Road, Dagenham, commencing October 13. The fee will be £2 2s. Enrolment forms may be obtained from the Head of the Department of Physics and Mathematics prior to the opening date. A course on Microwave Principles and Practice will commence at the same college on October 1. The fee for this course will also be £2 2s.

## R.S.G.B. Bulletin

THE September issue of the R.S.G.B. BULLETIN is due to be published on October 9 and the closing date for copy will be September 16. The closing date for the October issue, to be published on November 3, will be October 12.

**London Lecture Meeting**

**Friday, October 16, 1959**

**" Practical Applications of Transistors for the Radio Amateur"**

**by Newmarket Transistors Ltd.**

**Institution of Electrical Engineers**

**Savoy Place, Victoria Embankment**

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

## R·S·G·B Bulletin

### ADVERTISEMENT RATES

All enquiries regarding Display and 'Exchange and Mart' advertisements should be addressed to the Advertisement Manager:

**H. FREEMAN**
**The National Publicity Co. Ltd.**
*20-21 Red Lion Court, Fleet Street, London, E.C.4* *Tel.: FLEet Street 0473-6*

# EXCHANGE AND MART SECTION

**ADVERTISEMENT RATES. Members' Private Advertisements 3d.** per word, minimum charge **5s. Trade Advertisements 9d.** per word minimum charge **12s.** All capitals **1s.** per word, minimum charge **18s.** Write clearly. No responsibility accepted for errors. Use of Box number **1s. 6d.** extra. Send copy and remittance to **National Publicity Co. Ltd., 20-21 Red Lion Court, Fleet Street, London, E.C.4, by 22nd** of month preceding date of issue.

ALL types of valves required for cash. State quantity and condition.—Radio Facilities Ltd., 38 Chalcot Road, N.W.1. (PRImrose 9090.) (236

COMPLETE Station ready for use comprising 150 watt, 5 Band transmitter P.I. Tank output, Pair 807's, Modulated 807's Zero Bias, Miniciter v.f.o. black crackle cabinet, TVI precautions throughout, complete with crystal microphone receiver BC342 with converter for 10 and 15. Crystal calibrator Furzehill Lab. 1,000 KC multi vibrator, battery operated, £50 complete. Buyer collects, Midlands.—Box No. 978, The National Publicity Co. Ltd., 20/21 Red Lion Court, Fleet Street, E.C.4. (978

EDDYSTONE 888 with " S " meter, perfect condition, £70. Also AR88D with " S " meter and manual. Excellent condition, £50.—G3FKM, 10 Knightlow Road, Birmingham 17. (977

G3GGD QSLs.—Fixed and mobile samples on request. Printing inquiries welcomed.—30 St. Luke's Road, Cheltenham. (816

METALWORK.—All types cabinets, chassis, racks, etc., to your own specifications.—Philpott's Metalworks Ltd. (G4BI), Chapman Street, Loughborough. (99

MINIMITTER MR37 for sale, in excellent condition, recently overhauled. " S " meter needs slight attention, £32/10/- (o.n.o.) for quick sale.—Box 975, The National Publicity Co. Ltd., 20/21 Red Lion Court, Fleet Street, E.C.4. (975

QSL cards, G.P.O. approved. Log books, cheapest, best, prompt delivery. Samples—Atkinson Bros., Printers, Looe, Cornwall. (206

RUSSIAN THERMO-ELECTRIC GENERATOR including paraffin lamp, provides 90 volt at 10 mA + 1.2 volt at 0.5A + bias. Suitable operating any dry battery wireless sets. Contains hundred Thermo-couples for semi-conductor research. Useful camping, boating and expeditions. Post paid U.K., £18.—International Technical Developments Ltd., Colnbrook, Bucks. (979

SALE.—Eddystone 888A, £85; Hammarlund HQ120X, £40; Panda PR120V, £50; Minimitter 10/15 Minibeam, £10; Minimitter Q-Multiplier, £4. Buyer collects, N.W. London.—Box 965, National Publicity Co. Ltd., 20/21 Red Lion Court, Fleet Street, E.C.4. (965

V.R.L. 19 valve receiver, good condition, completely overhauled and scope re-aligned, auto transformer, handbook, " S " meter and spare valves £20. Miles, 76 Vicarage Road, Morriston, Swansea. (973

WANTED.—All types of communications receivers, test equipment, tape recorders, amplifiers, etc. Prompt cash payment.—Details to R. T. & I. Service, 254 Grove Green Road, Leytonstone, London, E.11. (LEYton 4986.)

