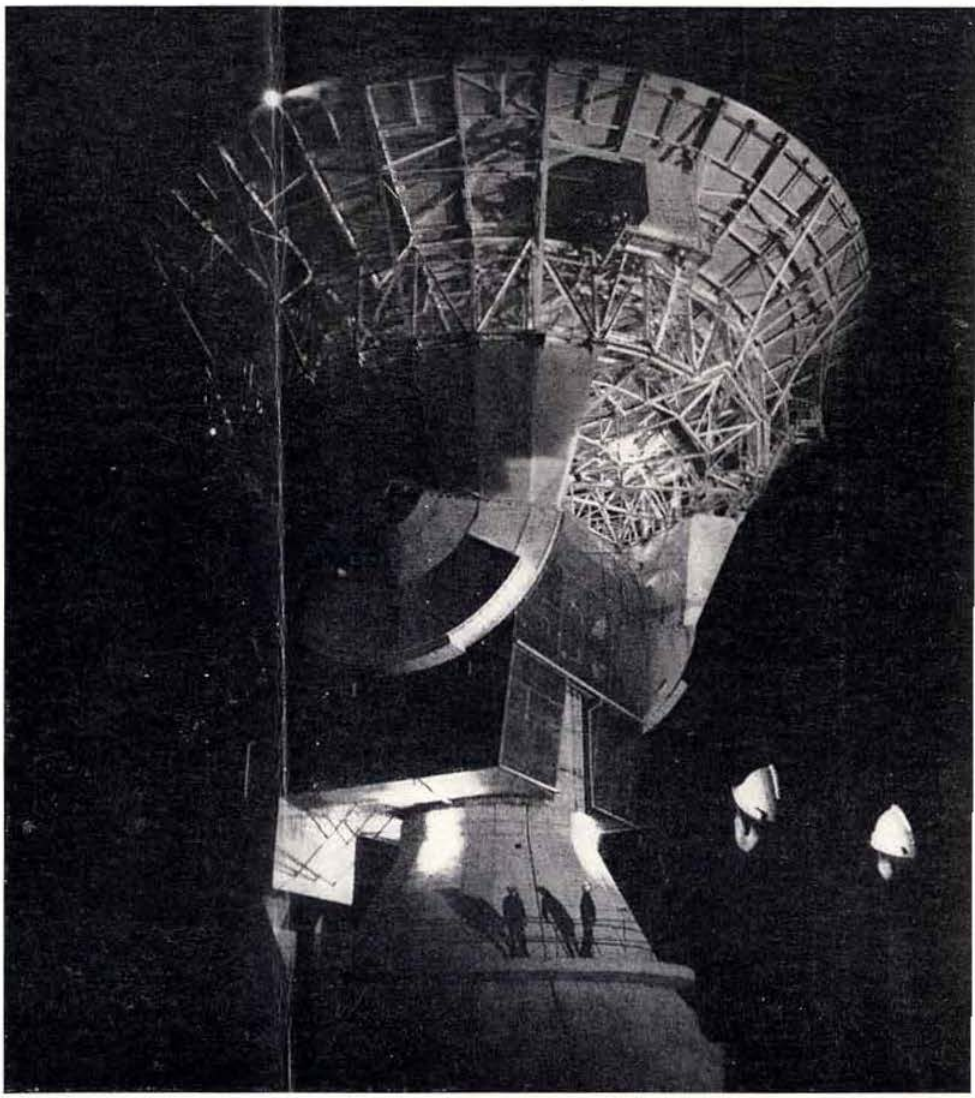
# RSGB BULLETIN

MAY 1967
VOL 43, No. 5

**BRITAIN'S LATEST SATELLITE TRACKER AND RADIO TELESCOPE AT CHILBOLTON HAMPSHIRE**



JOURNAL OF THE RADIO SOCIETY OF GREAT BRITAIN

# KW 201 *High quality — low price*

## AMATEUR BANDS COMMUNICATIONS RECEIVER

*Manufactured by the Leading Supplier for Radio Amateurs*


The KW 201 has been specifically designed for optimum performance on Single Sideband. 11 ranges give coverage in the amateur bands from 1.8 mc/s to 30 mc/s. A mechanical filter gives an I.F. selectivity of 3.1 kc/s at 6 db and 6 kc/s at 60 db. A 'Q' multiplier is available giving a variable range of 3.1 kc/s to 200 cycles selectivity.

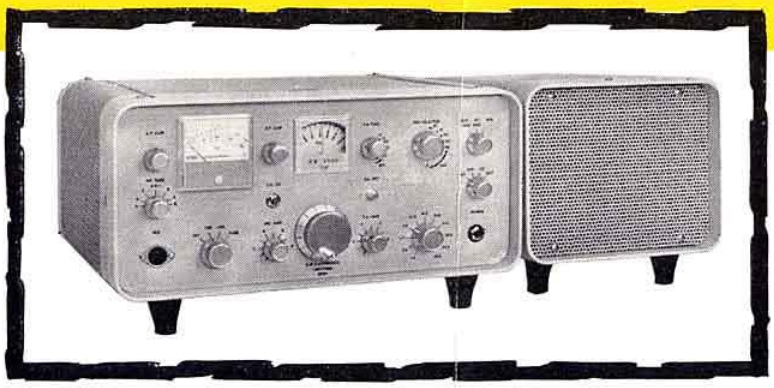
**£105** *basic*

*additional extras if required 100 kc/s Crystal Calibrator £6.0.0. 'Q' Multiplier £8.10.0.*

*ALSO AVAILABLE*

**KW VESPA** Transmitter, 10-160 metres SSB, AM and CW complete with AC PSU **£120**

**KW600** Linear Amplifier— 500w P.E.P. 572B tube built in power supply **£110**



**Exclusive UK agents** for DAVCO and HAMMARLUND equipment

**Agents for** Sommerkamp equipment, Collins, Drake, (2c receivers available.) Swan, Mosley, Hy-gain, CDR, Kokusai mechanical filters, Tokai walkie talkies.

Microphones, co-axial cable and all your amateur radio equipment always in stock.

## KW 2000A Transceiver

180 watt P.E.P. operation on all amateur bands 10-160 metres, complete with AC power supply **£220.0.0** inclusive. 12v DC supply available.

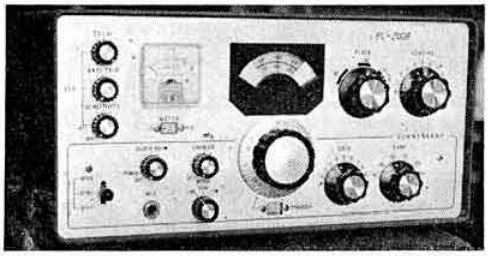
**KW ELECTRONICS Ltd.,**

**1 HEATH STREET, DARTFORD, KENT** *Phone:* DARTFORD 25574

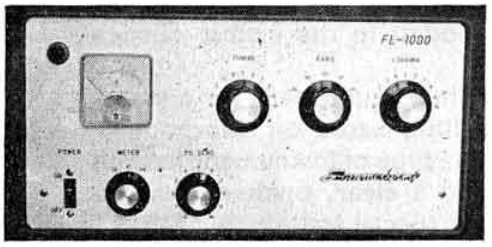
*Cables:* KAYDUBLEW, Dartford

# SOMMERKAMP—*BEST VALUE FOR MONEY ON THE MARKET*

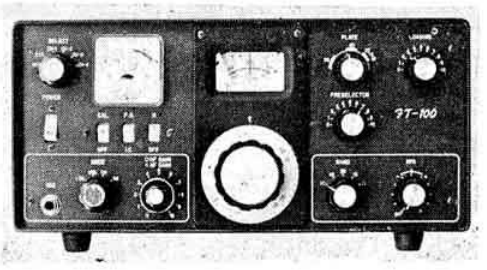
**FR-100B Rx.** 80-10, mechanical and crystal filters, 4, 2·1 & 0·5 kc/s. Better than ½ UV for 10db S/N. **£112.**



**FL-200-B Tx.** AM/CW/SSB. 240W p.e.p., 100W AM VOX, PTT, Break-in CW. Sidetone monitoring. Connectors for transceive with the FR-100-B supplied. Note:—The 6JS6A finals are the same electrically as the 6HF5 so the power ratings are *conservative*. **£130.**




**FL-1000 Linear.** 4-6JS6A's. 960W input. **£90.**




**FT-100 Transceiver.** 150W p.e.p. all transistor except driver and P.A. 13" × 6" × 10" deep. **£180.**

*Full details on request.*

Feeling in a writing mood, I thought I would just ramble on this month instead of just setting out a list of stuff. I like this writing bit—probably some deep psychological urge—schizo Willie! Maybe I should try talking our favourite Ham periodical into letting me do a column. It could be called "Bandit Bill's Bit" or, if decorum is required, "Obiter Dictum" and if any of you ignorant lot don't speak Latin—"Obiter" one who obits, "dictum" from the famous saying of Caesar "umpa, umpa, dictum upia jumpa." Ah well, if you were trying to work Dx on 80 you'd be nutty as a fruit cake, too!

Incidentally, who started this rumour about the Sommerkamp FT-100 being withdrawn? They may be right of course, but strange that I haven't heard anything officially. Even stranger is that I have continued to get deliveries and by the time this appears my next batch will be about due and subsequent batches every month. Very odd. Talking of this so-called cheap Jap junk, the report in this Bulletin will settle it once and for all. A very fair, unbiased report on the Sommerkamp line which bears out what I've been telling you, that Sommerkamp is the best value for money. If someone will produce something as good at the same price I will be very happy to sell it, but in the meantime I'll stick to Sommerkamp. Incidentally, at the time of writing I have 8 linears, 16 transmitters and 22 receivers in stock. The disadvantages and imperfections are really negligible when compared to the good points—figure it out for yourselves, lads, and if anyone can show me better value I'll eat my hat. For those who do want something better, Collins and Racal make quite good stuff I believe! If you don't want to go as high in price for a Rx as the FR-100-B, the Lafayette HA350 at 75 gns is a winner. In fact I like a lot of the Lafayette stuff and what I like, I sell. Conversely, of course, what I don't like I don't sell! I suppose that if I had any sense I would sell the stuff that gives me the biggest profit margin, but I would rather sell something that I know is going to make my Customers happy rather than have them come back complaining. Maybe I'm not so daft after all!

Anyway, just to show how unbiased I am, another winner in its price class is the RAI which I don't stock, not because I don't want to, but I'm not a Heathkit Agent. When properly aligned it takes a beating for the money. Please note though that I say "when properly aligned."

I have ordered the new Lafayette 500 and 700 which should be pretty good, but I'll let you know when I've had a chance to try them out. If I honestly feel they are value for money I will flog 'em.

I haven't left myself much space for stock this month—actually though, it's a bit of a dead loss because I am writing this advertising copy in March and by the time you see it my stock will have changed anyway!! Always the way—you see something you've been after a long time, just what you want, cheap too. You 'phone the minute you see the ad. but almost invariably it's been sold. Ain't it the truth, though! You can't win! The thing to do is to drop me a line telling me what you want. If I've got it, fine and dandy, but if I haven't, Jean, who does all the office work, will put your name down in her little book and you get first refusal of anything that comes in. May I just warn you, though, that the waiting list for mint all band SSB rigs at around £20.0.0. is rather long. Man, I'll do my honest best for you, but I'm no magician!!! Anyway, I have a pretty fair stock of stuff of all types and a s.a.e. will get you the latest list. I make no extravagant claims pertaining to absolute bargains—you know the sort of thing, "Unbelievable value! A huge bulk purchase enables us to offer the super de luxe blah blah at the incredible price of £9.19.11. Waste no time, buy now before prices go up." If prices were going up I would be inclined to keep quiet until they did, then flog 'em!! No, you won't get any stuff at an incredible price at Bill Lowe's, but you will get fair play.

I also buy and will give you a fair price for stuff which I can sell—which I myself recommend in my ads. and other good stuff such as HRO's, AR88's, SP600's, etc. etc.

If you are thinking of a sideband transceiver, drop me a line. By the time you see this, I may (if all goes well) be able to give you a very good deal on a top quality rig. Early days, but I think I have another winner coming up!

Best of DX es 73 de Bandit Bill

G3UBO/VE8DP.

# J. B. LOWE

**51 WELLINGTON STREET, MATLOCK, DERBYS.**

*Telephone No. MATLOCK 2817 (or 2430 after 6 p.m.)*

**73 de Bill. VE8DP/G3UBO**

# RSGB BULLETIN

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**CLOSING DATES**

**JUNE**
**14 MAY**

**JULY**
**9 JUNE**

**INDIVIDUAL COPIES 4/-.**



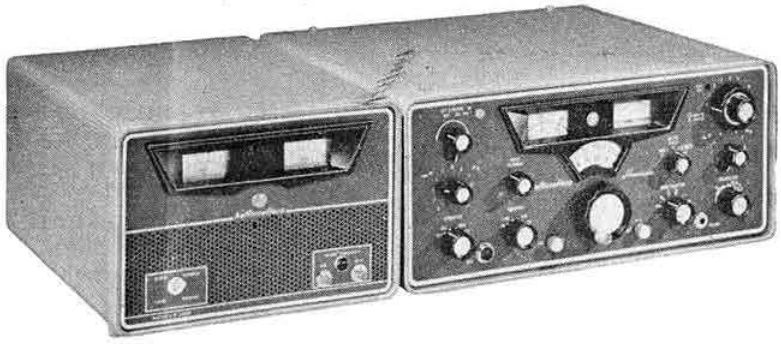
**MAY 1967**
**VOLUME 43 No. 5**

# Electroniques are proud to announce their appointment as exclusive UK agents for the Hallicrafters company

This advanced range of receivers, transmitters and transceivers bear the famous Hallicrafters hallmark "QUALITY THROUGH CRAFTSMANSHIP". All equipment is currently available ex-stock from our Harlow warehouse. Working demonstrations of the SR 2000 can be arranged on Saturday mornings by appointment. Credit sales and hire purchase quickly available. Where equipment is designed for 110V operation a free auto transformer is provided.
The Hallicrafters line will be fully described in a catalogue available later this year. In the meantime catalogue sheets are available on all products shown.

## First availability in Europe! SR 2000 Hurricane transceiver idles along at UK amateur power limit! Command the frequency!

□ 2000 watts PEP input—high/low switch □ Two 8122 tubes in final □ 80 to 10 metres. Full coverage crystals for 10M band □ Crystals for commercial bands available □ Built in VOX plus BK CW and PTT □ Built in CW sidetone □ 50 dB carrier suppression □ Audio 500-2600 c/s at 6dB □ Switched upper/lower sidebands □ Receiver 1μV for 20 dB S/N ratio □ Dial calibration 1 Kc/s linear □ IF noise blanker □ Built in 100 Kc/s calibrator □ Receiver offset control □ Exclusive amplified ALC □ S Meter and grid current meters in transceiver □ Plate volts and current meters in power unit □ Adjustable PI-net output



## HT46 SSB transmitter has unique single-conversion signal—conversion signal path all bands! Quartz filter for SSB and CW! Transceives with SX146—or unlock for full coverage VFO!

□ 175 watts input SSB □ 150 watts input CW □ PTT provided; VOX available □ 500 Kc/s bands 80-10 metres—commercial frequencies at option □ 28·5 to 29·0 Mc/s XTAL supplied — other 10M XTALS at user option □ 50dB carrier suppression □ 52 ohm PI-net output □ Meters MA/RF output □ Self contained solid state power unit

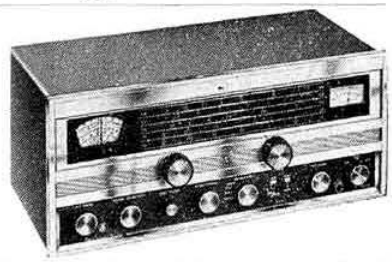
electroniques the *hallicrafters* agents

67/8MG

## SX146 SSB Receiver has single conversion signal path all bands! Premixed oscillator chain! Transceives with HT46—or unlock for split frequency working!

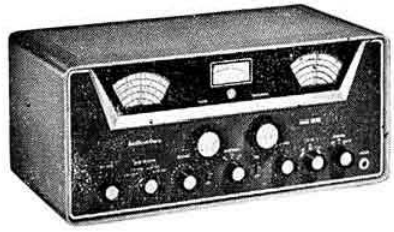
□ 80 to 10 metres—commercial frequencies at option □ 28·5 to 29·0 Mc/s crystal supplied—other 10M crystals at user option □ Three selectivity positions—0·5, 2·1, 5·0 Kc/s—2·1 Kc/s standard—other filters at user option □ S-Meter provided □ Built in power unit.

## SX130 General Coverage Receiver covers medium wave and shortwave to 31·5 M/cs! AM/CW/SSB reception! Calibrated bandspread!



□ Continuous coverage 535 to 31·5 Mc/s □ Hambands 160M to 10M □ Electrical Bandspread 80M to 10M bands □ Crystal Filter built in □ S-meter provided □ CW/AM/SSB—USB/LSB selectable □ Built in power unit □ Uses external speaker

## SX122 Receiver has double conversion! Broadcast plus three shortwave bands! Selectable sidebands and bandspread hambands!



□ Coverage 538 Kc/s to 34 Mc/s □ Electrical bandspread fully calibrated □ Antenna trimmer □ Nine valves plus semi-conductors □ S-Meter □ Power unit built in □ Dual conversion on all bands

## HA1 Electronic Keyer (not illustrated) uses digital techniques! Self completing dits and dahs clean up your sending! Constant ratio circuits!

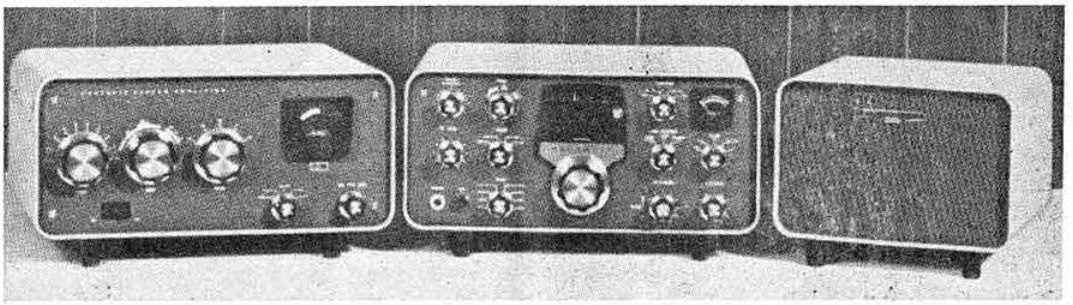
□ Employs digital techniques □ Suits SR2000, HT46 and all transmitters □ Constant-ratio self-completing dits and dahs □ Transformer operated □ Vacuum sealed mercury wetted keying relay □ Speed adjustable 10 to 65 wpm

| | |
|---|---|
| *Transceivers* | |
| SR2000 Hurricane | £495 |
| P2000 AC Power Meter and Speaker Unit | £195 |
| *Transmitter/Receiver Combinations* | |
| HT46 SSB Transmitter | £175 |
| SX146 SSB Receiver | £125 |
| *Receivers* | |
| SX122 General Coverage | £135 |
| SX130 General Coverage | £79 |
| *Accessories* | |
| HA16 VOX Adapter for HT46 Transmitter | £19.10.0 |
| HA7 100 Kc/s calibrator for SX122 Receiver | £9.15.0 |
| HA19 100 Kc/s calibrator for SX146 receiver | £9.15.0 |
| HA1 Electronic Keyer for any transmitter | £39 |

Electroniques (Proprietors STC Ltd.), Edinburgh Way, Harlow, Essex. Telephone: Harlow 26777

***hallicrafters*** equipment by electroniques

# —NOW FACTORY ASSEMBLED— THE WORLD'S MOST POPULAR RIG



# The HEATHKIT® SB-101 Transceiver and SB-200 KW Linear Plus Accessories

**In Answer To Your Requests** . . . now those of you who just can't spare the time for "do-it-yourself", can purchase the SB-101 Transceiver and SB-200 KW Linear factory assembled and tested ready for operating the moment you unpack them. For those who want to save the most, these units also will continue to be available in kit form. Either way, you get the renowned SSB performance and features that have made the Heathkit SB line the fastest selling rigs on the air.

The following related accessories also will be available factory assembled or in kit form: HP-13 DC Power Supply (for mobile operation of the SB-101), HP-23 AC Power Supply (for fixed station operation of the SB-101), and SB-600 Communications Speaker (matches appearance of SB line and has space for installing the HP-23 AC power supply).

### SB-101 80-10 Metre SSB Transceiver

● 180 watts PEP, 170 watts CW ● Switch select Upper or Lower sideband or CW ● CW sidetone ● PTT or VOX ● Linear Master Oscillator with 1 Kc dial calibration (resettable to 200 cps ● Provision for switch selection of optional SBA-300-2 CW filter ● Provision for external LMO ● Separate CW offset carrier crystal ● 100 kc/s calibrator

**Assembled SBW-101,** 23 lbs., write for terms ..... **£200 0 0**
**Kit SB-101,** 23 lbs. ..... **£165 0 0**

### SB-200 80-10 Metre KW Linear Amplifier

● 1200 watts PEP, 1000 watts CW ● Drives with 100 watts ● Built-in SWR meter, antenna relay, solid-state power supply ● ALC ● Shielded, fan-cooled amplifier compartment ● Pretuned cathode input ● Circuit breaker ● 120/240V

**Assembled SBW-200,** 41 lbs. ..... **£132 0 0**
**Kit SB-200,** 41 lbs. ..... **£107 10 0**

### SB-600 Communications Speaker

● Styled to match SB series ● For fixed station use ● 8 ohm speaker with shaped 300-3000 cps response ● Has space for HP-23 power supply

**Assembled SBW-600,** 5 lbs ..... **£10.10.0**
**Kit SB-600,** 5 lbs ..... **£9.0.0**

### HP-13 Solid-State Mobile Power Supply

● Supplies voltages for SB-101 ● Provisions for remote operation (can be located in engine compartment) ● Circuit breaker protection ● 12 to 14.5V DC input (pos. or neg. earth as requested).

**Assembled HPW-13,** 7 lbs. ..... **£40 10 0**
**Kit HP-13,** 7 lbs. ..... **£33 0 0**

### HP-23E Solid-State Fixed Station Power Supply

● Supplies voltages for SB-101 ● Excellent dynamic regulation ● 120-240V AC ● Can be installed inside SB-600 speaker cab.

**Assembled HPW-23,** 19 lbs. ..... **£33 0 0**
**Kit HP-23,** 19 lbs. ..... **£27 10 0**

*Liberal credit terms* available on all purchases over £10 UK only.

*FREE Factory Consulting Service.* Heathkit maintain a staff of expert technical correspondents to answer any questions about selection, construction and use of your kit. And it costs you nothing. In addition, factory repair service facilities are at your command should you ever need it.

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# RADIO SOCIETY OF GREAT BRITAIN

*INCORPORATED 1926*

***MEMBER SOCIETY INTERNATIONAL AMATEUR RADIO UNION***

***PATRON*** — *HRH THE PRINCE PHILIP DUKE OF EDINBURGH, KG*

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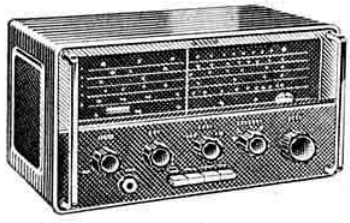
# Eddystone EA 12

## Amateur communication receiver

An amateur bands double-conversion superheterodyne receiver, for a.m, c.w, and s.s.b reception. For all amateur channels between 1.8 MHz and 30 MHz in nine 600 kHz bands with 28 MHz to 30 MHz in four bands.

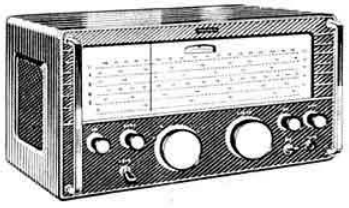
**Primary features.** Crystal controlled 1st oscillator, 2nd oscillator with continuously variable selectivity to 50 Hz, muting switched or by external relay, twin noise limiters, for a.m/c.w, and s.s.b, short-term drift better than 20 Hz and less than 100 Hz in any one hour, 'S' meter calibrated in nine levels of 6 dB and dB levels beyond 'S9,' two a.g.c time constants, deep slot filter, independent r.f, i.f, and audio gain controls with outputs for f.s.k and panoramic adaptor. **£185.**

**OTHER RECEIVERS IN THE FAMOUS EDDYSTONE RANGE**



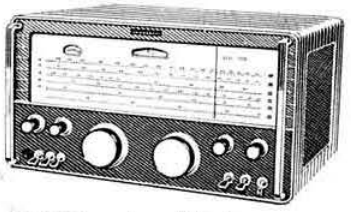
### EC10 communications receiver

The fully transistorized EC10 communications receiver, supreme in its class, covers both medium wave broadcasting and all shortwave service to 30 MHz. Incorporating the famous Eddystone tuning drive, with logging scale and auxiliary vernier, shortwave reception is particularly simple. Battery operated or from optional a.c mains unit. **£48.**



### 840C A.C or D.C communications receiver

An 8-valve receiver with gap free coverage from 600 to 10 metres providing excellent reception of broadcast programmes and all major s.w channels including marine and international distress frequencies. The famous Eddystone extended band spread and logging scale is an essential feature. Suitable for a wide range of a.c and d.c voltages. Fully tropicalized. **£66.**



### 940 13-valve high sensitivity receiver

A superb high performance receiver incorporating two r.f and two i.f stages, push-pull output and silicon diode noise limiter circuit. Gap free coverage from 480 kHz and suitable for reception of c.w, a.m, and s.s.b modes. Exceptional sensitivity and stability. Built to professional standards for the serious listener. **£133.**

**Comprehensive information from your Eddystone distributor or from: Eddystone Radio Limited, Eddystone Works, Alvechurch Road, Birmingham 31. Telephone Priory 2231. Telex 33708**

A MARCONI COMPANY

LTD/ED23

# CURRENT COMMENT *DISCUSSING TOPICS OF THE DAY*

## The Wireless Telegraphy Bill

*FOLLOWING the Current Comment in the April issue the text of a letter received from the Radio Services Department of the GPO is reproduced below:*

" Following receipt of your letter of 12th April about Clause 7 of the Wireless Telegraphy Bill, we discussed the matter on the telephone and I promised that I would write to you setting out how we envisaged that the orders and exemptions would work.

" Under this Clause the Postmaster General will have the power to make orders specifying apparatus which is to be banned. In making an order we shall try to limit its scope to roughly the sort of apparatus which we wish to stop. Apart from other considerations it is of course a matter of common sense that we should restrict the order in this way: we do not want to create a mass of administrative work in issuing an unnecessary stream of exemptions. As regards the 27 Mc/s walkie-talkie problem, therefore, we might ' specify ' radiotelephone transmitters using frequencies between X and Y Mc/s. We should keep this range reasonably narrow but not to the extent where we think that the apparatus we are seeking to ban could very simply be made to work just outside the specified range. We should also avoid descriptions such as ' portable ' or ' capable of being held in the hand ' because these invite differing interpretations, and hence misunderstanding.

" We shall not, of course, be aiming at apparatus which amateurs purchase or construct themselves for their own use within the terms of their licence but we do envisage that the frequency range would cover the neighbouring amateur band in order to ensure that this band does not become an illicit ' citizens band '—i.e. in order to protect the licensed amateur.

" In such an event we further envisage issuing a London Gazette notice giving a general authority for licensed radio amateurs to construct their own apparatus for their own use within the terms of their licence, and issuing suitable authorities, when the need arises, to suppliers (probably individually). The only case where we may want to be somewhat careful in matters affecting amateurs is if it is claimed that amateurs wish to use ' specified ' apparatus which is made professionally and not normally intended for amateur use. In such cases we might wish to satisfy ourselves that the claim made by suppliers is true and that the apparatus will be used by amateurs. It is here that the close relations between the Department and the Society will be particularly helpful to us both.

" Other than the 29 Mc/s area we do not foresee at this point in time that we shall seek to make an order which will impinge in any way on a radio amateur frequency band, but we must have freedom to make orders covering any sort of apparatus in any frequency band so that we can deal with problems as they arise. Our concern is essentially to offer a measure of consumer protection, partly to the unsuspecting person who might obtain something before discovering that he cannot get a licence to use it, but largely to protect authorised users (such as licensed radio amateurs) from interference caused by apparatus whose use we cannot license but which is difficult to track down.

" The foregoing statement should, I think, help to allay any anxieties which your Members may have as to the true nature of Clause 7 of the Bill and I have no objection to your publishing it if you wish to do so."

*Detailed comment is not made at this stage, but members will be able to judge for themselves the proposed action to be taken by the GPO when the Bill becomes law. We are still firmly of the opinion that exemption for radio amateurs should be written into the Bill rather than made the subject of any supplementary order which itself can be cancelled at short notice.*

### Front Cover: The Chilbolton Steerable Aerial

Britain's second largest satellite tracker was officially opened on 14 April, 1967, by the Rt. Hon. Anthony Crosland, M.P.

This fully steerable radio-telescope is capable of operation down to 3cm and its 82 ft. 430 ton aerial was designed for an accuracy of 2 minutes of arc, but it is expected to show a considerably improved accuracy after the tests carried out by the Radio and Space Research Station have been completed.

The aerial, which can be driven in azimuth through 540° and in elevation from 5° below the horizontal to 30° beyond the Zenith, is steerable at rates up to 3° per second in azimuth and 1° per second in elevation in order to follow transmissions from Earth satellites. Four electric servo motors drive the aerial in azimuth and two in elevation.

The main function of the Chilbolton Field Station is to further our knowledge of the way in which radio waves travel, both through space and through the earth's atmosphere.

The first experiments planned for the Chilbolton aerial will consist of tropospheric and ionospheric investigation. Included in these will be the scattering of microwaves by cloud, rain and snow, microwave ray structure on a light of sight path between the aerial and an advanced technological satellite, sky polarization measurements and the scintillation of Quasars.

The aerial control system is operated by an on-line digital computer or through an auto tracking system which locks on to a radio source and automatically follows it, as well as being able to be controlled manually.

D.W.R.

# The TVI Problem on Four Metres

By MIKE GIBBINGS, G3FDW*

AFTER a few years of operation on 4m the writer has come to the firm conviction that the one thing standing in the way of the development of the use of the band is the problem of TVI.

For the uninitiated the following is a rough outline of the situation.

Band I TV is transmitted in five channels spaced out between 41·5 Mc/s and 66·75 Mc/s, and TV sets, which have notoriously poor front-end selectivity, suffer an increasing likelihood of front-end overload as the TV channel frequency gets closer to 70·1 to 70·7 Mc/s.

The situation is such that 4m operators who live in areas supplied by channels 1 and 2, and to a lesser extent channel 3 TV transmitters have very much less of a TVI problem than those poor unfortunates in channel 4 and 5 areas. Nevertheless, even in channel 1 and 2 areas the use of a 50 watt a.m. transmitter and a high gain beam does produce a surprisingly high incidence of TVI. The use of a conventional 50 watt a.m. transmitter with a 4-element beam in a channel 4 or 5 area is definitely not to be recommended!

In respect to Band III TV signals a large third harmonic content in the 70·1 to 70·7 Mc/s signal can produce TVI in channel 11, 12 and 13 areas.

An examination of the operating habits of active 4m operators is also a very revealing exercise.

The Sunday morning activity period is not adopted from choice but because many just dare not go on the band during TV hours—the lucky few who can operate at all times all live within a stone's throw of high power channel 1 or 2 transmitters. In consequence, activity tends to be concentrated in these areas and vast tracks of the country have no 4m stations at all. Other areas just have a small representation on Sunday mornings and a few really keen operators on after TV hours in the evenings as well.

The writer has seen several stations with first class equipment come and go on 4m, driven off by persistent and incurable TVI, and yet in areas known as good for 4m activity. What is it, then, that makes 4m such an uneasy bedfellow with its neighbouring Band I TV? The author knows of only a handful of 4m regulars who have not at some time had TVI. Others find themselves forced to various remedies from using only low power during TV hours to the extreme of only operating portable! The latter idea is that if you are driven off one hillside by an irate farmer you can always find another hill and it might be a better site anyway.

Have we then become mesmerized by the thought that even the best of us get TVI so therefore we will not try and find a permanent cure? It might appear so.

If by this stage in reading this article you should have reached the conclusion that 4m is definitely not for you, let me hasten to add that after many painful years G3FDW can now operate at all times of the day and night and that even my severest critics, my young children, never even know if I'm on the air or not, and I run 50 watts input and use a 6-element beam.

Now for a little background information as an illustration of the extremes to which a 4m addict will go to use his favourite band.

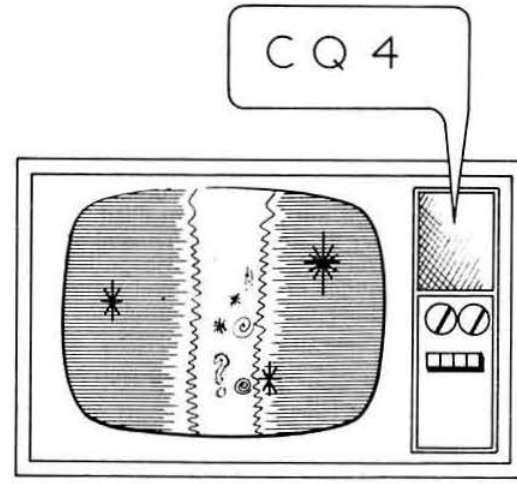
### Cure One

Cure one was thought out when resident on the west coast of Cumberland where channels 2, 3, 4 and 5 were used in an area which was very, very fringe. It was obvious that no normal cure was going to get the station on the air at all, so a careful study was made of every possible approach and it was concluded that a novel idea would be the only one possible. A powerful s.s.b. 4m transmitter was constructed, equipped with vox and accurate netting facilities rather similar to those used for many years on the d.c. bands.

At this stage a study was made, using a tape recorder to operate the s.s.b. transmitter while watching the Saturday morning BBC test transmission, as to what length of transmission could be made, on s.s.b., which would appear rather like a splash of high intensity noise such as a flash of lightning or a bad thermostat. It was found that random transmissions of about 1–3 seconds duration and at intervals of not less than 30 seconds could be tolerated before it became apparent what it was causing the TVI!

At this rate one could hardly call a protracted CQ, but with the techniques already learnt on 80m s.s.b. it should be possible to break in on an existing QSO on 4m. The technique evoved was to find two stations engaged in a QSO, for example G3OHH and G3PLX, and to zero beat with G3PLX's carrier, and while he was transmitting call G3OHH, in effect riding on G3PLX's carrier with the high power s.s.b. The system was certainly restrictive, but it worked like a charm, except that strange stations would often be rather taken aback by the brevity of the call!

In spite of everything this method cannot be recommended as a best buy, though time spent transmitting is exactly similar to that which you get in some 80m multiway s.s.b. QSO's!



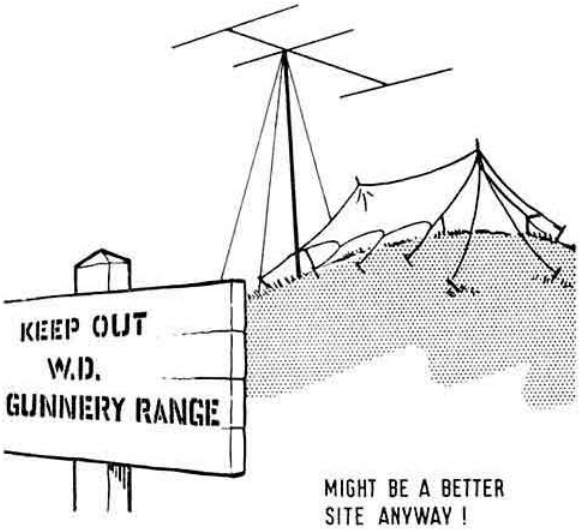

THE USE OF A CONVENTIONAL 50 WATT A.M. TRANSMITTER WITH A 4 ELEMENT BEAM IN A CHANNEL 4 OR 5 AREA IS DEFINITELY NOT TO BE RECOMMENDED.

### Cure Two

On moving recently to a fairly well populated village in a channel 2 signal area some 40 miles from Holme Moss, it was thought that all the previous troubles would be over, but far from it. Not only were there new types of interference which had not been apparent before, but no amount of quarter-wave stubs on TV sets seemed to remove the TVI.

So cure number two was set in train.

* 14 Howbeck Lane, Clarborough, Retford, Notts.




The original s.s.b. exciter had to have the injection oscillator crystals changed to remove a harmonic which appeared in channel 2 on the home TV set. Channel 3 had been used previously in Cumberland. When the s.s.b. transmitter was driven hard it was apparent on some TV sets, but not all, that some form of transient interference was taking place.

The s.s.b. exciter and linear were gone over with a fine tooth comb to eliminate any distortion or spurious oscillation on speech peaks and the drive reduced so that the linear p.a. never ran into grid current. But all was to no avail. It should be realized that the transmitter produced some 100 watts p.e.p. output and with this fed to a 6-element beam an e.r.p. of about a kilowatt was available. When this power output is considered the interference problem takes on a new meaning for a TV set only a few yards away.

At this stage it became apparent that two distinct types of TVI were present and the clue came when one person said that they had heard me talking to a station in Northern Ireland. But s.s.b. was being used!

The transient interference was of course front-end overload producing cross-modulation on s.s.b. speech peaks and a hasty reduction in power output to about the 50-60 watts p.e.p. level produced a cure even when the 4m aerial was pointing right at the offending TV aerial. But three cases of the mysterious, " I can hear you talking," variety were left. One of these was over 250 yards away!

However, if a 50 watt input carrier was transmitted no interference was apparent. If the carrier was keyed the picture frame unlocked with the keying and no key filter, however good, seemed to help. To prove this point, keying of the transmitter was carried out by injecting a 1000 c/s tone into the microphone input of the s.s.b. exciter resulting in a c.w. output. This 1000 c/s tone oscillator was constructed so that it had a near perfect rise and switch off characteristic when keyed, as observed on an oscilloscope. Still the TV pictures jumped around. It was finally concluded that the video circuits were amplifying the 4m signal and detecting it as a change in d.c. level, this change in d.c. level being sufficient to trigger the frame lock.

Now in case you should conclude from " Cure One " that the writer is a brave soul let it be hastily added that the thought of driving into the video and audio circuits of someone's (often rented) TV set fills me with horror. So not wishing to call on the ever-helpful GPO again, the inescapable conclusion was reached that in no way could the amplitude of the transmitted signal be altered by a.m. s.s.b or c.w. What therefore was left as Cure Two had failed to cure all complaints? Was G3FDW to join the Sunday morning only gang as well?

At this stage a complete rethink of the situation was called for and all information possible was gleaned from TVI sufferers past and present. The following Golden Rules were formulated:

*Rule 1. No harmonics to be produced on or near the TV channels in use in your area.*

In this respect the use of low frequency crystals on their fundamental frequency is definitely out. The above applies both to transmitter and converter circuits. In the writer's experience it is no good trying to get rid of interfering harmonics by screening or trap circuits once they have been produced. At v.h.f. these harmonics get through anything. The only cure is not to have the harmonics in the first place. In this respect a slide rule in conjunction with a list of TV frequencies is a very great help in deciding on the use of a particular frequency crystal or oscillator. For s.s.b. use overtone crystals have not been found stable enough for injection oscillators so high frequency fundamental crystals are now used throughout.

The above method has removed all interfering harmonics out of the range 41–69 Mc/s and above this frequency the use of class A and AB1 linear stages has removed all higher order harmonics which can cause trouble with Band III TV signals.

*Rule 2. A.m., s.s.b. and conventional c.w. in that order, are to be avoided like the plague.*

Simply any change in amplitude of the transmitted signal seems to upset some TV sets more than any other single cause. It would appear that a great deal of trouble is caused by the modulated r.f. getting straight into video and audio circuits of the TV without any apparent connection with the radio frequency involved. The old trick of taking the TV set aerial lead out to see if the interference disappears if it is r.f. pickup or cross-modulation, troubles would appear to be invalidated. The 4m signal flowing down the outer braid of the coax to the TV set, and causing severe earth currents to flow in the TV chassis causes detection to take place right in the video and audio circuits.

*Rule 3. A complete cure can often be produced by a reasonable reduction in power.*

Do we in fact need all the power we have available? Very often we could use a great deal less power with little loss in performance. To illustrate this point, some time ago while in QSO with G3BA 70 miles away, on two-way s.s.b., under only average conditions, power at both ends was reduced to 1 watt p.e.p. output to 4-element beams. Signals were still about S6–7 and solid Q5. It should not be lost sight of that changing from a 4-element aerial to a 4-over-4 can have the same TVI implications as a doubling of power input.

Many arguments have been heard which crystalize down to the fact that some amateurs think that they are entitled to run so many watts on such and such a band without let or hinderance and they are quite right. But let us not lose sight of the fact that this is a hobby and therefore if a little more neighbour co-operation can be bought at the price of non-interference by reducing power with no work necessary on the TV set in question, it is thought that a little good operating might reap benefits, especially when the 6-element aerial goes up to 50 ft. in height next Spring! What's 3db among friends anyway?

*Rule 4. TVI filters for use on a TV set should be of the coaxial line type.*

It has been found that if a filter is necessary at the TV set end, then by far the best method is to use a quarter-wave coaxial stub soldered directly across the TV aerial input socket. The stub should then be taped back along the aerial coax lead. This type of stub proves very superior to any lumped constant circuit. These quarter wave filters are made up by the following method.


MY SEVEREST CRITICS

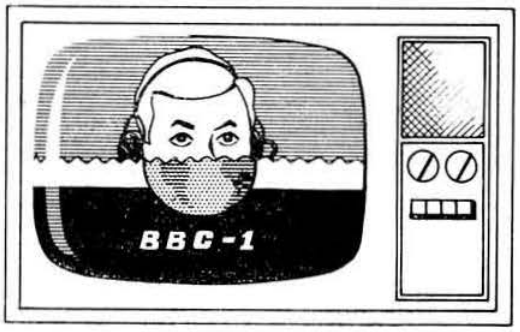
The station g.d.o. is calibrated against the station receiver to the most favoured frequency of transmission, high accuracy being necessary as coaxial stubs have quite a high *Q*. Ensure that one end of the coax is not shorting between inner and outer conductors.

Bare back about $\frac{1}{2}$ in. of one end of a 40 in. length of coax and solder the inner conductor and the end of the braid together to form a loop. This loop should now be loosely coupled to the g.d.o. Tune the g.d.o. lower in frequency than 70 Mc/s and a sharp dip should be noted in the g.d.o. meter. Cut off 1 in. from the other " open " end of the length of coax and note the change in resonant frequency as indicated by the g.d.o. By cutting off small pieces of the coax at a time, making sure not to short the ends out, increase its resonant frequency to the desired spot in the 4m band. Check for accuracy against the station receiver as the correct frequency is approached as the stub can " pull " the g.d.o. in frequency quite considerably.

When accurately cut, unsolder loop ends and solder these across the coax input socket of the TV set.

*WARNING.* Be very careful that the coax does not come into contact with the possibly live TV chassis as this will in turn make the TV aerial live.

It should be noted that a quarter wave 70 Mc/s trap will also act as a short circuit on 210 Mc/s as it is now a three-quarter wave trap. This will cause severe attenuation to a channel 12 or 13 signal.




NEW TYPES OF INTERFERENCE

*Rule 5. The 4m aerial can often cause TVI in its own right.*

Two cases of this have been experienced at the home QTH.

The first experience was with a 4m 4-element aerial which was home-made and of the popular type with a folded dipole. This was fed by 80-ohm coax without the benefit of a balun, to transform from unbalance to balanced feed. It was found that the vertically polarized signal on the outer braid of the coax down lead caused front-end overload via a nearby vertically polarized TV aerial. This became apparent when the 4m aerial was rotated without any reduction in the severity of the TVI. A change to a gamma match for the 4m aerial produced two benefits: a reduction in the noise pick-up by the 4m aerial and a complete disappearance of the TV front-end overload. Moral—use all the attenuation you can get!

The second case was due to corrosion where a steel bolt made a connection to an aluminium aerial element. The result was the most atrocious TVI imaginable and was only discovered as the onset of the TVI coincided with the end of a period of gales and aerial damage was suspected. To prevent a recurrence of this trouble all aerials are now assembled with all connections and joints smeared with Electrolube grease.

**Third and Final Cure**

In the light of the previous Golden Rules the stage was now set for a major rethink on the whole TVI problem.

Many of the requirements of the above mentioned rules had been incorporated in the 4m equipment but No. 2 was still to be complied with.

Without a doubt my 50-watt carrier was as clean as a whistle; no front-end overload, no harmonics, no break through, nothing, and that's what it conveyed to a listening public—nothing.

Urged, nay threatened, by G3BA, a simple reactance modulator was fitted to the s.s.b. exciter v.f.o. This consisted of only an additional eight components and the 12AX7 microphone amplifier in the s.s.b. exciter. With a little trial and error the G3BA approved standard of deviation on 70·16 Mc/s was an established fact, and so was the TVI, or rather, lack of it.

Apart from the lack of TVI, first results were disappointing. It wasn't as good as s.s.b. for DX working, but then what is? For local working it was every bit as good as a.m. and many people were most complimentary. One thing that was missed was the frequent visits of my children to complain when the operating time clashed with the " Man from Uncle "!

Another thing missed was c.w. operating, until it was realized that a reactance modulator could be controlled by altering the d.c. bias to produce frequency shift keying (f.s.k.). First experiments produced a non-U deviation of about 20 kc/s, which might have puzzled some people as to exactly why G3FDW's bug was wired back to front! Less bias change reduced this frequency shift to 1 kc/s, it sounded right, and certainly worked out well.

One problem is that at first other stations don't catch on to the fact that you are on f.m. or f.s.k., but after a while they stop saying that " You have a great deal of f.m. on your carrier OM " ! But with regular use others expect you to be a little odd and make allowances accordingly.

It was realized early on that very few stations had v.f.o.'s on 4m so that this particular type of f.m. modulator would only have limited scope. So a programme was started to develop a f.m./f.s.k. transmitter running about 15–20 watts input which was simple, only using four valves and a v.x.o., and which would be completely TVI-proof. This has now

*(Continued on page 302)*

# A Simple Receiver Squelch Circuit

By B. PRIESTLEY, G3JGO*

THIS circuit provides a simple way of silencing a receiver when no signal greater than a pre-set level is present, thus preventing the annoyance of listening to receiver noise without having to turn down the gain and risk losing a wanted signal. Its principal use is on the v.h.f. bands, when looking for signals amongst the noise, or for "sitting" a receiver on the local net frequency while doing another job in the shack. The receiver modification necessary is trivial and can be removed in a few seconds if necessary.

### Circuit Description

Due to the anode decoupling resistor (typically 1 to 2 K ohms) the d.c. anode voltage of an a.g.c. controlled i.f. stage rises slightly as a signal is tuned-in. This rise in voltage is made to snap-over a Schmitt bistable circuit which de-energizes a relay, the contacts of which mute the receiver audio. The simplest way of doing this is to switch the loudspeaker in or out, as shown, but various other methods can be used. The override switch S1 (shown in Fig. 3) removes h.t. from the Schmitt so that the relay is permanently de-energized.

### Practical Operation

As no two receivers are quite identical it is necessary to do some cut and try. First connect a high resistance voltmeter to an i.f. anode supply point X, as shown in Fig. 1, and note the rise in voltage as a moderate signal is tuned-in. Repeat this with the other i.f. valves. If the screen voltage is not stabilized do the same on the screens (point *Y*). The object is to find where the greatest proportional increase takes place. Having found this point, connect up to it as in Fig. 2(a). The actual snap-over point of the Schmitt is in the region of 120 volts so the potentiometer must be adjusted to reduce the critical voltage at point *X* (or *Y*) to the snap-over voltage. This adjustment is *very* critical for best results, so after rough adjustment the resistance of the halves of the potentiometer are measured and the arrangement of Fig. 2(b) substituted, which permits much finer adjustment and better long-term stability.

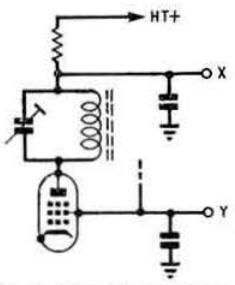



**Fig. 1. Operating voltage take-off point.**

As the circuit is not at all critical, in so far as layout is concerned, it can be put together roughly in an hour or so and left out of harm's way in a cardboard box for a trial period before being built into a presentable form, or discarded as the case may be!

The supplies for the 12AT7 can be derived from an external power unit, although most receivers will be able to stand the small extra load. Indeed, it seems possible, in battery-driven equipment, that the output valve could be switched-off by the relay, making the circuit really earn its keep!

A 10 ohm resistor should be fitted across the output transformer secondary assuming a low impedance speaker is in use.

*43 Raymond Road, Langley, Slough, Bucks.

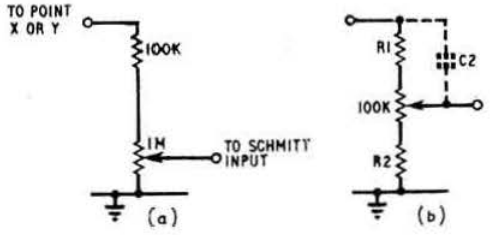



**Fig. 2(a) and (b). Operating voltage potential divider. R1 + R2 = 1M = ohm. Select values to give "band spread" around point found with system (a). C2, 0·1μF, 250V (see text).**

### S.S.B. and C.W.

As a squelch is operated by the automatic gain control, reliable operation on s.s.b. and c.w. Morse signals requires some form of stretching of the transient a.g.c. voltage. The ideal method is, of course, proper "hang" a.g.c., but the addition of C2 and CR1 help to make the squelch "peak sensitive."

### Appendix

The basis of the circuit is the Schmitt trigger. Referring to Fig. 3, if the input is earthed, V1 will not conduct and so $g_2$ is at

$$\frac{R_2}{R_L + R_1 + R_2} \times 250V = 124V$$

hence its cathode will rise to a slightly greater voltage, say 125V which ensures V1 is off, since the cathodes are cross connected and grid 1 is earthed. The current in $R_K$ is clearly

$$\frac{125V}{R_K} = 5{\cdot}6 \text{ mA}$$

and this is the anode current of V2, quite independent of the anode load resistance, provided this is not too high. If the input voltage is now raised steadily nothing happens until it

*(Continued on page 302)*

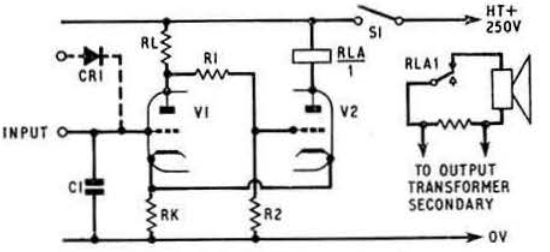



**Fig. 3. Schmitt Trigger Circuit.**

| | | | |
|---|---|---|---|
| $R_L$ | 2·7 K ohms | C1 | 0·1μF 250V |
| R1 | 220 K ohms 10% | V1 | ½ 12AT7 |
| R2 | 220 K ohms 10% | V2 | ½ 12AT7 |
| $R_K$ | 22 K ohms 10% 1W | CR1 | silicon diode (see text) |
| RLA | Sensitive relay up to 10 K ohms coil resistance. | | |

**Assuming a low impedance speaker is used a 10 ohm resistor across the speaker would be a suitable value to connect across the output transformer secondary.**

P. Simpson, G3GGK and B. Armstrong, G3EDD

# The Sommerkamp F Line

DURING the past year F Line has become well known as the name of a low cost line of s.s.b. communication equipment manufactured in Japan by Yaesu Musen Co. Ltd. of Tokyo and marketed by Sommerkamp of Germany.

The subjects of this review are the Sommerkamp FL200B transmitter, FR100B receiver and the FL1000 linear amplifier, which were loaned by Lowe Electronics of 55 Wellington Street, Matlock, Derbyshire. The current prices of these equipments are £130, £112 and £90 respectively.

The FL200B transmitter and FR100B receiver are capable of independent operation and the FL1000 linear amplifier can be used with any transmitter capable of supplying the necessary drive power.

**General Description**

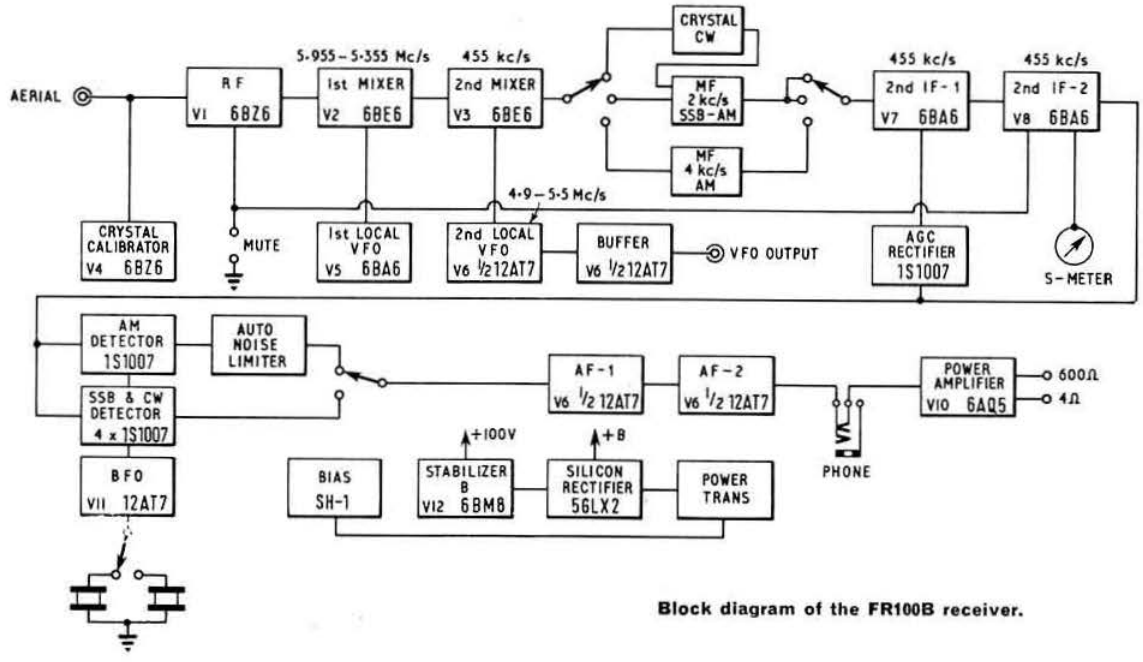
The receiver follows what is now conventional practice by employing a double superheterodyne with a crystal controlled first mixer. The first i.f., which is tuned by the main tuning gang capacitor covers 5·955-5·355 Mc/s. The tuning knob changes the received frequency by 50 kc/s for each revolution, and correspondingly the knob skirt is calibrated in 50 divisions, both 0-50 and 50-100. The skirt can be adjusted with respect to the drive shaft in order to put the 0 mark in the right position for calibration. The main scale is calibrated at 10 kc/s intervals. On switching to u.s.b., a varicap diode in the v.f.o. circuit shifts the frequency by the appropriate amount. A further facility for adjusting the received frequency is incorporated on the panel: a "clarifier" control alters the shunt capacitance across the first oscillator crystals, thus permitting accurate setting of the main dial in conjunction with the built-in 100 kc/s calibrator.

The second i.f. is 455 kc/s, where selectivity is controlled by a single crystal filter, a wide bandwidth mechanical filter and a narrow bandwidth mechanical filter in three combinations: for c.w., the crystal is switched in series with the narrow filter; for a.m. detected conventionally the wide filter is used, and for s.s.b. reception the narrow filter is used. A neon controlled valve stabilized supply is used for all the oscillators and the screen grids of the r.f. and i.f. amplifiers.

A single diode detector is used for a.m., while for c.w. and s.s.b. a semiconductor bridge is employed. The mode control also carries a position for f.m., but the appropriate circuitry is only supplied as an accessory kit. This facility could be very useful if the receiver is to be used with a converter for v.h.f. reception.

Muting is accomplished by applying a cut-off bias to the r.f. and i.f. stages; this bias can be adjusted by the sidetone knob to allow transmitted c.w. to be monitored. A switched noise limiter is fitted. The audio output impedances are 4 ohms and 600 ohms; no loudspeaker is provided, but connection to an external speaker can be made either to the rear terminal strip or a small two pin socket. A plug is supplied. The aerial connection is to a u.h.f. series SO239 socket. The v.f.o. output can be taken from a phono socket. There is also an auxiliary power socket on the rear panel to provide 220 volts at 20 mA and 6·3 volts at 1 amp for external apparatus.

The wiring is of a good standard, and everything that matters is accessible. The average amateur should be at home with the open construction. No silk-screening on the chassis is employed to identify the main components, but instead a comprehensive layout guide is fixed to the v.f.o. box. Mechanical drive to the v.f.o. is with spring-loaded




**Block diagram of the FR100B receiver.**

## RECEIVER FR100B

### HANDBOOK SPECIFICATION—FR100B

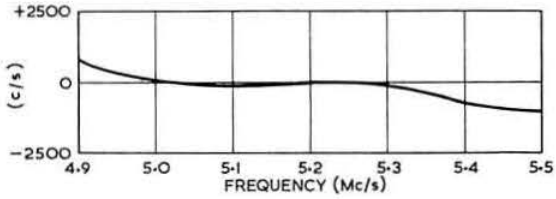
| | |
|---|---|
| **Mode of operation:** | U.S.B., L.S.B., C.W., A.M. |
| **Frequency range** | 3·5–4·1, 6·9–7·5, 13·9–14·5, 20·9–21·5, 27·9–28·5, 28·5–29·1, 28·9–29·5, 10 Mc/s WWV, plus provision for three additional 600 kc/s bands. Crystals for WWV and the two upper 10m bands are optional extras (In the UK the crystals are normally supplied as standard) |
| **Spurious Responses** | Image rejection greater than 50db |
| **Internal Spurious Signals** | Less than 1μV aerial input |
| **Frequency Stability** | Less than 100 c/s for 10 per cent line fluctuation after warm-up |
| **Selectivity** | **C.W.** 0·5 kc/s at 6db 2·5 kc/s at 60db<br>**A.M.** 4 kc/s at 6db 7·5 kc/s at 25db<br>or 2·1 kc/s at 6db 2·5 kc/s at 60db<br>**S.S.B.** 2·1 kc/s at 6db 2·5 kc/s at 60db |
| **Sensitivity** | Less than 0·5μV for 10db signal-to-noise ratio |
| **A.G.C.** | Discharge time constant<br>0·1 second on a.m.<br>2 seconds for s.s.b.<br>0·5 second for c. w. |
| **Audio Output** | 2 watts maximum |
| **Audio Distortion** | Less than 5 per cent |
| **Power Requirement** | Approximately 50 watts, 100/117/220/240 Va.c., 50/60 c/s |
| **Dial Calibration** | 50 kc/s main dial division, approximately 1 kc/s sub-dial reading |
| **Dimensions** | 7½ in. high, 15 in. wide, 11¾ in. deep |
| **Net Weight** | 24 lb (12 kg) |

split gears; although no flywheel is fitted, the control is very light. All-steel construction of the chassis and housing is employed. The main case is finished in fawn crackle, and the panel is painted matt silver with black engraved titles and knobs.

### THE TESTS

#### V.F.O.

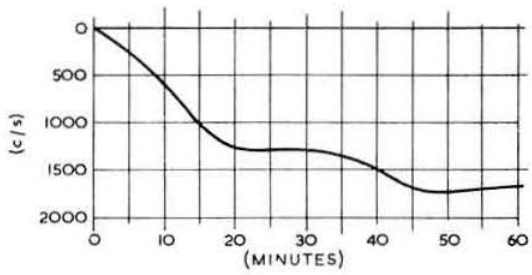
The frequency of the v.f.o. was measured every 100 kc/s and the error noted as follows:




| Nominal Frequency (Mc/s) | Linearity ref. Mid-scale (c/s) | Error (c/s) |
|---|---|---|
| 4·900 | +791 | −6589 |
| 5·000 | +11 | −5809 |
| 5·100 | −83 | −5715 |
| 5·200 | 0 | −5798 |
| 5·300 | −52 | −5746 |
| 5·400 | −863 | −4935 |
| 5·500 | −1017 | −4781 |

Before this test, the tuning knob skirt was visually aligned to agree with the main dial. If the skirt had been aligned at mid band using the calibration oscillator, the maximum scale error would have been one vernier dial division. Resettability was less than 50 c/s and backlash was measured as about 200 c/s although none was noticed on the air.

The v.f.o. was measured from switch on as follows:




| Elapsed time from cold start | Frequency drift |
|---|---|
| 1 minute | − 57 c/s |
| 2 minutes | −101 c/s |
| 5 minutes | −298 c/s |
| 10 minutes | −578 c/s |
| 15 minutes | −1008 c/s |
| 30 minutes | −1495 c/s |
| 45 minutes | −1703 c/s |
| 60 minutes | −1695 c/s |

Stabilization was thus reached after 45 minutes. The total drift, although greater than some of the competitive equipments previously reviewed, is not considered serious.

The change of v.f.o. frequency for ±10 per cent mains voltage was approximately ±150 c/s.

#### The Crystal Oscillators

The first oscillator crystal frequencies were measured as follows:

| Nominal Frequency | Clarifier Range (c/s) | Error Clarifier Central (c/s) |
|---|---|---|
| 9·4535 | −718<br>+1060 | +160 |
| 12·8535 | −984<br>+1412 | −782 |
| 19·8535 | −1768<br>+2396 | −688 |
| 26·8535 | −1882<br>+1685 | −1368 |
| 33·8535 | −2621<br>+3658 | −2047 |
| 34·4535 | −2614<br>+3792 | −1564 |
| 34·8535 | −3573<br>+3719 | −1372 |
| 15·8535 | −1160<br>+1679 | −370 |

These measurements are an excellent illustration of the effect of varying the shunt capacity on a crystal. Although the clarifier control could put all crystals on the right frequency, the error at the centre setting was unreasonably high on some bands.

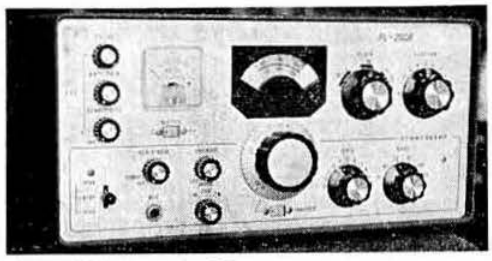
The carrier oscillator crystal frequencies were measured. The 453·5 kc/s crystal was 6 c/s low but the 456·5 kc/s crystal was unstable at a particular ambient temperature and kept jumping 200 c/s. A replacement crystal was supplied by return of post.

The calibrator crystal was 2·7 c/s high but could be reset to nominal with the trimmer provided.

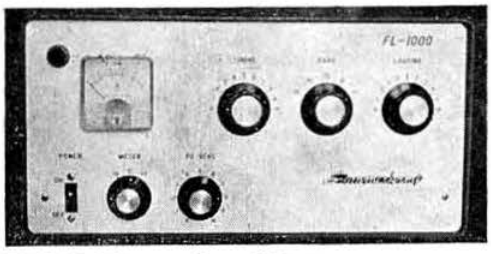
#### Birdies

The internally generated spurious signals were few and far between. On 40m, 20m, 15m and the middle 10m band there were none. On 80m two birdies, one strong, were present above 4 Mc/s and consequently out of the amateur

**FR100B Receiver**



**FL200B Transmitter**




**FL1000 Linear Amplifier**

band. A third on 3·60 Mc/s could be a minor annoyance. The top and bottom 10m sections had one very low level spurious each. These results were excellent.

### The S Meter

The handbook instruction is to set the S meter for S9 on 14,200 Mc/s with 50$\mu$V input (this is +40db in the following table), but no attempt was made to alter the S meter reading from the setting as supplied. The S meter read about S1½ with no signal, and went to this reading immediately on warm up and stopped there.

**S meter calibration in db above 1$\mu$V e.m.f.**

| S | Band 10m | 15m | 20m | 40m | 80m |
|---|---|---|---|---|---|
| 1 | | | | | |
| 2 | 3 | 2 | 0 | 6 | 2 |
| 3 | 6 | 4 | 2 | 9 | 4 |
| 4 | 8 | 7 | 5 | 11 | 6 |
| 5 | 12 | 10 | 8 | 14 | 10 |
| 6 | 16 | 14 | 12 | 18 | 14 |
| 7 | 22 | 18 | 16 | 24 | 22 |
| 8 | 29 | 24 | 24 | 30 | 30 |
| 9 | 36 | 34 | 32 | 38 | 36 |
| 9 + 20db | 68 | 62 | 62 | 66 | 70 |

Although there were calibration points at S9+40 and S9+60, the signal generator used could not provide the output necessary to reach these points.

### Signal-to-Noise Ratio and Sensitivity

A c.w. signal at 2$\mu$V e.m.f. input was supplied from 50-ohm source.

| Band | Sig/Noise Ratio | Audio O/P |
|---|---|---|
| 10 | 21db | 350 mW |
| 15 | 23db | 350 mW |
| 20 | 23db | 350 mW |
| 40 | 24db | 350 mW |
| 80 | 24db | 350 mW |

These results are excellent.

### A.G.C.

The a.g.c. performance is the best encountered in the equipments tested so far. Before serious testing commenced it was found that on tuning to a strong c.w. signal when switched to u.s.b. or l.s.b., the heterodyne did not disappear immediately outside the passband of the filter. As a result it was thought that the selectivity was lacking. However the reason was the excellent a.g.c. performance. A signal of S2 gives an audio output only 2db down on a signal of S9+20 if the r.f. gain is flat out and the audio gain control left constant.

The following table shows the results on 10m.

| Signal rel. to 1$\mu$V e.m.f. | Relative audio output |
|---|---|
| + 6db | 0 |
| + 26db | +1db |
| +46db | +1½db |
| +66db | +2db |
| +80db | +3½db |

### Selectivity

The figures claimed in the handbook and quoted above were found to be accurate. There was a tendency to self oscillation when tuning in very strong signals from a signal generator on the 2·1 kc/s a.m. position, but backing off the r.f. gain cleared any traces of instability. No trace of instability was found in on-the-air tests.

### Intermodulation and Blocking

The method of test was similar to that used in previous reviews. With full r.f. gain the results were not good. Two signals 20 kc/s apart at a level of +72db at the receiver input produced third order intermodulation signals equivalent to +32db.

At a slightly lower level of signal input, two signals of +60db produced an internal signal equivalent to 14db, i.e. S5. If, however, the r.f. gain was backed off about 10°, the intermodulation cleared to an excellent figure similar to the HA350 and NCX5 Mk II. The amount of gain lost by backing off the r.f. gain control was not significant in actual use.

Blocking tests showed that an interfering signal 20 kc/s away from and 68db higher than the wanted signal degraded a 17db signal-to-noise ratio by 3db.

### On-the-Air

The receiver handled very well. Only on 40m and 80m did the intermodulation show up to a disadvantage on full r.f. gain when some interfering signals disappeared on slightly backing off the r.f. gain. Since few operators use full r.f. gain on bands where commercial stations are extremely

strong, they will not be worried by this characteristic. It was felt that 50 kc/s per revolution was slightly coarse and care had to be taken not to jog the very light tuning control when removing one's hand. The c.w. selectivity is excellent and backed up by a crystal phasing makes single signal reception a possibility. Oddly enough one c.w. operator preferred one of the sideband positions when receiving c.w.

### HANDBOOK

The printed handbook contains all the information that is required for installation, use and servicing. The only adverse comment is the odd English and spelling which one tends to expect with products of Japanese origin. However, if the writer of this review had to write a handbook in Japanese, the result would have the Japanese rolling in the aisles!

## TRANSMITTER FL200B

### General Description

The FL200B transmitter uses the filter method of sideband generation with a 455 kc/s mechanical filter. Only one carrier crystal is used and upper sideband is generated. Choice of sidebands is made possible by mixing with either an 8545 kc/s or 9455 kc/s crystal oscillator respectively to produce the 9 Mc/s i.f. signal. The gain of the 9 Mc/s i.f. stage is controlled by a.l.c. bias from the grid of the output stage. The 9 Mc/s i.f. signal is mixed with the output of a third crystal oscillator to produce a frequency such that when mixed again with the 4·9-5·5 Mc/s v.f.o., the wanted output frequency is produced. It seems strange that although the receiver misses out 200 kc/s at the top end of 10m, the transmitter misses out 600 kc/s. The signal is amplified in a single stage to drive the pair of 6JS6A linear amplifiers operated in class AB. The final stage has a choke fed pi-section tank. The normal safety feature of a d.c. grounding choke across the aerial output is missing. The panel meter can be switched to read either final amplifier cathode current or relative power output.

As in the companion receiver, a neon controlled valve stabilizer supplies h.t. to the oscillators, and the screen grids of the a.l.c. controlled stage and final amplifiers. A neon lamp is also used to stabilize the final bias supply.

The microphone input impedance is 500 K ohms in parallel with 250 pF and is stated as suitable for a high level crystal microphone or low level dynamic microphone. For on-the-air tests a 2400-ohm dynamic microphone with a mean output of about 20 mV was used. The microphone and key jacks required are of the tip ring and sleeve type. Keying is by relay controlled block bias. The relay is in the vox circuit which can be activated by speech on vox, grounding the relay tube cathode on PTT or applying 6·3V a.c. to the vox amplifier grid on c.w. A separate aerial changeover relay is used with two sets of changeover contacts so that the receiver aerial input can be grounded when on transmit. The c.w. keying arrangement for break-in calls for a three wire arrangement. The back contacts of the key short the 6·3V a.c. vox keying voltage (which is fed through 1 Megohm) to ground and the front contacts short the blocking bias to ground via the keying relay and directly shorts to ground the a.l.c. line to the 9 Mc/s amplifier. On manual c.w. the

**HANDBOOK SPECIFICATION FIGURES FL200B**

| | |
|---|---|
| **Type of Emission** | C.W., A.M., S.S.B. (upper and lower sideband selectable) |
| **Operation** | VOX, PTT, Manual and break-in c.w. |
| **Power Input** | 240 watts p.e.p. |
| **Output Impedance** | 50 to 120 ohms |
| **Frequency Range** | 3·5–4·1, 6·9–7·5, 13·9–14·5, 20·9–21·5, 27·9–28·5, 28·5–29·1 Mc/s |
| **Frequency Stability** | 100 c/s after warm up for 10 per cent drift of line voltage |
| **Carrier Suppression** | 50db below peak output |
| **Sideband Suppression** | 50db below peak output |
| **Distortion Product** | Better than 25db |
| **Audio Response** | 6db at 400 to 2700 c/s |
| **Power Requirement** | 100/110/200/220/234V a.c., 50/60 c/s 350 watts |
| **Cabinet Size** | 7⅛ in. high, 15 in. wide, 11¼ in. deep |
| **Net Weight** | 38 lb (18 kg) |

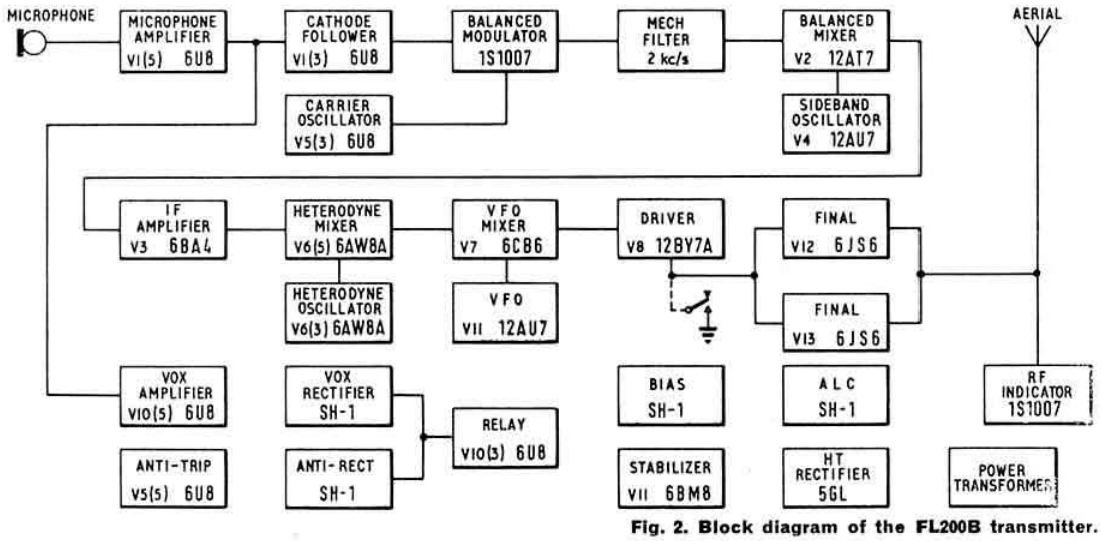



**Fig. 2. Block diagram of the FL200B transmitter.**

STANDBY/OPERATE switch is used. It is not possible to use a semi-automatic key on break-in unless an external keying relay is used.

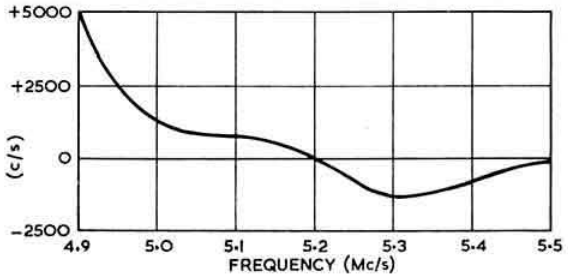
A large screw terminal is situated at the rear of the chassis to enable the equipment to be solidly grounded. The aerial socket is a u.h.f. series SO239 and phono sockets are used for receiver aerial outlet and external v.f.o. input. The octal accessory socket on the rear provides the necessary keying to the FL1000 linear, connections to the receiver audio output for vox antitrip, and to the FR100B receiver muting bias. In addition, −100V d.c. is available from a high impedance source for muting other receivers and from a low impedance source for providing bias to other linear amplifiers. All active sockets of the octal connectors are decoupled. The cabinet size and finish is identical to the FR100B receiver.

The main h.t. smoothing circuit consists of two 350V electrolytics in series. In common with other equipment previously reviewed, the voltage across one of the electrolytics in the standby conditions was slightly above the working voltage. With 240V a.c. input the voltages were 345 and 355.

## THE TESTS

### The V.F.O.

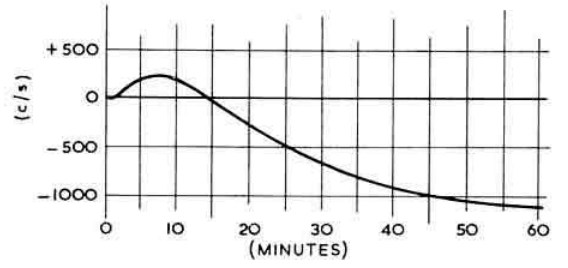
The v.f.o. is, naturally, identical to that used in the companion receiver. The frequency was measured every 100 kc/s in the same way as the receiver and noted as follows:




| Nominal Frequency (Mc/s) | Linearity ref. Mid-scale (c/s) | Error (c/s) |
|---|---|---|
| 4·900 | +5205 | +11286 |
| 5·000 | +1215 | +7306 |
| 5·100 | +855 | +6946 |
| 5·200 | 0 | +6091 |
| 5·300 | −1347 | +4644 |
| 5·400 | +798 | +6889 |
| 5·500 | −112 | +5979 |

Resettability was less than 50 c/s and backlash measured as about 200 c/s (similar to the receiver v.f.o.). The calibration was disappointing but could, of course, be corrected by reference to the receiver 100 kc/s calibration oscillator.

The v.f.o. drift was measured from switch on as follows:




| Elapsed time from cold start | Drift |
|---|---|
| 1 minute | −3 c/s |
| 2 minutes | +24 c/s |
| 5 minutes | +218 c/s |
| 10 minutes | +227 c/s |
| 15 minutes | −3 c/s |
| 30 minutes | −668 c/s |
| 45 minutes | −1028 c/s |
| 60 minutes | −1100 c/s |

The v.f.o. is identical to that in the FR100B receiver and it is interesting to compare the results. The change in the direction of drift is probably due to initial temperature difference between the frequency determing and compensation components.

The change of v.f.o. frequency for ±10 per cent mains voltage was within ±50 c/s.

### The Crystal Oscillator

The results of crystal frequency measurements were as follows:

| | Nominal Frequency | Error (c/s) |
|---|---|---|
| Band Crystals | 3·4 Mc/s | +351 |
| | 10·4 Mc/s | +1408 |
| | 17·4 Mc/s | +261 |
| | 24·4 Mc/s | −52 |
| | 25·0 Mc/s | +410 |
| Second Oscillator | 8·5465 Mc/s | −546 |
| | 9·4535 Mc/s | −430 |
| Carrier Oscillator | 0·4535 Mc/s | −58 |

It should be noted that the frequency error between transmitter and receiver on transceive is the arithmetical sum of the errors of the crystals in use.

The second oscillator crystals had mica compression trimmers on the circuit and the crystals could be set to frequency. At the correct capacitance setting the trimmer screw was, however, almost out of engagement.

### Power Output

The transmitter was set up as in the handbook and tones of 1 and 1·8 kc/s were applied at the microphone input at such a level as to obtain 25db intermodulation products with the following results:

| Band | P.E.P. Output |
|---|---|
| 80m | 120 watts |
| 40m | 105 watts |
| 20m | 110 watts |
| 15m | 110 watts |
| 10m | 105 watts |

### Carrier and Unwanted Sideband Suppression

Carrier suppression was measured at 50db and was independent of audio level. Unwanted sideband suppression varied between 50 and 60db depending on audio input level.

### VOX

Controls for vox gain, delay and antitrip are on the front panel. The vox operation is clean and free from chatter and the antitrip is effective, but apparently not all FL200B transmitters are free from trouble. J. B. Lowe, in a news sheet he supplies to his Sommerkamp customers, states that the vox relay valve h.t. bleed resistor to the cathode can be

out to tolerance and recommends a high stability resistor of the correct value. The effect of an out-of-tolerance resistor is relay chatter on PTT and the relay fails to come off on VOX. The maximum vox delay can be a little on the bare side for some operators—it is about 1-2 seconds. Again, in his news sheet, J. B. Lowe suggests increasing the fixed resistor in the grid of the vox relay valve to 4·7 Megohms.

**Audio Response**

The audio response was measured by applying a variable audio oscillator to the microphone input and noting the points at which the power output fell to a half (3db) of the mid-band output. The frequencies were 380 c/s and 2300 c/s. The ripple was within ± 1·5db.

**On the Air**

The transmitter worked well and was easy to use. Stations worked reported good quality speech. A large number of QSOs were obtained on 21 Mc/s using a 40m dipole, with DX including JAs (appropriately enough), YA1, ZL and VK. Using the FL1000, all continents were worked on 21 Mc/s during a four hour session. At the end of the tests a fault condition was manifested whereby self oscillation of the p.a. occurred when the loading control was rotated beyond a certain point. This only occurred on some aerials (although they were well matched), but other not so well matched aerials or a dummy load did not produce the effect. Occasionally the effect occurred when driving the FL1000. Neutralizing was checked and the accuracy improved, but with no effect. No sign of instability had previously been found, and the fault disappeared after a short time.

**TVI**

The transmitter was checked for TVI under similar circumstances to previous reviews. Channel 1 suffered slight interference from a 21 Mc/s signal and moderate interference from a 14 Mc/s signal. Channels 5, 6 and 11 were clear on all bands. It should be remembered that at the test site the Channel 1 signal is weak and barely acceptable.

**THE HANDBOOK**

The transmitter handbook is very similar to the receiver handbook. The circuit, however, is more difficult to follow since it shows valves without envelopes (and thus tend to become hidden) and long parallel lines. Also missing is the very useful resistance measurement table which is present in the receiver handbook.

## THE FL1000 LINEAR AMPLIFIER

**General Description**

Four 6JS6A valves in parallel are operated in grounded grid class AB2. The screen and suppressor grids are also grounded. The cathode circuit is untuned, but a low pass filter with a cut-off at about 35 Mc/s is fitted in series with the drive input. A pi-network is used in the output, but as in the FL200B, no protection with a d.c. short (via a choke) is provided across the output capacitor. Grid current, cathode current or relative power output can be selected by the meter switch to the single meter. The relative power output position has a sensitivity control on the front panel and although not used when using the FL200B, a.l.c. output is provided. The a.l.c. diode bias is adjustable from 0 to 8·5 volts.

The power supply has two mains transformers, one for the h.t. and the other for the heaters and bias. The main h.t. smoothing circuit consists of two 500V electrolytic capacitors in series with 250K ohm bleed resistors across each capacitor. With 240V a.c. input, both capacitors had 505V d.c. across them in the standby condition. The heaters of the 6JS6As are in a series parallel arrangement and so are fed with 13 volts to allow for a 1 volt drop in the bifilar heater choke.

The size and finish match the companion equipment.

**Power Gain**

The FL1000 handbook clearly states that the power input requirement is 30 to 100 watts p.e.p. *output* from the driver. The output from the FL200B was passed through a reflectometer and the output of the FL1000 terminated in a calibrated 50-ohm wattmeter. The following measurements were taken:

| Band | Power Gain | Input V.S.W.R. | C.W. Power Output |
|---|---|---|---|
| 80m | 8·5 | 2·2 : 1 | 350 |
| 40m | 6·3 | 5 : 1 | 500 |
| 20m | 20·1 | 3 : 1 | 510 |
| 15m | 28·1 | 3 : 1 | 600 |
| 10m | 16·1 | 2 : 1 | 380 |

**Intermodulation Products**

No claims are made for intermodulation products and unfortunately the spectrum analyser used for testing failed. However, preliminary testing showed no appreciable degradation of the input signal. On-the-air tests confirmed this observation.

**HANDBOOK SPECIFICATION—FL1000**

| | |
|---|---|
| **Frequency Range** | 80, 40, 20, 15 and 10m amateur bands |
| **Power Input** | 960 watts p.e.p. maximum, 350 watts a.m. carrier |
| **Anode Voltage** | 850 volts d.c. |
| **Power Requirement** | 100/110/200/220 volts a.c. 50/60 c/s |
| **Driving Power** | 30 to 100 watts p.e.p. |
| **Impedance** | Input approximately 50 ohms, output 50–100 ohms |
| **Valve and Diode Complement** | four 6JS6A, four 5GS, eight 8SL, two 1S1007 |
| **Cooling** | Forced air |
| **Size** | 7⅛ in. high, 15 in. wide, 11¾ in. deep |
| **Weight** | 42 lb (20 kg) |

**TVI**

On 80, 40 and 15m, channel 5 suffered slight patterning. On 20 and 15m channel 1 was obliterated. On 10m channel 1 suffered bad patterning which cleared completely with a high pass filter in the feeder to the television set.

**On the Air**

The FL1000 gave no trouble and the internal fan kept it quite cool. Tune-up was straight forward, but since reduced power operation is not allowed for, it was essential to tune up quickly. Since, in tuning up, the drive was controlled by carrier insertion on the FL200B it is best to bring the linear quickly to tune with low carrier insertion and then gradually bring the power up.

**HANDBOOK**

The handbook presentation was not the same as the companion transmitter and receiver. Although the circuit and layout diagrams were printed, the text was on duplicated sheets. No resistance or voltage analysis tables were given.

**GUARANTEE**

No mention is made of any guarantee in the handbooks, and so this point was queried with J. B. Lowe. Apparently

there is no official Sommerkamp guarantee. However, buyers from Lowe Electronics get a one year labour and material guarantee excluding valves and semiconductors. As no enquiries were made with other Sommerkamp suppliers, potential buyers would be well advised to obtain the agent's guarantee in writing before parting with their cash.

## GENERAL COMMENTS

As supplied from Sommerkamp, the three core mains input cable has the continental colour convention of black for ground. This is potentially dangerous and is the first point to check before installation. J. B. Lowe replaces the mains cable for a type with the British colour code.

Apart from one of the receiver channel crystals which was faulty at the commencement of testing, no failures occurred during extensive use on the air. One point that requires careful watching is the potential transmit receiver frequency error on transceive. With careless setting of the receiver clarifier control it is possible to transmit about 3 kc/s off the receive frequency. The transmit frequency can be checked by using the " spot " switch on the transmitter and tuning out any error with the receiver clarifier control. There is, of course, no problem when the transmitter v.f.o. is used.

## CONCLUSIONS

One would normally expect limited facilities and a " cheap and cheerful " approach in economic equipment that has travelled thousands of miles and is loaded with agent's and dealers' mark-ups and import duty. It is true that the cost of Japanese labour has the reputation of being low, but the equipment has obviously been well designed and constructed and can compete with much more costly equipment in terms of facilities and many performance parameters. There are, of course, several features which leave something to be desired but they were fewer than the reviewers expected.

## EPILOGUE

Before publication, a copy of all reviews is sent to the agent or manufacturer so that he can comment, the intention being to publish these comments at the same time as the review. Only one manufacturer has ever commented and in that case it was after publication date, and referred to the philosophy of this series of reviews.

However, comment on the Sommerkamp review has been received from J. B. Lowe and is as follows:

" I, as the main Sommerkamp agent, have been given the opportunity of adding my two bits worth, and very grateful I am. I should make it quite clear that there can be no argument with the report, which is exactly what a report should be—no opinions, no maybe's, no padding, just factual data. All I want to do is to mention one or two things from the dealer's point of view.

" First of all, with regard to receiver dial accuracy, an error of some 6 kc/s is noted. Fair enough—no argument. I would just mention that the main dial can be moved to compensate for this, and doing so would have brought the total error to less than plus or minus 1 kc/s and the error in the 5·000 to 5·300 part of the v.f.o. (where it really counts!) to less than 100 cycles. Not bad.

" Another point which leaves something to be desired is the question of the accuracy of the heterodyne crystals. Well, you know, this is fundamentally a question of price—whether to go for accuracy at inevitably much higher cost, or plump for something cheaper which in conjunction with trimmers can be made pretty close.

" This question of price is, I think, the thing to bear in mind—if you can afford Collins, all well and good (please buy it from me!) but if you can't, you have to shop around to find something in your price bracket which doesn't have too many shortcomings. All I can say is, stack the Sommerkamp range against comparably priced equipment and see what sort of an answer you come up with."

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## The TVI Problem on Four Metres (Continued from page 294)

been under test for several weeks. First results are encouraging. Sutton Coldfield on channel 4 is some 70 miles away from G3FDW and gives a noisy though detectable picture on an indoor dipole, and yet on this picture no TVI is apparent using this small transmitter, and also with the TV set fitted with a quarter wave stub the 50 watt class B p.a. was also clear. The local BBC on channel 2 and ITV on channel 10 is also clear of TVI with the 50 watt p.a.

The one big snag about the whole affair is that during TV hours there is no one to talk to! Anyone care to join me?

### Conclusion

It is possible to operate a completely TVI-free 50 watt transmitter even in a fringe channel 4 area without any recourse to TVI precautions at the TV set end if the rules mentioned are followed. It is regretted that as there is no channel 5 signal detectable in this area, work on clearing channel 5 could not proceed. Trials with the home TV set fitted with a quarter wave stub looked hopeful using the small 15–20 watt transmitter and simulating the TV sound with a modulated g.d.o., but the experiment is not thought to be conclusive.

Details of the complete 15–20 watt f.m./f.s.k. transmitter and the class B 50 watt p.a., with the all-important setting up procedure for n.b.f.m., will take the form of a further article.

### Acknowledgements

To the person who thought of f.m., f.s.k. and linear amplifiers first, which certainly wasn't me.

To the many locals who have had to put up with some rotten f.m. signals during past weeks, and in all seriousness to G3BA for his help and encouragement.

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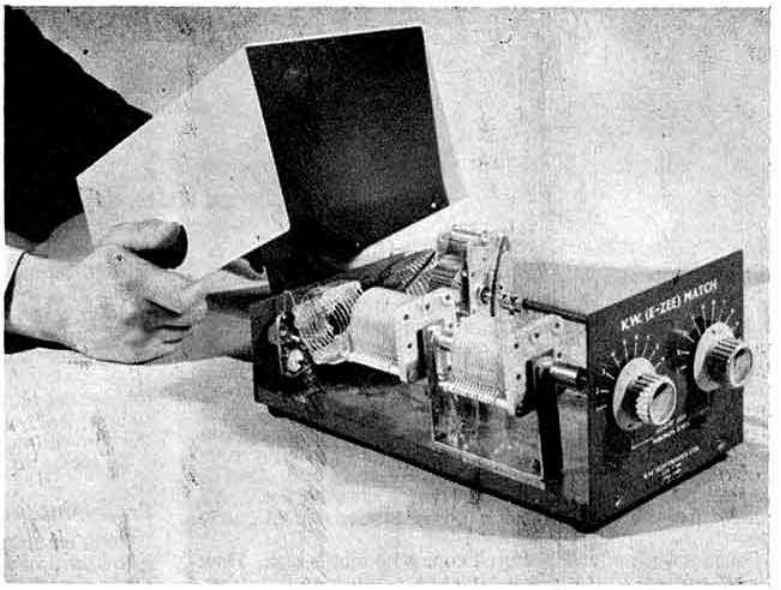
## A Simple Receiver Squelch Circuit (Continued from page 295)

is about 7 volts (cut-off bias for a 12AT7) below the cathode voltage, when V1 starts to conduct. This has two effects (*a*) its anode voltage, and hence the grid voltage of V2, falls due to the anode current in $R_L$ and (*b*) the extra current in $R_k$ raises the common cathode voltage. Both these effects increase the negative bias between the grid and cathode of V2 so that a very small rise in input voltage can completely cut-off V2, de-energizing the relay in its anode circuit. (This snap action considerably reduces the problem of relay chatter and could improve some vox circuits). Decreasing the input voltage reverses the action.

The correct value for $R_L$ is the key to correct operation. Too low a value will reduce the sensitivity whilst too high a value will result in " backlash," i.e., the input voltage will have to be reduced below the snap-over voltage to make the circuit snap back.

# Insurance for Your Final

By R. F. STEVENS, G2BVN*




**The KW E-Zee Match, the dimensions of which are 6 in. wide, 5 in. high and 12 in. deep.**

THE present trend in the design of power amplifier stage of transmitters operating on the h.f. bands, both home built and commercial products, is that the output circuit shall be of the " pi " configuration. In most cases this is designed to work into an impedance of 52 or 75 ohms in order to match the types of coaxial cable commonly used as feeders in amateur stations. Further, the designer or manufacturer usually states that the v.s.w.r. on the feeder should be kept as low as possible and certainly not greater than 3 : 1, otherwise performance of the amplifier will be degraded. Unfortunately, however, an aerial is rarely resonant at exactly 52 or 75 ohms, and then often at one frequency only. Therefore the impedance at the feed point will usually be a figure other than that for which the output circuit was designed.

Apart from the unproductive exercise involved in generating r.f. power only for it to be dissipated before it reaches the radiating portion of the aerial installation, a high v.s.w.r. brings other disadvantages. The voltage across the loading capacitor in the pi output circuit may reach a value large enough to cause arcing and there will certainly be an excessive circulating current in the tank coil. Where a final amplifier employs television deflection valves this current will bring additional and unwanted heat into a circuit whose heat dissipating properties are already being pushed towards the limit.

What then can be done to ease this situation? The answer is neither difficult nor expensive and can be supplied by the addition of an aerial matching unit. This device has been in use since the beginnings of Amateur Radio and is known by many names including aerial coupler, aerial tuning unit, and more recently, transmatch. The earlier units used band-switched circuits and one probable reason for their fall from favour was the time required in adjusting a further tuned circuit when changing bands. However the " Z Match " aerial coupler [1] provided switchless operation over the frequency range 3·5 to 30 Mc/s by the use of a multiband tank circuit, the basic details of which are shown in Fig. 1. Around this original design a number of commercial units have been fashioned, some of them including in the same cabinet a reflectometer to facilitate setting up.