WANTED.—BC610 Hallicrafters, E.T. 4336 transmitter; BC312 Receivers, BC221 Frequency Meters and spare parts for all above. Best cash prices.—P.C.A. Radio, Beavor Lane, Hammersmith, W.6. (266

WANTED.—Communications receiver covering, say 500 kc/s to well above 30 Mc/s (preferably 54 Mc/s). Also table top 160m thro' 10m TX. Neither necessarily working or perfect. Required London area, end September onwards. Offers required now by Air Mail.—D. T. Bradford (VQ4EV), Box 30175, Nairobi, Kenya. (974

## APPOINTMENTS SECTION *(Situations Vacant)*

TELEVISION ENGINEERS.—Vacancies exist at branches throughout the country for television engineers of all grades. This is an exceptional opportunity for men who place a value on loyalty and integrity. Salary dependent on skill and ability. An outstanding man can earn £1,000 per annum. Replies to, Technical Advisor, Family Television Ltd., Duracraft Works, Franklin Road, Portslade, Sussex. (976



## INDEX TO ADVERTISERS

# R.S.G.B. BULLETIN—VOLUME 34

(July, 1958 to June, 1959)

## INDEX

Key to Page References



### TECHNICAL AND CONSTRUCTIONAL

#### Aerials and Propagation



#### Audio Equipment and Modulation



#### General



#### International Geophysical Year



#### Receiving



#### Test Gear



#### Transmitting

### V.H.F. and U.H.F.



### REGULAR FEATURES



### CONTESTS, TROPHIES AND AWARDS



### EDITORIALS



### LICENCE NEWS



### MISCELLANEOUS ARTICLES AND REFERENCES

# RADIO SOCIETY OF GREAT BRITAIN

(Incorporated 1926)

*PATRON:*

H.R.H. THE PRINCE PHILIP, DUKE OF EDINBURGH, K.G.

*COUNCIL 1959*

*President:*
Dr. R. L. SMITH ROSE, C.B.E.

*Immediate Past President:*
L. E. NEWNHAM, B.Sc., G6NZ

*Penultimate Past President:*
D. A. FINDLAY, D.F.C., A.C.A., G3BZG

*Executive Vice-President:*
W. R. METCALFE, G3DQ

*Honorary Treasurer:*
N. CAWS, A.C.A., G3BVG

*Ordinary Elected Members:*

H. A. BARTLETT, G5QA
J. H. HUM, G5UM
C. H. L. EDWARDS, A.M.I.E.E., G8TL
J. D. KAY, G3AAE
W. A. SCARR, M.A., G2WS
K. E. S. ELLIS, G5KW
A. O. MILNE, G2MI

*Zonal Representatives:*

W. J. GREEN, G3FBA
E. G. INGRAM, GM6IZ
A. C. WILLIAMS, GW5VX
H. W. MITCHELL, G2AMG
E. W. YEOMANSON, G3IIR

---

*General Secretary:*
JOHN CLARRICOATS, O.B.E., G6CL

---

### *REGIONAL REPRESENTATIVES*

Region 1.—North Western. B. O'Brien (G2AMV), 1 Waterpark Road, Prenton, Birkenhead, Cheshire.

Region 2.—North Eastern. J. R. Petty (G4JW), 580 Redmires Road, Sheffield 10, Yorkshire.

Region 3.—West Midlands. W. A. Higgins (G8GF), 28 Kingsley Road, Kingswinford, nr. Brierley Hill, Staffs.

Region 4.—East Midland. E. S. G. K. Vance, M.B. (G8SA), 43 Blackwell Road, Huthwaite, Sutton-in-Ashfield, Notts.

Region 5.—Eastern. T. A. T. Davies (G2ALL), Meadow Side, Comberton, Cambridge.

Region 6.—South Central. L. W. Lewis (G8ML), 117 Fairview Road, Cheltenham, Gloucestershire.

Region 7.—London. F. G. Lambeth (G2AIW), 21 Bridge Way, Whitton, Twickenham, Middlesex.

Region 8.—South Eastern. E. R. Dolman (G2DCG), 20 Canterbury Road, Margate, Kent.

Region 9.—South Western. R. E. Griffin (G5UH), 13 Alexandra Road, Uplands, Bristol 3.

Region 10.—South Wales. C. Parsons (GW8NP), 90 Maesycoed Road, Heath, Cardiff, Glam.

Region 11.—North Wales. F. G. Southworth (GW2CCU), Samlesbury, Bagillt Road, Holywell, Flintshire.

Region 12.—East Scotland. A. G. Anderson (GM3BCL), "Helford," Pitfodels, Aberdeen.

Region 13.—South-East Scotland. G. P. Millar (GM3UM), 8 Plewlands Gardens, Edinburgh 10.

Region 14.—West Scotland. D. W. R. Macadie (GM6MD), 154 Kingsacre Road, Glasgow, S.4.

Region 15.—Northern Ireland. J. William Douglas (G13IWD), 54 Kingsway Park, Cherryvalley, Belfast.

Region 16.—East Anglia. H. H. Lowe (G2HPF), "Akabo," Main Road, Boreham, Chelmsford, Essex.

Region 17.—Southern. M. P. Nicholson (G2MN), 80 South Leigh Road, Warblington, Havant, Hants.

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

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.1

**IF UNDELIVERED** Return to:— R.S.G.B., NEW RUSKIN HOUSE, LITTLE RUSSELL STREET, W.C.1