Unfortunately the aerial matching unit has been credited with properties, none of which it possesses. Firstly, it *cannot* under any circumstances improve the v.s.w.r. of an aerial installation. If a mismatch exists between the aerial and the feeder then correction can only be applied at one place and it is necessary to adjust the aerial to bring the feed point impedance to a figure corresponding to the impedance of the feeder. Also, the addition of a matching unit will not affect the radiation pattern of an aerial in any way and most certainly it will not narrow the main lobe of a beam.

What useful function will the matching unit perform? Functioning as an r.f. transformer it will present to the output circuit of the transmitter a load for which this was designed and into which it will work with maximum efficiency, thus protecting the components in the final amplifier. The matching unit can be adjusted so that the feeder between it and the output of the transmitter will have almost a 1 : 1 v.s.w.r. and into which low pass filters may be inserted in the knowledge that their performance is not being degraded and components possibly damaged by the effects of a high v.s.w.r. Further, there will be available the attenuation afforded by the additional tuned circuit of the matching unit and harmonics may be reduced by up to 12dB. This property is particularly valuable where interference to television receivers poses a problem. With the Z-match type of unit using a multiband circuit the additional time necessary when changing bands is reduced to a minimum.

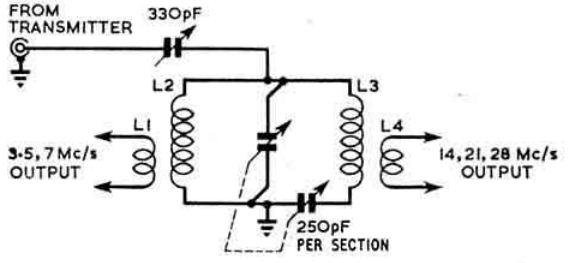
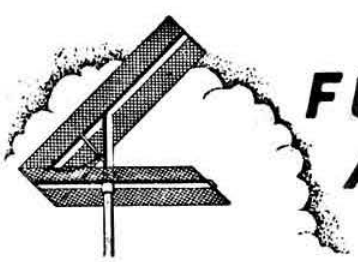



**Fig. 1. The basic circuit of the aerial matching unit using a multiband tank without switching. Coil values are L1, 2·4 μH; L2 3·5 μH; L3 1·7μ H; L4 1·8 μH.**

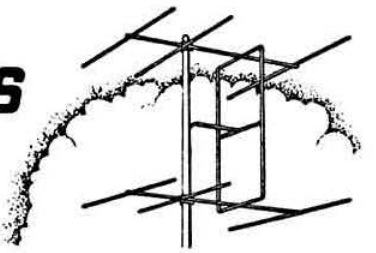
A bonus obtained from the use of a matching unit is that where the same aerial is used for transmitting and receiving, the strength of the received signals in many cases will be increased. This is due to the existence of an impedance match between the receiver input circuit and the feeder. To

*(Continued on page 315)*

* 51 Pettits Lane, Romford, Essex.



# FOUR METRES AND DOWN



By JACK HUM, GSUM*

## Gregarious

OF the three-in-sequence v.h.f. conventions of this spring the first will be four days behind us by the time this piece appears, and from all accounts—judging by the programme laid on and the numbers who intended to go—should have well sustained last year's fine event at Wolverhampton. Full report next time: but meanwhile only three days *ahead* there's the Scottish one in Edinburgh, so if you haven't already been in touch with GM3UM about your booking no time should be lost in contacting him. Details were in the panel on this page last month: and there will be a report from V.H.F. Manager Geoff Stone, G3FZL, *next* month.

Then a week after Edinburgh comes London's turn. How to get to The Winning Post Hotel at Whitton on Saturday, 13 May, is shown in the sketch map on this page. Although it is a fine spacious venue the seating capacity for the evening banquet will be quickly taken up, especially as this is going to be a very attractive night out for the ladies as well as the OMs. Tell Organizing Sec. Frank Green, G3GMY, what you would like to have in the way of tickets, *i.e.*, afternoon only at 4s. 6d., afternoon and evening at 30s., or, for your YF/YL, evening dinner only at 25s. 6d. Remittances to Frank at 48 Borough Way, Potters Bar, Herts., may still have a chance of acceptance even though the closing date for bookings was 29 April. If you *have* delayed thus far it might not be a bad idea to phone G3GMY (Potters Bar 57333) to ascertain if there are still any vacancies.

One of the trade exhibitors at the convention, JXK Converters, will be providing equipment for accurately measuring the noise figure of any converter brought along on the day. If you bring yours make sure it will work by simply plugging it into the mains. Then after it has been "JXK-ed" put it (if you still love it!) into the display of home-built v.h.f. equipment—and of course bring items other than converters to help make the amateur constructor's display really representative of current constructional techniques.

To the already strong list of lecturers for the afternoon tech-session may now be added the name of Mr A. H. Spittle, G8AMA, who will talk on overlay transistors after the tea break.

At the evening banquet chaired by President Patterson, GI3KYP, several VIPs will be with us, as in past years, including Dr Smith-Rose, and Dr J. A. Saxton, another good professional friend of the Society, as guest of honour (he is head of the Radio and Space Research Station).

Then after the dinner the raffle draw—and when you see the display of prizes you won't need further encouragement to buy plenty of tickets. The more you buy the better chance the convention will have of being self supporting.

Be seeing you there!

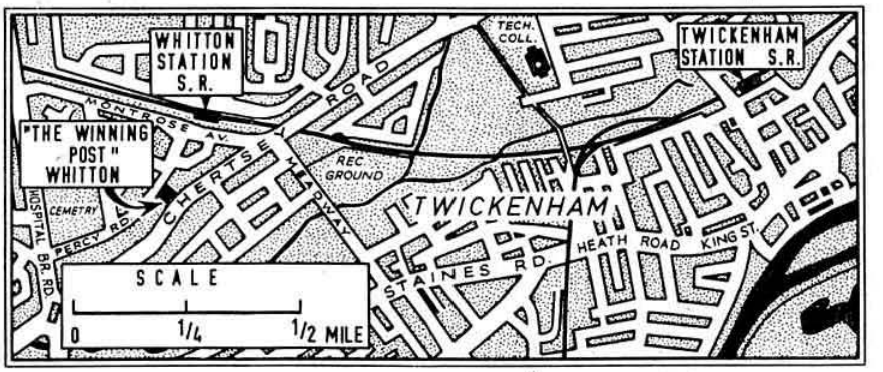
## From National to Local

Soon Saturday 13 May will have come and gone, and with it the third of this year's V.H.F. Conventions. What do we all do after that to keep alive the marvellous spirit of one-ness which is always so strongly to be felt at the annual national get-togethers?

"Go to our local clubs and talk about v.h.f. there." So you can, but only up to a point; for many who go to club meetings find no appeal in v.h.f. and rightly expect a range of other subjects to be aired there.

It is this situation which has prompted the proliferation of local u.h.f./v.h.f. groups in a number of areas to enable metre-wave men to meet their own kind, not in any way in competition to local clubs but complementary to them. There is indeed no reason why in the larger clubs a separate v.h.f. section should not be formed: there is every reason why one *should*, in the interests of inducting new folk into the very highs.

Because well run u.h.f./v.h.f. groups can help towards improving the way we do things in our metre-wave spectrum




**Map showing the location of The Winning Post Hotel at Whitton near Twickenham, home of the Thirteenth V.H.F./U.H.F. Convention on 13 May. Access by road is very easy—though watch out for one way systems—and there is ample car-parking space when you get there. By train: book to Whitton Station on the Southern Electric. Fast trains leave Waterloo at 12 and 42 minutes past the hour. The last train back to Waterloo leaves Whitton at 11.6 p.m. As for buses, the No. 73 (none other!) stops at the Odeon nearby.**

* 27 Ingarsby Lane, Houghton-on-the-Hill, Leicester. Send reports for the June issue by 15 May, and for the July issue by 12 June.

# THIRTEENTH INTERNATIONAL V.H.F.-U.H.F. CONVENTION

## WINNING POST WHITTON TWICKENHAM MIDDLESEX

SOUTHERN ELECTRIC TO WHITTON STATION.

**Organized by the RSGB V.H.F. Committee**

**GUEST OF HONOUR**

Dr J. A. Saxton, Director of the Radio and Space Research Station, Slough.

## SATURDAY, 13 MAY, 1967

**MORNING**

An exhibition of commercial and home-constructed equipment will open at 11 a.m.

**AFTERNOON LECTURES**

Arnold Mynett, G3HBW, will talk on field-effect transistors, followed by Mr J. E. Saw, of Mullard Ltd., on varactor multipliers. The AEI film "The Radio Sky" will be screened. After the tea break there is to be a lecture on overlay transistors by G8AMA and Heath Rees, G3HWR, will talk about "the next band up"—2400 Mc/s.

**EVENING**

The dinner, and presentation of prizes.

**TICKETS**

**Convention 4s. 6d., Convention and Dinner 30s., Dinner 25s. 6d. Apply to Mr F. E. A. Green, G3GMY, 48 Borough Way, Potters Bar, Herts. (see text opposite).**

they deserve every encouragement (and will certainly get it on this page). Perhaps one day there will be so many of them that they will be able to keep in touch with one another over the air by fixed time schedules that will put the Solent in touch with Tyneside, or the Solway with the Spey in a matter of minutes by u.h.f. relay from group to group (Why not? It's only a matter of organization).

For the present, though, while such groups remain comparatively few in number everything possible must be done to encourage their activities. If each one of them at present in existence will give "Four Metres and Down" the date and place of the next meeting it will be publicized here.

Right now, all South Wales v.h.f. people should have reserved the date of Tuesday 23 May for the gathering at the QTH of GW4CG, which is 20 Austin Avenue, Porthcawl. One would venture to say that the size of such gatherings gives a pointer to whether a v.h.f. group in a region is likely to be viable or not. So if "Charlie George" has a houseful on the 23rd the position of the pointer will be unmistakable. Drop him a line if you intend to go so that he can organize some extra tea cups.

At the other end of the country the new South East U.H.F./V.H.F. Group has got off to a good start with meetings at Wye College, Ashford (G3FZL on "New V.H.F. Techniques") and at the University of Kent, Canterbury (G6SSE/T on "Amateur Television"). The average attendance for the two meets was 55—and that to our way of thinking is pretty terrific.

The next meeting is on Convention Eve, Friday, 12 May, again at Wye College. The speaker, G3BA, will talk about "S.S.B. and allied techniques on V.H.F." Anyone may go: no formalities, no subscription.

All information about the Group may be had from G3DAH (QTHR).

And the next please!

### *The DX Front*

At just about the time these pages were being closed up, a series of tests was due to start on the 70cm band, with the promise of making another bit of Amateur Radio communication history. They were between Peter Blair, G3LTF, Chelmsford, and the famed Crawford Hill V.H.F. Group in the States—the well known "K2MWA/2 Gang." Their purpose: to repeat the 1965 feat of linking the two continents on 432 Mc/s by the Earth-Moon-Earth route.

As before, the American end will have the advantage of a 60 ft. parabola at Holmdel, N.J., excited by something like 400 watts of r.f., in conjunction with a receiver offering a noise factor of 2db. At the British end GM3FYB and G3CCH, noted exponents of the art of DX on 70cm using advanced techniques, were in on the tests along with G3LTF.

If results come too late to squeeze a stop-press into "Four Metres and Down," listen for them on GB2RS.

On 4m the long expected G-to-ZB2 opening may happen at any moment now. Says Don Hayter, G3JHM: "Members should keep a look out for ZB2VHF on 4m now that the sporadic-*E* season is upon us. The band should open about 15 May and remain that way on and off until about 15 August, with a peak in June and July. There should be something like 20 openings during these months, expected times being 11.00 to 13.00 GMT and 18.00 to 21.00 GMT."

And at the Gibraltar end Ossie (in full, Junior Technician Osborne, of the Royal Air Force) is ready and waiting, not only on "Four" but on 28·05 Mc/s as well, to take any information from UK operators to the effect that "Four" looks like opening up. On h.f. his call is ZB2AP, *NOT* of course ZB2VHF.

Still on the theme of DX, news is passed on via G3USF that 9L1HX has received special permission to operate on 2m with 80 watts input in place of the usual limit of 15 watts imposed for that band in Sierra Leone. The gear now under



C


**In twelve months, G3FDW of Retford, Notts., has worked 50 counties, seven countries and 190 different stations on "Four." In one 24-hour contest period he worked 36 counties and five countries, and here are the QSLs.**

construction will have a QQV06-40A in the final feeding two crossed Yagis.

It is said that the Post and Telegraphs Department in Freetown which gave the special permission—which is for a limited but renewable period—is taking a keen interest in developments.

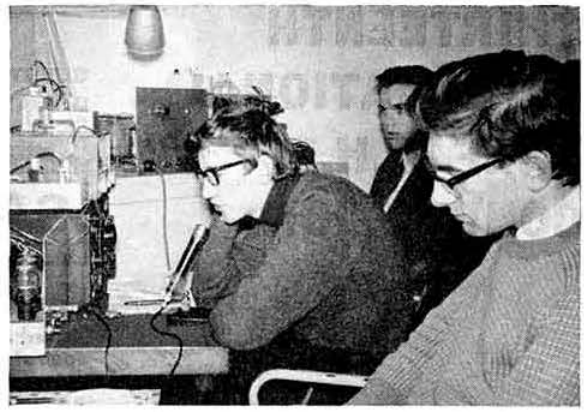
## *"Cumulative" Retrospect*

The last of the winter series of cumulative contests on several weekends since January was notched up on 8 April. Let Bill Scarr, G2WS, make the appropriate comment that will be echoed by almost all who "had a go." He writes:

"The Cumulative Activity Contests are in my view a splendid innovation, and enable one to experience a wide range of conditions under contest rules. My one regret is the scramble to change from the 144 Mc/s band to the 432 Mc/s band with no time interval between. Next time, perhaps, for the benefit of those who like to enter the contests on both bands, an interval of half an hour might be introduced to permit a modicum of rest and refreshment!"

Similar expressions of pleasure come from G8ARH who from his fine 400 ft. site in Surrey does well on 70cm. Why not says Nigel, arrange some *six* hour events in the future, running from say 18·00 to 23·59 hours on a Saturday night?

And from Martin Harrison, G3USF, writing from Keele University in Staffordshire: "When first these contests were announced general reaction was unanimously favourable up here even among non-contest people; but by the third session we were down to a fairly small band of interested operators. I'd guess the problem is partly the old one of c.w., but also publicity counts, since the initial announcement



**The operating team at G3OUL during the 144 Mc/s Open Contest. Left to right: G8AHQ, G3PSH and G3VXK. Behind the camera: G3VZJ.**

was obscurely placed, and a good many people just forgot when the later sessions were due, despite reminders in the news bulletins. May I suggest a tiny 'box' in 'Four Metres and Down' for the next contest?" (Wilco—and it's 9 September.—J.H.).

## *Contest Operating "Stroke P"*

Should portable stations operate during "fixed station" contests, or at any rate should they score at the same rate? This was the burden of the comment by Tom Douglas, G3BA, a couple of months back. Point was lent to his remarks by the results published last month of the First 144 Mc/s C.W. Contest showing the first three places to have been obtained by portable entrants—though some of the gruelling they had to put up with, weather-wise, is reported elsewhere.

Another leading DX man, G6RH, now offers some further views to add to those appearing in Contest News last month. Being constructive, Bob opines as many others do that the 144 Mc/s C.W. Contest should be a fixed station event, "for there are plenty of other contests during the season for the Stroke P stations." He goes on to suggest that perhaps some modified scoring system such as five points for the first contact with every county should be adopted, with four points for the second, reducing to one point for the fifth and succeeding contact. This would, he feels, give better opportunities to competitors to try to work as many counties as possible. A bonus of 25 or even 50 points could be given for the first contact with each new *country*, to be counted once; subsequent contacts would earn no bonus.

G6RH adds: "I for one do not want to be involved in making point to point measurements for the calculation of points, as this is a complicated and time consuming task."

With contests still in mind on to———

## *Mudexpeditionaries*

When during a v.h.f. contest you hear the well-sited "Stroke P" stations clocking up the points with a speed that home based operators find it hard to equal, have a thought for the effort they have to expend before ever they give their first "Zero Zero One." These pictures tell the story—or at any rate, *one* story, that of GW3NOH/P. They were taken while the team were on their way westwards from the Home Counties and approaching their intended portable site near Abergavenny in Monmouthshire, to operate in the 144 Mc/s C.W. Contest.

As might be expected during the British winter, everything

was not plain motoring, and after about two hours of hard work attempting to reach the summit of the selected mountain, they found themselves well and truly bogged down 800 ft. short of their goal.

" At this point in the proceedings," writes G3NOH, " the GW3NUE/P team arrived in a Landrover and gave us a pull out—an excellent example of co-operation between two rivals planning to use the same site."

Picture Number One shows the 'NUE Landrover about to be hitched to the 'NOH Dormobile, and———

Picture Number Two shows the big heave in operation, to the evident excitement of the CQ Hound.

* * *

Another expedition which suffered its meed of troubles from this-and-that, cussmaking at the time but no doubt enjoyed by the sufferers when they looked back on them, was that mounted by the Dorking Club at Easter. " Everything that could possibly have gone wrong did," reports G8ARH. Before the Club's van was very far along the route to Rutland it blew a tyre. When it reached the site the weather blew a gale (" Erecting tents and aerials was made interesting, to say the least"). Switching on the 4m receiver showed the local TV station blowing video all over the band. Then the generator blew its top, never to start again. And on the journey home the van decided to blow a head gasket . . . short hops and out popped the ops to top up the radiator.

Although 4m and " One sixty " produced nothing, 70cm did (good old " Seventy "!) and lots of lucky u.h.f. homebirds were given Rutland for the first time. Best path distance was to G8AHF in the Isle of Wight (218 km).

## *Other Expeditionaries*

Those operators who were unable to link with the G8AHE/P expedition in Westmorland last month will have another chance to raise this rare county on 70cm later this month—during the 432 Mc/s Open Contest, in fact, when there should be plenty of activity in evidence on the band. Then will NottingHams G3PXP and G3BNL be journeying north to put the latter " Stroke P " on 70cm at the summit of Knock Fell, almost 3000 ft. up. Dave himself, G3PXP/P, will be operating on 2m from the same site.

Operations will commence at the start of the 70cm contest on Saturday evening, 27 May and will continue on both bands until the Tuesday morning of 30 May. Very conveniently, this carries right through Monday Night Activity Night on " Two."

For schedules on either band an s.a.e. to Dave Watson, G3PXP, at The Blue Boar, The Rushes, Loughborough, Leicestershire.

* * *

Another rarish county, Brecon, will be available later in the year again on 70cm but with " Two " and " Four " as well. The sponsors: the City University Radio Society, G3UCU. The dates: 30 August to 6 September. The man to contact for advance skeds: Colin Westwood, G3VFD, 25 Knoll Road, Bexley, Kent.

* * *

Last month's BULLETIN was barely a week old when G3JKO/P (Mike Dransfield on leave from Nigeria) appeared on " Two " and promptly gave Huntingdonshire to several aspirants to the RSGB " Four Metres and Down " award for 2m. His movements will be approximately as follows (they are governed in some measure by the need to make a number of professional calls while on his journeyings round the UK): Flintshire (and possibly adjoining counties), 7 to 12 May; Cumberland 13 to 18 May, Derby week commencing 20 May, with likely forays into some of the rare counties of Central Wales.

* * *

Of the various other expeditions pending news will be given wherever possible on GB2RS—so long as it is forthcoming from the intending expeditionaries. So for the stop press, attend to the RSGB News Bulletins on Sundays.

## *EuOscar Moves West*

One of the most elaborate expeditions of all is that into inner space by satellites carrying Amateur Radio. As is generally known, a European Oscar has been designed and

**V.H.F./U.H.F. BEACON STATIONS**

| Call-sign | Location | Nominal Frequency | Emission | Aerial Direction |
|---|---|---|---|---|
| GB3ANG* | Craigowl Hill, Dundee | 145·985 Mc/s | AI | |
| GB3CTC | Redruth, Cornwall | 144·10 Mc/s | AI | North-East |
| GB3GI | Strabane, N.I. | 145·990 Mc/s | AI | N/SE |
| GB3GW | Swansea | 144·250 Mc/s | AI | E.N.E. |
| GB3LER | Lerwick | 145·995 Mc/s | AI | S |
| GB3LER | Lerwick | 70·305 Mc/s | AI | N/S |
| GB3LER | Lerwick | 29·005 Mc/s | AI | N/S |
| GB3VHF | Wrotham, Kent | 144·50 Mc/s | FI | North-West |

*Not operational

**RSGB V.H.F. BEACON STATION GB3VHF**

The frequency of the Society's v.h.f. beacon transmitter at Wrotham, Kent, when measured by the BBC Frequency Checking Station, was as follows (nominal frequency 144·50 Mc/s):

| Date | Time | Error |
|---|---|---|
| 9 March ... ... ... ... | 11.30 GMT | 210 c/s high |
| 14 March ... ... ... ... | 11.40 GMT | 196 c/s high |
| 29 March ... ... ... ... | 9.53 GMT | 120 c/s low |
| 4 April ... ... ... ... | 16.10 GMT | 320 c/s low |

constructed by DJ4ZC, and such is the interest in it that many members have been writing to Bill Browning, G2AOX, asking " What's up? " or more precisely: " Is it? " There is no need to do this: everybody who has lodged envelopes with " Able OSCAR Xray " will get up to date news from him just as soon as it is to hand.

The present status of EuOscar is that it has arrived at Project Oscar headquarters in California, and there are hopes it will be launched in June or July as and when a vehicle has accommodation for it.

## Xtalxchange

By G3VTF, 15 Anderson Road, Wilpshire, near Blackburn, Lancs.: has crystals for 7825 kc/s (70·425 Mc/s), 7833 kc/s (70·5 Mc/s), 7840 kc/s (70·56 Mc/s) and 7850 kc/s (70·65 Mc/s). Will exchange for any crystals between 7789 kc/s (70·1 Mc/s) and 7816 kc/s (70·35 Mc/s).

By G3NDF, 4 Dawnay Road, Great Bookham, Leatherhead, Surrey: has crystals for 7801·11 kc/s (70·21 Mc/s), 7803·3 kc/s (70·23 Mc/s), and 7811·11 kc/s (70·299 Mc/s). Requires 7789 to 7794 kc/s (two crystals) and 7831 to 7844 kc/s.

## 23 Countries on five metres

Don't be fright. This headline is not to suggest that we have got a new band (or an old one back again). Now read on.

Last month's item about DX television reception in Nigeria has evoked a fascinating letter from BRS27148, Dennis Boniface, of Ripon, whose speciality is identifying television broadcast stations far beyond their normal range. He has " seen " 25 countries and 56 stations in Band 1 around where our old 5m band once existed; and Band 3 has revealed 12 countries and 56 stations to him. On the u.h.f. Bands 4/5 he has identified no fewer than four countries and 20 stations.

There could be some sort of special " Four Metres and Down—and Up " award for that little lot—if only they would QSL!

Such reception is assisted, as Dennis says, by tropo and, during the midsummer months, by Sporadic-*E*.

The powerful Spanish transmission received in Nigeria by Mike Dransfield was, thinks BRS27148, from the well sited 200 kW station high up at Madrid: it has been received in Ripon at a strength sufficient to carve up the local BBC1 service on Channel 2.

From professional TV to amateur TV . . .

## "SUT" on

. . . and particularly the efforts of the members of the G3SUT Club at Sutton Coldfield to organize live television at the Birmingham Boat Show (the call-sign GB3BBS caused quite a stir in the Midlands at the time). Protagonists were G3BA, G8AKQ and G3PYB, and the results achieved reflected great credit upon them and their helpers.

One of them has now moved south from his job at the Sutton Coldfield television station and has taken up new duties at the Crystal Palace one. He is G3PYB, who before he left the Midlands had obtained the video call-sign of G6ACU/T. Although it may be some little time before he is able to join the several other video-equipped operators on 70cm he hopes soon to be in evidence from South London on 2m n.b.f.m., and on 70cm, varactor-borne.

## Tech-Problem

From the burgeoning 70cm activity in the south-west has sprung a modest difficulty, reports Bill Scarr, G2WS, who describes it as follows:

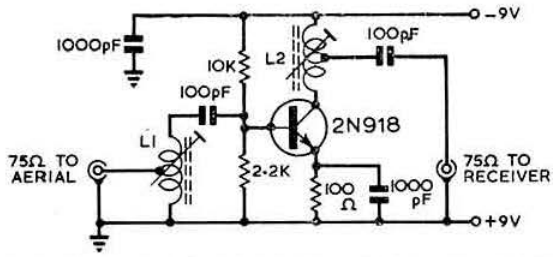



**Fig. 1. A wideband transistor preamplifier used by G3PLX capable of useful amplification from 10m to 2m (see below).**

" Many G8 plus three stations in the south west are now active most evenings between 432 and 432·3 Mc/s, namely in more or less the correct zone for the area. Most of their transmitters have therefore a stage working between 144 and 144·1 Mc/s, with the result that they put out a certain amount of r.f. energy on these frequencies—enough in fact to produce detectable carriers bearing low orders of modulation up to ranges of several miles. Of course, the operators are not to blame for this state of affairs, but keen c.w. operators wishing to use the 144 to 144·1 Mc/s segment on ' Two ' are finding it to be just one more obstacle to the effective use of the c.w. end of the band in the south-west."

Why " just *one more* obstacle "? Because, says Bill, there are at least two active stations on " Two " who persist in using phone in the agreed c.w. segment. Buy them new crystals, chaps!

Back to the first problem, however: driver stages radiating on 2m. Thorough screening of exciter units and filtering of power supply services seem the obvious answers, but are they enough when, such is the potency of a 2m signal, well sited stations can converse with one another using nothing more than dummy loads in the transmitters?

If *you* have the answer to this one—how to keep all the desired radiation in the right place—drop Tech Corner a line.

## Tech-Corner

From **G3PLX** (Peter Martinez, Havant, Hants.):

I recently constructed a wide-band pre-amplifier using ferrite beads as transformers, to the circuit shown at Fig. 1. Each transformer consists of five turns of 36 s.w.g. wire in twisted pair form, so that there are really ten turns, with the windings very closely coupled. The windings are then connected in series, and to make certain, check the continuity of each winding. It is a good plan to use wire of different colours. It should be wound on to the beads in toroid fashion, *i.e.*, the turns through the central hole. The beads themselves may be of the 0·2 in. variety, though the type is not critical.

On the input transformer the centre tap is the 75 ohm aerial feeder input; on the output transformer the centre tap takes off to a 75 ohm co-ax outlet to feed the aerial input of the station converter.

Although the noise factor measured at 70 Mc/s was 4·5db (not very good), the whole point of the device is that it gives wide-band coverage virtually down to 2m and certainly up to 10m. In other words it will work over pretty well the whole of the lower v.h.f. spectrum, and would be a useful addition to receivers such as the S36, R1392 and the like, to give general coverage of the v.h.f.s for checking on conditions.

The transistor is a 2N918; others with a better noise performance would improve this preamp if they were used instead.

From **BRS15744** (R. A. Ham, Storrington):

Increased sunspot activity and its effects on v.h.f. propagation may tempt members to try to see the spots for them-

selves. As has been stated many times, this exercise should be attempted only through very heavily smoked glass.

A method the writer has tried is to use a war surplus 7 × 50 gunsight and project the sun's image on the wall. The actual image projected is 4¼ in. in diameter, and the clarity with which the spots can be identified may be seen from the accompanying sketch, made on Wednesday, 1 March, at 16.50 GMT.

From **G6RH** (R. Holmes, Bexley):

I have been troubled for the first time with TVI on BBC2, where the frequency is approximately four times that of the 144 Mc/s band, and the new transistorised front ends of some receivers are easily overloaded. I found a simple cure was to connect a short piece of 80 ohm cable one quarter of a wavelength long across the aerial terminals of the television receiver. The far end should be left open circuit and this then looks like a short circuit at 144 Mc/s on the input of the TV set.

From **G3JGO** (B. Priestley, Slough):

I have been doing some work on a c.o. multiplier chain using transistors. Originally, two common base doublers were used, but although the first was correctly tuned it was possible to get appreciable output at 3, 4, 5 or 6 times the crystal frequency, depending on the second "doubler" tuning.

On converting to common emitter stages with no forward bias much purer output was obtained. I imagine that in the common base mode there was appreciable feed-through of power at the fundamental which could beat with the wanted output in the next stage to produce a variety of frequencies. Certainly when an absorption wavemeter can find four frequencies at once, it's bad!

Has anyone else met this one?

### *Skeds Operative*

By G8ARD, Yeovil, with G8AFA, Sparkford, every Saturday at 18.00 GMT, 432·108 Mc/s.

By West Country and South Wales operators in general: on 70cm every Monday evening from 18.00 GMT onwards concurrently with Two Metre Activity Night, enabling members to sample each band in turn as activity warrants. "... continues to attract an ever widening circle of participants ... most welcome addition in recent weeks has been the arrival of two Swansea stations, GW3CBY and GW3DFF, who are very regular attenders on 70cm on Mondays," reports G2WS.

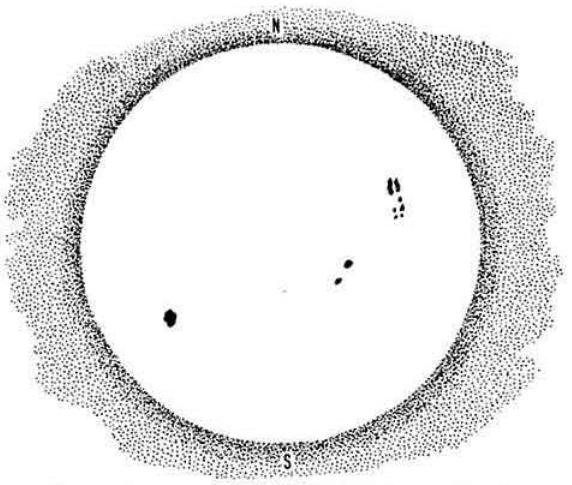
By Cambridgeshire u.h.f. operators: on 70cm every Thursday between 9 and 10 p.m. clock time in connection with the newly established "Cambridge Evening on 70cm." Nucleus comprises G8ADE, G8AKT, G8ATS, G8AWO, G8AXP and G6PGF/T, and all other 70cm operators within range are invited to join ... but, adds G8AXP, "... we shall be on the lookout for more distant signals as well."

### *Here and There*

Look out for Eastern European contestants on 2m, 70cm and the next two u.h.f. bands up, during the weekend of 1-2 July. The occasion: the International "Polni Den" V.H.F./U.H.F. Contest organized by the Czechs. It coincides nicely with our own 144 Mc/s Portable Contest on 2 July. A copy of the rules can be had from G5UM if a foolscap s.a.e. is sent.

* * *

First 23cm contact in Canada? On 21 March VE2LI worked VE2HW in Montreal, 11·2 miles away, on 1296 Mc/s, at S9 both ways, using c.w. Interestingly, in the light of Tech Corner discussions, VE2HW used two varactor triplers from 2m, the second one delivering 5 watts at 23cm.




**Sunspots as recorded by BRS15744 on 1 March.**

This news comes from expatriate Mike Barlow, ex-G3CVO, who doesn't miss much of the v.h.f. news that's going in VE and W.

* * *

If a mobile rally takes place within your service radius make frequent checks on 432 Mc/s as well as 144 and 70 Mc/s. You may well come across G8ARD/P who in company with G8AFA hopes to be operative on 70cm during several of them.

* * *

Almost three dozen 4m operators in the West Sussex and South Hants area keep regular listening watch on the national mobile frequency of 70·26 Mc/s. If motoring in those parts put out some CQs: you may open someone's receiver mute nearby and earn yourself an unexpected contact.

* * *

"Monday Night Activity Night on 2m is very nice, but it would be nicer still if operators remembered that there are six other nights of the week when the band should be used." —G4MN.

* * *

If you're thinking of buying an aerial delay doing so for a couple of weeks: you might win that J-Beams 10-element one when the Lucky Dinner Ticket is drawn at the Convention Banquet on 13 May.

* * *

Last word on the London Convention: if you want talk-in call G3GOX on 70·26 Mc/s between 11.00 and 14.00 hours BST.

* * *

"Why a 20 year old BRS number and no ticket? The reason is simple: I enjoy listening, building equipment, and v.h.f. contests, and especially studying propagation ... I like listening to satellites and am also building gear for radio astronomy."—BRS15744.

* * *

"My new QTH is 810 ft. a.s.l., ideal for 2m, and I hope to get fixed up on 70cm and 23cm if possible and make a modest attempt at the V.H.F./U.H.F. Listeners' Championships this year ... if I get the QSLs in I might be able to join BRS15744 in getting those 'Four Metres and Down' certificates (in the far distant future)"—A4871 (Anthony Watts, Tenbury Wells).

# THE MONTH ON THE AIR

By JOHN ALLAWAY G3FKM

THOSE of us who occasionally feel that *we* are unfairly treated by our authorities may be interested to read an extract from a licensed Commonwealth amateur's letter to his national radio society. This said: "The police had a thorough search of my house on 4 February—all because of Amateur Radio. Intrigued by all sort of insight—by wires all over my yard, the police were almost sure that undoubtedly a spy lived in there. They conducted a two hour search. In fact I had to start right from the ABC of Amateur Radio and explain up to where my brain would carry me. I had to bring up all the RSGB and ARRL books in my possession in my explanation in order to convince them it is a perfectly legitimate thing. I had to start showing them my licence from 1961 to 1967. The interesting thing about the whole affair was that four full-bodied policemen came for the search—one carrying a rifle with a set of ammunition . . ." So much for progress!

The President of VERON has written to W4BPD drawing his attention to the fact that all QSL cards for PA, PE, PI, PJ and PZ stations should be sent to VERON, PO Box 400, Rotterdam, Netherlands. All cards received are forwarded to the amateur for whom they are sent regardless of the fact that he may not be a member of VERON or may not keep s.a.e.'s at the Bureau.

A note from VS9ABL says that during a clear out at the old club house a large number of QSL cards intended for the following stations were discovered: VS9AB, VS9AHB, VS9AJA, VS9APB (for QSOs in 1962/63), and VS9ARK. If any of the owners of these call-signs should read this would they please contact VS9ABL, Amateur Radio Club, RAF Khormaksar, BFPO69?

G2MI wishes to point out that the **RSGB QSL Manager for all 7Q7** calls is Mr A. M. Pomfret, PO Box 13, Mzuzu, Malawi, to whom all cards should be sent. *Other bureaux please note.*

It is understood that the Northern California DX Club has called for the resignation of the present ARRL DXCC Committee on the grounds that its members do not include representatives from any area other than that of ARRL HQ. They propose that the Committee be reconstituted to include qualified DX'ers from each US Division as well as ARRL HQ Staff.

In conclusion of this paragraph your scribe would like to make it clear that any opinions expressed in MOTA are his own, and that they do not necessarily reflect the official views of the Society!

### Top Band News

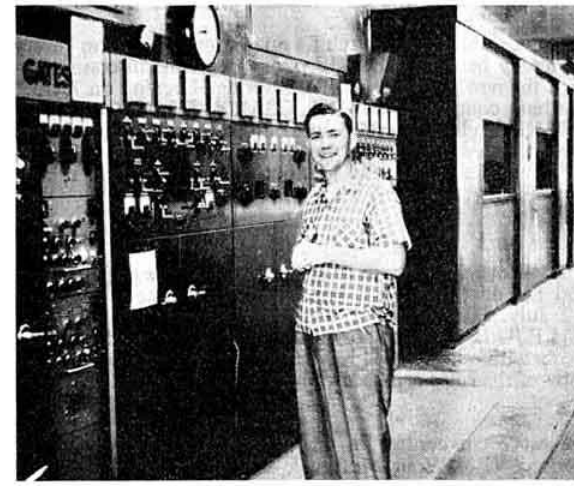
VO1FB reports that in spite of the increasing sunspot activity there have been some quite good openings. He managed about 20 European QSOs during the *CQ 160m Contest*. During February there were openings as early as 21.38 on the 11th when HB9NL was worked. On 26 March over a dozen Gs were worked, and G3RXH and G3MYI were raised on phone. Joe will continue to listen on the band around 00.00 until late May.

9J2BC has now erected a 300 ft. wire aerial and has been listening on 160m. No amateur signals have been heard yet, but Radio Monte Carlo and other European broadcast stations have been heard at good strength around 1500 kc/s. When the static subsides in Zambia Peter hopes to attempt some operation on the band. It is believed that the only previous Zambian activity has been that by VQ2AS.

Now that Bob Snyder has left Singapore 9V1LP is no longer available, however there is a possibility that his place will be taken next winter by 9V1LK who hopes to undertake some operation.

### News from Overseas

A most interesting letter has been received from YJ8BW (ex-G3JWW) who is one of the two amateurs in the New Hebrides currently active. He is particularly interested in contacting UK stations, but finds that with few exceptions (which include G6VQ, G2ATM, G2RF, G3s FRI, RGD, ZY and GM3ITN) their signals are weak and watery, and it seems that he shares 9V1LK's views on the matter (see December *MOTA*). The rubber stamp QSO is not one of Bill's specialities, except during contests, and he has a great deal of trouble from Asian QRM during DX contacts. The Europeans and Ws are fairly well behaved, though some of the latter get a little impatient with YJ8BW's QSO preference! Equipment consists of a Viking II transmitter, and an SX88 receiver, aerials being a G5RV at 55 ft. and a ground-plane using the metal roof of the house for a ground. The site itself is surrounded by coconut palms and to the



**Although SV0WF (who is now HS1WF) had a good signal when on Rhodes this was not his linear but the equipment at the VOA station on the island!**

* 10 Knightlow Road, Birmingham 17. Please send contributions for the June issue to arrive by 17 May, for the July issue by 14 June, and for the August issue by 12 July.

North (the short path to Europe) there is rising ground and the aerials and masts of the Government radio station where Bill works. The QSL situation has proved to be difficult as there are no printers on the island but 2000 cards have just been obtained via VK2OI and the backlog should soon be dealt with. Incidentally Bill is prepared to make skeds on any band 1·8 to 28 Mc/s for those wanting YJ QSOs on bands other than those on which he is currently mostly active. His normal operating times are from 08.00 to 11.00 on 14 Mc/s, 28 Mc/s has been open to Europe and many Gs were heard during BERU. In future all new licensees will be given YJ8 calls—no more FU8's will be issued. Any UK station who does not get a reply when calling Bill is asked to remember that he may be submerged beneath 100 S9 other callers!

**VP8IY** has now arrived at South Shetlands, and is particularly anxious to contact UK stations, especially GMs. He will be at his present location for 10 months. News of other VP8s has been received from G3NMH. He points out that VP8HZ has never operated on s.s.b. in contradiction to reports in *MOTA*. VP8s HZ, JB and JC are a father and two sons team and their mother is VP8IA. At present they are a.m. only as they are having trouble with their SB100. VP8IN and VP8IK have returned to Falkland Is. from Antarctica, and VP8IN is due to return to the UK in June. VP8IE (S. Georgia) is expecting an s.s.b. transmitter to arrive from the US soon. VP8FL (Falklands) is temporarily using VP8IK's SBE 33. Hal wishes to point out that he acts as QSL manager *for G contacts only* to the VP8HZ, IA, JB and JC family.

It is reported that ZD9BE will shortly be coming home on six months leave in the UK and will be replaced by Geoff Summers, G3NTZ, who will probably have the call **ZD9BH.** He will be available most Wednesday and Saturday evenings on 14,260 kc/s around 19.00.

**G8FC, the Headquarters station of the RAF ARS during the recent CQ WW S.S.B. Contest. Placed second highest multi-operator station in the world in the 1966 Contest, the operators at G8FC made more than 1900 QSOs with 370 prefixes during the 1967 event. G3JLZ, G3CCH, G3NAC and G3MRP man the second line with G3GJQ, G2BVN and G5UG in the forward operating position.**

### Awards

The **WAOY Award,** issued by the FRA (Føroyskir Radioamatørar) to commemorate the Faröese national amateur radio society's foundation, is available to all amateurs who can produce a list of contacts with OY since 11 April, 1965. European stations must have 35 " points " from OY contacts; the rest of the world 20. Points are awarded as follows: (European stations) 1 point for each FRA member contacted on each band, and 2 points for contacting the club stations OY6FRA and OY6NRA. Non-European stations: 1 point for FRA members on 14, 21 or 28 Mc/s, 2 points on 7 and 3·5 Mc/s, double points for QSOs with the club stations. Applicants should send a list of contacts, verified by another licensed amateur, plus 10 IRC's to Award Manager, Føroyskir Radioamatørar, Box 184, Torshavn, Faroe Islands. Note that contacts may be c.w. or phone, but that c.w./phone or crossband QSO's do not count.

The Budapest Radio Club is again holding its annual QSO party—this time between 00.00, 10 May and 24.00, 20 May. All bands 80m to v.h.f. will be used and contacts may be used as credits for the **" BP-Award."** QSO exchanges will consist of RS(T) and zone number, Budapest stations will give their Budapest district number. Each station may be worked only once during the 10 days, QSOs with one of the club stations (HA5's KDQ, KDI, HG5KDQ and HG5KDI) count 3 points, with club members 2 points, and with other Budapest stations 1 point. European stations need 15 points for BP-I and BP-II, and 10 for BP-III; these must include QSOs with at least 10 Budapest districts. BP-I contacts since 1 January, 1959 are valid, but the other two classes are annual awards. Applications must include a list of QSO data plus QSLs for stations worked and eight IRCs (five IRCs for the BP-I). All logs should be posted before 1 August to: Radio Club of Budapest, XIII, Dagaly utca 11/a, Budapest-Hungary, Bp. 134 Box 35.

The **Derby City Award** will be issued by the Kentuckiana Radio Club to publicize the 90th running of the Kentucky Derby. It is necessary to contact five stations in Louisville/Jefferson county during the Derby City Party which takes place between 00.00 6 May and 23.59 7 May. Frequencies to be watched are: 3550, 7050, 14,050, 14,345, 21,050, 21,350, 28,050 and 28,600 kc/s. Applications should be sent to: K4CSS, 1355 S. Third St., Louisville, Ky, USA 40203.

### Contests

A small number of leaflets giving full details of the 1967 **" CQ M " Contest,** organized by the Radio Sport Federation of the USSR have been received by the writer. Interested parties may obtain one by sending a s.a.e. to G3FKM.

Details of the **VK/ZL/Oceania DX Contest 1967** have now been received from WIA who are the organizing Society this year. The phone section will be taking place between 10.00, 7 October and 10.00, 8 October, the c.w. section between the same times on 14 and 15 October. Two points are derived from working VK/ZL stations, one for contacts with other stations in Oceania. The final score is arrived at by multiplying total QSO points by the sum of VK/ZL call areas worked on all bands. Note that the same area worked on different bands counts as a separate multiplier. Stations should send report plus serial number of QSO, starting with 001. Logs must show: date, time, call-sign of station worked, number sent and number received. Each new call area worked should be underlined, and separate logs should be sent for each band. A summary sheet should accompany the log sheets and should show call-sign, name and address (in block letters!), and details of equipment used, together with a list of QSO points and call areas claimed on each band. Entries may be single or multi-band. A declaration that all

## QTH Corner

| | |
|---|---|
| **K0OXV/CE0** | via K8EHU, 6470 Penick Drive, Reynoldsburg, Ohio, 43068. USA. |
| **CR5CA** | Apartado 47, Sao Thome. |
| **CR8AH** | Fernando J. B. Santos Leite, SPM 225, Dili, Portugese Timor. |
| **GD6UW** | via DOTM, PO Box 7388, Newark, NJ, USA, 07107. |
| **HK0GQ** | HK3GQ, Guillermo Escobar V., Cra. 8, 15-20, Fontibon, De. Colombia. |
| **HL9KO** | via K9FOV, 1518 Main St., Lafayette, Ind. USA. |
| **I6ESV** | Box 26, Varese, Italy. |
| **JT1KAA** | (Opn. by UA1CK), Box 639, Ulan Bator, Mongolia. |
| **KG6SL** | via W4FRO, 7340 SW, 123rd St., Miami, Fla., 33156, USA. |
| **KG6SM** | via W2CTN, 159 Ketcham Av., Amityville, NY, USA, 11701. |
| **KS4CC** | (New QSL Mgr.) WB6ITM, John Morrice, RFD 3, Box 171, Carmel, Calif., 93921. |
| **G3ESP/LX** | W. Farrar, 1 Wentwood View, Ackworth, Pontefract, Yorks. |
| **MP4QAL** | Box 56, Doha, Qatar. |
| **PA9CN** | via WA1GIA, 68 N. Main St. Farmington, NH, USA, 03835. |
| **PJ3CC** | (25-29 March QSOs only), via WA2OJD, RFD, Box 494, Woodstock, NY, 12498, USA. |
| **VE8YL** | W0QUU, 686 Arbogast Road, St. Paul, Minnesota, 55112, USA. |
| **VP5RS** | via K7UXN, Elizabeth Kuegeman, RFD 1—Box 97, Eastsound, Wash., USA. |
| **VP8's HZ, IA, JB, JC** | (UK contacts only) via G3NMH, 24 Hook Street, Hook, Nr. Swindon, Wilts. |
| **VQ9BC/D, VQ9HB/D** | Box 101, Mahé, Seychelles. |
| **XW8AX** | W6KTE, 214 S. Emerald St., Anaheim, Calif., USA. |
| **ZF1RD** | K8LSG, Grace Hospital, Detroit, Mich., USA, 48201. |
| **3V8BZ** | Reinhard Fierle, 6 Bvd. Habib Tharreur, Ez Zahra, Tunisia. |
| **4W1G** | via HB9MQ, Hauptstrasse 13, Koelliken, Ag, Switzerland. |
| **5T5KG** | YASME, PO Box 2025, Castro Valley, Calif., USA, 94546. |
| **7Q7QSL Bureau** | Mr A. M. Pomphret, PO Box 13, Mzuzu, Malawai. |
| **9M6LE** | via 9V1NT. |

* * *

**RSGB QSL Bureau, G2MI, Bromley, Kent.**

rules and regulations were observed should be made. There is a listener's section: scoring is the same but only VK or ZL stations may be logged. Entries should show date, time, call of VK/ZL station heard, call of station being worked, RS(T) of station heard and serial number sent by him, band and points claimed. All logs should reach: Federal Contest Committee, WIA, Box N1002, GPO Perth, Western Australia, no later than 20 January, 1968.

The **Hawaii QSO Party** will run from 00.00, 13 May to 24.00, 14 May. Participants exchange signal reports only, each KH6 QSO counts 1 point and the same station may be worked once only on each band. Score is QSO points multiplied by number of bands on which KH6 stations were contacted. Logs go to: Hawaii QSO Party, PO Box 101, Aiea, Hawaii, 96701.

The **CHC/FHC/HTH Party** will take place between 23.00, 2 June and 06.00, 5 June. The rules for this one are somewhat complicated and it is suggested that intending participants write to K6BX, Box 385, Bonita, Calif., USA 92002, for fuller details (enclosing an s.a.e. and IRC/IRCs).

The **YL International SSBers Contest** starts at 23.00, 19 May and finishes at 06.00, 22 May, and in spite of its title includes c.w. operation. It should be noted that non-members are welcome to join in. The rules of this one are also complex and may be obtained from WA6MWG, 4040 Via Opata, Palos Verdes Estates, Calif., USA 90274.

### "QSL via W2CTN . . ."

Those of us who are interested in contacting DX stations and obtaining QSL cards have always known that to be told to QSL via Jack Cummings, W2CTN, meant the cast iron certainty that a QSL would be received in return. Just how enormous a task Jack has been undertaking is shown by a list of stations for whom he currently acts as QSL Manager. This lists 192 call-signs in over 100 countries! For reference purposes it is proposed to give a complete list, the first half this month, the rest in June issue. They are as follows: CN2BK, CN8FE, CN8FW, CN8GB, CN8GC, CP1EA, CP1EA/5, CR3KD, CR4AH, CR4AX, CR6DX, CT1NW, CX9AAN, DU1OR, EI2AT, EL5A, EP2RW, FA3CT, FA9UO, FG7XK, FG7XS, FK8AH, FK8AI, FK8AT, FK8AW, FM7WP, FM7WU, FY7YG, GC3POI/P, GC3SHZ/P, GD3AIM, HC1GC, HI8MMN, HI8XAG, HI8HBG, HK1AAF, HK2YO, HK3LR, HK4RQ, HK6LR, HK6RQ, HK0RQ, HR2FG, HS1JB, HB9AET/HZ, KA2DF, KA2JH, KA2LD, KA5RC, KB6CY, KC4USK, KC6FM, KG6APR, KG6SM, KR6BQ, KR6JZ, KW6CU, KW6EJ, KW6EK, KZ5LC, LX3AA, LX3AB, LX3KP, MP4BFK, MP4QBG, OA7F, OE9DZ, OH2AM/0, OH2BH/0, OH2EW/0, OX3BZ, OX3KC, OX3RH, PY7BAL/0, PZ1AP, SL1CF, TA3BC, TI2CMF, TI2WD, VE1ASJ/1, VK2AYY/LH, VK2FR/LH, VK9AG, VK9GK, VK9JK, VK9MJ, VK9NT, VK9RR, VK9SB, VK9TG, VP1TA, VP2AV, VP2KH, VP2KT, VP2LD, VP3RW.

Please remember to QSL direct to W2CTN, 159 Ketcham Avenue, Amityville, NY, USA 11701, together with s.a.s.e. or s.a.e. and IRCs. Remember **there is no free outgoing QSL bureau available to US amateurs!**

### DXpeditions

A circular received from WA6SBO gives the information that he hopes to leave the US on 1 May in a specially built 35 ft. Trimaran, on an extensive expedition. The boat is fitted out for a four to five year journey and the present planned itinerary includes visits to **Clipperton Is.** (FO8), **Cocos Is.** (TI9), and **Malpelo Is.** (HK0). It is intended to remain long enough at each stop to have time to work all those who desire contacts with the expedition. Bill makes six points concerning the expedition—(a) major contributors will receive direct QSLs; (b) a great deal of activity on bands other than 20m will take place, both c.w. and s.s.b.; (c) one contact per mode per band only *please*; (d) copies of all logs will be available to ARRL for checking; (e) contributors providing self-addressed cards will be notified direct of pending activity; (f) because of the high expenses it may be necessary to " rubber stamp " non-contributor's cards for confirmation.

Region 4 of the IRTS will be making its annual DX-pedition on 3, 4 and 5 June. This year it will be to Bere Is. in Bantry Bay, off S.W. Eire, and the call-sign will be EI0BI. They will be on all bands 160 to 10m on a.m., s.s.b. and c.w. and special QSLs are being printed. QSL via EI2AW (see *QTH Corner*).

G3ESP, G3HCX and G3US will be operating from **Luxembourg** between 28 May and 2 June. They will be on all bands c.w., s.s.b. and a.m. and their call-sign will be G3ESP/LX. QSLs should go *via* G3ESP.

K6CAA is hoping to leave California about 1 June on a prolonged trip around the Pacific area. No exact details are yet available, but possible areas to be visited include Rota (KG6), Saipan (KG6), Gilbert Is. (VR1), Br. Phoenix Is. (VR1), Christmas Is. (VR3), Tonga (VR5), Cook Is. (ZK1), Manihiki Is. (ZK1), Tokelau Is. (ZM7), and Western Samoa (5W1).

VK2BRJ/9 who was very active from **Norfolk Is.** has now left for a stay of a month or so in Australia, and is still hoping to obtain permission to visit Nauru. It is understood that one of the difficulties is that there is no accommodation on the island, which virtually consists of a large heap of phosphate which is being commercially developed. Late information suggests that this phase of the trip may not materialise due to illness and transport difficulties.

It is rumoured that whatever the decision reached by ARRL, **Don Miller, W9WNV**, will return to the Indian Ocean area about 10 May and proceed with the remainder of his expedition as originally planned.

### DX Briefs

**VE8YL** is the call-sign of the Plaisted Polar Expedition, which is endeavouring to retread the route taken by Admiral

# THIRD LONDON S.S.B. DINNER

## Saturday, 20 May, 1967

*The Royal Garden Hotel*
*Kensington High Street*
*London W8*

- The Palace Suite, an entire floor, has been reserved for this event.
- From 3.30 p.m. a Trade Show—All the latest s.s.b. equipment.
- 7 p.m.—Dinner.
- Dancing to the famous Stapleton-Lipton band.
- Spot prizes.
- Grand Raffle for s.s.b. equipment and mink tie for the ladies.
- 11 p.m.—Late night refreshments.
- 11.15 p.m.—THE REX GREY CABARET—London's leading floor show.
- Licensed to 1 a.m.
- Ample, two-storey underground car park beneath hotel.
- Many well known overseas amateurs will be attending so don't miss this biennial event—GIVE THE WIFE A TREAT!

**Organized by Joe Steele, G3KZI, Norman Fitch, G3FPK, Jim Farlow, G3BXI**

**Tickets, 75s. each, from**
**N. A. S. Fitch, G3FPK**
**79, Murchison Road**
**London, E10**
**(01-539 6700)**

**Hotel reservations to hotel direct or:**
**J. C. Farlow, G3BXI**
**49 Mount Pleasant Road**
**Chigwell, Essex**
**(01-500 4546)**

Peary in 1909, but with the aid of 10 " Snowmobiles " which are capable of speeds of up to 30 m.p.h.! QSLs should be sent via W0QUU with s.a.s.e.

The following stations are presently active from **Antarctica:** KC4AAD (Byrd Base), KC4USB, KC4USJ (Polar Plateau), KC4USL (Little Brockton), KC4USN (S. Pole), KC4USP (Palmer Archipelago), and KC4USV (McMurdo). All operate in the US portion of the 14 Mc/s phone band.

HM9DZ is the first resident amateur to operate from Cheju Is. off S.W. Korea. This counts as Korea for DXCC purposes. On 1 January, 1967 there were 89 Korean nationals with licences—47 HM1s, seven HM2s, one HM3, four HM4s, 10 HM5s, one HM8, 18 HM9s, and one HM0.

There appears to be activity from **Portuguese Timor** again. CR8AH, who was formerly CT1OT, has been heard on 21 Mc/s a.m. between 10.00 and 14.00.

DI2LE, aboard the *World Cat* is due to sail from ZL about 7 April. He hopes to obtain permission to operate from a number of Pacific islands during the remainder of his voyage.

Late news received from WA6SBO states anticipated departure date for **Clipperton** to be 28 April. Special efforts will be made to contact Europe; frequencies to be used are 3501, 7001, 14,005, 21,005 and 28,008 kc/s c.w. and 3785, 7085, 14,185, 21,385 and 28,485 kc/s s.s.b. More activity from **1A6SBO** may take place en route for FO8.

UA1CK, operating from **Mongolia** as JT1KAA appeared around 12 April and was a good signal on 21,350 kc/s on 15 April. UA1KED, **Franz Josef Land** will soon be activated by three new operators and should be heard around 14,050 on c.w.

### Rotary of Amateur Radio

ROAR is **Rotary of Amateur Radio** and is a world organization of Rotarians who hold transmitting licences. Its HQ is at 1155 Temple Hills Drive, Laguna Beach, California, and the Secretary is Jack Stewart, W6BXG. Rotary Round Tables are held on 14,335, 14,070 and 7230 kc/s at 02.30 on Tuesdays, Wednesdays and Thursdays.

A few months ago Harold Chadwick, G8ON, inaugurated a UK Rotary Net at 09.00 Sundays on 3690 kc/s, and Rotarians are invited to join in. At present the " regulars " are G8ON (Worksop), G3ASC (Oswestry), G3UHM (Cinderford), G2DDR (Falmouth), G5FH (Oldbury), G3GAW (Driffield) and G3RK (Bungay). Other Rotarians in Scotland and Northern Ireland have called in. Club greetings are exchanged and items of Rotary interest discussed, including DX contacts. ZS2FA is looking for Rotary contacts on 21,305 kc/s, and there are many others. This net usually runs for about 90 minutes and there is no need for anyone to stay the course—anyone is welcome to introduce himself and then drop out after a round, in fact, individual lengthy transmissions are not desirable where a net includes a number of stations.

### Band Reports

Once again good DX conditions have existed on all bands at some time during the month, but with the approaching summer interest on the l.f. bands is beginning to wane. No signals from the Pacific have been reported on 28 Mc/s yet, but 21 Mc/s has produced the odd ZK1, KW6 or VR6. The following contributors are sincerely thanked for the trouble which they took to send in reports, as many of them have obviously gone to a great deal of trouble to assist and apologies are offered to any whose choicest item may have been overlooked in the following: G2BOZ, G2LB, G3AAE, G3ATK, GW3AX, G3HCT, G3HDA, GM3IAA, G3LZQ, G3NMH, G3PQF, G3PUF, G3RJX, G3SML, GM3SVK, G3UMV, G3URX, G3VJG, G3VMQ, G4MJ, G8JM, G8VG, BRS20317, BRS25429, BRS26737,

BRS27358, BRS27806, BRS28198, A3942, A4038, A4182, A4568, A4713, A5004, A5016, A5032, A5096, A5105, A5125, A5126, A5135, A5182 and A5224.

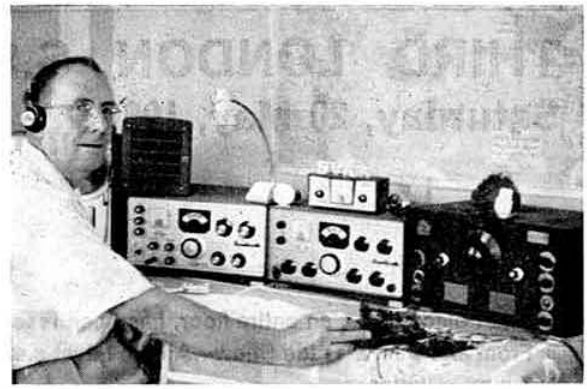
**1·8 Mc/s C.W.:** HI8XAL (05.14), W2GGL (05.08), WA3EPT (05.40), WA4RGH (05.17), W9CZA (05.56).

**3·5 Mc/s S.S.B.:** EP2GI (22.51), OH0NI (20.45), PZ1CF (22.00), TI2NA (04.07), VE1IE (23.04), YA5RG (22.51), YV5BTS (05.30), ZD3G (22.30), ZL1NCQ (21.00), ZL's 3AAD, 3RJ, 3WT, 4LM (05.45-05.55), 6Y5EM (23.10).

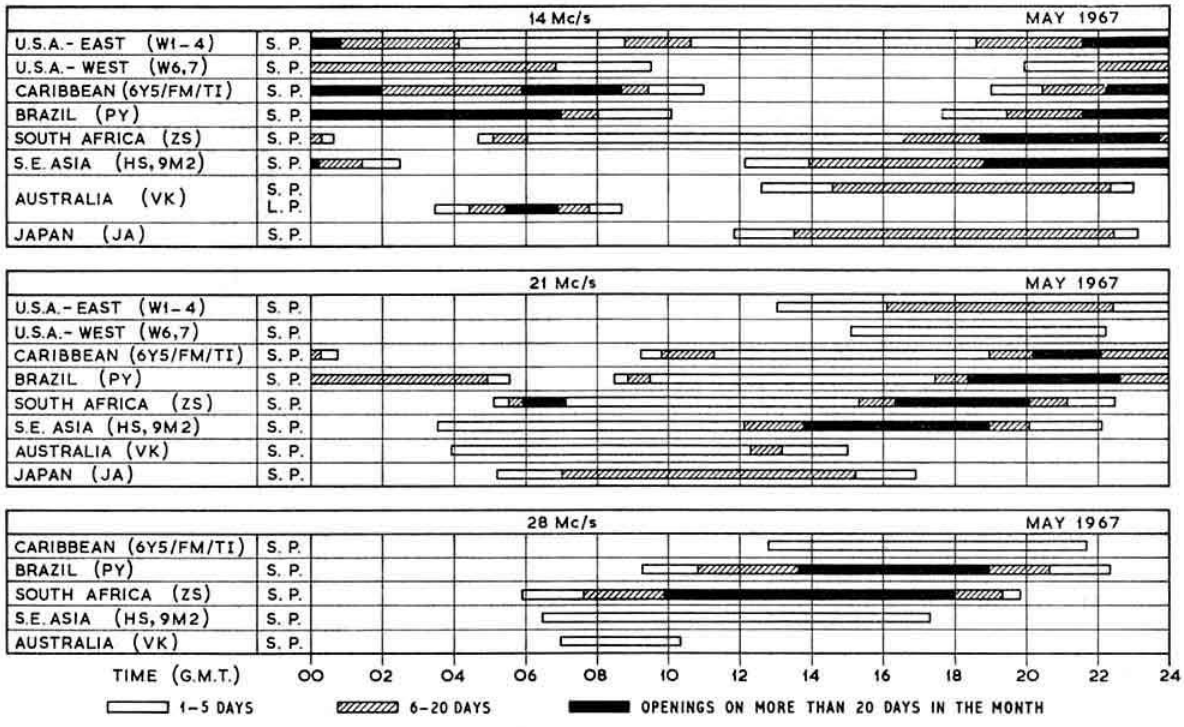
**7 Mc/s S.S.B.:** JA2BAY (21.00), JA6YB (20.46), OA4SO (04.58), PZ1CF (21.23), VP6KL (21.00), YV1BI (05.35), 7X0AH (21.40).

**14 Mc/s C.W.:** FB8WW (16.53), FB8YY (09.06), FL8DY (21.04), LU1ZA (S. Orkneys 19.55), VP8IN (Falklands 21.42), VP8JD (23.00), VQ9BC/D (15.47), VQ9HB/D (20.04), 4S7NE (17.25).

**14 Mc/s S.S.B.:** K0OXV/CE0 (05.07), CR5SP (21.10), EA9EJ (Rio de Oro 17.30), HK0GQ (06.12), HS4AK (18.27), HV3SJ (11.48), KC6AA (W. Carolines 13.57), KS4CC (10.03), KX6BU (15.15), VK9DJ (20.53), VP8AO/OX (19.40), VP8FL (21.30), VQ9EF (22.24), XW8AW (20.00),



**Dick Halls, 9V1LK, at the operating position of the first all commercial station he has used! He should be heard on all bands 1·8 to 28 Mc/s in the near future.**




## Propagation Predictions

The Month of May is a typical summer month as judged from the condition of the ionosphere. In the Northern hemisphere the daytime F2 m.u.f.'s are relatively low; the night time values on the other hand do not fall as low as those of the winter months. The low daytime m.u.f.'s mean that on 28 Mc/s, in contrast to the winter months, North America and Japan will hardly be workable. One small consolation for the poor DX conditions on this band, which will persist until the beginning of September, is the appearance during the summer months of sporadic short skip conditions, making possible contacts over distances of 300 to 1,250 miles. These short skip contacts are made possible by the sporadic-*E* layer of higher limiting frequency. On 21 Mc/s also, the coming summer months will see a worsening in propagation conditions, so that North America, Australia and Japan will no longer come through reliably. On favourable days (i.e. with above average m.u.f.'s) South America will probably come through all night on this band. On 14 Mc/s in summertime DX possibilities will exist throughout the night. On the other hand, distances covered in daytime will continue to decrease. DX on 7 and 3·5 Mc/s will be more difficult during the summer than in winter. Local traffic on 3·5 Mc/s will no longer be interrupted in the early morning by the dead zone.

The provisional mean sunspot number for March 1967 was 108·3 with the periods of greatest solar activity occurring at the beginning and end of the month. On 3 March the daily number was 191 the highest recorded since September 1959. The predicted smoothed sunspot numbers for July, August and September are 100, 104 and 108 respectively.

YK1AM (14.40), ZD7IP (22.10), ZD7KH (18.52), ZD9BE (19.10), ZK1AR (06.30), ZS9D (18.15), 3V8BZ (22.22), 3W8D (15.25), 5R8AS (17.30), 7Z3AB (20.37), 9M6MG (15.53).

**21 Mc/s C.W.:** CE6CF (18.50), CR3KD (22.36), CR5CA (21.35), EA6AM (17.40), EA9EO (19.15), FG7XG (10.35), HK0AI (20.52), MH1CB (10.12), KS4CC (22.10), TA2AC (16.20), UA0LH (07.30), VK2BRJ/VK9 (09.15), VP1VR (16.53), VP8IY (18.34), VR2DK (10.35), VR2EK (08.13), VQ9AR (13.50), YJ8BW (12.50), 5T5KG (18.53).

**21 Mc/s A.M.:** EA6AR (18.00), FG7XY (19.10), FR7ZG (14.47), TI4FCH (21.39), VP2GW (21.15).

**21 Mc/s S.S.B.:** K0OXV/CE0 (22.20), CR4BA (09.18), EP2KW (13.40), FB8WW (14.34), HK0AI (20.37), HM9DL (09.15), JT1KAA (11.38), KL7's FEU, OJ (08.20), KS4CC (12.32), KS6BZ (08.00), KH6CH/KW6 (10.05), KW6EJ (09.50), KX6DB (10.32), OA3C (22.55), OX4AA (08.45), TY5ATD (08.23), VK8OX (08.15), VK9KS (T.N.G. 11.35), VR2EK (08.34), VR6TC (21.00-23.00), ZD8's (21.45), ZF1RD (19.35), 4W1G (18.05).

**28 Mc/s C.W.:** CR7IZ (18.25), FG7XX (13.19), HZ1AT (12.50), JAs (11.00), SU1DL (11.23), UA0AG (11.00), UM8AP (12.30), VK8NO (10.30), VP2GLE (11.45), VP8HJ (16.01), VU2TZ (12.30), XE1AX (19.10), 5H3KJ (15.00), 5T5KG (19.20), 9V1NV (18.19).

**28 Mc/s A.M.:** CO2BB (15.58), CR4BC (18.23), CT2AP (17.52), FH8CD (10.43), OA5AS (18.13), ST2SA (13.35), TG9US (14.25), XW8BS (09.40), 9V1NY (08.35).

**28 Mc/s S.S.B.:** CE6DP (18.20), CR4BC (15.24), CR9AH (11.30), DU1FH (08.08), EP3AM (15.03), FH8CD (11.44), FH8CE (11.05), HC8JG (15.50), HK3AVK (14.06), HL9TQ (10.50), HR1KAS (19.54), KV4AM (18.10), KR6KJ (11.27), KZ5NS (19.38), MP4TBO (09.21), OA8Q (17.15), PJ2MI (13.15), VQ9TQ (11.33), VU2FN (11.08), All W districts (12.00-22.00), XW8AX (08.09), YA5RG (11.10), ZD8CX (08.52), ZS8L (16.42), ZS9B (08.58), 4M4A (18.25), 4W1G (08.06), 5H3KJ (09.49), 5R8AX (16.40), 5T5KG (17.31), 9M2LO (10.30), 9V1NY (07.32).

**1967 Countries Table**

| | Mc/s 1·8 | 3·5 | 7 | 14 | 21 | 28 | Total |
|---|---|---|---|---|---|---|---|
| G8VG | 1 | 16 | 18 | 36 | 47 | 43 | 161 |
| GM3SVK | 13 | 12 | 23 | 79 | 62 | 15 | 204 |
| G3IAR | 10 | 48 | 35 | 76 | 51 | 24 | 244 |
| G8JM | 1 | — | 12 | 123 | 44 | 19 | 199 |
| G8DI | — | 19 | 18 | 56 | 46 | 16 | 155 |
| 9V1LK | — | 2 | 22 | 76 | 32 | 25 | 157 |
| G3VJG | — | 2 | 6 | 12 | 9 | 39 | 68 |
| G3KSH | — | 13 | 17 | 31 | 20 | 27 | 108 |
| 9J2BC | — | — | 1 | 28 | 10 | 36 | 74 |
| G3PQF | 1 | 22 | 19 | 20 | 13 | 29 | 104 |
| G3OJV | 1 | 1 | 22 | 21 | 16 | 20 | 81 |
| G3LNS | 1 | 9 | — | 16 | 9 | 8 | 43 |
| G3ING | 3 | 11 | 6 | 4 | 6 | 1 | 31 |
| G3JVJ | 14 | 10 | 2 | 1 | 2 | 4 | 33 |
| A4568 | 4 | 40 | 37 | 149 | 100 | 84 | 414 |
| BRS27806 | 3 | 20 | 20 | 93 | 87 | 76 | 299 |
| BRS25429 | 5 | 53 | 40 | 114 | 77 | 76 | 365 |
| A4038 | 5 | 12 | 13 | 56 | 82 | 39 | 187 |
| A4182 | 3 | 29 | 25 | 69 | 56 | 48 | 230 |
| A5105 | 1 | 25 | 10 | 78 | 60 | 40 | 214 |
| A5004 | 4 | 54 | 29 | 112 | 41 | 48 | 288 |
| A3942 | 12 | 45 | 45 | 95 | 52 | 42 | 291 |
| BRS28198 | 1 | 41 | 30 | 88 | 33 | 26 | 219 |
| A5273 | 4 | 34 | 16 | 45 | 28 | 18 | 145 |
| A5135 | 2 | 16 | 8 | 52 | 25 | 8 | 111 |
| A5126 | 3 | 17 | 5 | 36 | 14 | 8 | 83 |
| A4552/VK | 1 | 1 | 2 | 80 | 10 | 2 | 96 |

This month's table is in order of 21 plus 28 Mc/s totals.

Many thanks to all those who have sent in reports and special thanks and acknowledgements are particularly due to the following: *DX'press* (PA0FX), *The LI.DX.A Bulletin* (WA2EFN), *The DX'er* (W6PHF), *DX News Sheet* (Geoff Watts), *The DX'ers Magazine* (W4BPD), *The West Gulf DX Bulletin* (WA5LES), *Florida DX Report* (W4MVB), *CQ DX* (ARI), *On The Air* (ON4AD) and *KARL News* (HM1AJ). Please send all items for **June** issue to arrive by **17 May,** for **July** issue by **14 June,** and for **August** issue by **12 July.**

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**Insurance for your Final** **(Continued from page 303)**

make use of this further advantage, send-receive switching must obviously be carried out in the cable between the unit and the transmitter.

### The K.W. E-Zee Match

The only commercially manufactured match unit at present readily available in the UK is that produced by K.W. Electronics Ltd., and which is shown in the photo. This is designed to cover bands between 3·5 and 30 Mc/s without switching and will enable loads varying in impedance up to several thousand ohms to be matched to the transmitter output circuit. A combination of terminals on the rear of the unit will accommodate single wire, twin feeder or coaxial cable. One set of terminals is used on 3·5 and 7 Mc/s with the remainder being used on the three higher frequency bands.

An approximate adjustment of the tuning controls can be made on a received signal on or near the transmitting frequency, but the preferred method of setting up is to use a standing wave indicator, and an instrument of the "Monimatch" type [2] is entirely suitable as it is not desired to measure accurately the value of the s.w.r., but rather to obtain dial settings where the reflected power is at a minimum. Once dial settings have been obtained for the various bands they can be marked with Letraset or similar material to facilitate rapid retuning.

Where coaxial cable feeder is used it is considered essential that this should have a high density braid covering, which most of the cables designed for entertainment use do not have, and that the fitting of suitable terminations should be carefully carried out. The quality of the cable should be such that there can be no doubt that it does conform to the stated impedance. Impedance changes can often be accounted for by alterations in the position of the centre conductor relative to the braid and this has frequently been noted in cheap cable. The writer is firmly of the opinion that time spent on the station aerial system is a good investment and the use of an aerial matching unit will in many cases enable your transmitter to more efficiently carry out the job for which it was designed.

### References


[1] "The Z-match Aerial Matching Unit," page 276, RSGB BULLETIN, December 1956.
"The ZS1CK Transmatch," "Technical Topics" (J. P. Hawker, G3VA), page 304, RSGB BULLETIN, May 1966.
"The Z-Match Antenna Coupler," by A. W. King, W1CJL, page 11, *QST*, May 1955.

[2] "Standing Wave Ratio Meters," by P. Harris, G3GFN; page 297, RSGB BULLETIN, May 1964.

# TECHNICAL TOPICS

By PAT HAWKER, G3VA

THE WIRELESS TELEGRAPHY BILL—N.B.F.M. PHASE DISCRIMINATOR
TWO-TRANSISTOR MICROPHONE MATCHING UNIT
RADIO ON ASCENSION ISLAND—TRANSISTORS FOR TRANSMITTERS
USING TRANSISTORS IN PARALLEL—SERIES-TUNED T-MATCHING NETWORKS
HIGH-STABILITY IGFET CRYSTAL OSCILLATOR—SIC APPLICATIONS
COHERENT DETECTION—AUTOMATIC KEYER—FORWARD A.G.C.
F.E.T. DEVICES IN THE EDDYSTONE 640

ALTHOUGH *Technical Topics* is not usually concerned directly with what are basically political or administrative matters, it seems highly important that British amateurs should be fully alert to the possible ultimate effects of two matters currently before Parliament. One of these is the sweeping powers contained in Clause 7 of the Bill proposing amendments to the Wireless Telegraphy Act (the Bill is aimed primarily at reducing the number of television licence evaders but covers a number of other points); the other is the implications of the re-organization of the Post Office into a corporation instead of its present status of a Department of State.

Why should these proposals directly affect Amateur Radio? The vital point about Clause 7 is that if it becomes law in its present form, the PMG or the Minister who eventually takes over his powers (see below) will be able to prohibit the *construction* (whether or not for sale) as well as the importation of any specified types of " wireless telegraphy apparatus of any class or description." The actual wording includes the sentence: " Where it appears to the PMG to be expedient that the provisions of this section should apply to wireless telegraphy apparatus of any class or description for the purpose of preventing or reducing the risk of interference with wireless telegraphy he may by order specify apparatus of that class or description for the purpose of this section." Once specified, it would become illegal to construct, assemble from kits, manufacture or import that class of equipment.

This Clause is generally believed to be aimed initially at Citizen's Band and " bugging " equipment, but the more one thinks about the potentially almost unlimited scope of such a law, the more one realises how easy it would be to end up with restrictions cutting right across the normal activities of home constructors and radio amateurs. An obvious example might be the prohibition of all super-regenerative circuits (whether or not precautions had been taken to reduce radiation), or the specifying of all walkie-talkies other than those type-approved by the Minister (see some views on this subject in *Electronics Weekly*, 15 March).

We are not suggesting that the PMG is deliberately setting out to restrict amateur activities—but rather that the powers contained in the new Bill, should it become law, would so easily permit this to happen. It is worth recalling that in the 'twenties there was a famous attempt by the authorities to ban amateur contacts with stations outside the UK and that it was possible to oppose this on the grounds of the " experimental " clause in the original Wireless Telegraphy Act of 1904—so the precise wording of such acts is highly important.

Similarly the recent White Paper on the re-organization of the Post Office makes it clear that the regulation of radio transmitting licences will be one of those matters for which responsibility will remain with the Minister rather than the new Post Office Corporation. The White Paper does not indicate just which " Minister " will inherit these powers of the PMG (the actual post of PMG will almost certainly disappear) and it seems possible that the heir will be either a new Ministry of Communications or the expanding Ministry of Technology.

Here again, this may or may not have any practical significance as far as amateur licences are concerned—but it might well mean for example that we could find ourselves dealing with an entirely different Ministry with all the possible difficulties (and opportunities) that might offer.

For all these reasons, it seems vital that, in the next few months, amateur organizations and particularly the RSGB should keep an alert eye on what exactly is happening.

Note: This was written before seeing the April editorial on the subject. The matter is sufficiently important to warrant some repetition!

**Phase Discriminator for N.B.F.M.**

Many amateurs have remarked over the years on the relative lack of interest shown in narrow-band frequency-modulation/phase modulation which offers a number of useful points particularly for portable and/or low-cost equipment, as well as for normal fixed-station operation. One of the reasons for this state of affairs is undoubtedly the question of incorporating a good detector in the receiver (off-tuning to use slope-detection is just not on for serious operation).

So we are glad to be able to include an idea for a form of phase discriminator which eliminates the need for a centre tapped i.f. transformer or for the tertiary winding of a ratio detector. This has been sent along by Sven Weber, G8ACC; he has been using the circuit for some time although he points out that he has not got the equipment to go into it as thoroughly as he would like. But it " seems to work quite well at my QTH." It is a cross between a standard Foster-Seeley and diode integrator detectors (*TTftRA*, page 36).

He writes: " Many people have a standard 465 kc/s i.f. chain, and it is very rare that the last transformer is centre tapped. If one wants to read n.b.f.m. on such a receiver, more often than not it will be tuned to the side of the

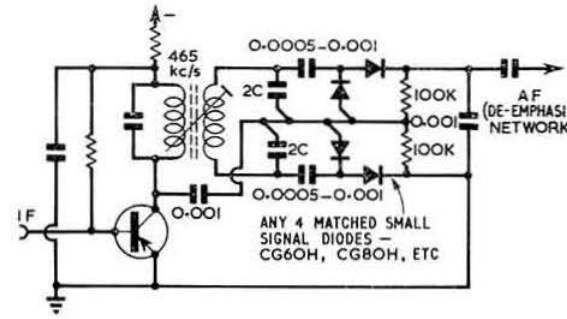



**Fig. 1. A four-diode phase discriminator for narrow-band frequency modulation reception, suggested by G8ACC.**

resonance curve, unless one goes out and buys a centre tapped transformer. Far easier is to centre tap the capacitance and to have two double diode integrator detectors (Fig. 1). The rest of the circuit is the same as the Foster-Seeley arrangement; in other words this implies that some kind of limiting is called for before the detector (say, manual gain, no a.g.c.). The detector is aligned the same way as the normal kind."

### Transistor Microphone Impedance Transformer

An idea for eliminating the need for a microphone transformer and at the same time providing gain is shown in Fig. 2 and comes from *Electronics World*, March 1967. This is a rather more elegant circuit (intended primarily for high-quality audio) than the more usual single stage step up arrangement which has been described in *TT* on previous occasions.

It is a form of " operational amplifier " using direct coupling; with the input transistor operated in the common base configuration, and with flexible matching and gain characteristics. The value of R1 is chosen to match the nominal impedance of the microphone, while R2 governs the closed-loop voltage gain (typical value about 100K ohms). This particular unit was designed for use with high-beta *p-n-p* silicon transistors (examples 2N3906, 2N2925 or 2N3644) but other types could almost certainly be used.

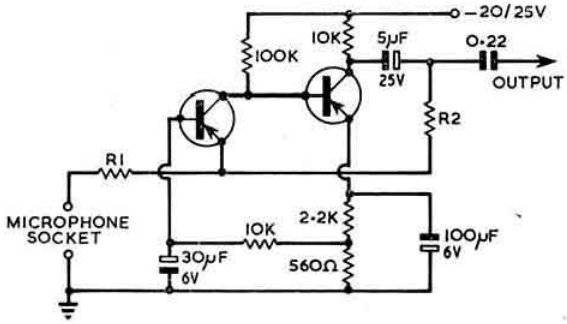



**Fig. 2. A transistorized microphone transformer (*Electronics World*). R1 is chosen to match the microphone impedance, and R2 governs the closed-loop voltage gain.**

### Radio Communication on Ascension

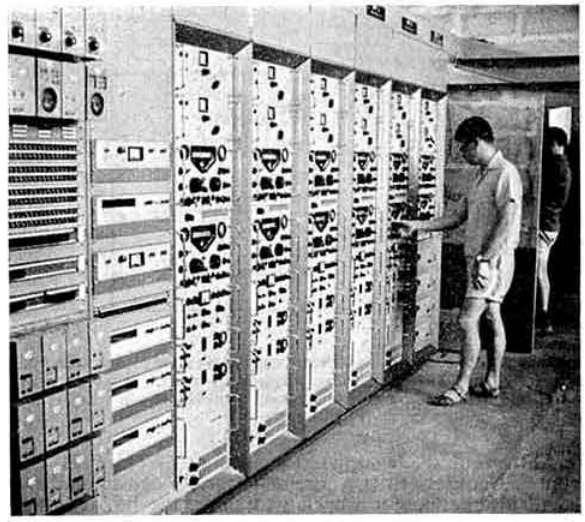
There are some advantages to being associated with what at one time was quaintly called the " fourth estate " but now more often draws rather harsher descriptions. As a journalist in the technical field one often gets a chance to examine the latest professional radio equipment, occasionally in " off-beat " places.

Recently, for instance, it gave me a chance to make a two-way contact on the 4000 and 6000 Mc/s bands between ZD8 and W1. This by putting some 15 kW into a 42 ft. dish aerial while the signals were beamed many thousands of miles upwards to the errant Lani Bird 1 communications satellite.

Not, of course, exactly an amateur station, but rather the new Cable and Wireless earth terminal out amid the dust and prickly pears and shrublands of Donkey Plain on Ascension Island, between Africa and South America.

Nevertheless, my mention of my amateur call to the manager of the Andover station in the States brought me into almost immediate personal contact with Tony Preedy, ZD8ARP (G3LNP) who had been listening.

And the day before, at the highly complex and fabulously equipped NASA unified S-band (2300 Mc/s) tracking station up on Devil's Ashpit (a descriptive name applicable



**The Hutt Crater BBC Atlantic Relay Station (Ascension Island) receiving bays. The receivers are Racal.**

to many of the lower parts of this fascinating island), the Bendix Field Engineer in charge of the equipment who showed us over the station, intended for working directly with the Apollo manned spacecraft, turned out to be ZD8BR (WB6SGT). And outside, along with the two 30 ft. dishes for the spacecraft links were a couple of three-element beams —one connected to an amateur rig, the other for receiving WWV.

Indeed on this island, along with its ash and clinker and lava, its giant turtles and rare seabirds, there seemed to be an amateur-radio population that amounted, in the new Two Boats community, to something approaching ten per cent of the occupants of these new bungalows.

One gained a suspicion that one of the attractions of a tour of duty on this remote island (apart from the absence of income tax, whisky at 12 shillings a bottle) was the chance of a still rare ZD8 call. I did not actually meet ZD8RP but was told that almost half the mail arriving on the island seemed to be addressed to him! And a siren is sounded down in the township of Georgetown whenever the mail arrives.

It is in such circumstances that one sees what radio communications can really mean to isolated spots in the world. Apart from the Cable and Wireless earth terminal, the NASA tracking station and all the NIKE-Zeus and Nike-X paraphernalia of the US missile tracking range, the entire island seems to sprout every form of h.f. aerial, from rotating and fixed log periodics, dipole arrays and multitudes of rhombics, as well as Tacan and other navigational aids.

In the Cable and Wireless transmitter hall in Georgetown —only a few yards from a beach where giant turtles come at night to lay their eggs—there are several generations of Marconi h.f. equipments, from old a.m. transmitters converted for linear i.s.b. operation up to the latest 7½ kW self-tuning units with full frequency synthesis. We noted an almost amateur shack touch in a couple of old fluorescent light tubes placed across the open-wire transmission lines to provide a visual indication of the h.f. output en route for London, New York and St. Helena. It was interesting to find that the short route of about 760 miles to St. Helena had presented considerable problems and had led to the erection some years ago of a large fixed log periodic array to give reasonable gain at a higher angle of vertical radiation than the more customary rhombics.

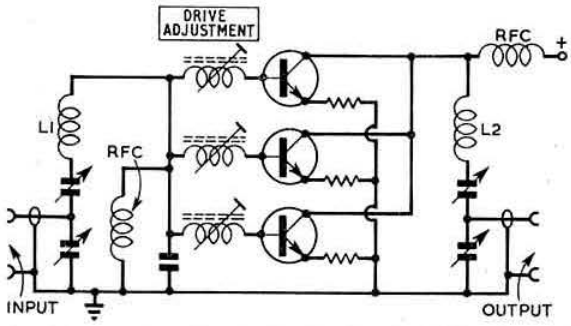



**Fig. 3. Outline of a three-transistor power amplifier of a type used by TRW for obtaining powers of about 60 watts up to 50 Mc/s. Note use of series tuned T-networks for input and output.**

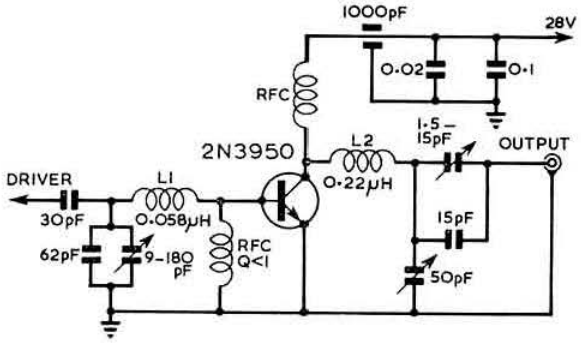



**Fig. 4. Output stage of the Motorola 50-watt, 50 Mc/s transmitter illustrating the use of the increasingly popular T-network for input and output matching.**

At the central telegraph office one finds that Morse is now confined entirely to the ancient telegraph cables and to a small installation for working to ships, the h.f. telegraph channels being obtained by splitting down i.s.b. telephone channels and using five-unit teleprinter codes.

Altogether a remarkable and fascinating island—both topographically and from a radio viewpoint. The near lunar desolation of the lower slopes contrasts with the pleasant farm land up on the central Green Mountain. Certainly, an amateur allowed to poke around the earth station, the four 250 kW BBC transmitters at English Bay, and the associated banks of Racal RA117 receivers at the Hutt Crater receiving site, the traditional telegraph cable equipment, the banks and banks of phase-locked microwave receivers for the NASA station discovers what a communications-dominated island can be like. And one can note with some satisfaction that in such a set-up Amateur Radio has a definite role to play.

Cable and Wireless have made an interesting 29-minute colour film of the building of the earth station and its part in the Apollo project. I understand this can be obtained (available June) for club showing (16mm) from the Company's Film Library.

### Transistors for Transmitters

A mass of information continues to appear from the makers of r.f. power transistors on how to use their devices without tears—and from transmitter designers that now more and more are endeavouring to do so. One of the more interesting recent meetings in London was that organized by MCP Electronics to allow George Luettgenau, director of advanced circuits of TRW Semiconductors to spend a day and a half dispensing very practical hints on transmitter applications (see *Electronics Weekly*, 15 February).

TRW now have devices providing up to 5 watts output at 1000 Mc/s, and ½-watt at 2000 Mc/s, and capable of giving useful power at even higher frequencies when operated in the transistor-parametric-mode (see *TT*, January 1966 and July 1965). These units are on the fringe of the state-of-the-art and are correspondingly costly, but as has been made clear in recent *TT* there are now plenty of transistors that give reasonable power at reasonable cost.

Among the many points that he stressed were the practical advantages of using a number of devices in parallel rather than attempting to develop really high power devices. This firm did in fact produce a few one-kilowatt h.f. transistors for the US Air Force but this approach resulted in almost unusable circuit parameters. On the other hand, h.f. transmitters producing 500 watts c.w. have been developed using a broadband (4 to 9 Mc/s) amplifier incorporating 20 transistors; two transistors are paralleled directly, then two of these units put into push-pull modules, and finally five such modules matched together using toroid transformers. This point has been put by Luettgenau as follows:

"Although the power output obtainable from single semiconductor devices is now appreciable, higher powers are often desired. This necessitates the combination of several power transistors in one stage. Many designers feel that no more than two transistors should be used in a single stage. This is not really so. If a symmetrical layout is used and further provision is made to equalize the drive power (see Fig. 3), three or more transistors will work quite well together."

The point is made that while it is tempting to employ the largest available transistor this approach may not be optimum for a number of reasons: one is the disproportionally high price of the highest power devices (this is because the probability of obtaining a flawless transistor chip decreases very rapidly as the crystal size increases); another is the very low base resistances of high-power devices resulting in matching problems.

Another technique which appears to be gaining widespread acceptance among designers of commercial equipment (particularly on v.h.f.) but has not often been raised in the amateur journals is that of using series-tuned circuits in the main output tank circuit of power amplifiers. This is basically because power amplifiers driven sinusoidally and having very distorted collector voltages work better into series tuned loads.

Power transistors operate in a rather different manner to valve circuits. The collector current is often nearly sinusoidal but the collector voltage is highly distorted due to the non-linear output impedance. Series tuned output tank circuits (Figs. 3 and 4) enhance the collector efficiency, and at the same time aid harmonic suppression. This method of operating a power amplifier is sometimes referred to as "dual class C conditions" and can result in high efficiencies of the order of 60 to 80 per cent.

On the question of efficiency, the following notes by the TRW engineers are worth noting: "High collector-efficiency of an individual transistor is certainly a desirable characteristic. What really counts, however, is the efficiency of an entire transmitter. The use of unbypassed emitter resistors permits one to trade collector efficiency for power gain. Because of this possibility, optimum transmitter efficiency is obtained when gains and efficiencies of the individual stages are carefully adjusted. It is usually desirable to operate the final amplifier with maximum efficiency, even if this means lowering the gain to 6db or less."

Several useful design points illustrating some of these matters can be found in a Motorola application note

(AN-246) available from: Motorola Semiconductors, York House, Empire Way, Wembley, Middx.

This describes a crystal-controlled 50 Mc/s transmitter providing 50 watts output with only three stages: 2N4072 oscillator, 2N3961 buffer and 2N3950 p.a. with a T-output matching network: see Fig. 4.

Some of the lower cost v.h.f. power transistors are of the " overlay " type; this is a technique developed by RCA using a sophisticated interdigital form of structure with the emitter split up into a large number of small " islands " evenly distributed over the base area in a square pattern: like some of the other special geometrical forms it will be noted that the device thus really consists of large numbers of small transistors in parallel. Production of all these modern r.f. power transistors has required the development of highly accurate photolithographic techniques with tolerances down to a tiny part of a micron.

Some recent RCA devices are now available in plastic encapsulated versions: for example the new 2N5017 which provides 15 watts output at 400 Mc/s and usable to 700 Mc/s (American quantity price around £15; but new RCA plastic a.f. power transistors at under a dollar). Another new RCA unit is the TA2793 developed for s.s.b. applications providing 25-watts p.e.p. output at 30 Mc/s. A relatively low-cost RCA " overlay " unit, the 2N4427, will provide some 1·25 watts output at 144 Mc/s and 0·4 watts at 470 Mc/s.

A new ITT 2N4130 gives 50 watts output at 70 Mc/s, and we note that this firm is offering a booklet: " Circuit considerations in v.h.f./u.h.f. power transistor design " (ITT Semiconductors, 3301 Electronics Way, West Palm Beach, Florida, USA).

**Integrated Circuit Applications**

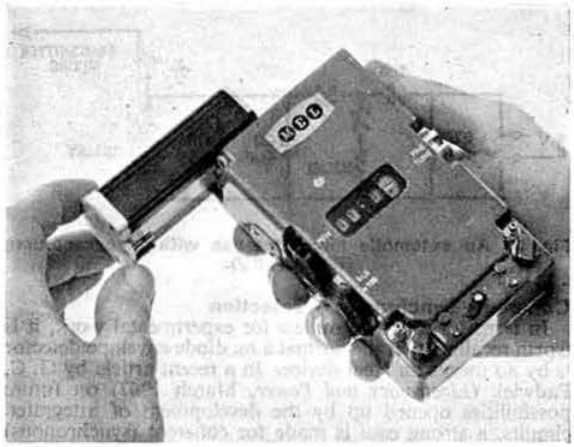
Since writing the notes on microelectronics (*TT*, January 1967) the evidence continues to accumulate on the potential value of SICs and other devices for amateur applications, with both digital and linear devices.

An interesting article (Motorola *Engineering Bulletin* Vol. 15, No. 1, 1967) describes in some detail how experiments have been made to convert the standard small American helmet radio (AN/PRR-9, 45-57 Mc/s double conversion receiver) to a circuit based on five SICs. This emphasizes that " large reductions " of size and weight are not likely to be achieved with receivers since many of the heavier and larger components cannot be integrated; nevertheless there are shown to be a number of useful advantages in this form of construction.

In January, we gave a possible source of the low-cost Fairchild epoxy-encapsulated units. Another source of low-cost units has been suggested by G8ASY. He points out that some extremely useful Motorola devices, such as the digital MC724P and the promising MC717P (a quad four input gate) both of which could be used in many of the ways suggested in January for the Fairchild unit, as well as a useful linear r.f./i.f. amplifier device, are available from Semicomps, 78 Stephyns Chambers, Bank Court, Hemel Hempstead, Herts at very competitive prices. Members wishing to obtain a few units for experimental purposes should write for a quotation of prices, preferably using RSGB members' headed notepaper.

Although as we have noted above, microelectronics does not automatically imply miniature equipment, it is interesting to see what can be done. The accompanying illustration shows a pocket-sized high-performance, communications receiver using both SICs and thin-film circuits currently under development by the MEL Equipment Company (presumably intended primarily for professional or military applications).

Although we have no first-hand knowledge of this set, it is claimed that it is a double superhet circuit covering the range 30 kc/s to 30 Mc/s with easy tuning by means of a digital display having the equivalent scale length of over



**A high-performance double conversion pocket-sized communications receiver using SICs and thin-film circuits under development by MEL Equipment Company.**

300 in. 1 Mc/s and 100 kc/s steps are selected by indexing knobs, with fine tuning on the variable control. Although designed primarily for a.m. and c.w., stability is said to be sufficient for s.s.b. working.

The first oscillator is crystal locked at 1 Mc/s harmonics, selected by an indexing mechanism geared to the variable capacitor, and the 1 Mc/s control also carries cams to operate microswitches to select pre-selection filters. The 100 kc/s steps are derived from switching in any one of ten crystals. There is also a crystal-controlled b.f.o. and the entire set is powered by two mercury cell batteries in the detachable plastic compartment. Size is $6 \times 3\frac{1}{4} \times 1\frac{1}{4}$ in.—it all sounds quite an advance since the days of the old MCR1 miniature communications receiver and other wartime efforts to produce compact gear. We remember one Dutch resistance worker showing us proudly a little mains-operated receiver he had built in a small tobacco tin with a performance/size ratio that seemed rather better than most of the official gear developed for the underground organizations; the set had even survived—undiscovered—searches (including an unexpected one on a rail journey) which would otherwise have resulted in some highly unpleasant consequences for its owner.

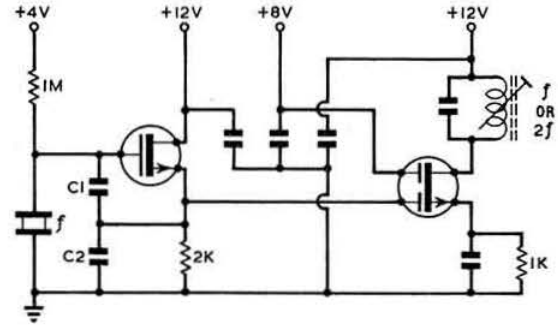



**Fig. 5. An interesting IGFET oscillator and dual-gate IGFET buffer designed to provide high stability by extremely low loading of the oscillator. C2 is three to six times larger in value than C1. At present device prices this would be an expensive unit, but it is worth noting for the future. From George Luettgenau's lecture.**

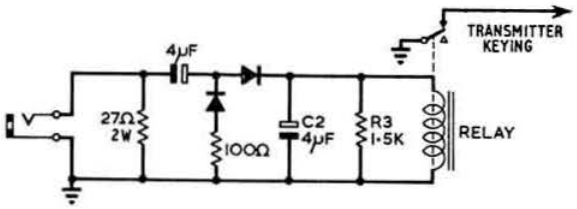



**Fig. 6. An automatic keyer for use with tape recorders (K3AAY, *CQ*).**

### Coherent (Synchronous) Detection

In terms of potential outlets for experimental work, it is worth recalling that the normal a.m. diode envelope detector is by no means an ideal device. In a recent article by G. C. Padwick (*Electronics and Power*, March 1967) on future possibilities opened up by the development of integrated circuits, a strong case is made for coherent (synchronous) detection even for a.m. broadcast receivers. He notes: " The envelope detector (diode) is certainly not the best form of signal recovery, but is, for cost reasons, mandatory. A coherent detector, which requires the use of complex carrier restoration circuits, has many advantages, but, by present-day techniques, is too expensive.

" It is superior to the envelope detector in that it offers: better noise rejection; automatic frequency control; better apparent adjacent-channel selectivity; possible better performance under selective-fading conditions."

He points out that the possibility of making practical coherent detectors at suitable cost by means of integrated circuits " may well have profound effects on broadcasting, and, in particular, on the factors that affect the choice between a.m. and f.m. and between h.f. and v.h.f."

True coherent detection is usually postulated for double-sideband suppressed-carrier operation (d.s.b.), and following up this question is a further thought-provoking passage from the recent book " Principles of Coherent Communication " by A. J. Viterbi.

" The only advantage of s.s.b./a.m. over d.s.b./a.m. is that the transmission bandwidth is reduced by a factor of two. It is a common misconception that the output signal-to-noise ratio for s.s.b./a.m. is double that for d.s.b./a.m. because of the decrease in bandwidth. The origin of this error lies in the fact that conventional noncoherent d.s.b./a.m. demodulation employs a filter before the demodulator which passes twice as much noise power as for coherent demodulation ... However coherent demodulation yields the same performance for both systems."

This underlines a point which is now fairly widely understood by some (but not all) amateurs—and why the old " 9db " advantage of s.s.b. is seldom mentioned nowadays. Of course, for amateur operation, the halving of bandwidth with s.s.b. is an extremely important consideration.

Later in his book, Viterbi states that the classical modulation systems are still probably the most widely used for broadcasting ... " on the other hand, the optimum demodulation systems are relatively recent and for the most part have yet to replace the conventional demodulation techniques which have been in existence for many decades."

Synchronous demodulation is already used for colour television (control by accurate timing " bursts "), and for pilot-tone stereo broadcasting (subcarrier at half the required re-insertion frequency). Coherent or synchronous demodulation provides the same advantages as product detectors. If we may quote yet a further authority (Dr. P. F. Panter's " Modulation, Noise and Spectal Analysis "): " Another very important observation ... there exists (unlike for the diode detector) no threshold effect if product detection is used in d.s.b. and a.m. receivers. The output signal-to-noise is, of course, proportional to the input signal-to-noise, but the desired signal is always there, even under adverse receiving conditions. This signal preservation property of synchronous detection may turn out to be of great value in future communications systems where signal processing requires that the desired signal be present at all times."

This is one of the reasons why communications engineers are becoming so interested in phase-locking (*TT*, March 1967) to provide accurate carrier injection signals for coherent forms of demodulation with extremely narrow bandwidths. It is worth remembering that it has already been shown that sufficient information is contained in the sidebands of a d.s.b. signal to allow the reconstitution of a locked carrier frequency, permitting the use of a coherent detector.

It has also been suggested (W6GXN, *QST*, December 1965) that the key to the reception of extremely weak slow telegraphy signals on a narrow-band phase-locked receiver lies in the use of phase-shift keying.

A good review of sychronous communication by Dr. J. P. Costas, W2CRR appears in the " s.s.b. issue " of *Proc IRE* (December, 1956) in which he points out that " we have been misusing rather than using a.m. in the past " and gives a block outline (later reproduced in *Wireless World*, May 1961) of a synchronous demodulation system. Over ten years later, we are still misusing a.m.!

These subjects can take one into pretty deep water, but there could be some correspondingly remarkable improvements to weak signal operation if all the problems could be cracked.

### Automatic Keyer

Way back in 1959 (*TT*, July, 1959 and *TTftRA* page 56), we gave a simple circuit for an auto-keyer to allow a tape recorder to be used, for example, for making pre-recorded CQ calls by keying the transmitter from the a.f. output. Fig. 6 is another version of this same idea but using rather more modern components to allow operation with a good deal less a.f. input. This circuit was described by K3AAY in *CQ* (February, 1967) and uses two 1N91 rectifiers, a time-constant provided by C2-R3 and a mercury wetted type of relay having a coil characteristics of 4000 ohms at 1·25 mA.

### Forward A.G.C.

In all the various discussions in *TT* on the subject of cross-modulation in receivers using conventional bipolar transistors, one of the important aspects of the subject seems to have been missed. This is the question of using forward as opposed to reverse a.g.c. This is a subject that has been receiving increasing attention in recent years and has led to the appearance of a number of transistors intended specifically for this type of operation.

With valves, gain control has traditionally been achieved by shifting the bias conditions towards cut-off (i.e. made more negative to decrease gain). With vari-mu characteristics, this is perfectly satisfactory. And when transistors came along it was natural to translate this simply into a question of reducing gain by shifting the operating point so as to reduce emitter/collector current to reduce gain. This was widely used (and still is in many broadcast receivers) but it overlooks the fact that the transistor characteristics are those of a sharp cut-off pentode rather than a vari-mu device.

But there is an alternative technique; that of so *increasing* the emitter current that the amplifying properties begin to deteriorate. This technique is usually called *forward a.g.c.* and the conventional system *reverse a.g.c.* Forward a.g.c. depends upon the so-called " high-frequency knee " region of transistor characteristics, and in transistors intended for this type of application (for example many of the recent

silicon u.h.f. and i.f. types for television receivers) this region is made extra large. It should be noted that this form of gain control is not practicable at low frequencies.

Why should forward a.g.c. be better than reverse a.g.c.? The answer is that the signal handling properties of a stage using forward a.g.c. are much larger than those for the corresponding reverse a.g.c. In other words larger signals can go through the stage without serious cross-modulation occurring, than with reverse a.g.c. (always provided that these larger signals can be passed through all the remaining stages without cross-modulation).

A problem with either form of a.g.c. is the relatively large variations in input and output admittances that occur when the operating point of a bipolar transistor is changed.

A technique we have noticed being used in commercially-developed communications receivers is the connection of an additional gain-control transistor in series with the emitter circuit of the main amplifying transistor (collector of control transistor to emitter of main transistor, emitter to chassis) with the gain control line taken to the base of the control transistor.

**FETs in the Eddystone 640**

Interest continues at a high level in FETs and IGFETs and an idea which must have occurred to many amateurs is the possibility of putting these devices into older communications receivers. Interestingly enough it looks as though this can be done without great difficulty.

Mike Barlow (ex-G3CVO) in Montreal reports that after buying some 2N3819 junction-FETs intending to build the G3HBW converter, he succumbed to the temptation to try them in the front-end of his old Eddystone 640. The FETs are mounted in the wiring of the underside of the coil box, and he says that the fascinating thing is that all the existing components can be used unchanged, and that even the oscillator trimmers did not require adjustment!

Fig. 7 shows the outline of his conversion. Originally he used a grounded-source r.f. stage, but because of neutralization problems and bandswitching, this was changed to a grounded gate circuit, using the existing 400-ohm aerial coil as the source driving circuit, letting the normal "grid" coil float. The 12 volts of h.t. are obtained from the cathode of the 6V6 audio valve. Next, he tackled the mixer, again simply replacing the hexode portion of the 6K8 (ECH35) by an FET, and obtaining injection by removing the cathode bypass capacitor so that it becomes a common cathode-coupled oscillator-mixer hybrid. The valve oscillator went next, and as already noted, came up dead on frequency. Some experimenting with bias values followed, and the decoupling resistors were reduced in value because of the low h.t. (up to 25 volts is permissible). It was not found necessary to increase the decoupling capacitors. The a.g.c. and r.f. gain lines have been disconnected from the FETs pending some re-organization of the i.f. and audio end; this improved stability on s.s.b. signals considerably.

Efforts to replace the i.f. stages by 2N3819s however came unstuck because of the difficulty of neutralizing the stages without tapping the existing i.f. coils. It is possible that someone with a deft hand could tame the system, but Mike Barlow says he found that the crystal phasing capacitor always seemed to act as a regeneration control. Using two FETs in a cascode arrangement did not help, and he thinks that the answer is probably to rebuild the i.f. coils or put in a new miniaturized i.f. strip.

With the b.f.o. also replaced, and its neon stabiliser, there is now room under the chassis for several v.h.f. converters. He says that as far as performance is concerned, his test equipment is not accurate enough to be able to say more than that the front-end noise is less, and the sensitivity seems unchanged.

This report could well encourage others to look at older receivers to see if they can be FET-ized or IGFET-ized!

**Here and There**

Eric Sabin, G8AKR would like to see more attention paid to developing modern forms of super-regen circuits (a sentiment that has been echoed several times in *TT* in the past) and we hope to refer to some of his ideas in forthcoming *TT* (always assuming that it remains legal to build them!).

A new type of flat, low profile audio cable, developed for music distribution systems, is adhesive backed and can be readily fixed to many types of walls and other surfaces without nails or staples. It might well have applications where "shacks" share with other domestic uses. But note that this is not designed for mains voltages and that r.f. characteristics are not known. This is the 3M "Scotchflex" brand flat cable system.

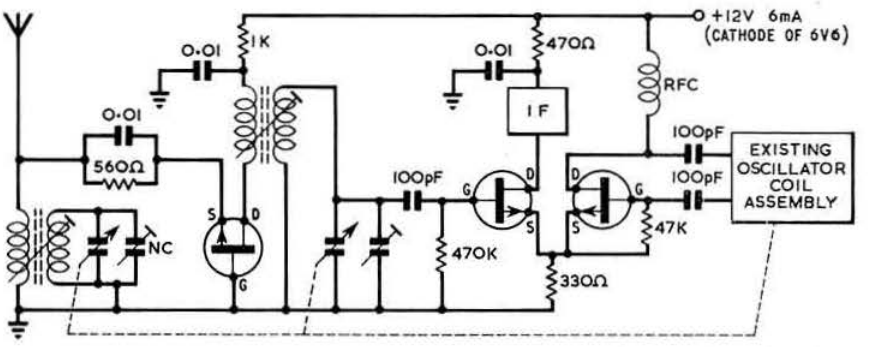



**Fig. 7. Simplified circuit of the Eddystone type 640 receiver after the valves have been replaced with 2N3819 FETs. The coil pack and trimmers can remain untouched.**

**Radio Fraternity Lodge**

RSGB Past President Leslie Cooper, G5LC, was recently installed as the Second Master of Radio Fraternity Lodge of Freemasons. The Secretary of the Lodge is Mr A. V. Tillin, G3MES, 1 Frogmore Gardens, North Cheam, Surrey. Mr Cooper is President of the Thames Valley Amateur Radio Transmitters' Society and Mr Tillin a prominent member of the Sutton and Cheam Radio Society.

**RSGB Amateur Call]Book 1967**

The following are corrections to the 1967 edition of the *RSGB Amateur Radio Call Book:*

G3VNX, Anthony R. Uwins, Ravenscourt, Grange-over-Sands, Lancashire.

G3HJM, D. Outram, Adaville, Hunwick Station, Nr Crook, Co. Durham.

# Radio Amateur Emergency Network News

By S. W. LAW, G3PAZ*

### Slick Job!

Those of us who followed with interest, or even apprehension, the progress of the vast oil slick emanating from the ill-fated *Torrey Canyon* as it crept inexorably towards the Cornish coastline may well have been too occupied with the Easter holiday to consider the full extent of the possible ramifications. Not so the local RAEN group. No Easter holiday for them! As soon as the County Controller, G2AYQ, realized the possible consequences of the prevailing weather conditions he was more than half prepared for a call from the User Services. Sure enough a request was received from Newquay, where official communications were overloaded. In a gratifyingly short space of time a base station was in operation at " Oil Headquarters " in the Town Hall, and three mobiles were at work passing traffic from the beaches on 3·7 and 70·375 Mc/s. Since this was no ordinary disaster but a long struggle against increasing odds, all stations of the Cornwall Group of the Radio Amateur Emergency Network went on Standby until further notice.

The emergency continued throughout the Easter Sunday and Monday, and on Tuesday afternoon, 28 March, Superintendent Lobb, in charge of Police Communications, Newquay, asked for a net between the Operations Room in the Council Chambers and the beaches. Starting with a control station and two mobiles, this grew to four and even five including some walkie-talkies. During this period the control station was visited by the Lord Lieutenant of Cornwall accompanied by Mr Harold Greenwood, both of whom were most impressed by the working of the Radio Amateur Emergency Network.

Our very best congratulations to G2AYQ and his hard-working team, and a special cheer to the lady member G3UGO who, we understand, put in some sterling work at the control station. Good Show, Cornwall!

### Blind Spot

One of the first duties of a writer is to ascertain for whom he is writing. The jargon of the dedicated computer engineer can be quite incomprehensible to the practical diesel mechanic. It is with some sense of shame that we realize that this column has been hitherto directed at the established RAEN member to the exclusion of the SWL, young or not-so-young, who avidly reads this publication from cover to cover each month. Several letters have made us aware that our activities (and our " jargon "!) are a source of great interest and no little puzzlement to a number of short wave listeners—potential members at that! We will try to bear this in mind.

### We Mustn't Do It

One of the questions raised by a listener recently concerned the use of the term " Raynet " instead of the initials of our heading RAEN. To explain—*all* radio transmitters anywhere in the world, whether amateur or professional, are given an exclusive call-sign. This may consist of a mixture of letters and figures or a group of letters only. Since the ships of every nation carry four-letter call-signs, it is evident that the transmission of certain groups of four letters could cause great confusion to shipping. The term " Raynet " is perfectly acceptable and forms a suitable alternative.

* 11 Chisholm Road, Croydon, Surrey. CRO 6UQ

### Makes Perfect?

Another letter queries the practice sessions and exercises mentioned in this column. Now we are treading on delicate ground here because, while nobody will deny that a radio amateur must display a certain degree of discipline in order to obtain, *and retain* his " ticket," we maintain that continual practice in the efficient passing of messages under *controlled* net conditions is essential if chaos is to be avoided in the event of an emergency. Any listener who has heard a " pile-up " on a competition night will realise that good-will and a desire to help might not be enough!

### Willing Hands

To settle yet another query—let us make it quite clear that the short wave listener is very welcome in the framework of the Radio Amateur Emergency Network. The possession of a transmitting licence is not an essential qualification, and we hasten to assure the SWL that there are many useful and interesting jobs to be done—we mentioned one last month which is " tailor-made " for the tape enthusiast. Then there are aerial systems to be designed, constructed and erected at the premises of User Services; to say nothing of monitoring and message carrying. Don't forget that it is all voluntary—you'll get nothing out of it except satisfaction!

### Had Any Luck?

Tips would be welcome from those members who have been working on the R220 receivers which have recently become available to us. These have good potential as a stand-by receiver with mute facility, but there are one or two snags to be ironed out for some members to make them suitable for our 4m channel (70·375 Mc/s ± 25 kc/s).

### Hands Across The Sea

For those who may not yet have elucidated the cryptic comment in a previous column re shamrock—let us not overlook the sterling efforts of our friends in the Emerald Isle. The group in Belfast have been quietly getting in some really first class work, often in weather conditions which would daunt the keenest Raynet man. When the full tale can be told we know that these chaps will merit the good wishes of us all.

### Hot Spot

For those who favour the fashion of driving in shirt-sleeves on the coldest day (presumably to demonstrate their heater-booster?), watch out for those sly little jets of hot air that may well do a bit of no good to that transistor front end or converter. Many a strange breakdown may be eventually traced to a distorted dash or parcel shelf directing a hot stream of air into the rig.

### Point of View

Are you sure that you understand the viewpoint of the local User Services? It may well be that both you and they have some differing views as to the respective functions without realising that these ideas exist. Try to get together occasionally for a friendly chat to get the other point of view. It may surprise you, but it cannot fail to be of help when you are suddenly called upon to co-operate under emergency conditions.

*(Continued opposite)*

# Don't Leave It To Them— Them Is Us!

**By SYLVIA MARGOLIS, RSGB Public Relations Officer**

COMMUNAL projects like the Radio Society of Great Britain are made up of two classes of people—them and us. THEM are the few enthusiasts who do the endless, tedious, demanding work. They are always impetuous, extravagant, self-seeking, wilful, opinionated and egocentric. The criticizing and the carping is done by US. Us are always cautious, economical, altruistic, malleable, understanding and modest.

As the Society's first Public Relations Officer I am going to attempt to turn some of US into THEM. I promise it won't hurt a bit!

At first we envisaged the PRO Scheme purely as a defence mechanism, operated by a Don Quixote who would roar into battle whenever Amateur Radio got a bad Press notice. The Council were canny enough to let a woman take on the job, because a woman is less likely to be duffed up by enraged Fleet Street characters than a man.

To the surprise of everybody concerned the scheme shows startling signs of workability. The Press is reacting politely, if rather bemusedly, to the appointment of a Press Officer. One leading newspaper, on the snoop for something we wouldn't tell them, even if we could tell them, were so delighted with our information that we were unable to give them any information, that they sent us a cheque for £2. This was handed over to the Society and it will be used for the PRO petty cash account. It seems that not only might the PRO venture pay its own expenses, but that it might even show a profit for the Society!

Thus encouraged we are going to attempt something new, something which, I believe, no other national society has yet tried. If it works—and it can work only with the direct collaboration of the members—we shall have launched a first-rate public relations scheme which other societies will surely want to copy.

What is at fault is our image. There's a lot of smug and pompous blather put out by some amateurs who say this doesn't matter. They might not care that the greater the public's suspicion and dislike of Amateur Radio, the less secure stand our frequencies. Or, on a more domestic plane, they might not, as I have, met radio amateurs' wives who loathe the hobby and have been *forced* the other side of the "XYL Barrier," only because of the appalling relations Amateur Radio has created with their neighbours.

Right-minded, responsible amateurs will agree that to improve our image is vital for our survival. This can be achieved only by educating the public to a better understanding of the Amateur Radio *Service*—we use this phrase deliberately. In Britain we may not be able to extend the services to the public that amateurs in other countries may, but we still give an essential service in training people in the science of communication and in maintaining emergency communication systems.

We propose therefore that the PRO scheme becomes an active, not merely a passive, operation. We want to establish a panel of speakers, to cover the whole of the UK, willing to go out and talk, in an entertaining and informative way, about Amateur Radio to local audiences. The whole country is honeycombed with organizations who want speakers—Rotaries, Women's Institutes, Townswomen's Guilds, Friendship Clubs, schools, colleges and youth clubs.

The only qualification needed is one which radio amateurs, more than any other section of the community, possess to the nth degree—talk power. If we can harness and exploit a fraction of the energy expended on Top Band to the benefit of Amateur Radio, we shall have launched a formidable scheme! Anybody who is reasonably articulate can help. For this type of speaking no special training is necessary and a local accent is the greatest asset a speaker can offer a local audience.

Most clubs arrange their speakers weeks ahead and the volunteers would take on dates within a 10-mile radius of their own homes. Individual travel expense arrangements could be made by the speakers themselves, although it is not anticipated that RSGB speakers would expect payment for their services.

We could draw up a brief, using ideas submitted by all the speakers, to guide speakers, supply data and suitable anecdotes, of which the supply is enormous, and circularise the headquarters of the host organizations.

If sufficient people offer their services and we can arrange a nationwide network of RSGB speakers, the scheme can begin at once and with only token expenditure. Offers should be sent to the RSGB Public Relations Officer, 95 Collinwood Gardens, Clayhall, Ilford, Essex.

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## RAEN News

(Continued from opposite page)

### Concrete Results

Those who turn an ear towards "Little England Beyond Wales" may well hear some rather good 4m signals on our channel. These will be emanating from a concrete fort overlooking Pembroke Dock. A complete block of the old fort (now vacated by the Territorial Army) has been leased by the local RAEN members, largely due to the sterling efforts of Old Timer GW2OP. From what we hear this is a cosy and well-equipped headquarters despite the exposed position, and we must congratulate those concerned in the acquisition of this excellent site. Those who can tune our 50 kc/s band might care to send in a report if they hear Pembroke.

### Hardly Tactful?

There were some disrespectful remarks passed by members of the Surrey Group recently when they were unceremoniously shot out of their Sunday stupor by an emergency exercise. The mild rancour quickly turned into good-humoured chuckles, however, when the title of the exercise was revealed —Exercise *Polecat*! There was an *excellent* turnout. A number of mobiles covered the area of activity and the User Service stations involved were soon manned and on the air. All the test messages were duly dealt with, and the participants eventually returned to their various firesides highly satisfied.

### Radio Eisteddfod?

A little bird whispers that there is some "harping" on RAEN in the Welsh valleys. We would be delighted to hear that the "bards" have got together to meet the challenge of what must be some of the most difficult terrain in the country.

# An S.S.B. Mixer and Linear Amplifier for 70 Mc/s

By Dr D. V. FOSTER, G3KQR*

A STANDARD s.s.b. exciter capable of supplying a watt or two of drive on 21 Mc/s can, with the aid of this unit, produce an output up to the legal limit on 70 Mc/s of 200 watts p.e.p. input. The circuitry uses readily obtainable valves, is easy to build and complete alignment can be achieved with the aid of a grid dip oscillator and a milliammeter. The total cost is small and in the prototype all the components came out of a well stocked junk box.

It is essential that the stability of the exciter supplying drive on 21 Mc/s should be beyond reproach and also that the output on this frequency should not contain any spurious frequency, which, after mixing, would appear in the output of the 70 Mc/s amplifier. The exciter used by the author is equipped with a drive control which enables control of the injection frequency, but if this refinement is not available then the output of the exciter may be fed into a passive resistive network. Use of the audio gain control on the exciter as a drive control will result in a degraded s.s.b. performance.

### Power Supplies

The provision of the power supplies for these units is a major undertaking and due regard must be paid to this before embarking upon the construction of the relatively simple two r.f. units.

The power supply for the crystal oscillator, mixer, class A amplifier and screen of the linear amplifier should have an output of 250V at 100 mA. The author used a Solartron AS/754 supply having electronic voltage stabilization, but a supply having good dynamic characteristics with a large output capacitance in the filter would also be suitable. It is suggested that this capacity should be in the region of 40 to 50 $\mu$F.

The anode of the QQV06-40A/5894 linear amplifier is supplied from a second power unit having an output of 500-600 volts at 200 mA. In this case a home built supply was used employing 3B28 rectifiers and a pair of 12E1 stabiliser valves. The linear current may swing from a resting figure of 30 mA to 150 mA peak if it is operated in Class AB2 and therefore, while a stabilised supply is not essential, it must be emphasised that the p.a. h.t. must have good dynamic characteristics with a large output capacitance.

### R.F. Units

It is accepted that those amateurs embarking upon the construction of this equipment will have had reasonable experience of v.h.f. practice. It is upon this premise that no details are given as to the actual positioning of small components.

There are two r.f. units: unit one comprising the crystal oscillator, mixer and Class A amplifier, and unit two being the linear amplifier. The first is built upon a standard chassis 12 in. × 5 in. × 3 in. and the second unit is built on a 12 in. × 3 in. × 3in. chassis. When the two units have been completed and tested they are bolted together with a centre aluminium dividing screen.

Unit one employs a 6AK6 as a crystal oscillator tripler, a 5763/QV03-12 as a doubler, a second 5763 as the high level mixer and an 832A as a Class A amplifier. The crystal frequency used is 8·138 Mc/s but this is not critical The anode of the 6AK6 is tuned to approximately 24·5 Mc/s and this is doubled to 49 Mc/s by the second 5763. The injection frequency of 49 Mc/s combines with the 21 Mc/s output of the h.f. s.s.b. exciter in the 5763 mixer and the resultant 70 Mc/s output signal is linearly amplified by the 832A. The output of the 832A is link coupled to the grid circuit of the 5894/QQV06-40A final amplifier in unit two.

For those constructors wishing to use a crystal oscillator of the Colpitts type, the circuit in Fig. 5 on page 161 of the RSGB *Amateur Radio Handbook* (Third Edition) is recommended.

Unit two, the linear amplifier, is built on the smaller chassis. Bias for the QQV06-40A/5894 is derived from a heater transformer, with half of its 250V primary winding removed, mounted on the top of the chassis. The bias voltage required for class AB2 operation is only about 25V and any small transformer giving just over this figure when coupled to the heater line will function perfectly adequately. Excess voltage is not required as then it would only have to be dissipated in the wirewound bias control potentiometer.

Fig. 1 shows the distribution of components on the larger unit; this is not critical and need only follow the functioning of the parts. There are only two circuits tuned to the same frequency, i.e., the grid and anode of the 832A and if the usual precautions are taken no problems of instability should occur.

Reference has already been made to the crystal frequency and that chosen for the prototype equipment was arbitrary inasmuch as that a good specimen was at hand having a frequency of 8·138 Mc/s. Various factors determine the choice of crystal frequency: it should heterodyne with the s.s.b. from the exciter in such manner that there are no unwanted frequencies near 70 Mc/s; the multiplying factor should not be too large and unwanted multiplying frequencies should not cause interference with television reception, the station 4m converter and main receiver system.

A fundamental frequency of 8·138 Mc/s satisfies these requirements in the London area coupled with the fact that the s.s.b. exciter used (a home built one) has a tuning range of 21 to 22 Mc/s on that band and 8·138 Mc/s multiplied by six, places the s.s.b. exciter tuning in the middle of its range.

The surplus FT243 range of crystals provides a ready source of supply for our purpose and after the necessary sums have been done having regard to the tuning range of the exciter to be used, one can be selected, say 8·125 Mc/s.

The h.t. supplies to unit one are split up and brought out separately to a five way tag strip mounted on the crystal end of the chassis in order to make alignment and testing easier. The crystal oscillator and multiplier, mixer and class A amplifier can all be checked individually and when this has been accomplished, permanent jumpers are connected to tie all three 250 volt points together to make the final wiring complete.

Fig. 1 and Fig. 3 refer to unit one and reference should be made to the parts list. No other actual constructional details are given as the work and layout is quite straightforward.

### Alignment

When unit one has been completed and the usual visual checks for faulty workmanship have been made, the circuits

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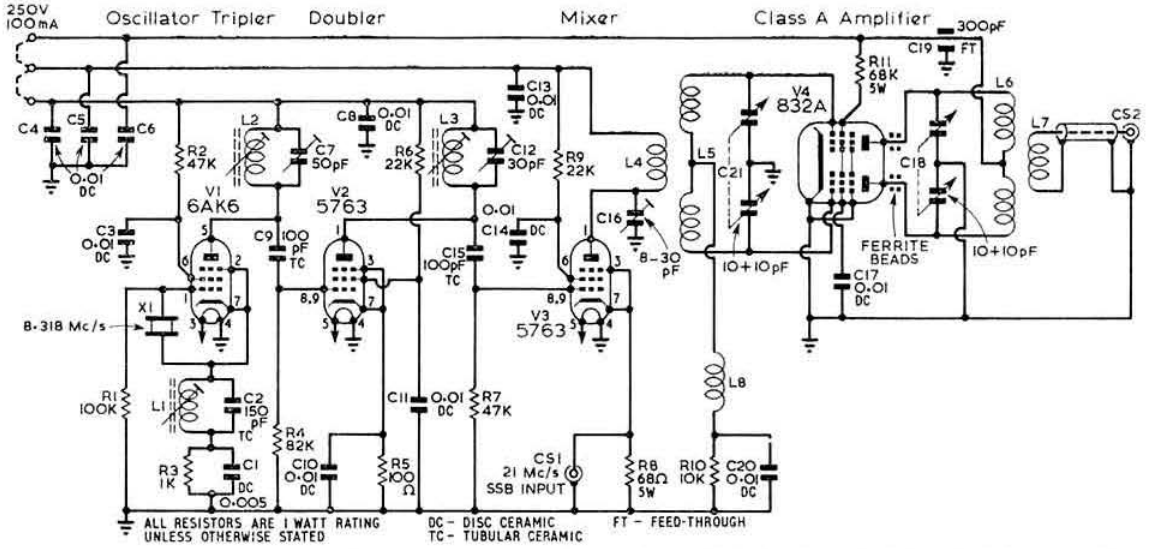



**Fig. 1. Single sideband mixer for 70 Mc/s, driven by 1 or 2 watts p.e.p. from a 21 Mc/s h.f. exciter. This circuit is referred too as unit one in the text and delivers about 5 watts p.e.p. output at 70 Mc/s.**

of the crystal oscillator and doubler L1, L2 and L3 can be adjusted with a g.d.o. to something close to their operating frequencies. L1 should resonate on the high side of the crystal frequency to prevent overexcitation and high crystal current and the circuit should have a low L/C ratio. C2 may have to be replaced by a variable capacitor for initial adjustments. L2 resonates at three times the crystal frequency which is very nearly 24·5 Mc/s, and L3 is resonated to 49 Mc/s. Valve shields are not used for either of the 5763 valves. Power is applied, consumption noted at about 30 mA and L1, L2 and L3 can be adjusted using the g.d.o. as an absorption wavemeter.

Power is then removed from the unit and L4, L5 and L6 are resonated to 70 Mc/s, as hitherto, with a g.d.o. Power is applied to the 832A, a milliammeter being inserted in the anode line. Current consumption should be 30-40 mA. A diligent search should be made for instability and grid and anode circuits should be critically tuned to coincident frequencies at and near 70 Mc/s and the anode current watched carefully. The circuit must be electrically dead without drive applied and no variation of anode current must take place when the grid and anode are tuned. Provision was made in the prototype for cross-neutralization and at one point in time it was thought that it was needed but this proved to be fallacious for self resonance was traced to the use of an r.f. choke in the anode circuit, and once this was removed the 832A became tractable. It became placid when two ferrite beads were slipped over the anode leads close to the anodes. This " friskiness " of the 832A appeared to be unrelated to grid tuning but related to anode circuit configuration.

Once all is in order, natural curiosity can be satisfied and unit one tested. The 4m receiver is turned on, the station s.s.b. exciter is connected to the unit and power applied to all stages except the 832A. A small amount of carrier is inserted and the signal identified on the receiver. L4 and

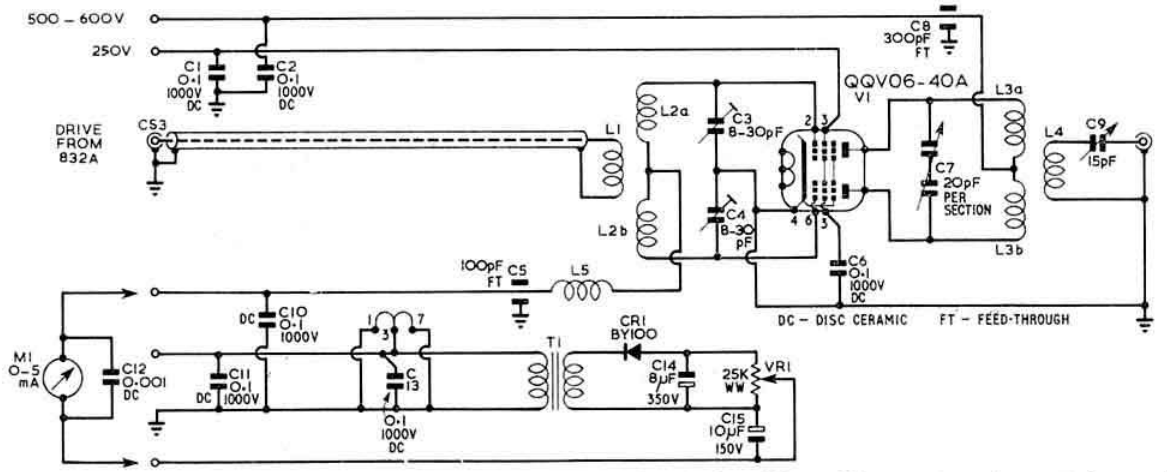



**Fig. 2. Unit two as described in text. This operates at 200 watts p.e.p. input, when driven with approximately 5 watts from unit one.**

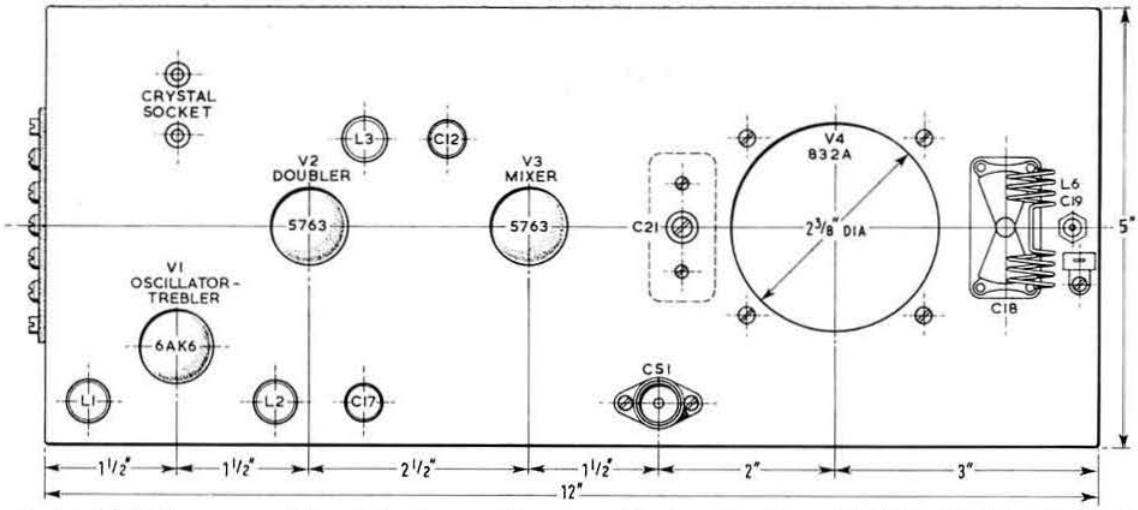
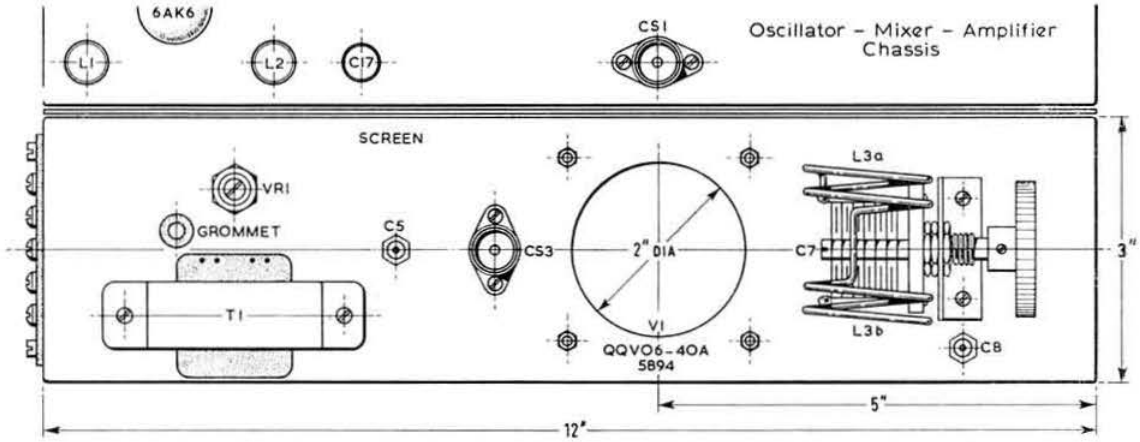



**Fig. 3 and 4. Main component layout of unit one and two as used by the writer. As explained in text this is not critical.**




L5 can be trimmed up against the receiver " S "-meter. If power is now applied to the 832A and the amount of inserted carrier reduced, L6 can also be trimmed in the same manner as L4 and L5. If the carrier is now eliminated, 70 Mc/s s.s.b. can be monitored on the station receiver.

It will be noted that L4, L5 and L6 are all high *Q* circuits and that no resistive loading is used. It was felt that there should be as many circuits as possible tuned to 70 Mc/s, precisely, in this stage to degrade any other frequencies coming out of the mixer. A useful power output is obtained from the 832A, something of the order of 5 watts p.e.p., though this was not accurately measured. No retuning of the circuits is necessary from one end of the band to the other. Slight use was made of the unit as a barefoot exciter for two evenings using a poor quality three element Yagi at 30 ft. and the unit was said to be working well at 40 miles. It could well be that this unit alone would satisfy the requirements of some 4m operators if the anode voltage of the 832A were raised.

**Linear Amplifier**

Fig. 2 and 4 refer to this (unit two) and a list of components is appended. The linear has, of course, the same circuitry as a conventional final and the only difference lies in the conditions under which it is operated, with perhaps a hint of high " C " in the anode circuit as a concession to theory.

Fig. 4 outlines the positioning of components and C3 and C4 should be angled so that their tips do not protrude below the bottom level of the chassis. The usual care should be exercised in making sure that the QQV06-40A/5894 has its internal shield level with the chassis platform and that the hole cut through the chassis to receive the valve is only just large enough. Mounting studs of $\frac{3}{8}$ in. on the septar valve socket gave the right depth with a British version of the valve but a slight discrepancy was noted when an American valve was used; a small point but worth watching.

C5 is certainly not critical and neither is C8 except insofar that the latter must have an adequate voltage rating. C9 was included in the prototype but then promptly shorted out; the anode circuit should be tightly coupled to the aerial. C7, the anode tuning capacitor, is held off the chassis deck with its spindle about $1\frac{1}{2}$ in. above the chassis by means of a simple " L " shaped aluminium or brass bracket, which allows the anode leads to be short.

The bias supply has been referred to before; the voltage required is about 25V and there should be as little

as possible in the way of resistance in the grid circuit. That portion of VR1 which provides a grid leakage path can back up the bias voltage when grid current flows and the aim should be to find as large a potentiometer as can be included below the chassis and to pass through it as high a current as it will safely tolerate. C15 cushions the bias and can be made as large as one likes.

When unit two is complete its circuits can be adjusted to 70 Mc/s with a g.d.o. Most of the tests can be made as it stands, not connected to anything but its power supplies. The heater voltage can be applied and the bias potentiometer VR1 adjusted to give 25 volts at the grids. Care must be exercised in applying screen voltage with reduced anode voltage or the screen ratings may be exceeded.

As with the 832A a careful search must be made for instability. In the prototype this was a labour of supererogation and the final was without trouble from the inception of testing. Bias was released to allow the valve to dissipate its full 40 watts and the controls juggled, but the only thing that was learnt during this exercise was that a 6-40A can get very hot.

A good deal of thought was given to the class of operation of the valve and it is felt that AB2 should not be attempted unless all supply voltages have excellent regulation. A hearty looking supply idling at 30 mA and 600 volts very often looks quite sick when whisked up to a peak of 150 mA.

The linear must be disabled in some fashion in the receive function position. A simple toggle switch in the screen supply will accomplish this. If this is not done anodic bombardment of the linear's anode takes place and with its input and output tuned to 70 Mc/s an S 7 white noise jumps across the aerial change-over relay and blankets any incoming signal. Disabling the 832A was not found to be necessary, presumably because of the lower voltages and power.

When the two units have been made and tested they may be bolted together and for isolation purposes a sheet of aluminium of such a size that it isolates the 832A anode circuit from the 5894/QQV06-40A anode circuit is sandwiched between the two.

No attempt at elegance has been made with the prototype, the chassis when bolted together being fastened by self tapping screws into a rectangular skeletal box made of $\frac{1}{2}$ in. $\times$ $\frac{1}{2}$ in. aluminium angle measuring 12 in. $\times$ 12 in. $\times$ 7 in. high. The front of the box had secured upon it by pop rivets a sheet of aluminium 12 in. by 7 in. and upon that sheet were secured the T/R relay, anode milliammeter, grid milliammeter, T/R relay d.c. supply switch, linear amplifier screen supply cut off switch and dial lamp.

Final checking of the equipment must be done with it fully installed and connected, first of all to a dummy load, and then to the aerial in use. The one check of importance that should be carried out is that of linearity and it must be reiterated that the circuits cannot be linear if the supply voltages to the 832A and QQV06-40A/5894 vary with load. Linearity checks are a subject in themselves, therefore no attempt is made in this article to go into detail. Many articles have been published on this subject and a ready source of information is the ARRL publication "*Single Sideband for the Radio Amateur.*"

## Conclusions

Single sideband on 4m is too new to the writer to have any fixed opinions about it. At the present moment there are a large number of stations that cannot receive this mode at all and contacts can only be made by bypassing the whole purpose of the unit and reinserting carrier. There is, however, little doubt that an increase in the number of s.s.b. stations on 4m would be beneficial and with full vox facilities utilised, long distance net contacts are eminently practicable and traffic could be attracted on to this band where several propagation modes can be encountered.

### COMPONENTS LIST

**70 Mc/s Linear Amplifier**

| | |
|---|---|
| C1, 2, 6, 10, 11, 13 | 0·1μF Erie 1000V disc ceramic. |
| C3, C4 | 8-30 pF Philips concentric air spaced trimmers. |
| C5 | 100 pF feed through. |
| C7 | 20 pF per section ceramic butterfly. |
| C8 | 300 pF feedthrough capacitor, 1000V. |
| C9 | 15 pF variable. |
| C12 | 0·001μF disc ceramic. |
| C14 | }μF 350V. |
| C15 | 10μF 150V. |
| CR1 | BY100 silicon diode (800 p.i.v.) or equivalent. |
| L1 | 2 turns, 22 s.w.g. plastic covered connecting wire, $\frac{1}{2}$ in. diameter. |
| L2a, L2b | 7 turns, 18 s.w.g., $\frac{1}{2}$ in. diam., split into two sections of 3$\frac{1}{2}$ turns each separated by $\frac{1}{2}$ in., into which L1 is close coupled. |
| L3a, L3b | 4 turns, 14 s.w.g., 1$\frac{1}{2}$ in. diam., split into two sections of 2 turns each separated by $\frac{5}{8}$ in., into which separation is coupled L4. |
| L4 | 1 turn, 18 s.w.g., plastic covered connecting wire, 1$\frac{1}{2}$ in. diam., with ends kept long taped together with plastic tape and aerial changeover relay. |
| L5 | Ohmite Z-1 choke. |
| T1 | Heater transformer 250/6·3V dismantled and half of primary winding removed and reassembled. Any surplus transformer can be used that being fed from the heater line gives out 20 mA at 50-100V. |
| VR1 | 25K ohms wirewound. |

Valve socket, septar seven pin, fitted with $\frac{7}{8}$ in. mounting legs.
Tag strip, 6 way.
Chassis 12 in. x 3 in. x 3 in. deep.
Aluminium separating sheet 12 in. x 7 in.
Milliammeter, 0-5 mA.
Milliammeter, 0-200 mA.
Aerial change-over relay.
Toggle switches (2).
Dial lamp.

**70 Mc/s S.S.B. Mixer**

| | |
|---|---|
| C1 | 0·005 μF 250 volt, disc ceramic. |
| C2 | 150 pF, tubular ceramic. |
| C3, 4, 5, 6, 8, 10, 11, 13, 14, 17, 20 | 0·01 μF Erie 1000 volt, disc ceramic. |
| C7 | 50 pF air spaced trimmer. |
| C9 | 100 pF tubular ceramic. |
| C12 | 30 pF air spaced trimmer. |
| C15 | 100 pF tubular ceramic. |
| C16 | 8-30 pF air spaced trimmer (Phillips). |
| C18, C21 | 10 + 10 pF per section Butterfly capacitor (Ex Pye "Reporter"; Wingrove and Rogers). |
| C19 | 300 pF 600 volt feedthrough. |
| J1 | Belling-Lee co-axial socket. |
| J2 | Belling-Lee co-axial plug on 10 in. 75 ohm of co-axial cable. |
| L1 | 15 turns, 18 s.w.g. enam., close wound on $\frac{1}{4}$ in. diam. former, slug tuned. |
| L2 | 8 turns, 22 s.w.g. plastic covered connecting wire, close wound on $\frac{1}{4}$ in. diam. former, slug tuned. |
| L3 | 4 turns, 22 s.w.g. plastic covered connecting wire, close wound on $\frac{1}{4}$ in. diam. former, slug tuned. |
| L4 | 5 turns, 22 s.w.g., $\frac{3}{8}$ in. diam., $\frac{3}{8}$ in. long, self supporting. |
| L5 | 10 turns, 20 s.w.g., $\frac{1}{4}$ in. diam., wound as two 5 turn sections with $\frac{1}{4}$ in. spacing between sections, close coupled to L4, self supporting. |
| L6 | 7 turns, 20 s.w.g. $\frac{1}{4}$ in. diam., wound as two 3$\frac{1}{2}$ turn sections with $\frac{1}{4}$ in. spacing between sections, close coupled to L7, self supporting. |
| L7 | 2 turns, 22 s.w.g. plastic covered connecting wire, close coupled to L6. |
| L8 | Ohmite Z-1 V.H.F. choke or equivalent (40 turns 32 s.w.g. close wound on $\frac{1}{4}$ in. polystyrene rod 1$\frac{1}{2}$ in. long). |
| R1 | 100 K ohms. |
| R2 | 47 K ohms. |
| R3 | 1 K ohms. |
| R4 | 82 K ohms. |
| R5 | 100 ohms. |
| R6 | 22 K ohms. |
| R7 | 47 K ohms. |
| R8 | 68 ohms (5 watt). |
| R9 | 22 K ohms. |
| R10 | 10 K ohms. |
| R11 | 68 K ohms (5 watt). |

(all resistors 1 watt unless otherwise stated).
Anti-parasitic beads (Radio spares, sold in packets of 12).
Valves. 6AK6. Oscillator tripler.
QV03-12/5763 doubler.
QV03-12/5763 mixer.
832A class A amplifier.
Note: Both 5763 valves are operated without shields.
Tag strip, 5 way.
Valve holders: B7G (1); B9A (2); Septar seven contact socket with 1 in. stand-off legs(1).
Crystal, 8·138 Mc/s (see text).
Chassis, 12 in. x 5 in. x 3 in. deep.

# The Radio Amateur's Handbook

44th (1967) Edition

Compiled by ARRL HQ Staff. Editor W1DX.

Published by the American Radio Relay League.

For full details turn to the comprehensive review on page 336.

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# An Absolute Method of Measuring Standing Wave Ratio and Aerial Impedance

By N. ASHTON, FIEE, G3DQU *

IN recent years there have been many descriptions of devices for measuring the impedance presented to a transmitter by an aerial and feeder system, but virtually all have been based on the r.f. bridge. For most of these devices it has been claimed that they measure standing wave ratio (s.w.r.), but in fact, they only perform this function correctly when the feeder in use has precisely the same impedance, $Z_o$, for which the bridge is designed, and when the feeder is connected to the bridge in an ideal manner, i.e., without stray inductance or capacitance.

These ideal conditions are very seldom attained in amateur equipment and, while useful relative readings are usually obtained, there is often cause to doubt the absolute values of s.w.r.

The method favoured by G3DQU for h.f. use is simple, if a little laborious, and is possibly the only truly absolute method of measuring s.w.r. as in principle it amounts to cutting the feeder at various points and inserting an ammeter to measure the current. It can be used as an alternative to the bridge method, or simply as a check on the accuracy of bridge measurements. But by an extension of the process and the introduction of a little mathematics, it can also be used to measure the resistive and reactive components of the impedance presented to the feeder by the aerial and its matching system.

It is thus perhaps the most satisfactory method of deciding how an aerial system should be modified to bring it into resonance and present the correct value of purely resistive load to the feeder.

The only equipment needed, in addition to that usually found in any amateur station, are two lengths of feeder of the same variety and characteristic impedance, $Z_o$, as the feeder to be investigated, and some graph paper.

One of the lengths of feeder should be $\frac{1}{8}$ wavelength long, electrically, and the other should have an electrical length of one quarter wavelength. Each should be fitted with a plug at one end and a socket at the other, both of the correct impedance. The physical lengths can be found by multiplying the theoretical electrical lengths by the velocity factor of the feeder, which is usually provided in the manufacturer's literature; for coaxial cables with solid polythene insulation between inner and outer conductors the factor is usually about 0·65.

To measure s.w.r. proceed as follows: If not already fitted, an r.f. ammeter should be connected in series with the output socket of the transmitter or aerial tuning unit. This ammeter should be connected to the socket by a short length of wire and must not be disturbed during the series of measurements.

The feeder and aerial system should now be fed in the usual way by the transmitter, taking care to resonate the p.a. tank circuit and the aerial tuning unit accurately, although, if possible, with the p.a. loaded to slightly less than its normal maximum input. Make a note of the p.a. anode current and the feeder current.

The $\frac{1}{8}$ wavelength feeder section should now be inserted in series with the main feeder, and readings again taken of the p.a. and feeder ammeters. If possible, the p.a. should be loaded to the same input as before, but not by tuning the p.a. tank or aerial tuning unit away from resonance. This process should be repeated with the $\frac{1}{4}$ wavelength section inserted instead of the $\frac{1}{8}$ wavelength section, and finally with both the $\frac{1}{8}$ wavelength and $\frac{1}{4}$ wavelength sections incorporated.

If it has not been possible to load the p.a. to the same input for each of the readings, the feeder ammeter readings should be corrected to values related to a common power input level, e.g., if the feeder ammeter reads 0·6A with 30 watts input to the p.a. with one feeder length, and 0·2A with 15 watts input on another feeder length, the second feeder current reading should be corrected to the 30 watts input level by multiplying by the square root of the input ratio:

$$0{\cdot}2 \times \sqrt{\frac{30}{15}} = 0{\cdot}283\text{A}.$$

### Plotting the Measurements

We now have four readings of feeder current taken at $\frac{1}{8}$ wavelength intervals and these should be plotted on graph paper as shown in Fig. 1.

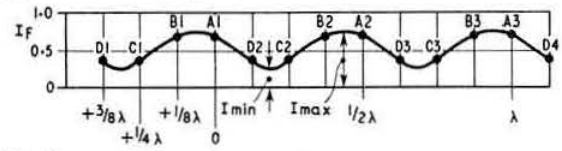


Fig. 1

The actual readings, corrected if necessary, are shown at points A1, B1, C1 and D1, and to clarify the graph of the standing wave they may be repeated at $\frac{1}{8}$ wavelength intervals as shown by the points A2, B2, C2, D2 and A3, B3, C3 and D3. An examination of the points plotted and a little imagination will enable the graph to be drawn as shown, where the s.w.r. is simply the ratio of the maximum to the minimum current, i.e., s.w.r. $= \frac{I_{max.}}{I_{min.}}$

In the example shown, readings A and B are each 0·7A, and readings C and D are each about 0·35A. $I_{max}$ obviously occurs between A and B and is about 0·75A, while $I_{min}$ occurs between C and D and is about 0·25A. The s.w.r. is thus $\frac{0{\cdot}75}{0{\cdot}25} = 3$.

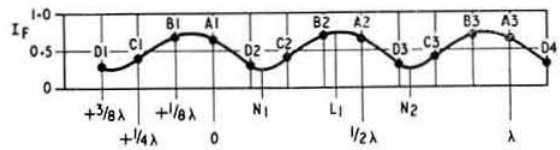


Fig. 2

Fig. 2 illustrates a different group of readings which gives the current loops and nodes further to the left, i.e., nearer to the transmitter than in Fig. 1. This is because the current at A is less than at B and that at D is less than at C. The maximum and minimum currents are, however, the same as in Fig. 1.

* 13 Woburn Drive, Hale, Altrincham, Cheshire.

When drawing these standing waves it should be remembered that the wave shape depends on the s.w.r. Fig. 3 shows how the shape varies with s.w.r.

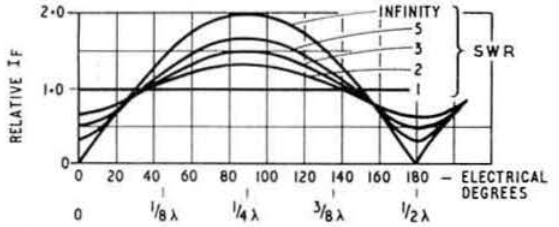


**Fig. 3**

### Aerial Impedance

Having found the s.w.r. the average amateur will wish to reduce it by adjusting the aerial length or the matching device. The usual method is to make a change at the aerial and see if it improves or degrades the s.w.r., but it simplifies matters considerably if the impedance presented by the aerial is known, because the way in which to modify the aerial to reduce the s.w.r. will then be obvious.

The s.w.r. of 3 in Fig. 2 could be due to an infinite series of aerial impedances, but if the electrical length of the feeder is known the aerial impedance can be calculated, e.g., if the feeder length is $N_1$ or $N_2$, such that a current node occurs at the aerial, the aerial impedance will be a pure resistance equal to $Z_0$ multiplied by the s.w.r., whereas if the length is $L_1$, i.e., ending at a current loop, the aerial impedance will be a pure resistance equal to $Z_0$ divided by the s.w.r. On the other hand, if the length is between $N_1$ and $L_1$ the aerial impedance is a combination of resistance and inductive reactance while the load for lengths between $L_1$ and $N_2$ is resistance and capacitive reactance.

To find this aerial impedance the first step is to determine the effective electrical length of the feeder. This could be obtained approximately by measuring the physical length and dividing by the velocity factor, but the accuracy of this method depends on the velocity factor which is seldom known sufficiently accurately for this purpose. A method which reveals the true electrical length in terms of wavelength at the desired frequency is to open-circuit the feeder at the aerial, preferably disconnecting it entirely. Then, using low power r.f. inputs, measure the feeder input currents at the $\frac{1}{8}$ wavelength points by plugging in the test sections as previously described. When these values are plotted a curve of high s.w.r. will result, similar to that of Fig. 4.

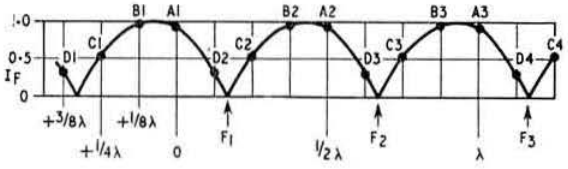


**Fig. 4**

Obviously, the current at the end of the open circuited feeder must be zero, so that the feeder length must be $F_1$, $F_2$ or $F_3$ etc., but for the present discussion it will not matter which of these lengths is assumed to be correct. If, however, the calculated electrical length is compared with the length indicated by the standing wave graph the velocity factor can be checked and, if necessary, corrections made to the lengths of the $\frac{1}{8}$ wavelength and $\frac{1}{4}$ wavelength test sections, either by physically changing the lengths or by correcting the positions at which the points are plotted on the graph paper.

Referring again to Fig. 4, we can assume our feeder length to be from the zero point to $F_1$, i.e., equal to $\frac{1}{4}$ wavelength (60°).

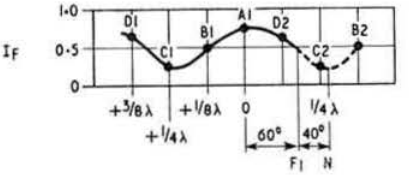


**Fig. 5**

To find the impedance at $F_1$ we need to estimate the s.w.r. and the distance in electrical degrees between $F_1$ and the nearest current node or loop to the right. Fig. 5 shows a typical example in which the node $N$ is 40° to the right of $F_1$. The load at $N$ would be a fictitious pure resistance $R_N$ equal to $Z_0 \times$ s.w.r., and the distance between $F_1$ and $N$ indicates an imaginary additional length of feeder which would be present if the feeder load was $R_N$. The actual load at the aerial end of the feeder $Z_F$ can be calculated from the formula $Z_F = Z_0 \dfrac{R_N + jZ_0 \tan 40}{Z_0 + jR_N \tan 40}$ where tan 40 is the tangent of the electrical angle of distance between $F_1$ and $N$.

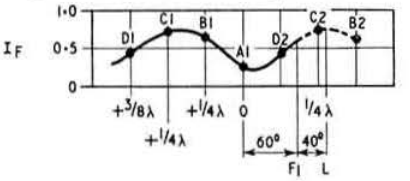


**Fig. 6**

A similar example is given in Fig. 6 but in this case the nearest point for a pure resistive load to the right of $F_1$ is the current loop $L$ and the load at this point would be $R_L = \dfrac{Z_0}{\text{s.w.r.}}$ Again the load at the end of the feeder can be calculated from the formula $Z_F = Z_0 \dfrac{R_L + jZ_0 \tan 40}{Z_0 + jR_L \tan 40}$ where tan 40 is the tangent of the distance between $F_1$ and $L$.

The method can obviously also be used to determine the impedance presented to the aerial tuning unit or transmitter, a knowledge of which is often of value in matching the transmitter to the aerial and feeder system. For those unfamiliar with, or who wish to avoid, the somewhat tedious process of solving the expression for $Z_F$, reference may be made to published curves (e.g., the ARRL *Antenna Book*) giving feeder input resistance and reactance values (in terms of $Z_0$) for various values of s.w.r. and feeder electrical lengths from resistive loads.

### Conclusions

Throughout this article it has been maintained that the results are absolute, and this is theoretically true, but it should be remembered that results *can* be affected by mismatch at the plugs and sockets. Hence, it is recommended that components of known impedance and quality be used throughout.

# LETTERS TO THE EDITOR

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

### A Review of the Yagi-Uda Aerial

A slight amount of artistic licence has crept into Fig. 5 of the above article (p. 228, April BULLETIN). The array pattern of two sources spaced 2λ apart is correctly shown as the eight-petals of Fig. 5(c) with equal amplitude lobes. This is used to multiply the Yagi pattern of Fig. 5(b). Since the effective front/back and front/side ratios of the petal pattern are both unity, these ratios in the Yagi pattern must remain unaltered, and not, as Fig. 5(d) would have us believe, be significantly reduced. The extra gain of the pair of Yagis shown arises only from the considerable tailoring of the width of the main lobe and suppression of the first pair of side lobes.

A better solution is to space the Yagis an odd number of half wavelengths apart. In such an arrangement the source array pattern has zeros along the line of the sources, and as in Fig. 1 below, for a spacing of three half wavelengths, gives rise to a worthwhile improvement in front/side ratio, the side radiation of the Yagis being in anti-phase and cancelling out.

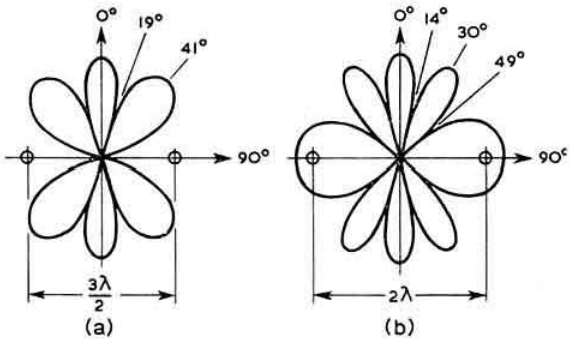


**Fig. 1**

The situation is not entirely as straightforward as this. The mutual impedance between the various elements of the two Yagis coupling one to another upsets the behaviour of each Yagi by re-distributing the amplitude and phase of the currents in the elements. The result of this is (*a*) failure to achieve the expected 3db gain, although this can be approached with spacings exceeding two wavelengths, and (*b*) modification of the radiation pattern to give rise to some sideways radiation even when spaced at odd multiples of a halfwavelength.

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

### Four Metre Band Planning

I would like to point out two shortcomings of the trial band plan which are painfully obvious to myself and, I should imagine, most other South Coast operators:

(i) The presence of the South Downs on our doorstep (but higher) constitutes a very real signal absorbing barrier in our main "firing" direction. By including us with the South of England generally in the plan we are prevented for all practical purposes, during high activity periods, from working DX stations for the simple reason that our signals are unavoidably wishy-washy in comparison with, say, London stations from the DX stations' point of view.

(ii) Activity generally (apart from contests, etc., when (i) applies) is pretty low—so why have a band plan? I can only imagine that this "slicing up of the cake" must have been done by operators either foreign to 4m or with only a passing knowledge of what the band is like.

While I'm having a little beef about things I'd like to put the record straight re the use of 70·26 Mc/s, which is merrily quoted around as being The Mobile Calling Frequency, as if it was something divine and sacrosanct. The use of 70·26 started in Worthing, in 1961, when G3GVM ordered two crystals for 70·3, which was then the "in" frequency for the few on the band in those days, but by accidental miscalculation he received two crystals, frequency 11·710, or 70·26 Mc/s transmitted frequency.

Only by the high level of activity in Worthing and environs, was the use of 70·26 as a mobile frequency developed, which only goes to prove that in Amateur Radio, as in other fields, Worthing is a pacemaker!

For the record I have now worked about 140 stations mobile on 70·26 Mc/s using one of those two original crystals so feel justified in putting typewriter to paper and grinding my axe on this topic.

ROBERT J. TARR, G3PUR
Worthing, Sussex

### Three Cases of TVI

Further to your article "Three cases of TVI" in the April edition of the BULLETIN, I would like to thank you and Mr Pilley, G3HLW, for the opportune publishing date.

At the time I received the BULLETIN, I was beginning to think that I would never cure the TVI next door and that I would have to continue transmitting (14 Mc/s) only when my neighbour was out or when TV had finished for the night. However, after building the filter described and inserting it in the coax feeder, what had been described by the rental engineer as "a particularly bad case of TVI" disappeared, leaving my neighbour a clear picture and myself a clear conscience to "get back on the air."

The rental company (Co-operative Society) were sympathetic and came to see the trouble for themselves, but to date have not offered to change the receiver or try a filter.

I called in the GPO in case I could not cure the TVI and needed some help with the rental company and the engineer seemed very impressed with the TTF (Tobacco Tin Filter).

Once again my thanks for an excellent article and excellent timing!

A. COLLORICK, G3RLG
Kingswinford, Staffs.

I agree that the GPO engineers are most helpful, although seemingly rather swamped with other work these days. For your information, the current Band I high-pass filters available from the GPO (London Telecommunications Region, ref. E/Misc., Camelford House, Albert Embankment, London, SE1) are type Filter Suppression No. 38a, at 13s. post free, and type Filter Suppression No. 49a at 19s. post free (add about 30 per cent if you buy them through your retailer!). Type 38a I have found to be fully effective in most cases, although sometimes it works best if connected in reverse. It is a sealed type in a can. Type 49a is an open, tunable type, the capacitor covering 10m and 15m bands (an extra 10 pF added in parallel makes it tune 20m), and it is designed as a wave-trap for use on the outer of a coaxial TV feeder.

When searching out TVI bugs, cures have been known when the mains lead to the TV set has been connected the "right" way round, that is, with the neutral to chassis. In addition, a simple two-capacitor bridge, with a pair of 0·1 μF, 500V wkg (a.c.), from the earth-wire to line, and from the earth-wire to neutral, has been known to help obstinate cases. Another type of simple "filter," which is often most effective, is the pair of Faraday links strapped together connected in the TV set downlead.

It seems that the vertical ground-plane or dipole, which is well-matched to the ordinary 50 watt rig, only stirs up TVI problems because of its efficiency-factor, and it is nothing to be ashamed of. A bit of tact and willingness on the part of the amateur to seek out the cause, if necessary with the help of the GPO, can lay the bogeys almost every time. Obviously, it is a mistake to duck the TVI problems; such things should be faced as a matter of course, investigated and mastered, not only for the

sake of peace in one's neighbourhood, but for the sake of full enjoyment of the hobby.

" We don't get nearly so much interference from the traffic since that Ham lent us that tobacco tin thing " sort of expression is a good advert for Amateur Radio in our respective neighbourhoods!

R. A. CATHLES, G3NDF

Bookham, Surrey

### What I Shall Say—Over The Air

The vast amount of gibberish at present passing over the air is causing many of us a great deal of concern, particularly as the number of licensees increases. This is particularly so to those who are not able to spend lengthy periods trying to " get a word in edgeways."

One can naturally sympathize with those who are retired and whose great solace is in communication over the air with other similar spirits.

On the other hand as more users of the medium are being introduced to a medium already crowded, the greater is the need for discipline. This, not to restrict those who use it, but to ensure that the rights of all are protected. The motoring fraternity have the Highway Code, albeit that there are those who ignore its precepts, nevertheless the majority respect it. It is abundantly clear that we need an Airway Code.

Such a code of behaviour would ensure that all users of the air, whether members of the Society or not are acquainted with those rules which would ensure their enjoyment as well as that of others. There is a little guidance in the Society's publication, *A Guide to Amateur Radio*, but it is a little. How nauseating it is to listen to the use of the International Q Code during telephony transmissions in interminable succession, which during difficult conditions may be mistaken for call-signs. Furthermore, the phonetic alphabet (Appendix 16 of the Radio Regulations, Geneva 1959), seven years old has still not been mastered by a great many amateurs. Again during difficult conditions, one is given the impression that one is listening to transmissions from exotic places. This despite the " notes " attached to the GPO licence, wherein it is recommended it be used.

An additional source of annoyance is the gabbled call-sign, as though there was a time limit. Considering the large number of telephony operators there is a strong case for " Diction " being included in the test, much stronger than for Morse. I would also suggest the Phonetic Alphabet be written when applying for a licence.

It is therefore suggested that a publication be prepared and a condition be placed upon the annual renewal of the licence that it be re-read, a publication entitled *Procedure* or *The Operator's Handbook*, and it be in two sections:

(*a*) Telegraphy
(*b*) Telephony

The headings could be

(*a*) Telegraphy
1. Establishing Contact—Person to Person
   Netting a Group
2. Communication—Specimen Natter
3. Difficult Conditions—Missed Words
   WA, WB, AB, etc.
4. Closing Down—Drill—Person to Person
   Group
5. Codes
6. Frequency Allocation
7. The European Band Plan
8. The International Q Code
9. Signal Strength

(*b*) Telephony
1. Establishing Contact—Person to Person
   Netting a Group
2. Communication—Specimen Natter
3. Difficult Conditions—Missed Words
   WA, WB, AB, etc.
4. Diction and Enunciation—Examples
5. Closing Down—Drill—Person to Person
   Group
6. Codes
7. Phonetics
8. Frequency Allocation
9. The European Band Plan
10. Signal Strength

G. E. SPARK

Ealing, London, W5

### GPO Morse Test

I think it ought to be widely known that the Postmaster General will do all to assist in making alternative place arrangements for sitting the GPO Radio Amateurs Morse Test for those who because of their domicile have a very long way to travel to any of the officially designated centres and because of other commitments, are short of time.

From my own home in Workington the nearest designated centres are Whitly Bay and Glasgow, 220 and 270-mile round journeys respectively.

Alternative arrangements were made, however, to take the test at Ambleside (40 miles away) involving a morning only with the further suggestion that it could be taken in Workington but only at very short notice.

All readers working for the Morse Test, living in places remote from named centres, should write to the Radio Services Dept., GPO Headquarters where I have no doubt they will be given courteous consideration and some easier reached centre.

A. G. THORBURN, G3WBT

Workington, Cumberland.

### Basic

Computer and Space Age and still with something called " Conventional Current." The word " current " means a flow of electrons, and electrons flow from a negative source or material to a positive one. But we are constantly, particularly in today's complicated semiconductor circuits, inverting arrows. Can someone give a logical answer to this apparently crazy state of affairs?

A. D. TREGALE, G3LMT

Exeter, Devon

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**Overseas visitors to London who wish to meet British radio amateurs are invited to telephone any of the numbers on the right, so that suitable arrangements for their reception can be made. It would be of assistance if a preliminary letter, giving the dates of their trip and details of any special interests or needs, could be sent to the Publicity Officer, RSGB, 95 Collinwood Gardens, Clayhall, Ilford, Essex, England. We regret we are unable to undertake accommodation bookings, although we are able to advise visitors who have difficulty in finding hotel rooms. Visitors are advised not to come to London unless they have made definite accommodation arrangements. Direct enquiries from visitors to RSGB Headquarters will be re-routed to one of the numbers.**

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# ANNUAL GENERAL MEETING

Minutes of the 40th Annual General Meeting of the Radio Society of Great Britain held at the Royal Society of Arts, John Adam Street, Adelphi, London, WC2 at 6.30 p.m. on Friday, 9 December, 1966.

*Present:* The President (Mr R. F. Stevens in the Chair), the Immediate Past President (Mr E. W. Yeomanson), the Executive Vice-President (Mr A. D. Patterson, B.A.Sc.), Honorary Treasurer (Mr N. Caws, F.C.A.), Messrs. J. Etherington, J. C. Foster, J. C. Graham, L. E. Newnham, B.Sc., J. F. Shepherd, G. M. C. Stone, A.M.I.E.E., A.M.I.E.R.E., J. W. Swinnerton, T.D., B.Sc. (Econ.) (Hons.), A.I.L. (Members of Council), Mr John A. Rouse (General Manager and Secretary), Mr P. C. M. Smee (Assistant Secretary), Mr D. W. Robinson (Assistant to the General Manager), Mr T. R. Preece, Mr J. J. Adey (Headquarters Staff), Mr John Clarricoats, O.B.E. (Honorary Member) and 62 Corporate Members.

**Notice Convening the Meeting**

The Secretary read the notice convening the meeting.

**Minutes**

Mr C. E. Newton moved, Mr T. L. Herdman seconded, and it was *Resolved* that the minutes of the 39th Annual General Meeting, as published in the February 1966 issue of the RSGB BULLETIN be taken as read, confirmed and signed as a correct record.

**Annual Report**

The President moved the adoption of the Annual Report of the Council as published in the December 1966 issue of the RSGB BULLETIN.

The President stated that Mr R. C. Marshall, G3SBA, had given notice that he wished to ask a question, and invited him to put the question.

Mr. Marshall's question related to literature on 27 Mc/s walkie-talkies which had been available from certain exhibitors at the last two years' Exhibitions; these he stated inferred that the use of this equipment was proper and legal. He felt that the Society should ask exhibitors not to display or offer 27 Mc/s equipment.

The President replied that the leaflets had been noted and that where equipment was offered this had been converted to 28·5 Mc/s. However, as amateurs the Society and its members had no jurisdiction over the control of 27 Mc/s equipment, but in view of the fact that indiscriminate and irresponsible use might be blamed on to amateurs, the Society had approached the Post Office for its comments in this respect. The present ridiculous position was that although the operation of this equipment was illegal and the Post Office were prosecuting in these cases, the Board of Trade on the other hand had stated that they could not ban or restrict the import of the equipment.

The President invited any other questions. Mr Clarricoats drew attention to the decrease in membership shown by the figures published at 30 June, 1966 which he observed was the first decline since 1956. In view of this he suggested that the Council through the Membership and Representation Committee should look into and analyse this decrease to find the cause, in order that appropriate action could be taken for the future. Mr Clarricoats suggested that possible remedies might be to renew the old practice of publishing lists of members and by encouraging and organizing more extensive and regular regional meetings.

The President replied that the decline had been less than anticipated when the subscription rate had to be increased, and that the Membership and Representation Committee was already investigating methods of remedying this decline and had in fact already instituted ideas for expanding the membership. As regards lists of members this was not practicable as space in the BULLETIN was always fully taken up with technical articles which had a far higher priority. In conclusion the President assured Mr Clarricoats that the Council was actively working towards an expanding Society.

Mr Corsham commented on the expenditure in the Annual Accounts referring to meetings and the entertainment of visitors at home and from abroad, and this he felt was well justified. However, he asked if Council would consider expanding this aspect of the Society in order that more members and visitors could meet those concerned in running the Society.

The President thanked Mr Corsham for his comments, and stated that Council would consider this matter further during the coming year.

The Secretary then read a Supplementary Report of the Council covering the period from 1 July, 1966, to early December, 1966.

It was then *Resolved* that the Annual Report of the Council as published in the December 1966 issue of the RSGB BULLETIN be approved and adopted.

**Report of the Honorary Treasurer and Audited Accounts for the year ended 30 June 1966**

Before the adoption of the Report and the Audited Accounts was moved, the President explained that due to his recent indisposition, the Honorary Treasurer, Mr Norman Caws was unable to take his usual part in the proceedings. Mr Shepherd would, however, present the Report and Accounts on behalf of the Honorary Treasurer.

Mr Shepherd then moved, and Mr Allen seconded the adoption of the Honorary Treasurer's Report and the Annual Accounts.

Before putting the motion to the meeting, Mr Shepherd drew attention to items of interest in the accounts and then invited questions.

Mr C. E. Newton commented that from his examination of the Accounts it was obvious that the Profit on Sales of Publications was subsidizing the subscriptions of the membership, and in his view the subscription rate should be at such a level that this Profit could be available for more useful purposes within the Society.

Mr Shepherd replied that the Council would if necessary take action on subscription rates, but at present the Profit on Sales of Publications was expected to be maintained, and that members were entitled to receive as many benefits as could be financed by use of this Profit, in conjunction with their subscription.

Mr Broadbent suggested, to assist the Society on the Headquarters Building Fund, that one year's additional subscription should be levied to give the Fund the boost required to enable a suitable property to be purchased.

Mr Shepherd commented that a general levy of this nature was likely to be highly unpopular and at the present time of a " national standstill on prices and incomes " would be inopportune. The Council hoped to make an appeal to members if necessary when a definite property was available.

Mr Crane suggested that Associate members should not receive the RSGB BULLETIN as the rate of subscription did not cover the cost of this, which was at present subsidized largely by the Corporate members.

The President reminded Mr Crane that the Associate members were the Corporate Members of the future and, that for many young people the present subscription rate for Associate membership was considered high. The Council, however, would note Mr Crane's comments.

Mr P. A. Thorogood suggested that a monthly competition

could be organized to maintain interest in the Headquarters Fund and to increase the total available should a suitable property be found.

The President felt, although this was a possible means to this end, that there was not the staff available to organize this.

The motion was then put to the meeting, and it was *Resolved* that the Report of the Honorary Treasurer and the Audited Accounts of the Society for the year ended 30 June, 1966, be approved and adopted.

**Election of Council for 1967**

The President announced that it gave him great pleasure to report that, in accordance with Article 10 of the Articles of Association, the Council had appointed Mr A. D. Patterson, GI3KYP, to the office of President for 1967.

The President then declared the following members elected unopposed to fill the vacancies amongst those Council Members elected on a Zonal Basis, occurring on 31 December, 1966:

Mr J. C. Graham, G3TR.
Mr G. Twist, G3LWH.

The result of the ballot to fill the vacancies which occur among the ordinary Members of Council on 31 December, 1966, were as follows:

| | |
|---|---|
| Mr B. Armstrong, G3EDD .. .. | 1089 |
| Mr L. A. Crane, G3PED .. .. | 813 |
| Mr L. E. Newnham, G6NZ .. .. | 1707 |
| Mr. E. W. Yeomanson, G3IIR .. .. | 1277 |

The President formally declared Messrs. Newnham and Yeomanson elected.

The President also thanked the unsuccessful candidates and the scrutineers.

In accordance with Article 12, Mr Norman Caws, G3BVG, had been re-appointed Honorary Treasurer for a new three-year term of office commencing 1 January, 1967.

**Auditors**

Mr J. F. Shepherd moved, Mr J. C. Graham seconded and it was *Resolved* that Edward Moore & Sons be re-appointed Auditors for the year to 30 June, 1967, at a fee of 120 guineas.

**Other Business**

The President announced that in accordance with Article 58, it was necessary to appoint a panel of TEN Corporate Members from whom the scrutineers for the 1967 Ballot for Council would be drawn.

The following members volunteered their services:

| | |
|---|---|
| R. J. C. Broadbent, G3AAJ | A. J. Shepherd, G3RKK |
| J. Clarricoats, G6CL | D. W. Robinson, G3FMT |
| D. A. Findlay, G3BZG | A. H. Paul, G3RJI |
| A. H. Dormer, G3DAH | W. E. F. Corsham, G2UV |
| G. S. Fitton, G3RAA | A. H. Trigell, G3JAF |

*The Meeting terminated at 7.50 p.m.*

**Informal Session**

Mr Crane stated that insufficient publicity was given of the Annual General Meeting and that in his view a notice should appear in three or four issues of the BULLETIN before the meeting in addition to the formal Notice sent out with the November BULLETIN each year.

Mr Broadbent asked why the name of the International Radio Communications Exhibition was to be changed to International Radio Engineering and Communications Exhibition. The President stated that this was to indicate its wider scope and Mr Thorogood reported that as there was no longer a National Radio Show, and with a larger Hall, it was hoped that this would bring forward a far wider range of manufacturers and also add to the prestige and publicity accruing to the Society.

Mr Corsham suggested that National Conventions should be reinstituted. The President replied that experience in recent years did not encourage the Council to arrange such events, due to the lack of support from members, and cited the 1960 Cambridge Convention which, despite an excellent programme made a heavy financial loss for this reason. He also pointed out that these Conventions had to a large extent been superseded by the Annual Exhibition and Mobile Rallies.

Mr Corsham and Mr Hollington commented that with a large Society there appeared to be a tendency to disregard individual members. In his view contact with the members was more important than the day to day business at Headquarters.

The President stated that the Society existed for its members and every effort was made to provide an efficient membership service. Without the operation of Headquarters on business lines the subscription would be considerably higher.

Mr Stone observed that the Society already holds a successful V.H.F. Convention and suggested that it should be possible to organize similar types of activity for those interested in h.f. matters. He also emphasized that Society-run mobile rallies such as Woburn Abbey were very successful.

Mr J. W. Mathews observed that any Convention would take a great amount of organizing and as it was already difficult to find sufficient members for some of the Committees of Council, he asked where the additional manpower was to come from to arrange such a Convention. In his view, the present tendency was for amateurs to attend local meetings rather than large functions, as a result of which the work required for the organization of a national event was comparatively greater than that needed for the more popular local meeting.

The President concluded the discussion on Conventions by thanking members for their comments and remarked that there appeared to be two directly opposed opinions. Council would note this, but it was to be remembered that the Society's major effort was to protect the amateur bands on behalf of members, and that social events as such took a considerably lower priority.

*The informal proceedings then terminated.*

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**Special Event Station—GB3SBF**

Scarborough Amateur Radio Society will operate an exhibition station during the Scarborough Benelux Festival Week. The station GB3SBF will be operational from 5 to 10 June, 1967 from the North Bay Promenade, Scarborough, working suitable frequencies in the 80m to 10m bands. Although operation will in general be confined to s.s.b. or a.m. it is hoped to use c.w. in the evening. Further infomation can be obtained from G3KEE or G3TZU.

**Printset Kits**

The address of Spacemark Ltd., importers of kits from West Germany, was incorrect last month. It should be 14 Piccadilly, Manchester 1 (Telephone 061-237 0817)

**Parlez-vous Francais?**

Gerard Mercier, REF 17840, of 25 rue de l'ecole, Bray Mt. Selot, 62, France would like to correspond with an amateur in the Durham area.

# Book Reviews

**THE RADIO AMATEUR'S HANDBOOK** (44th Edition, 1967). By the HQ Staff of ARRL. 648 pages, copiously illustrated. *QST* format. Price 44s. (Buckram Bound 52/-) post paid, from RSGB Publications, 28 Little Russell Street, London, WC1.

The arrival of the latest edition of the ARRL Handbook is always a most invigorating experience, even after one has reviewed successive editions for 37 years, and never been disappointed. The production of this book is so exactly pitched to the needs of the amateur, and is so superb, that one is apt to take it all for granted after nearly four million copies have been sold. We are so quick to criticize adversely when things fall short of our expectations, that we should be all the more ready to praise generously when that is merited. So, the reviewer wishes to say that in 50 years' experience of practical and academic electrical engineering, he knows of no other text-book of this quality in its own setting, and few to equal it in any setting, for superb production. It is not perfect—in this edition there is at least one plural noun where a singular is meant, but the reviewer considers this almost a collector's piece.

Nor does the reviewer feel that his appreciation of an excellent production should limit his comments on any details which will assist the reader to understand the scope and usefulness of the treatment of any subject.

What's new in it? Naturally, junction and insulated-gate field transistors and their modes of operation now appear, and also the testing of unknown silicon rectifiers for p.i.v. and maximum current rating by simple methods. There is a simple circuit for testing transistor $I_{co}$ and gain, for both *n-p-n* and *p-n-p* types. A list of manufacturers' publications, from which transistor data can be obtained, is given at the end of the semiconductor chapter. No table of transistor data is given along with the useful and comprehensive valve data " because the industry, or even a single company, cannot provide one." What an extraordinary situation!

In the receiver section the new HB-67 replaces the old HB-65; the latter was designed for 80 and 40, with converters for 20, 15 and 10m, but the new model is designed for 80m only, and 40m also is obtained by conversion; for this, if a crystal of 3·5 Mc/s were used, there would be a stong second harmonic on 7 Mc/s, so the crystal used is one at 11·1 Mc/s. This makes the 40m band calibration read backwards, which is a small price to pay for extra stability and reduced complication. The new receiver also differs in having a mechanical filter at 455 kc/s with a bandwidth of 2 kc/s, following the mixer, and two stages of 455 kc/s amplification follow. An r.f. stage with ganged tuning has been added ahead of the mixer, which increases the complication somewhat, but should be an asset. The audio end now uses a triode-pentode two-stage (6T9) amplifier.

The receiving systems chapter also has the description of an audio filter using two circuits tuned to about 750 c/s, with two amplification stages; using one circuit gives a bandwidth of 1100 c/s and using two gives 100 c/s to the −20db points. As the filter plugs into any receiver and has its own power supply, it will appeal to c.w. men.

The electronic speed key has a monitor added and silicon rectification.

The design of the 10–15 watt audio amplifier has been radically altered: it now has a 12AX7 phase inverter and no drive transformer. The output stage is push-pull 6CK4s, and silicon rectification is used and a lower voltage transformer. The amplifier is now rated as 5–10 watts.

Some practical consideration is given to the choice of valves for class-B modulation, and the use of negative feedback on their drivers. The 50 watt modulator has been redesigned using two 7027-A valves in the output instead of four 1625s, speech clipping and filtering have been added, and silicon rectification.

In the s.s.b. phone section there is an attractive " Economy Sideband Package " for 75m with 85 watts input p.e.p. It is designed for minimum cost consistent with high-class performance, and uses an inexpensive mechanical filter, v.f.o. control, and a.g.c. to minimize " splatter." The output stage is a 6146B and the circuit includes an r.f. output indicator for tuning.

The v.h.f. " 6 and 2 " transmitters have been designed with the same physical and a.m. modulation arrangements. The " 50 through 432 " transmitter has been replaced by a series of single-band transmitters. There is a new 40 watt transmitter for 220 Mc/s in which alternative designs for oscillator-tripler-tripler stages are shown, with the same 6252 dual tetrode stage as p.a.

A varactor tripler is described which, when driven by 20 watts at 144 Mc/s gives 14 watts output on 432 Mc/s. As this is not frequency multiplication by distortion due to non-linearity, but a beat effect between the second harmonic and the fundamental, modulation of the latter is satisfactorily reproduced on the output.

The mobile side gets a feather-weight portable station for 50 Mc/s. This uses a small commercial BC set as i.f. but, otherwise, weighs only 3 lb. for receiver, transmitter, modulator, microphone, aerial, battery, *et al.* It is a real station and not a hand-held whip-aerial affair. It uses a long-wire aerial, random tuned, has an output of 100 mW at 9V, and ranges up to 125 miles have been covered.

The reception side of mobile work seems to have rather sparse treatment; but a good simple oscilloscope with a linear time-base and amplifiers does not seem too sophisticated an item to be included in such a handbook.

The pagination of the Index shows " Bogus 1, Bogus 2, etc." Surely this is an excess of modesty, but as the reviewer's dictionary says that " bogus " is an American word of doubtful etymology, he will tread not further.

Aye, it is a worthy successor in a long line.

T. P. A

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**HOW TO LISTEN TO THE WORLD.** Published and edited by O. Lund Johansen, World Publications, Hellerup, Denmark. 184 pages, 8¼ in. × 5¾ in. Available from RSGB Publications, 27s. 9d. post paid.

The January 1967 edition of this well known book contains in its 24 chapters something of interest to all, whether they be short wave listeners or licensed amateurs. The subject matter ranges from articles on the radio frequency spectrum by a member of the BBC Engineering Division, a description of standard frequency services by a member of the National Bureau of Standards (USA), complete information on short wave and medium wave DXing to such subjects as single sideband and the reception of satellites. Two chapters, " *Principles of all Receiver Types* " and " *Listening to the Amateurs* " have been contributed by G3GFN and G2BVN respectively. The book is durably bound and the text and illustrations are clear and easy to read. A valuable addition for both reading and reference purposes.

R. F. S.

**RCA LINEAR INTEGRATED CIRCUIT FUNDAMENTALS.** Technical Series IC-40, published by RCA Electronic Components and Devices, Harrison, N.J., 240 pp., paperback, list price $2.00. (It is available from RSGB Headquarters, price £1, plus postage).

Published in late 1966, this book is right up to date on the applications of integrated circuits for all sorts of requirements from r.f. and i.f. amplifiers to oscillators and differentiators. The first chapter gives a basic minimum of semiconductor theory, plus some interesting facts on economic costs of using ICs, problems of temperature and basic design rules: use the maximum number of active components, use resistor ratios rather than absolute values, and take advantage of matched component parameters. The next chapter describes the basic differential amplifier, the effects of emitter resistors, and the constant current sink. Next is a chapter on operational amplifiers, with information on phase compensation. These chapters occupy the first 102 pages of the book and are broadly theoretical (but not too mathematical) and of value because these circuit configurations may not be too familiar to the average reader. After all, it is not every day we are asked to use *more* transistors and less capacitors for a given purpose.

The next 128 pages are the real meat for the average experimenter. Here is how to use an IC in practice, with facts, figures and component values, and enough background explanation so that you can suit your own need. Every stage of a communications receiver, including balanced demodulators, product detectors, a.g.c. amplifiers, audio, video, i.f. and r.f. systems are here, plus items on f.m. i.f. strips and discriminators. This sort of material will give you a great urge to get out the soldering iron, especially when you check the latest prices of integrated circuits (most of those listed are under 30s. and price cuts are announced frequently). Although the book is, of course, concerned with RCA ICs of the CA3000 series, most of the material is just as applicable to other ranges of ICs.

M. B.

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**TRANSISTOR BIAS TABLES.** By E. Wolfendale, B.Sc., (Eng.), M.I.E.E. Published by Iliffe Books Ltd. 71 pages. Size: 9¾ in. x 7¼ in. Price: 21s. net (by post: 22s.).

This collection of tables has been compiled to assist anyone wishing to design or build a transistor amplifier. The tables can be used either directly, to provide the values of the three resistors required for the conventional bias circuit, or alternatively, as a starting point for more detailed bias circuit analysis. Optimum values are not given in the tables as these depend on a number of factors outside the control of the author, such as the tolerance of the resistors to be used, the range of the ambient temperature over which the amplifier is to operate and the likely variation in the supply voltage. Sufficient information is provided, however, to enable the designer to arrive rapidly at values near the optimum for the conditions for which he is designing.

Six introductory pages are included outlining the aims of the tables and describing in detail how to use them. Eleven values of collector current are given and for each there are five values of supply voltage each occupying a full page. Other information given includes the values of the transistor parameters in the conventional bias circuit and the range of junction temperatures over which the transistor is required to operate. The complex calculations necessary for the preparation of the tables were possible only with the use of an electronic digital computer.

The tables are clearly printed on stout paper and are strongly bound to withstand constant use in design office or laboratory.

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**CCIR HANDBOOK ON HIGH-FREQUENCY DIRECTIONAL ANTENNAS.** ITU, Geneva, 1966, 105 pages, 82 figs., 175 × 250mm. Price 11.50 Swiss francs.

This book was prepared by the CCIR Specialized Secretariat in Geneva in accordance with a decision of the panel of Experts entrusted with the study of measures to reduce congestion in the bands between 4 and 27·5 Mc/s. The panel held sessions in Geneva in 1961 and 1963 and gave particular emphasis to the importance of directivity in h.f. aerials.

The handbook is prepared from a concise and practical standpoint and does not attempt to cover the history and design of h.f. aerials. The basic concepts of different types of aerials are given and the performance and application of various preferred types are dealt with (arrays of dipoles, rhombics and other long-wire aerials, screen reflector aerials, long-periodic aerials, etc.). The use of mathematical formulae has been avoided as far as possible and graphs and nomograms have been used instead.

The handbook has the special aim of serving new and developing countries. It is intended to be used by technicians who are mainly concerned with the selection of appropriate types of aerials, but not directly with their construction. Nevertheless, a few constructional details of h.f. aerials are included.

The book is immediately available in English and will shortly be published in French and Spanish. It can be obtained from the International Telecommunication Union, Place des Nations, 1200-Geneva, Switzerland. R. F. S.

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**RADIO CIRCUITS.** By W. E. Miller, M.A. (Cantab), M.I.E.R.E., revised by E. A. W. Spreadbury, C.Eng M.I.E.R.E. Published by Iliffe Books Ltd. 228 pages, 8¼ in × 5½ in. Price 35s.

This volume can best be described as a qualitative appreciation of the principles of sound broadcast receivers, both a.m. and f.m. The text has been extensively revised by Mr Spreadbury who is well known in the field of publications for the service engineer and technician and continues, in this fifth edition to keep abreast of current practice in the domestic radio field.

The volume can be recommended to the non-technical reader who, knowing the functions of the four basic building blocks of a receiver, i.e. resistors, capacitors, coils and valves transistors) wishes to go further and learn how and why these are fitted together to produce the complete circuit. It is in no sense a textbook and forms relatively light reading for the uncommitted student of radio.

G. C. F.

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**Can You Help?**

● G. V. Haylock, G2DHV, 28 Longlands Road, Sidcup, Kent, who wishes to acquire information on the USN Crystal Calibrator type LR1 and also a 5873 kc/s FT243 crystal?

● A. P. Bull, G3ICB, Agniesetraat, 111, Rotterdam, 1, who wishes to locate some Amateur Radio suppliers in Holland?

● Kemal Goksel, Robert College, Hamlin Hall, Bebek-Istanbul, Turkey, who requires information and a circuit diagram of the Mk. 1 ZC1 wireless set?

● T. R. Popham, A3675, 32 Summerway, Whipton, Exeter, Devon who wishes to know the valve types employed in the R208 receiver?

# CONTEST NEWS

## RESULTS—REPORTS—RULES

### 13CM TEST PERIOD 1967

This new event will have very few fixed rules. Those wishing to enter should submit to RSGB Headquarters a report on their 13cm activities covering the period from 1 June, 1967 to 31 October, 1967. A brief report covering operations before this period should also be included. The main part of the report should include full details of equipment and proposed equipment, results of contacts attempted and made during the period. As many details as possible should be given for any particular contact made and this should include location of both stations (if not at home location), signal strengths and modes used, date, time etc., comments on signal path and beam headings used. It is suggested that a particular attempt should be made on V.H.F. National Field Day (2-3 September, 1967) to secure contacts with other portable stations; this could be done in collaboration with one's local club. Three stations are being allowed in V.H.F. NFD this year, so that there will no doubt be time to attempt contacts with other groups on this band. The call-sign used to make such contacts is not important. The copyright of descriptive matter may be retained by the entrant though the V.H.F./U.H.F. Contests Committee reserves the right to abstract information for purpose of preparing a report on the test period.

Entries should be addressed to the Honorary Secretary, V.H.F./U.H.F. Contests Committee, RSGB Headquarters and sent, preferably, not later than two weeks after the closing date. The contestant submitting the best report in the opinion of the judges will be recommended to Council for the Arthur Watts Trophy.

The entry must contain the following declaration:

"*I declare that my report is a correct record of my 13cm activities during the test period. I declare that my station has been operated in accordance with the spirit of these tests and that I agree that the ruling of the Council of the RSGB shall be final in cases of dispute.*"

Date ..... Signature .....

### FIRST 70 MC/S CONTEST (OPEN) 1967

| Call-sign | Position A | Position B | Points | Contacts | Power | Location | Receiver | Transmitter | Aerial |
|---|---|---|---|---|---|---|---|---|---|
| GW3RUF/P | | 1 | 7252 | 74 | 15 | 11 E Brecon | TW Communicator | 3-10 | 4 ele |
| G3OXD/A | | 2 | 6768 | 91 | 30 | 2 SE Dudley | 6CW4 | 6-20 | 4 ele |
| G3JHM/A | | 3 | 6083 | 102 | 50 | 6 N Worthing | E88CC | PTC3302 | 4 ele |
| GW3UCB/P | | 4 | 4579 | 55 | 35 | 7 SW Conway | FET | 3-20A | 6/6 |
| G3KMI | | 5 | 4426 | 70 | 50 | Southampton | E88CC | 6-40A | 4 ele |
| G3VPK/A | | 6 | 4151 | 81 | 12 | SE Chelmsford | TW Communicator | 3-10 | 4 ele |
| G3KAC/P | | 7 | 4098 | 46 | 25 | 3 NE Cheddar | E88CC | 3-20A | 4 ele |
| G5FK | | 8 | 3165 | 69 | 50 | SE Ruislip | A2599/2521 | 6146 | 4 ele |
| G3LAS | 1 | | 2996 | 69 | 45 | Berkhampstead | — | 3-20A | 4 ele |
| G3PPG | | 9 | 2987 | 47 | 50 | 2 NW Evesham | — | — | — |
| G3RLE | 2 | | 2979 | 41 | 50 | Cleckheaton | E88CC | 6-40A | 4 ele |
| G3GGL/P | | 10 | 2977 | 45 | 10 | 5 NNE Ludlow | E88CC | 5763 | 3 ele |
| G3MEH | 3 | | 2843 | 82 | 50 | 2 NW Caterham | E88CC | 3-10 | 3-3 |
| G3RIK/P | | 11 | 2432 | 50 | 10 | 4 SE Rochdale | B44 | B44 | 4-4 |
| G3VRW/P | | 12 | 2348 | 53 | 17 | 2 S Burnley | AF139 | PT 15 | 6 ele |
| G3RWM/P | | 13 | 2294 | 36 | 15 | 2 W Oakham | GMO 378A | 3-10 | 4 ele |
| G3PXP/P | | 14 | 2096 | 35 | 10 | 8 W Leicester | B44 | B44 | 5 ele |
| G3OHH | 4 | | 2052 | 42 | 50 | 6 N Macclesfield | 6CW4 | 6-40A | 4-4 |
| GW3IWE/P | | 15 | 2045 | 46 | 12 | 4 NNE Llangollen | — | 4-7 | 4 ele |
| G3TCU | 5 | | 2015 | 60 | 50 | 2 NW Guildford | 6CW4 | 6-40A | 6 ele |
| G3EKP | 6 | | 2009 | 43 | 24 | 4 S Blackburn | RF 27 | 3-20A | 4 ele |
| G3FDW | 7 | | 1970 | 26 | 50 | E Retford | Nuvistor | 6-40A | 6 ele |
| G3VIR | 8 | | 1832 | 57 | 10 | Farnham | TW Communicator | 3-10 | 6 ele |
| G3RCF/A | | 16 | 1767 | 69 | 25 | 1 N Bromley | — | 3-20A | 4 ele |
| G3LVP | 9 | | 1747 | 69 | 50 | 1 W Ilford | 6CW4 | 6-40A | 4 ele |
| G3HRH | 10 | | 1721 | 45 | 25 | 2 N Welwyn | 6CW4 | 3-20A | 4 ele |
| G3OYU | | 17 | 1698 | 50 | 50 | Biggin Hill | EF183 | 6-40A | 3 ele |
| G3TXB | 11 | | 1591 | 62 | 20 | 6 SE Ruislip | — | — | 4 ele |
| G3ABM/P | | 18 | 1502 | 43 | 4 | Helsby Chesh. | — | — | 3 ele |
| GW3UED | 12 | | 1484 | 34 | 12 | SW Mold Flint | — | 3-10 | 4 ele |
| G3TDM/P | | 19 | 1482 | 57 | 6 | 2 W Barnet | — | — | 4 ele |
| G3PMJ | 13 | | 1334 | 40 | 45 | Manchester | E88CC | 6-40A | 5 ele |
| G3OCC | 14 | | 1294 | 49 | 24 | Chislehurst | — | 3-20A | 4 ele |
| G3SBL/P | | 20 | 1279 | 26 | 10 | 5 S Stafford | — | — | 4 ele |
| G3VYB | 15 | | 1265 | 36 | 8 | 4 SW Prescot | EF184 | 2 X 6F17 | Dipole |
| G3CCM | 16 | | 1245 | 37 | 50 | Potters Bar | 6CW4 | 829B | 3 ele |
| G3UUT | 17 | | 1129 | 25 | 50 | York | AFZ12 | 6-40A | 4 ele |
| G3TJW/P | | 21 | 1028 | 16 | 50 | 9 SW Exeter | — | 6146 | 5 ele |
| G3OUL | 18 | | 950 | 27 | 15 | Liverpool | 6AK5 | 3-10 | 4 ele |
| G3PLX | 19 | | 937 | 17 | 40 | Havant | 6AK5 | 3-20A | 4 ele |
| G6HD | 20 | | 896 | 37 | 15 | Bexley | E88CC | 3-10 | Dipole |
| G2WS/P | | 22 | 468 | 10 | 16 | 3 SE W-S-M | — | 2-6 | Dipole |
| G2AVC | 21 | | 209 | 12 | 25 | Hounslow | — | 6-20A | — |
| G2DHV | 22 | | 65 | 5 | 15 | Sidcup | — | 3-20A | 3 ele |

There were 44 entries for the 12 February contest compared with 41 in 1966. Four GW stations participated, the remainder being G.

The overall winner was GW3RUF/P who headed section B with G3OXD/A and G3JHM/A as runners-up. Section A was won by G3LAS with G3RLE and G3MEH as runners-up.

Best DX was the G3JHM/A QSO with GW3UCB/P, a distance of 224 miles. The latter station also made contact with G3VPK/A for a distance of 215 miles while the G3JHM/A contact with G3RLE produced 207 miles. The shortest distance appears to be the contact between G3UUT and G3PTU reported as under one mile.

Highest points per QSO were obtained by GW3RUF/P with 98 followed by G3KAC/P with 89. Best mileage per watt transmitted went to GW3RUF/P with 484 for 15 watts in. Incidentally, GW3RUF/P was operated throughout the contest by a single operator, G3KXA. Congratulations!

Subject to Council approval, miniature cups will be awarded

to the winners and Certificates of Merit to the runners-up.

Details of equipment in use and input power are shown in the results table.

Check logs were received from G3PAO, GC3OBM, G3NKS, G3JDM/A and BRS28005. Listeners' logs came from A4752, A5032, BRS26234/P, BRS15744, BRS15822, A4048 and A4674. Many thanks.

### Comments

Several entrants commented on the timing of the contest. Some were of the opinion that it started too early and others that it started too late. The majority opinion was, however, that no changes should be made, as any attempt to avoid TV hours by altering times would result in fewer entries. However, the V.H.F. Contests Committee is considering splitting the contest into two in the future, possibly on two successive Sunday mornings. Your comments on this proposal would be appreciated.

### Points from Letters

From G3RWM/P: " Suggest there should be three sections, home stations single operator, other stations single operator and other stations multi-operator." He asks how a single operator can erect a 4-over-4 by himself.

From G3OYU: " enjoyed the contest, even the three hours spent re-building the c.o. and neuting the p.a. This couldn't have made itself known during the testing on Saturday." A well known law governs this.

From G3SBL/P: " by mid afternoon we were operating in a sea of cars."

From G3UUT: " a bonus should be given for each c.w. QSO."

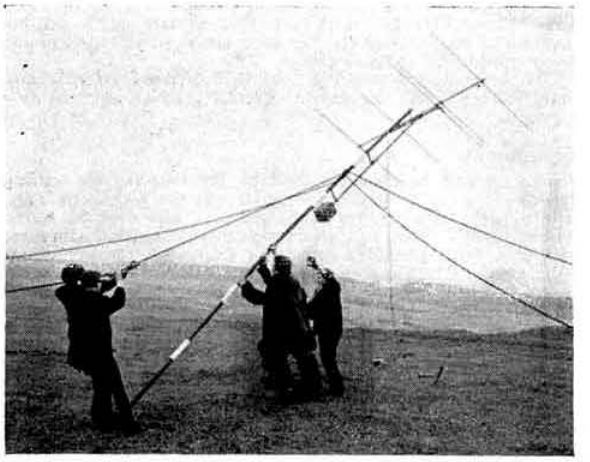
From G3JDM/A: " let's have QRA Locators *and* locations."

From G3HWR/G5FK: " please apologize for the poor readability of signals here. The received noise level is 25dB above the receiver noise."

From G3RIK/P: " don't want a general band plan for 70 Mc/s but a segment of the band for c.w."

From G3MEH: " my aerial is 2½/3 as half a reflector dropped off."

A. H. D.



**Placed 15th in the First 70 Mc/s Contest was GW3IWE/P, seen here during the erection of the four element Yagi.**
*(Photo by G3IWE)*

## SECOND 144 MC/S CONTEST (OPEN) 1967

| Call-sign | Position A | Position B | Score | QSOs | Location |
|---|---|---|---|---|---|
| GW3RUF/P | | 1 | 32943 | 160 | Nr. Pandy, Mon. |
| G3RXK/P | | 2 | 22754 | 144 | Nr. Ludlow, Salop. |
| G3LAS | 1 | | 18408 | 125 | Berkhamstead, Herts. |
| G3OXD/A | | 3 | 17749 | 119 | Rowley Regis, Worcs. |
| G3IMV | 2 | | 17558 | 97 | Bletchley, Bucks. |
| G3TR | 3 | | 17112 | 128 | Nr. Crawley, Sussex |
| G3NUE/P | | 4 | 16422 | 123 | Nr. Oakham, Rutland |
| G3NEO | 4 | | 16266 | 84 | Nr. Sheffield, Yorks. |
| G4JJ/P | | 5 | 16222 | 74 | Sutton Bank, Yorks. |
| G3KAC | | 6 | 14322 | 105 | Bristol |
| G3PMH | | 7 | 12501 | 76 | March, Cambs. |
| G3PXP/P | | 8 | 10730 | 75 | Beacon Hill, Leics. |
| G3PTM | 5 | | 10538 | 76 | Solihull, Warks. |
| G5DF | 6 | | 9154 | 84 | Reading, Berks. |
| G3OUL | | 9 | 8999 | 67 | Liverpool, Lancs. |
| G2AUD | 7 | | 8638 | 73 | Bletchley, Bucks. |
| G3USB | 8 | | 8377 | 71 | Comberton, Cambs. |
| G3UBI/P | | 10 | 8289 | 55 | Nr. Halifax, Yorks. |
| G2XV | 9 | | 7297 | 71 | Cambridge |
| G3SIC | | 11 | 7253 | 68 | Worcester |
| G3USF | 10 | | 6104 | 65 | Keele, Staffs. |
| G2WS | 11 | | 5500 | 52 | Weston-super-Mare, Som. |
| G3BRK | | 12 | 5495 | 75 | Bromley, Kent |
| G3AHB | 12 | | 5392 | 86 | Slough, Bucks. |
| G3SHZ | 13 | | 4886 | 81 | Harrow, Middx. |
| G3VRW/P | | 13 | 4770 | 64 | Nr. Burnley, Lancs. |
| G3UKV | 14 | | 4384 | 55 | Cheltenham, Glos. |
| G3ILO | 15 | | 3185 | 35 | Dursley, Glos. |
| G3UCU | | 14 | 2825 | 60 | London, EC1. |
| G2NH | 16 | | 2385 | 25 | New Malden, Surrey |
| G5UM | 17 | | 2383 | 27 | Houghton-on-the-Hill, Leics. |
| G3UIK | 18 | | 2343 | 53 | London, NW11. |
| G3SZS | 19 | | 2205 | 32 | Nr. Gloucester |
| G3JDM | 20 | | 1973 | 21 | Nr. Galley, Staffs. |
| G3THM | 21 | | 1654 | 35 | Luton, Beds. |
| GW3ULU/P | | 15 | 1557 | 23 | Wentwood, Mon. |
| G3NTJ/P | | 16 | 1251 | 31 | Pendle Hill, Lancs. |
| G5UM/P | | 17 | 700 | 10 | Tilton, Leics. |

| P.A. | Input (watts) | Aerial | Receiver | Best QSO (km) | Continental QSOs |
|---|---|---|---|---|---|
| 3-20A | 25 | 10 ele | 6DS4 | 900 | 15 |
| 3-20 | 30 | 10 ele | FET | 890 | 12 |
| 6-40A | 100 | 10 ele | 6CW4 | 993 | 17 |
| 3-20 | 40 | 10 ele | — | 1105 | 12 |
| 6-40 | 60 | 8/8 | 6CW4 | 1005 | 22 |
| 7-50 | 100 | 10 ele | NUV | 720 | 14 |
| 3-20A | 25 | 2 x 10 ele | EC88 | 850 | 6 |
| 6-40A | 150 | 5 ele | 6DS4 | 1010 | 11 |
| 3-10 | 10 | 10 ele | Trans. | 1120 | 7 |
| 6-40A | 100 | 8/8 | 6CW4 | 870 | 2 |
| 6-40A | 50 | 6/6 | AFZ12 | 964 | 10 |
| 3-20A | 20 | 8 | Trans. | 930 | 9 |
| 3-20A | 45 | 6/6 | 6CW4 | 1092 | 5 |
| 6-40A | 100 | 16 ele stack. | NUV | 680 | 4 |
| 3-20A | 20 | 8 ele | 6CW4 | 316 | — |
| 6-40A | 100 | 10/10 | 6CW4 | 625 | 4 |
| 6-40A | 110 | 2 x 6 ele | E88C | 563 | 7 |
| 3-10 | 8 | 8 ele | 6CW4 | 785 | 3 |
| 6-40 | 100 | 3 x 3 x 3 | 6AM4 | 563 | 1 |
| 4X150A | 150 | 6/6 | A2521 | 258 | — |
| 3-10 | 15 | 6 ele | 6CW4 | 256 | — |
| 6-40A | 70 | 4/4 | NUV | 336 | — |
| 832 | 20 | 5 ele | 6CW4 | 317 | — |
| 6-40A | 60 | 8 ele | 6CW4 | 298 | 3 |
| 3-20A | 25 | 10 ele | GM0290 | 292 | — |
| TT15 | 20 | 8/8 | AF139 | 251 | — |
| 3-20A | 30 | 8 ele | 6CW4 | 260 | — |
| 3-10 | 10 | 10 ele | 6CW4 | 285 | — |
| 832 | 16 | 8 ele | 6CW4 | 211 | — |
| 4X150 | 150 | 4 ele | 6CW4 | 312 | — |
| 3-20 | 18 | 10 ele | Cascade | 200 | 1 |
| 3-10 | 15 | 6/6 | FET | 206 | — |
| 829B | 50 | 8 ele | VQ4EV | 220 | — |
| 6-40 | 15 | 5 ele | 6CW4 | 265 | — |
| 3-10 | 15 | 8 ele | AF139 | 119 | — |
| — | 12 | 6/6 | — | 217 | — |
| 3-10 | 10 | 8 ele | NUV | 176 | — |
| 3-10 | 8 | 5 ele | Cascade | 160 | — |

Thirty-eight entries were received for this contest (4–5 March) compared with 46 for last year's event. Seven stations made more than 100 contacts against 15 last year, but if there was a fall in activity it was more than made up by the continental stations very much in evidence during the early stages of the contest. Of the 418 different call-signs appearing in the logs, 32 were DLs, 19 PAs, eight ONs, four Fs, three DMs and one OK.

In the UK, 18 GWs, one GD and one GC were recorded, with nothing heard from GM and GI.

Midlands Contest Club, GW3RUF/P, retained first position overall with a slightly improved score. The operators were G3KXA and G3MRZ. G3PWJ, G3UDY and G3UWK of Dudley ARC gained second place in Section B with their club call-sign G3RXK/P. *(Continued)*

John Butcher, G3LAS, was leader in Section A, followed by John Hunter, G3IMV. Both these stations were able to put the opening to good advantage, the latter scoring over 11,000 points from continental contacts alone.

The best contact recorded was that between DL0ZW and G4JJ/P near Thirsk, Yorkshire. G4JJ/P used an input of only 10 watts.

### Equipment

Ten element beams were used by the four highest scoring stations but the most popular aerial was the 8 element Yagi. The average input power employed was just over 50 watts. Twenty-one Nuvistor converters were used, compared with three cascodes, three grounded grid units and eight transistor front ends, two of which used field effect transistors.

### Comments

G3OUL (Liverpool University) reports hearing DL stations at S9 +, but they were unable to raise any of them as the DLs continually went back to south-eastern stations at the bottom of the band.

G3UKV (Cheltenham) mentions that only one continental station managed to thread his way through the Cotswolds, for a few seconds. In view of this, G3UKV plans portable operation for future contests.

G3NUE, G3TQZ and G3TQD joined forces not only in taking fourth position in Section B but in writing a five-page letter containing an assortment of brickbats, bouquets and constructive comments for the attention of the V.H.F. Contests Committee.

One of the suggestions has been put into practice and another, in a modified form, has already been agreed by the Committee.

G3KXA, for GW3RUF/P, pointing out the fact that only fixed stations are eligible for the award of the Mitchell Milling Trophy, mentions some of the hazards and discomforts of portable operation.

G3UBI/P at 1350 a.s.l. near Halifax experienced cold weather and high winds which kept turning the beam to the North!

Several contestants commented on the inadequacies of existing QRA locator maps.

### Logs

One or two operators incorrectly claimed points for contacts made with mobile or portable stations already worked at the home location. Only one contact will count for points. In such cases the higher scoring contact should be claimed and the other contact logged with no score.

Some doubtful QRA locators were received, two of them with numbers over 80. No points have been deducted for acceptance of the latter but operators are requested to query " suspect " locators at the time of the contact.

Two logs were almost entirely rescored as the measurements of distance quoted contained errors of up to 50 per cent. Some entrants may find themselves credited with more points than they claimed, which is due mostly to measurements being made to the wrong basic QRA rectangle, the rest of the measurements being carried out correctly.

Check logs received from G2ASL, G3NJF/P and G3OJE are gratefully acknowledged.

A. J. G.

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## Fourth 144 Mc/s Contest (Portable) 1967

The rules for this event are similar to those for last year, with the exception that contest exchanges now include both QRA locator and geographical location. The QTH must be indentifiable without ambiguity on the Ordnance Survey " Ten-mile " map. Where bearing and distance from a town are given the distances should be given in kilometres.

Check logs from listeners are invited and may be credited towards the V.H.F./U.H.F. Listeners' Championship (see January 1967 RSGB BULLETIN).

1. When: 10.00 GMT to 18.00 GMT on Sunday, 2 July 1967.
2. The General Rules for RSGB Contests published in the January 1967 issue of the RSGB BULLETIN will apply except as superseded by the rules of this contest.
3. Power Supplies: Power for any part of the station shall not be derived from supply mains and the d.c. input to any stage of the transmitter shall not exceed 25 watts.
4. Contacts may be made on any permitted mode except A2 (m.c.w.).
5. Scoring will be on the basis of 1 point per km for contacts with fixed stations and 2 points per km for contacts with portable and mobile stations.
6. Contest Exchanges. RST or RS reports followed by the contact number and both the QRA locator and QTH.
7. Entries. (*a*) Logs should be tabulated in columns as follows: date/time (GMT); call-sign of station contacted; my report on his signals and serial sent; his report on my signal and serial received; QRA Locator received; QTH received; call-sig n of operator; points claimed.
(*b*) The cover sheet should be made out in accordance with the General Rules and the declaration signed. Entrants are requested to state their height above sea level on the cover sheet.
(*c*) Entries must be postmarked not later than 17 July, 1967.
8. Awards. At the discretion of Council a miniature cup will be awarded to the winner and a certificate of merit to the runner-up.

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## Third 70 Mc/s (Portable) Contest 1967

The rules have been amended so that scoring distances will be measured in km. Contestants are requested to send both QRA locator and a QTH, for space is provided on the log. The QTH should consist of a distance (in km) and a bearing from a place identifiable on the " Ten-mile " map. Contestants are reminded that most Ten-mile Ordnance Survey Maps have a grid system superimposed based on 10km. Use of the QRA locator system definitely speeds the checking of contest results, which has been demonstrated by many recent contests.

1. When: 10.00 GMT to 19.00 GMT on Sunday, 23 July, 1967.
2. The General Rules for RSGB contests will apply except where superseded by the rules of this contest.
3. Power Supplies. Power for any part of the station shall not be derived from supply mains.
4. Contacts may be made on any permitted mode except A2 (m.c.w.).
5. Scoring will be on the basis of 1 point per km for contacts with fixed stations and 2 points per km for contacts with portable and mobile stations.
6. Contest Exchanges. (*a*) RST or RS reports followed by serial number starting at 001. (*b*) Location information, QRA locators and a distance and bearing system may be used. Entrants should know their correct QRA locator and be prepared to give it if requested.
7. Entries (*a*) Logs should be tabulated in columns as follows: date/time (GMT); call-sign of station contacted; my report on his signal and serial sent; his report on my signal and serial received; QRA locator received; QTH received; call-sign of operator; points claimed.
(*b*) The cover sheet should be made out in accordance with the general rules and the declaration signed. Entrants are requested to state their height above sea level on the cover sheet.
(*c*) Entries must be postmarked not later than 7 August, 1967.
8. Awards. At the discretion of Council a miniature cup will be awarded to the winner and a certificate of merit to the runner-up.

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## D/F Qualifying Event

The following are details of the High Wycombe Qualifying Event.

**When:** Sunday 21 May, 1967.
**Organizer:** G. T. Peck, BRS15402, Dell Cottage, Horsleys Green, Stokenchurch, Bucks.
**Map:** Ordnance Survey, Sheet 159, " Chilterns."
**Assembly Time:** 13.00 GMT.
**Location:** Winter Hill, 1½ miles east of Marlow, NGR 875864.
**Frequencies and Call-signs:** To be announced at start.
**Entries and Tea:** Intending competitors should notify the organizer by 15 May, stating the number in their party requiring Tea.

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## Posting Contest Entries

When sending contest entries to RSGB Headquarters, please remember to write the *complete, official title* of the contest in the top left-hand corner of the envelope.

# *GB2GG—The Run from Woburn Abbey to Stanbridge*

**By Mrs R. Barton, wife of G3PQH***

THE first of April dawned fair and sunny, if cold, and the weather was all that we had hoped for, and more. During all the preparations for GB2GG/Mobile we had prayed for fine weather on the day, and our prayers had certainly been answered. We had had one or two minor disappointments during the organization—a promise of a rig had, unfortunately, not materialized, and the aerial (loaned) had arrived damaged. However, to our delight and relief, G4NT (Mr Norman Turner) offered us his own mobile rig, which we almost literally jumped at, and G3THQ turned up trumps with an aerial which proved most useful.

The Harrier, on which we travelled, is owned by Mr and Mrs J. Hewat and normally runs at Woburn Abbey. Freshly painted and drawn by a fine team of four horses, it looked a picture as the passengers, all in Victorian costume, proudly took their places on the coach and prepared for the run from The Royal Oak at Woburn Village to the Five Bells at Stanbridge. The operators were inside the coach, G3PQH and G3KLK, and while they enjoyed themselves making as many contacts as they could, we enjoyed the ride and the countryside from a different view-point. We learned later that they had worked stations locally, in Great Britain and, although perhaps, I should not say so—to our amazement, stations in Norway, Libya, America, Russia and Poland, which we all felt to be quite an achievement.

The reactions of passers-by, to our amusement, ranged from indifference through amazement, incredulity and disbelief to great enthusiasm. Some people even stopped to take pictures of this incredible scene, and we waved frantically to all who passed, even those who ignored us.

After a typically English lunch of Roast Beef and all the trimmings, Mr James Hewat delighted us all with a speech in praise of any form of enthusiasm for something different,


**Bob Barton, G3PQR, in mid-Victorian costume—operating GB2GG—Mobile on the 100-year-old stage-coach from Woburn Abbey, which did a charity trip in Bedfordshire on 1 April. Several overseas contacts were made. More than £35 was raised for the RAIBC.**

and the pleasure which the outing had afforded all who had joined in. Mr Margolis replied suitably.

We owe a big vote of thanks to all those who helped so willingly to make the day the success it was, which could not have been achieved without their assistance. To Mr and Mrs Hewat who gave their time and Coach so generously for the occasion, to Norman Turner, G4NT, for supplying the rig so readily, to G3THQ for his aerial, G3KLK who assisted G3PQH with operating, to G3WEQ who helped to start the project, to G3SSI and the rest of the team, with the backing of the Ealing and District Amateur Radio Society. It remains to say that the meter provided as a prize for a raffle by G4NT helped to swell the fund for the RAIBC to its present amount of £35.

* 25 Hillside Road, Marlow, Bucks.

**Two first of April weddings: Geoff Stone, G3FZL (RSGB Council Member) and Ceri Taylor, G3SGN (*left*) were married at Catford, and a Guard of Honour of beam elements was provided for Roy Harrison, G3VPR (*above*), when he was married at Market Deeping Parish Church.**

# News from Headquarters

## WHAT'S IN A NAME?

The suggestion has been made that a change of title of the RSGB BULLETIN might be desirable.

The word "Bulletin" does not perhaps adequately describe our monthly publication, after all it is a journal of quite high technical standard.

Would a change of title be more attractive to potential advertisers and by this means be of financial advantage to the Society?

A change, just for the sake of change has no particular merit, but if such a change were to be advantageous to the Society it should be considered.

One must not forget that the "BULLETIN" is widely known throughout the world.

Do the members want a change? If so, what should the new title be? Some of the more obvious and attractive ones are already in use or reserved.

The Council of the RSGB would like to hear members' views on this subject and suggestions for a new title where it is felt that a change is needed.

## PRESENTATION OF THE 1966 MULLARD AWARD TO TOM DUGDALE, G3KQK

Tom Dugdale's modesty left him tongue-tied and a little embarrassed when he and many of the local amateurs heard Mr Basil O'Brien, G2AMV, read extracts from the many testimonials, which had been presented, nominating G3KQK for the 1966 Mullard Award.

The occasion was the presentation, at the Cheshire Home, Sandbach, Cheshire on Tuesday, 28 February, to Tom Dugdale, G3KQK.

In his address, before handing over the inscribed plaque and the Heathkit Oscilloscope, which Tom had chosen, G2AMV spoke of Tom's outstanding achievements among which has been the preparation of a tuition course and tutorial tapes for members of the Invalid and Bedfast Club. Through the medium of the tutorial tapes Tom has been able to give detailed instruction to many sightless SWLs in order that they might progress towards tackling the RAE and then earn a licence. Despite the severe handicap of Multiple Sclerosis, Tom has also managed to correspond regularly with many of the course members and also many of his friends made on the amateur bands.

After a bad fall in his shack, during which he sustained severe burns to his body, Tom spent many months in various hospitals and convalescent homes last year, but is now back at Sandbach and living for the day when he will be able to make the call G3KQK heard on the air again.

G3KQK is indeed a very worthy recipient of the Mullard Award.

G3NFB

## NATIONAL CARAVAN RALLY, SANDRINGHAM

Negotiations between the Radio Society of Great Britain and the Caravan Club have resulted in a decision that the Society shall set up a demonstration s.s.b. Amateur Radio station at the Caravan Club's Diamond Jubilee Rally (weekend of 27 May) on the Royal Estate at Sandringham, in Norfolk.

The station will be located close to the central point of the rally and will be under the supervision of Rowley Shears, G8KW, Bill Winsford, G4DC and Maurice Margolis, G3NMR. It is hoped that the RSGB's Immediate Past President, Roy Stevens, G2BVN, will attend the Opening Ceremony of the Caravan Rally.

Many RSGB members are also members of the Caravan Club and will thus be at Sandringham; we are most anxious that they should make themselves known to the RSGB representatives. Offers of help and suggestions would be welcome, and it would be useful if radio amateurs who propose attending the Caravan Rally would send their names to the RSGB Public Relations Officer, 95 Collinwood Gardens, Clayhall, Ilford, Essex.

## KENT HAMFEST AND MOBILE RALLY

Mote House, Mote Park, Maidstone, Kent, will be the centre of a hamfest and mobile rally on Sunday, 11 June, which deserves special support as all profits will be donated to the funds at the home for Muscular Dystrophy Patients. It will start at 12 noon, finishing at 8 p.m. The social side of Amateur Radio has been given particular attention, and many events have been planned: mobile judging, folk dancing, fencing, judo displays and competitions are representative. Good arrangements have been made for refreshments and teas, etc. and so "Uncle," G6NU, and the organizing committee, are looking forward to a good gathering.

Entertainment for the wives, girl friends and children is a speciality at this event, so bring them along. Raffle prizes include TV sets, an electric razor, super blankets, loudspeaker, an Eddystone dial (latest model), a 25 watt modulator, a P40 receiver, a micrometer, two TT21 valves, a transformer, a panda, a doll, a fire engine and lots of other useful things. Great support is being given by many radio firms who will have stands to exhibit their goods, and some hundreds of data sheets, books, etc. will be there. Antique radio gear for the collector will be offered and there will be many sideshows. Parking is plentiful, including space for buses and hundreds of cars. Although this will be an open air rally there is shelter for all.

Talk-in stations will be operating on 160m, from 10.30 a.m.

Those who remember the big rally at the Elliott Automation Works Canteen in 1962 will find this one as interesting. Please try and give your support to this home; some of the patients are radio fans.

W.E.N.

## LONDON LECTURE MEETING

The Lecture on 29 March at the Institution of Electrical Engineers was given by Mr Dud Charman, G6CJ, on the subject of Aerials. There was an audience of more than 100 members whose interest was retained by the lecturer from start to finish. The famous display of aerial models working on a frequency of 3000 Mc/s was used to prove in a practical manner the theory outlined by the speaker, and which covered both h.f. and v.h.f. aerials.

A vote of thanks to the Speaker was proposed by Mr W. H. Allen, G2UJ, and the Chairman of the meeting was Mr R. F. Stevens, G2BVN.

### Pacific Voyage by Raft

A crew of four Ecuadorians are sailing a Balsa Wood raft across the South Pacific hoping to reach Australia by July. An Amateur Radio station using the call HC9EP is operattional on 14·150 Mc/s s.s.b.

### RSGB Dinner Club

The Dinner Club met on Friday, 7 April at the Kingsley Hotel, when nearly 40 members and guests were present, including the President, Mr A. D. Patterson. Amongst the visitors from overseas were: VK7DT, VS9ARO, W3ASK, 4X4IX and 9G1ED. The next meeting of the Dinner Club will be on Friday, 21 July, at the Kingsley Hotel.

### Postponement of Region 1 ORM

Owing to difficulties encountered in the organization of the Region 1 Official Regional Meeting, due largely to a clash with other events, it has been decided to postpone the meeting originally planned for 21 May. Apologies are offered to any members who have been inconvenienced in any way. It is hoped to hold the ORM in the Autumn.

### Pirates Fined

As a result of Post Office enquiries into the suspected unlicensed use of wireless telegraphy transmitting equipment, the following convictions have been obtained.

On 16 March, 1967, at Retford Magistrates' Court a Mr Horace Tebbutt, of 34 Greenwood Crescent, Boughton, Newark, Notts, was convicted on charges of installing and using wireless telegraphy transmitting apparatus without the appropriate licence, contrary to the provisions of Section 1 of the Wireless Telegraphy Act, 1949. He was fined £5 on each of the two charges with £5 5s. costs and £5 5s. Advocate's fee and ordered to forfeit his equipment.

On 23 March, 1967, at Hinckley Magistrates' Court, a Mr Clifford Franks of 6 Frisby Road, Barwell, Leicester, was convicted on two similar charges. He was fined £10 on each charge and ordered to forfeit his equipment.

## Obituary

**Group Capt. George Rowland Scott-Farnie, C.B.E., G5FI**

The announcement of the death, suddenly, on Easter Day 1967, of Group-Capt. George Rowland Scott-Farnie, G5FI, at Porthcawl, South Wales, was read with great sadness by the many hundreds of his friends who knew him as a radio amateur of long standing and as a prominent business man.

Rowley Scott-Farnie was a bank clerk in South Wales in 1937, when the opportunity occurred for him and many others to join the Royal Air Force Civilian Wireless Reserve. Within a few months he had been commissioned and appointed Controller for Wales. On the outbreak of war in 1939, he began a service career which carried him to the Middle East, Western Europe and into Russia and brought him promotion in due course to the rank of Group-Captain. He had a narrow escape while serving in Egypt when a Lysander in which he was a passenger crashed and caught fire.

At the time of his death Group-Capt. Scott-Farnie was Managing Director and Deputy-Chairman of International Aeradio, Southall, Middlesex, and was Chairman of the recently constituted Civil Air Transport Industry Training Board.

Licensed in 1931, Rowley Scott-Farnie operated regularly on the DX bands from his Dolphin Square flat in Pimlico. His call, G5FI, was well-known on the air and his voice will be sadly missed by the many hundreds of radio amateurs who had both worked him and met him during his countless visits to overseas countries on behalf of his company.

G5FI was a member of the Radio Amateur Old Timers' Association and his application for a ticket for the 1967 Reunion to be held on 5 May, was the first to be received.

He was made a C.B.E. in 1959 in recognition of his work in the field of civil aviation and radio communications.

To his aged mother (who lives at Porthcawl) and to his wife Mrs Zinda Scott-Farnie and her family, sympathies and condolences are offered in their great loss.

The funeral was private but a memorial service was due to be held later in London.

G6CL

# MOBILE RALLIES

**21 May** ..... **Cardiff Mobile Picnic**
Porthkerry Park, near Barry, Glamorgan.
*Organized by the Cardiff RSGB Group.*

**21 May** ..... **Northern Mobile Rally**
Harewood Park, Nr. Leeds.
*Organized by the Northern Amateur Radio Mobile Society.*

**11 June** ..... **Medway Mobile Rally**
Mote House, Mote Park, Maidstone, Kent.
*Organized by the Medway Amateur Radio Mobile Rally Committee.*

**17 June** ..... **Royal Naval Air Display**
RN Air Station, Lee-on-Solent, Hants.
*Organized by the Royal Naval ARS.*

**18 June** ..... **ARMS Mobile Rally**
RAF Alconbury, Huntingdonshire.
*Organized by the Amateur Radio Mobile Society.*

**18 June** ... **Hunstanton Annual Bucket and Spade Party**
Brookes Refreshment Rooms, the Car Park, opposite the railway station.

**25 June** ..... **Longleat Mobile Rally**
Longleat Park, on the Frome-Warminster Road, A362
*Organized by the Bristol RSGB Group*

**9 July** ..... **RSGB National Mobile Rally**
Gilwell Park, Chingford, NE London.
(Overnight camping is permitted on the site)
*Organized by the Radio Society of Great Britain.*

**9 July** ..... **South Shields Mobile Rally**
Bents Park Recreation Ground, South Shields.
*Organized by the South Shields and District RC*

**16 July** ..... **Colchester Mobile Rally**
Colchester Zoo.
*Organized by the Colchester RSGB Group.*

**16 July** ..... **Worcester Mobile Rally**

**23 July** ..... **Cornish Mobile Rally**
Pentire Head, Newquay, Cornwall.
*Organized by the Cornish Radio Amateur Club.*

**30 July** ..... **Saltash Mobile Rally**
Calstock Playing Fields, Nr. Saltash.
*Organized by the Saltash and District ARC.*

**13 August** ..... **Derby Mobile Rally**
Rykneld School, Derby.
*Organized by the Derby and District Amateur Radio Society.*

**3 September** ..... **Swindon Mobile Rally**

**10 September** ..... **RSGB Woburn Rally**

**24 September** ..... **Harlow Mobile Rally**

## Thanet Mobile Rally, 7 May, 1967

**Cliff-top site by the Viking Ship, Pegwell Bay, Ramsgate.**

Talk-in stations: G3DOE, 160m; G3JMB, 70·56 Mc/s; G3BAC, 144·48 Mc/s.

Refreshments will be available from the site Hotel and from a nearby restaurant.

## Mobile Picnic, 7 May, 1967

**2.30 p.m. Burnham Beeches, Buckinghamshire. On the B473 road.**

Talk-in station: G3EJA/M crystal controlled on 1910 kc/s.

# IARU

## Region 1 calling

INTERNATIONAL AMATEUR RADIO UNION

### Cyprus Amateur Radio Society

The Cyprus Amateur Radio Society now a subscribing member in IARU Region 1 Division, has 25 members, 15 of whom are licensed amateurs. The President in Major Cyril Collins, ZC4SC/G8SC and the Secretary, Mr R. H. Etherington, PO Box 216, Famagusta. There are now 25 subscribing member societies in IARU Region 1 Division.

### Temporary Licences in Poland

Licensed radio amateurs who propose to visit Poland may obtain a short-time permit to operate while in that country by making application to Ministestwo Lacznosci, Biuro Koordynacji Lacznosci Radiowej, Plac Malachowskiego 2, Warsaw, Poland. The applicant must state the period of his proposed stay in Poland, the input power required (which must not exceed that granted for the home station) and the address where the station will be installed in Poland. The application must be sent via the Polish Embassy or Consulate of the applicant's own country together with an application for a Polish travel visa and a photostat or verified copy of the home station licence. No charge will be made for the licence. The call-sign issued will consist of the applicant's home station call followed by the appropriate SP District Number, e.g. G2XXX/SP5. It is recommended that a copy of the application be sent to the Headquarters of the Polish National Amateur Radio Society, PZK, Skrytka Pocztowa 320, Warsaw 1.

### Temporary Licences in Yugoslavia

An application form for a temporary licence to operate while visiting Yugoslavia can be obtained by writing to the Secretary of the SRJ (the Yugoslav National Society), PO Box 48, Belgrade, or a photocopy can be obtained from G2BVN, c/o RSGB Headquarters. The completed form must be returned to SRJ with 10 IRCs. Application can be made for a fixed, portable or mobile licence. A YU7 call will be issued to approved applicants.

### QSL Bureau for Turkish Stations

As the Turkish Radio Amateur Club has not yet been able to overcome the problem of establishing its own QSL Bureau, the Yugoslav National Society (SRJ) has agreed, temporarily, to accept and deliver cards addressed to TA call-signs.

### Customs and Mobile Equipment

So far there appear to have been few instances where Customs officials on the Continent have asked for documents relating to transmitting equipment carried in a car during a holiday. However this is always a possibility and members who may wish to safeguard themselves against any difficulties of this type should contact the Automobile Association and ask them to prepare a "Carnet de passage en douane." This is a document which was at one time necessary for the temporary import and subsequent re-export of motor vehicles but which is no longer required by most European countries. The AA have indicated that as a temporary measure until a more suitable system is introduced they will issue a carnet and for which a charge will be made.

### EuOscar

The satellite, which has been constructed by DJ4ZC, and which has been financed by donations from several European Societies (including RSGB) and the Region 1 Division, is now in the hands of Project *OSCAR* awaiting final tests. Latest news is that the launch is scheduled for June/July of this year. It is understood that there has been some delay with *Australis* satellite but it is hoped that this will fly later in 1967.

### Reciprocal Licensing

Following co-operation between the Amateur Radio Mobile Society and the RSGB it is hoped to make available in the near future a document which will give particulars of the requirements for obtaining licences in the various countries with which the UK has a reciprocal agreement. An announcement will be made when the information is available in this form.

Acknowledgement is made to G6CL (Secretary of Region 1 Division) for the first four news items of this feature and to G3BID for information regarding the issue of carnets.

G2BVN

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### Canadian RTTY

To commemorate Centennial Year in Canada, radio-teleprinting enthusiasts have formed the Canadian Amateur Radio Teletype Group. The call sign VE3RTT has been assigned to the Group, but as Canadian amateurs may use the prefix 3C during Centennial year the station will also use the call 3C3RTT.

## CONTESTS DIARY

| | |
|---|---|
| 6-8 May | —USSR Contest (see p ge 166, March, 1967) |
| 7 May | —Third 144 Mc/s Contest (Portable)* (see page 189, March, 1967) |
| 20-21 May | —First 1296 Mc/s Contest (Open)* (see page 190, March, 1967) |
| 20-21 May | —YL Int. S.S.B. Contest |
| 21 May | —High Wycombe D/F Event (see opposite) |
| 27-28 May | —First 432 Mc/s Contest (Open)* (see page 189, March, 1967) |
| 3-4 June | —National Field Day (See page 50, January, 1967) |
| 18 June | —D/F Qualifying Event |
| 2 July | —Fourth 144 Mc/s Contest (Portable)* |
| 8-9 July | —1·8 Mc/s Summer Contest |
| 16 July | —D/F Qualifying Event |
| 23 July | —Third 70 Mc/s Contest (Portable)* |
| 30 July | —D/F Qualifying Event |
| 2-3 September | —V.H.F. NFD/IARU Contest* (see page 108, February, 1967) |
| 10 September | —80 Metre Field Day (see page 259) |
| 17 September | —D/F National Final |
| 7-8 October | —Second 1296 Mc/s Contest (Open)* |
| 7-8 October | —RAEN Rally |
| 14-15 October | —RSGB 21-28 Mc/s Telephony Contest (see page 257) |
| 14-15 October | —Second 432 Mc/s Contest (Open)* |
| 28-29 October | —RSGB 7 Mc/s DX Contest (Phone) |
| 11-12 November | —RSGB 7 Mc/s DX Contest (C.W.) |
| 18-19 November | —Second Top Band Contest |
| 9 December | —Fourth 70 Mc/s Contest (C.W.)* |

*Qualifying contests for V.H.F./U.H.F. Listeners' Championship.

# Society Affairs

## *A brief report on the March, 1967 meeting of the Council*

THE meeting was held on Saturday, 4 March, 1967, and was attended by Mr A. D. Patterson (President), Messrs. B. Armstrong, N. Caws, J. Etherington, J. C. Foster, J. C. Graham, E. Ingram, H. E. McNally, L. E. Newnham, J. F. Shepherd, R. F. Stevens, G. M. C. Stone, J. W. Swinnerton, G. Twist, E. W. Yeomanson (Members of the Council), Mr D. W. Robinson (Assistant General Manager) and Mr H. J. Hallen (Headquarters Staff).

*Apologies for Absence* were submitted on behalf of Mr L. N. Goldsbrough and Mr J. A. Rouse.

*Welcome to New Member.* The President extended a welcome to Mr H. E. McNally as a new member of Council.

**Membership and Affiliation**

The Council elected 145 members (107 Corporate and 38 Associate) and accepted 11 applications for transfer from Associate to Corporate.

Affiliation was granted to the Mid-Sussex Amateur Radio Society.

**RSGB Film Library**

The Council received a report on the Film Library from Mr R. A. Cathles and Messrs. Graham and Yeomanson were asked to discuss the future of the Library with Mr Cathles.

**Title of the Society**

Following a suggestion made by a member that the title of the Society should be changed to " The Radio Society " the matter was considered by Council who unanimously agreed that no change should be made. In the opinion of Council the present name of the Society is known both nationally and internationally and there would be no benefit from any change. Consideration of a change of title for the RSGB BULLETIN was referred to the next meeting (see also page 342).

**Class B Licences**

In view of the requests received from members for the extension of the Class B Licence to include 144 Mc/s, the Society will approach the GPO for their views on this matter.

**New Headquarters**

A report was tabled giving details of a property in Doughty Street, WC1 which might be suitable for the Society's purposes. A full survey report was awaited.

**" History of the Society "**

A progress report on the publication was tabled and dummy copies of the de-luxe and paperback editions were available. It is hoped that this book will be on sale at the 1967 Exhibition.

**Scottish V.H.F. Convention, 6 May, 1967**

Mr G. M. C. Stone (V.H.F. Manager) was authorized to attend on behalf of the Society.

**Caravan Club Rally**

Approval, in principle, was given to the setting up of an official RSGB Station at the Caravan Club Rally at Sandringham on 26/29 May, 1967 (see page 342).

**IARU Voting Proposal**

Votes were cast in favour of applications for membership by the Faroese Amateur Radio Society and the Malta Amateur Radio Society. (This will bring the membership of the IARU to a total of 76.)

**Region 1 ORM**

The Council was pleased to accept the offer of the Region 1 Representative Mr B. O'Brien to hold an ORM in Southport on Sunday, 21 May, 1967 (see page 343).

**Malta Beacon, 9H1MB**

Equipment for the 70 Mc/s beacon had been assembled and was now awaiting transport to Malta. Recent events had delayed the shipment of the equipment.

**V.H.F. Contests Results**

The Council approved the new system whereby entrants to v.h.f. contests will send their logs direct to an adjudicator named in the contest rules. This is designed to speed the checking and publication of v.h.f. contest results.

**Regional Representatives' Expenses**

It was agreed that in the case of an active Regional Representative, and where the existing expenses allowance is not adequate, additional payments will be sanctioned.

**Minutes of Meetings of Committees**

Minutes of the following Committee Meetings were received as reports: RAEN (21.1.67), V.H.F. (23.1.67), Education (28.1.67), V.H.F. Contests (1.2.67), Finance and Staff (4.2.67), H.F. Contests (9.2.67), Ad Hoc Headquarters (10.2 67), Mobile (14.2.67), Technical (16.2.67).

*The Council was in session for 3¼ hours.*

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**Affiliated Societies**

The following societies are now affiliated to RSGB:

LEYTON AMATEUR RADIO SOCIETY:
A. W. Rix, G3RYF, 17 Forest Drive East, Leytonstone, E11.

35 (SM) SIGNAL REGIMENT AMATEUR RADIO CLUB:
Sgt. J. Brinley, Dormer House, Wootten Wawen, Warwickshire.

RUGBY COLLEGE OF ENGINEERING TECHNOLOGY AMATEUR RADIO SOCIETY:
D. A. Powell, G3RLB, Student's Union, Eastlands, Rugby, Warwickshire.

NORTH LIVERPOOL RADIO CLUB:
P. H. Jeffs, 38 College Road North, Liverpool, 23.

MID-SUSSEX AMATEUR RADIO SOCIETY:
E. J. Letts, G3RXJ, 87 Meadow Lane, Burgess Hill, Sussex.

**RSGB V.H.F. Committee**

M. Wallace, G8AXA, has accepted an invitation to serve on the Society's V.H.F. Committee.

**History of the Society**

Original photographs of Amateur Radio equipment and personalities of the period up to 1925 are urgently required for possible use in this book. Please send any photographs, which will be carefully treated and returned after use, to the Society's Historian, J. Clarricoats, OBE, 16 Ashridge Gardens, Palmers Green, London, N13.

# CLUBROOM

## A Monthly Survey of Club and Group Activities

*For further information on membership or the activities of a particular club, application should be made to the person whose call-sign is indicated at the end of the item. Full addresses may be obtained from the RSGB Amateur Radio Call Book.*

"During the past months our image may have become a little tarnished and we have lacked the inspiration to prevent ourselves from ploughing deeper and deeper into the rut of disinterest. Clearly changes, even changes for the sake of changes, were not only highly desirable, but very necessary." Thus another club, **AERE (Harwell) ARC,** has been afflicted with the dangerous disease of apathy, brought to light by Cliff Sharpe's editorial in the Feb./March *QAV*. Naturally, a crash programme has been arranged to try and pull out of this state, and 1967 is hoped to be a year of startling recovery. One tactic which might help to pull the club together is given about a couple of pages; headed "Steptoe and Son," the scrap scheme is being revitalized. Members can purchase many types of radio and electronic components at keen prices, but if this is disputed, there is a useful clause—". . . more than 100 watts, you prove you can buy a similar item cheaper elsewhere, and we will undercut their price"! *G2HIF*.

**Aberdeen ARS.** We cannot recollect having received a letter from this society for some time at any rate, but this month we have been sent a (rather lengthy) run-down on its history and activities. Since 1946 the members have been provided with a very full programme of lectures and other events in which to participate, and now have the facility of a fully equipped s.s.b. h.f. station. Funds are kept up by junk and surplus sales which are held at the remarkably close intervals of five weeks. Through the sales, and RAE classes on Tuesday evenings, younger members are given as much help and encouragement as can be afforded, which is a noble aim. *GM3FRI*.

Amateurs living in the region of **Bishop's Stortford** might be interested in helping to establish a new club, proposed by G3VWC and G3KFE. G3VWC can be reached at 21 Thorley Hill, Bishop's Stortford, Herts., phone Bishop's Stortford 4796.

**Cambridge and District ARC.** The club is now going all-out for Field Day, with preparations led by G3GGK. The other important item in a club calendar, the junk sale, went off well with a full house on 8 April (well, that is, except for the club treasurer who had his hand in the way when the auctioneer's foot came down with a bang to signify "lot sold"!). *G5BQ*.

**Chelmsford ARS.** The last meeting on 4 April meant "an undeserved win, 40 points to 43 points" for Chelmsford when they competed in a quiz with Basildon. It proved to be a very light-hearted occasion, and over 50 people must have thoroughly enjoyed themselves. *G3RZP*.

**Cheltenham RSGB Group.** Many old and new friends turned up for a demonstration of Heathkit equipment at the April meeting. Sid Boakes, G3HXN, answered several queries, and managed to satisfy both a.m. and s.s.b. enthusiasts. *G3CGD*.

**Chester and District ARS.** Following the tremendous success of last year's DXpedition to the Isle of Arran (reported in our November 1966 issue) a similar event is being planned, this time visiting Orkney. Anticipated dates for operation, which will be mainly on 160m, are 8 July to 14 July, with call-sign GM3GIZ/P as before. Anyone who would like further details at this stage should contact *G3TZO*.

**Cornish RAC.** The club's annual dinner was held on 17 March, attended by about 60 members and guests. The highlight of the evening followed the five-course dinner, when the President, Bill Colclough, G3XC, presented a "lighthouse lamp" made from local stone to Brad Butcher, G5AAC/W9WPV, who will be leaving England in June. A short slide show followed, and the evening presumably concluded at 10.30 p.m. *G3UCQ*.

**Coventry ARS.** After perusing the BULLETIN's Class. Ads., four club members travelled to Wiltshire and acquired a KW2000 for the club. They are now trying to work out the most satisfactory way of letting it out on loan to members. The President, G2LU, was confined to his bed when the Newsletter was written, but we hope he is now making rapid recovery. *G2ASF*.

**Crawley ARC.** The February meeting brought several interesting devices for the constructional contest; winning equipment was a transistorized v.h.f. receiver by G3SGA, an l.f. band receiver by G3VAK and a 160m transmitter by Derek Bradnum. The prizes were due to be presented at the Annual Dinner on 17 March.

Appended to the **Cray Valley** RS newsletter *QUA* are the AGM minutes and a two-page questionnaire seeking details of members' views. It covers group activities pretty thoroughly, and we particularly appreciate the wording, "Are you prepared to give your services to. . . ."! *G3NDC*.

**Crystal Palace and District RC** has had to vacate its Bromley Road meeting place, but fortunately the Town Clerk has granted permission for the Woodyates Road, SW12, Civil Defence depot to be used. Members are already eyeing an unused 45 ft. mast on the site. *G3FZL*.

**Dorking DRS** have recently suffered from a lack of support at recent club meetings owing to members preparing for various forthcoming examinations. However time was taken to make a trip in the ex-GPO van (see December 1966 BULLETIN, page 840) to Rutland during the Easter weekend. Following various mishaps including a puncture on Kew Bridge they arrived at their site during high winds and snow showers; however it was not until day break that they realized they had parked next to a BBC television repeater, which put an end to 4m operation. After the generator had been persuaded to work success was achieved on 70cm. The return journey was completed with a cylinder head gasket blown! *G3MBQ*.

**East Worcestershire Group's** Secretary, G3HCT has excelled himself in securing many lectures for forthcoming meetings. During the next three months members can look forward to a junk sale, the first for many years, and a discussion on NFD strategy. In June G3HZD will talk on operating in Nigeria, while in July G5PP will present one of his famous lectures on mobile operation. *G3HCT*.

**Edgware and District RS** will meet on the 8th and 22nd of this month, although unfortunately, no confirmation on lectures has as yet been received. *G3FKI*.

**Fylingdales RC** held its AGM on 21 March when the officers were elected with the addition of an assistant secretary. Amongst other business discussed, it was resolved that the club should

**Bill Colclough, G3XC, President of the Cornish RAC, presenting a "lighthouse lamp" to Brad Butcher, G5AAC/W9WPV, at the annual dinner.**

*(Photo by J. Farrar)*

again operate an exhibition station in conjunction with the Whitby regatta. This station will operate on 19, 20 and 21 August. *G3VGN.*

**Grafton Radio Society** held only three meetings in March. On Friday, 10 March, Russell Medcraft, G3JVM, gave a talk and demonstration on "Stereo and Hi Fi"—he commenced by playing some cylinders on an early Edison Phonograph, and then produced his own highly ingeneous working model which clearly demonstrated the operation of a modern stereo pick-up. The evening concluded with a selection of extracts from stereo records, ranging from Beethoven to the Beatles.

The final meeting of the month, on 17 March, was the Easter Junk Sale—this is always a popular event, and this year it produced one of the biggest attendances that Grafton has seen for quite some time. Among the many visitors to the Junk Sale on 17 March was Fred Curtis, GM3SVK, home on leave from Unst in Shetland. *G3SIL.*

**Lothians RS** report that for the first time in several months the Society ventured out of the warm confines of the YMCA to visit Turnhouse Airport Control Tower. At a subsequent meeting Phillip Pisar, W0GNT gave an amusing talk about Amateur Radio in the States covering every aspect from phone patch working to the Citizens Band. We trust no one this side of the pond will confuse the Citizens Band with any of our bands. *GM3PSP.*

During its AGM held on 10 March **Loughton & District RS** reported an unfortunate drop in attendance during the year. It has now been arranged that members provide material for lectures in turn at forthcoming meetings. Meetings are held on alternative Fridays at 7.45 p.m., the next being on 5 May. *G3TUM.*

**Maidstone YMCA ARS** is yet another group to recently pass through its AGM. At the meeting, a model of the new YMCA Building and HQ was exhibited and members were pleased to hear that the building was on schedule and due to be completed in September.

**Mansfield ARS** now meets on the 1st and 3rd Fridays of the month, the next meeting being on 5 May when a Junk Sale is scheduled. Visitors or groups from other clubs are, of course, always welcome at meetings.

**Northern Heights ARS** held during the past month a discussion on NFD and a junk sale. During the NFD discussion it was decided to find a new site this year. In doing so they hope to perhaps climb a little higher in the results table this year. *G3MDW.*

**Paddington and District ARS** is hoping to hold two field days during May. The first will be held at Chillwell Park on 7 May to give a demonstration to the Hackney group of scouts at their training ground. Operation will be on Top Band, 10 and 2m. On the 28th the group will visit the Aquaius Archery Club in Finchley, operating from its grounds. Following the demonstration of Amateur Radio the Paddington members will try their hand at archery. *G8AQO.*

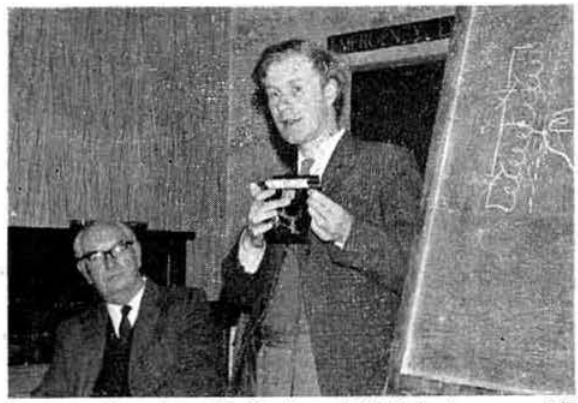
**Portsmouth and District RS** reports a change in Secretary, G3CNO has taken over from G3ORR who has reluctantly, owing to pressure of work, had to resign his post. *G3GNO.*

**Port Talbot RC** welcomed 50 guests to its annual club social held at the beginning of April. Guests travelled from far afield including such areas as Pembroke, Rhondda, Caernarvon, Cardiff and the University of Swansea Radio Club. Many took advantage of this situation to meet people who perhaps they have worked over the years and never had the chance to meet personally. *GW4CG.*

Well over 60 enthusiasts attended a junk sale held on 7 March at the **Purley & District RC,** in fact much equipment was left over necessitating continuation of the sale on 7 April when the large hall was again used. Four SWL members have recently obtained licences, G3VYM, G3WDW, G8AXN and G8AWQ. A number have passed the RAE and are now struggling with their Morse. Preparations are now afoot for NFD with a full-scale rehearsal taking place over the weekend of 20-21 May from Kenley Common, from mid-day Saturday until Sunday evening. *G3FTQ.*

**Reigate ATC** reports a rather disappointing turnout at the recently held jumble sale but despite this lack of support the Society's funds were considerably boosted. G3NKS is still the Honorary Secretary and not G3FRV as published last month. *G3NKS.*

**Royal Naval ARS** will be holding its annual rally to coincide with an air display at the RN Air station, Lee-on-Solent on 17 June. Doors open at 12.00 GMT with the air display taking place between 14.30 and 18.00 GMT. Talk-in stations will be operating on 4m on 70·26 Mc/s and attractions will include static



**Honorary Secretary, P. Burden, G3UBX lectures on D/F techniques whilst E. L. Gardiner, B.Sc., G6GR, looks on at the meeting of the Wolverhampton ARS held at the "Golden Lion" on Monday 6 March.** *(Photo by G8RY)*

Naval exhibits, children's playground, refreshments and prizes. Among the aircraft expected to be included in the air display are the Buccaneer, Vixen, Scimitar, Hunter, Wessex and Wasp, and it is also possible that the new American Phantom aircraft will be included. It would seem that this event could be made into a family occasion to be remembered. *G3ENI.*

**Scunthorpe ARC** will be holding a direction-finding contest on Bank Holiday Monday, 29 May. Details and programme may be obtained from the Secretary. *G3MSB.*

**South Birmingham RS** met in March when a questions-to-the-panel evening replaced the quiz previously arranged. Bob Jenning, G3NXB, previous editor of *QSP* Newsletter of the South Birmingham RS has had to resign as editor owing to pressure of business. To quote from *QSP* "the position of editor is now open, who wants it?" *G3OMG.*

G3AMY lectured to a joint meeting of the **South Dorset Radio Society,** Yeovil Amateur Radio Club and Street Radio Club on 10 March when he presented his lecture on aerials. With the aid of a centimetric transmitter and receiver and close-circuit television the effectiveness of some 18 different types of aerials ranging from a simple dipole to Colinear array was clearly demonstrated. To quote from the Secretary "members present regarded the lecture as most outstanding and one of the most practical they have ever had." *G3EAT.*

**South East V.H.F./U.H.F. Group** held its second meeting of the year at Rutherford College University of Kent on 17 March when Roy Trevitt, G6SSE/T, gave an interesting talk on Amateur Television with demonstrations with his own equipment. Attendance was larger than on the previous occasion, and it is now hoped that the group has been well and truly launched. *G3DAH.*

**South Shields & District ARC** recently held a construction competition which was judged in March by G2OX of Gateshead and G3NOQ of Newcastle. Of the ten entries the club shield was awarded to Frank Harris, G3SFL, for his 2m transmitter incorporating QQV06/40 p.a. with SWL Peter Robinson winning the junior section with an audio amplifier. *G3KZZ.*

**Spen Valley Amateur Radio Society** met on 9 March when T. Taylor of British Rail spoke on microwave techniques. On 16 March Mrs M. I. Shaw, G3OMM, discussed and demonstrated various aids to learning Morse code. The Sommerkamp F line equipment was the subject of a talk and demonstration on 23 March by J. R. Tweedy, G3ZY, to a packed clubroom of 59 people, neighbouring societies having been invited to this meeting. *G3JQC.*

**Stockport RC** were recently visited by Dr David Last who presented an informative talk on single sideband. Other recent events have included a talk by G3NUQ on transmission lines which was followed by G2JT's lecture on aerials. Lectures were also arranged on the subject of atomic energy and a talk was presented by a Trident pilot of BEA. *G3FYE.*

**Stourbridge and District ARS** are settled in their new Headquarters at Longlands School, Brook Street, Stourbridge. The recent AGM resulted in a reshuffle in the committee, with younger members taking a more active part. Following a dis-

*(Continued on page 349)*

# Forthcoming Events

**Details for inclusion in this feature should be sent to the appropriate Regional Representatives by the first of the month preceding publication. A.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. Standing instructions cannot be accepted.**

### REGION 1

**Ainsdale (ARS).**—3, 17, 31 May, 8 p.m., 77 Clifton Road, Southport.

**Allerton (Liverpool) Scout Radio Hobbies Society.**—Thursdays, 8 p.m., 3rd Allerton Scout Group Headquarters, Church Road, Woolton, Liverpool.

**Ashton-under-Lyne (AUL & DARS).**—Fridays, 7 p.m., Rooms F52 and F53, Ashton College, Beaufort Road.

**Blackburn (East Lancashire Amateur Radio Club).**—4 May (Talk by G2HFP), 1 June (Quiz—ELARC v Bury) 7.30 p.m., YMCA, Limbrick, Blackburn.

**Blackpool (B & FARS).**—Mondays, 8 p.m., Pontins Holiday Camp, Squires Gate. Morse tuition from 7.30 p.m.

**Bury (B & RRS).**—9 May, 13 June, 8 p.m., Old Boars Head Hotel (private room), Crompton Street.

**Chester (C & DARS).**—9 May (Surplus Sale), 16 May (Visit by Regional Representative, G2AMV), 23 May (Lecture by G3OWY), 30 May (NFD Arrangements), 8 p.m., YMCA.

**Crewe & District.**—5 June, 8 p.m., Earl of Crewe Hotel, Nantwich Road.

**Eccles (E & DRC).**—Tuesdays, 8 p.m., Patricroft Congregational Schools, Shakespeare Crescent, Patricroft. Every Thursday Club Top Band net 20.30.

**Isle of Man.**—10 May, 8 p.m., Falcon Hotel, Douglas (Official visit by the Regional Representative).

**Liverpool (L & DARS).**—Tuesdays, 8 p.m., Conservative Association Rooms, Church Road, Wavertree.

**University of Liverpool Amateur Radio Society.**—No more meetings until October due to examinations.

**Macclesfield (M & DRS).**—9, 23 May, 6 June, 8 p.m., The George Hotel, Jordangate.

**Manchester (M & DARS).**—Wednesdays, 7.30 p.m., 203 Droylsden Road, Newton Heath, Manchester 10.

**(SMRC).**—Fridays, 7.45 p.m., Rackhouse Community Centre, Daine Avenue, Northenden.

**Morecambe.**—3 May, 7 June, 125 Regent Road.

**North West V.H.F. Group.**—Tuesdays, 8 p.m., Club Headquarters, Chapeltown Street, Manchester 4.

**Preston (PARS).**—9, 23 May, 13 June, 7.30 p.m., St. Paul's School, Pole Street.

**St. Helens (SES).**—16, 30 May, 13 June, 7.30 p.m., I.V.S. Centre, 55 College Street.

**Southport (SRS).**—Wednesdays, 8 p.m., and Sundays, 2.30 p.m., The Esplanade. D/F Contest on first fine Sunday each month.

**(73 S.S.B. Society).**—Tuesdays (all commencing with a talk on part of the RAE Syllabus), 8 p.m., 73 Avondale Road North, Southport.

**Stockport.**—3, 17, 31 May, 14 June, The Blossoms Hotel, Buxton Road.

**Warrington—Culcheth (CARC).**—Fridays, 7.30 p.m., The Harrow Inn, Culcheth.

**Wirral (WARS).**—3, 17 May, 7 June, 8 p.m., Harding House, Park Road West, Claughton, Birkenhead.

### REGION 2

**Barnsley (B & DARC).**—12 May (Visit, details to be announced), 26 May (" Mobile 4m Gear," by G3DHU), 7.30 p.m., King George Hotel, Peel Street.

**Bradford (BRS).**—9 May (Field Day Arrangements), 23 May (Sale of Surplus Equipment), 7.30 p.m., Bradford Technical College, Great Horton Road, Bradford.

**Hull (H & DARS).**—5 May (Preparation for NFD), 12 May (RAE question paper to be answered by G3NOP at the blackboard), 14 May (NFD practice run at Beverley Westwood), 19 May (Radio Quiz with local clubs), 26 May (Workshop projects), meetings at 8 p.m., 592 Hessle Road, Hull.

**Northern Heights.**—10 May (Ragchew), 24 May (" Line Output Linear Amplifier," by J. T. Riley, G3TCS), 7 June (Visit to Manchester & District Amateur Radio Club), 7.45 p.m., Sportsman Inn, Ogden, Halifax.

**Scarborough (SARS).**—Thursdays, 7.30 p.m., rear of 3 Trinity Road, Scarborough.

**York (YARS).**—18 May (Tape Lecture " Transmitter Design and TVI "), 7.30 p.m., 61 Micklegate, York.

### REGION 3

**Birmingham (Bournville RS).**—Every Friday evening, 8 p.m.

**(MARS).**—Third Tuesday in each month, 7.45 p.m., Midland Institute.

**(South Birmingham RS).**—17 May (Junk Sale, Review of NFD 1967), 8 p.m., The Scouts Hut, Pershore Road, Selly Park.

**Bromsgrove (B & DARC).**—Second Friday in each month, 8 p.m., Co-op Hall.

**Cannock (CCARS).**—First Thursday in the month, Bridgtown Social Club, Walsall Road, Cannock.

**Dudley (DARC).**—5 May, 8 p.m. (" Amateur Receivers and Transmitters," by G3HXN of Daystrom Ltd.), 19 May, 8 p.m., Art Gallery, Dudley.

**Leamington Spa (MWARS).**—8 May (Visit to Warwick Police HQ.), 22 May (Nuclear Power Mr J. Daniel), 8 p.m., 7 Regent Grove, Leamington Spa.

**Shrewsbury (SARS).**—11 May, Visit to RAF Station Shawbury. Meeting Place, normally Old Post Office Hotel, Milk Street, Shrewsbury.

**Stratford (S-u-A & DRC).**—11 May (Planning for NFD) 8 p.m., Halls Croft, Old Town.

**Sutton Coldfield (SCRS).**—8 May (Junk Sale), 24 May (Natter Night), "The Fox," Walmley, Sutton Coldfield.

**Worcester (W & DARC).**—Informal meeting each Saturday, 8 p.m., 35 Perdiswell Park, Droitwich Road, Worcester.

### REGION 5

**Bedford (B & DARC).**—Now at the " Dolphin Inn," Broadway, Bedford. Details of programme from Ken Hatton, G3BVA, 49 The Briars, Kempston, Bedford.

**Cambridge (C & DARC).**—5 May (Quiz—Questions by Chris Pedder and David Wright of University Wireless Society), 12 May (NFD Arrangements—Peter Simpson, G3GGK), 19 May (" Kenya "; lecture by Cliff Watson, G3TGH), 26 May (Informal), 2 June (Assembling of Gear for NFD), Fridays, 7.30 p.m., Club Headquarters, Victoria Road, Cambridge.

**Luton (L & DARS).**—Tuesdays, 8 p.m., ATC Headquarters, Crescent Road, Luton, Bedfordshire.

**March (M & DRAS).**—Tuesdays, 7.30 p.m., rear o Police Headquarters, High Street, March, Isle of Ely.

**Royston (R & DARC).**—Wednesdays, 8 p.m., Manor House Social Club, Melbourn Street, Royston, Hertfordshire.

**Shefford (S & DARS).**—Thursdays, 7.45 p.m., Church Hall, High Street, Shefford, Bedfordshire. Programme details from D. A. Pike, G3VMI, 11 Hazel Grove, Stotfold, Beds.

### REGION 6

**Cheltenham (RSGB Group).**—4 May (Films), 8 p.m., Great Western Hotel, Clarence Street.

**Gloucester (GARS).**—11, 25 May, 7.30 p.m., Lamb Inn, Market Parade.

**High Wycombe (Chiltern ARC).**—12 May (Mobile Techniques by Bob Palmer, G5PP), British Legion, St. Mary's Street, High Wycombe.

### REGION 7

**Acton, Brentford and Chiswick (ABCRC).**—16 May (" Test Gear for Aerial Matching," by G6RC), 7.30 p.m., Chiswick Trades and Social Club, 66 High Road, Chiswick.

**Ashford (Middlesex) (Echelford ARS).**—25 May (WIBB Tape and Slide lecture on 160m DX) (RAE), 7.30 p.m., St. Martin's Courts, Kingston Crescent, Ashford.

**Bexleyheath (NKRS).**—11 May (AGM), 25 May (Final NFD arrangements), Church Hall, Chapel Road, Bexleyheath.

**Chingford (SRC).**—Fridays (except first in month), 8 p.m., Friday Hill House, Simmons Lane, Chingford, E4.

**Croydon (SRCC).**—16 May, 7.30 p.m., Blue Anchor, South End.

**Dorking (D & DRS).**—9 May (Informal Meeting), 8 p.m., Wheatsheaf, 23 May (Formal Meeting), 8 p.m., Star and Garter, Dorking.

**East Ham.**—First and Third Tuesdays, 7.30 p.m., 12 Leigh High Road, East Ham.

**East London.**—Sunday, 2.30 p.m., Wanstead House, The Green, Wanstead, E11.

**East Molesey (TVARTS).**—First Wednesday each month, Prince of Wales, Bridge Road, East Molesey.

**Edgware & Hendon (EADRS).**—8, 22 May, 8 p.m., John Keble Hall, Church Close, Deans Lane, Edgware.

**Gravesend (GRS).**—Third Wednesday each month, 7.30 p.m., RAFTA Club, Overcliffe Road.

**Guildford (G & DRS).**—12, 26 May, 8 p.m., Guildford Model Engineering Society in Stoke Park.

**Harlow (DRS).**—Tuesdays and Thursdays, 7.30 p.m., Mark Hall Barn, First Avenue.

**Harrow (RSH).**—5 May (Lecture by G3TR on " Air Traffic Control "), 12 May (Practical Morse and RAE), 19 May (Constructional Contest), 26 May (Practical), Fridays, 8 p.m., Roxeth Manor School, Eastcote Lane.

**Holloway (GRS).**—Mondays (RAE Classes), Wednesdays (Morse), 7.30 p.m., 5, 12 May, 7.30 p.m., Practical Evening; 19 May (Lecture), Montem School, Hornsey Road.

**Hounslow (HADRS).**—4, 18 May, Canteen, Mogden Main Drainage Department, Mogden Works, Isleworth.

**Kingston (K & DARS).**—Second Wednesday each month, 8 p.m., YMCA, Eden Street.

**Leyton and Walthamstow.**—16, 30 May, 7.30 p.m., Leyton Senior Institute, Essex Road, London, E10.

**London U.H.F. Group.**—First Thursday, 7.30 p.m., White Hall Hotel, Bloomsbury Square, Holborn.

**Loughton.**—5, 19 May, 7.30 p.m., Meetings alternate Fridays, Loughton Hall (nr. Debden Station).

**Maidenhead (M & DARC).**—16 May, 7.30 p.m., Victoria Hall, Cox Green, Maidenhead.

**New Cross.**—Wednesdays and Fridays, 8 p.m., 225 New Cross Road, SE14.

**Norwood & South London (CP & DRS).**—20 May (" Modulation—A Controversial Discussion," by Lyell Herdman, G6HD), Catford, London, SE6.

**Paddington (P & DARS).**—7.30 p.m., Wednesdays, Beauchamp Lodge, 2a Warwick Crescent, W2.

**Purley (P & DRC).**—5, 19 May, 8 p.m., Railwaymen's Hall, Side Entrance, 58 Whyteclíffe Road, Purley.

**Reigate (RATS).**—10 May (Discussion on Contest Operating Tactics and Planning), 7.30 p.m., George & Dragon, Cromwell Road, Redhill.

**Romford (R & DRS).**—Tuesdays, 8.15 p.m., RAFTA House, 18 Carlton Road.

**Scouts ARS.**—18 May (Your subject, meeting of the month), 7.30 p.m., Baden Powell House, Queensgate, South Kensington, SW7.

**Sidcup (CVRS).**—4 May (" S.S.B. Equipment," by P. Horwood, G3FRB), 8 p.m., Congregational Church Hall, Court Road, Eltham. 18 May (Natter Nite), 8 p.m., All Saints Church Hall, Bereta Road, New Eltham.

**Slough (SDR Group).**—First Wednesday in each month, 8 p.m., United Services Club, Wellington Street.

**South London Mobile Club.**—13 May, 7.30 p.m., Clapham Manor Baths, SW4.

**Southgate & District.**—11 May, 7.30 p.m., Parkwood Girls School (behind Wood Green Town Hall).

**St. Albans (Verulam ARC).**—17 May (" Modern Transmitter and Transceiver Design," by E. B. Grist, G3GJX), Watford Road, St. Albans.

**Sutton & Cheam (SCRS).**—16 May, 8 p.m., The Harrow Inn, High Street, Cheam.

**Welwyn (Mid Herts ARS).**—11 May (Another Transistor Symposium), 8 p.m., Welwyn Civic Centre, Welwyn.

**Wimbledon (W & DRS).**—12 May, 8 p.m., Community Centre, St. George's Road, Wimbledon, SW19.

**Wembley (GECARS).**—Every Thursday, 7 p.m. Visitors —this Club is now open to non-GEC Employees by invitation. ARNold 1262 first. Sports Club, St. Augustin Avenue, North Wembley.

### REGION 8

**Canterbury (EKRS).**—Arrangements for future meetings are being made; details from D. N. T. Williams, G3MDO, 65 New House Lane, Canterbury.

**Maidstone (YMCA ARS).**—3 May (" Chassis Bashing," by G3REM), 10 May (Check out on the air of Club 160m transmitter), 17 May (RSGB Tape Lecture), 24 May (" Tower and Quad Construction," by G3ORH), 31 May (NFD Final Arrangements). Meetings every Wednesday, 7.45 p.m., Cheshire Home Annexe, Mote House, Mote Park, Maidstone.

**Medway (MARTS).**—8 May (Discussion night), 22 May (Visit to Signals Wing, R. E. Barracks, Chattenden).

**Worthing (W & DARC).**—9 May (NFD Final arrangements and Aerial discussion), 13 May (" Simple Printed Circuits for the Home Constructor," by G6KFH/T). Meetings held every Tuesday evening, 7.30 p.m.

**REGION 9**

**Bath.**—19 May, 7.30 p.m., RNR Training Centre, James Street West, Bath.

**Bristol.**—26 May, 7.30 p.m., Transport House, Victoria Street, Bristol 1.

**(BARC).**—Mondays and Thursdays, 7.30 p.m., 43 Ducie Road, Barton Hill, Bristol, 5.

**Burnham-on-Sea (B-o-SARS).**—Second Tuesday in each month, 8 p.m., Crown Hotel, Oxford Street, Burnham-on-Sea.

**Camborne (CRAC).**—First Thursday in each month, Staff Recreation Hall, SWEB Headquarters, Pool, Nr. Camborne.

**(CRAC V.H.F. Group).**—First Thursday in each month, 7.30 p.m., The Coach and Horses, Ryder Street, Truro.

**Exeter.**—First Thursday in each month, 7.30 p.m., George and Dragon Inn, Blackboy Road, Exeter.

**Plymouth (PRC).**—Tuesdays, 7.30 p.m., Virginia House, Bretonside, Plymouth.

**Saltash (S & DARC).**—Alternate Fridays, 7.30 p.m., Burraton Toc H Hall, Warraton Road, Saltash.

**South Dorset (SDRS).**—First Friday in each month. 7.30 p.m., Labour Rooms, West Walks, Dorchester.

**Taunton.**—Alternate Thursdays, 7 p.m., Lecture Theatre, Taunton Technical College.

**Torquay (TARS).**—Last Saturday in each month, 7.30 p.m., Club HQ, Belgrave Road, Torquay.

**Wells (WARS).**—Mondays from 8 p.m., EMIE (Wells) Sports and Social Club, Chamberlain Street, Wells, Somerset.

**Weston-super-Mare.**—First Friday in each month, 7.30 p.m., Technical College.

**Yeovil (YARC).**—Wednesdays, 7.30 p.m., Park Lodge, The Park, Yeovil.

**REGION 10**

**Blackwood (ARC).**—Fridays (Lecture Programme with section devoted to RAE), 7.30 p.m., Blanche Cottage, off High Street, Blackwood, Mon.

**Cardiff (RSGB Group).**—8 May (" Introduction to Transistors," by Mr D. M. Thomas, GW3RWX), 7.30 p.m., TA Centre, Park Street, Cardiff.

**Port Talbot (ARC).**—30 May, 7.30 p.m., Trefelin Workman's Institute, 8/10 Jersey Street, Port Talbot.

**South Wales (V.H.F. Group).**—23 May, 7.30 p.m., 20 Austin Avenue, Porthcawl, Glam.

**REGION 11**

**Llandudno (CVARC).**—18 May (" My Hobbies," by C. F. Woodward, GW5WO), 7.30 p.m., Cross Keys, Madoc Street, Llandudno.

**REGION 13**

**Edinburgh (LRS).**—11 May (Constructional Competition and NFD Briefing), 25 May (" Electronic Organs," by G. W. Lamb, G3MNL), 7.30 p.m., YMCA, South St. Andrew Street, Edinburgh.

**REGION 14**

**Ayrshire (AARG).**—3, 17, 31 May, 7.30 p.m., Seaforth House, Seaforth Road, Ayr.

**Auchenharvie (A & DARS).**—4, 9, 11, 16, 18, 23, 25, 30 May, 7.30 p.m., Auchenharvie Community Centre, Stevenston.

**North Ayrshire (NAARC ATC).**—7 May, 7.30 p.m., Ardrossan ATC, The Academy, Ardrossan.

**Glasgow RSGB Group.**—12, 26 May, 7.30 p.m., Christian Institute, Bothwell Street, Glasgow.

**Glasgow University (GURC).**—10 May, 7.30 p.m., Engineering North Building, University of Glasgow.

**Greenock (G & DARC).**—5, 19 May, 7.30 p.m., Arts' Guild, Campbell Street, Greenock.

**Motherwell RSGB Group.**—19 May, 7.30 p.m., Carfin Hall, New Stevenston, Motherwell.

**REGION 15**

**Belfast and District RSGB Group.**—Third Wednesday in each month, 8 p.m., War Memorial Building, Waring Street, Belfast.

**REGION 16**

**Basildon (BDARS).**—Details from G3IJB.

**Chelmsford (CARS).**—6 June (off Air Demonstration of Amateur Television," by G3NOX/T), 7.30 p.m., Marconi College, Arbour Lane, Chelmsford.

**Colchester (CARC).**—Meetings each Wednesday during term, 7 p.m., Room 40, Colchester Technical College, Sheepen Road, Colchester. RAE class, Tuesday evenings. Details from G3SJO.

**Great Yarmouth (GYRC).**—Fridays, 7.30 p.m., The Manager's Office, the Old Power Station, Swanstons Road, Great Yarmouth.

**Ipswich (IRC).**—31 May (" Aerials and Transmission Lines," by F. Barhas, 7.30 p.m., Red Cross HQ, Gippeswyk Hall, Ipswich.

**Norwich (NARC).**—Meetings every Monday at Old Lakenham Hall, Mansfield Lane, Norwich.

**REGION 17**

**Harwell AERE (ARC).**—Third Tuesday in the month, 16 May (" Aerials," by Dud Charman, G6CJ), 7.30 p.m., Social Club, AERE Harwell.

**Portsmouth (P & DRS).**—Wednesdays, 7.30 p.m., Room 5, Twyford Avenue, Community Centre, Portsmouth.

**Southampton (RSGB Group).**—Second Saturday in the month, 7 p.m., Engineering Lecture Theatre, Lanchester Building, The University, Southampton.

## LOOKING AHEAD

**7 May.**—Region 1 (NW) Field Day.

**13 May.**—International V.H.F./U.H.F. Convention.

**13 August.**—Region 1 (NW) V.H.F. Field Day.

**28 September.**—Electronics, Instruments, Controls and Components Exhibition and Convention, Belle Vue, Manchester.

## Clubroom

(Continued from page 347)

cussion on NFD arrangements on 2 May, Alec Higgins, G8GF, gave a short talk on ethics and operating. *G3BMY.*

Following free use of a film projector, **Stratford upon Avon and District RC** now find the lens missing, and correctly or incorrectly are looking at members and friends who are interested in photography. Did anyone borrow it and has since forgotten doing so? Also included in its newsletter was this comment on Road Traffic Acts; " A motor horse-box carrying a live horse may travel at 30 m.p.h. If the horse dies in transit the vehicle immediately becomes a carrier of horseflesh and by law must reduce speed to 20 m.p.h. So where does the mobile operator stand?" *G3RPJ.*

**Surrey RCC** comments on its success in the RSGB Affiliated Societies' Top-Band contest in which it came sixth, only 110 points below second place. The AGM was held on 18 April the results of which are not as yet known. *G3KGA.*

**Swindon and District ARC** are busy in preparation for NFD. It would also appear that one or two members have still to pay their annual subs. " May we remind those who, as a matter of principle hang on to their Worldly wealth until the final notice, that this is it!" *G3LLZ.*

**Verulam (St. Albans) ARC.** Inter-club rivalry provided the subject for Verulam's spirited March meeting and Quiz when four club members pitted their wits against an equal number of Harrow's best.

Playing at home this time, Verulam's team started badly, being well down on the visitors at half time, but responding to the urging of their supporters they went into the lead during the closing minutes of the game and won by a small margin. With the result for the two games a draw both clubs are anxious to make it " best of three " and another match will be organized soon. The trouble is, as the organizers know, they are running out of questions!

By the time this is read, Verulam's ambitious " Weekend refresher course " for the RAE will have been held. Open not only to Verulam members but anyone who is soon to take the examination, the weekend event provides a lot of specialist tuition on that all important subject " How to *pass* the examination." Conscious that technical knowledge and academic achievement are not always synonymous with a " pass " in this singular and unusual examination, Verulam's committee (all holders of call-signs) have tried to make available the sum total of their own and others experience of the subject. Run entirely on a non-profit making basis this radio amateurs " teach-in " is a must for aspiring licence-holders in Hertfordshire.

**Wakefield and District RS** has had to move QTH. It now meets at the Youth Centre, Zetland Street, Wakefield. It is hoped that the interests of junior members will shortly be looked after by a junior committee, chairmaned by a senior member. *G3TQV.*

**Wirral & District ARC** met on 14 March when Peter F. Jones, GW3SPS, conducted a junk sale to an audience of 44, making one of the largest attendances ever at the club. During April, G. A. T. Lawrence, GW3JGA, lectured on transistor receivers. *GW3UTG.*

**Wolverhampton ARS** were presented with a talk on Private Radio Telephone Systems by Ernest Gardiner, G6GR, on 3 April, which was most interesting and the demonstration station set up proved very popular. Some of the typical modern equipment on display drew envious (and covetous) looks from members of the local v.h.f. and u.h.f. fraternities. *G3UBX.*

**Worthing and District RC** made its first contact from the club station on 28 March. Although the Isle of Wight on 160m is not DX to them, it is a start. They are now awaiting a club call to be arranged. Thanks are due to G3KXF who built the transmitter. *G3LQI.*

**Yeovil ARC** will meet on 10 May when two films, " Ship to Shore Radio " and " Beyond all Frontiers," will be screened. *G3NOF.*

**York ARS** continue to meet on Thursdays at 7.30 p.m., at 61 Micklegate, York. On 18 May the Tape Lecture entitled " Transmitter Design and TVI " will be played. *G3HWW.*

Newsletters were also gratefully received from the **RAIBC, Southgate RC, Midland ARS, North Kent RS** and **Wolverhampton ARS.**

It would be of assistance to the compiler of " Clubroom " if reports could be concise, typed doubled spaced and submitted before the final deadline if at all possible. In hand written reports, please spell unusual words in block capitals.

Deadline for the **June** issue is **12 May**, and for the **July** issue **9 June.**

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* Experienced in radio/radar servicing, with 3 years training/practical experience.

IF SO, WE OFFER:

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* Facilities for Day release on full pay to attend ONC, HNC, City and Guilds etc., courses at Technical College.
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## FOR SALE

**HAMMARLUND HQ170A.**—Beautiful condition, no mods, handbook, £85. Labgear 160/TX, £13. Salford signal generator, type 106, 5 to 55 Mc/s. As new with all leads and charts, £8. Labgear PSU 300v, 130 mA, £3 10s. Variac Claude Lyons 2 kW, £7. Modulation transformer, 2 × 807 to 813, £1. Delivery by arrangement.—Beech, G3PVL, 45, Blackgate Lane, Tarleton, Preston. Tel.: Hesketh Bank 2855.

**HEATHKIT HW32,** 14180–14350 k/cs, 200 watt P.E.P. transreceiver, complete PTT mic, solid state Heath A.C. power supply, cables and manual. First class condition and signal, £48. Buyer collects London or Surrey.—Box No. J7336, c/o RSGB BULLETIN, 4 Ludgate Circus, London, E.C.4.

**CLASS " D " WAVEMETER** 230 VAC, £2 10s. SR550 Hamband rcvr. xtal calib. variable selectivity as new condition, £36 or will swop for an EC10 or RG1 or similar. Grundig TK 20 taperecorder, mic., tape fair condition, £11. Buyer collects from G3RUD, 121, Norton Road, Coleshill, Birmingham.

## K.W. Corner

Dartford, Kent

Dear OM,

Last month I mentioned going on a business trip to U.S.A. and Canada. I did not have much chance to operate from U.S.A. but using our Club call sign VE3KWE or my own call VE3BUS many contacts were made with the KW2000A and a 20 meter dipole made of line-cord. I was absolutely astounded to hear the Pacific stations coming into Vancouver at S9+; calls like ZK2, VR1, VR2, VR4, KH6, KW6, KG6, KM6, KJ6 and even the VK's & ZL's seemed to have a bigger punch to their signals compared with conditions in G. Operating from the eleventh floor of a Vancouver hotel I had some really exciting contacts and NO TVI from the KW2000A even though I had a TV set along side (11 TV channels 4 of them in colour). The other side of the Rockies in Calgary, Alberta (53° below freezing), propagation conditions were completely different—their big signals seem to come from Mexico & Brazil, apart from all districts of U.S.A. Everywhere I went, visitors to our meetings were most impressed by the appearance and performance of KW equipment and in particular to the frequency stability of the KW2000A KW Vespa and KW201. The word got around that I demonstrated frequency stability on the KW2000A & KW201 by tuning-in to a sideband station and then lifted the equipment 8-9 inches above the table to let it drop without de-tuning the signal. Consequently I was asked more than a dozen times to exhibit this potential and of course I was confident and proud to do so I am only sorry that I managed to work about half-a-dozen British Isles stations—conditions for Europe were not at all good during the whole trip.

If you are thinking of buying KW equipment in the near future, please contact us soon, as a great deal of our output will be finding it's way west—then there is South Africa and the EFTA countries all of whom have recently discovered the qualities of the latest KW models. We try to maintain stocks of all our advertized equipment and adjust our production accordingly. Next month I hope to tell you about some new additional lines from the KW production line.

Yours faithfully, **ROWLEY SHEARS** Sgd.
Managing Director, G8KW

**K.W. ELECTRONICS LIMITED**
**VANGUARD WORKS,**
**1 HEATH STREET, DARTFORD, KENT**



## FOR SALE

## FOR SALE (contd.)

**1964 KW77.** Very good condition; cabinet just resprayed in maker's colours. Best offer over £65.—Plot 75, Pentre Estate, Mold, Flints.

**BOLEX P2 ZOOM,** Grip, Case, EUMIG P8 auto, as brand new. 5 films (250 ft.) only used. Exchange best S.S.B. offer.—G3KDA, 98, The Leys, Bidford-on-Avon, Alcester, Warks.

**K.W. VANGUARD Mk. II** (10-80m), £35; 30 ft., 2 inch O.D. Mast (6 x 5 ft. sections), Couplers, 2 SVS Rotating Guy Rings, No Guys Pickets etc., in transit case, £10; 32 ft. portable mast complete in holdall, £1; Carriage extra. No. 3038232, Sgt. Russell, J. S. Sgts. Mess, R.A.F. Bawdsey, Nr. Woodbridge, Suffolk.

**LATE G2BBT.** All Band rack, Minimitter Exciter, PA ATU modulator, £25; BC342, £12 10s.; 600V Power Pack, £5; Small Modulator, £5; Freq. Meter, £3; MC Mike MC, Speaker, £2; Buyer collects—Miss Robinson, 35, Forty Acres Rd., Canterbury, Kent.

**TWO 10 in., ONE 6 in.** speakers, Lot 30/-. XTAL Calibrator No. 10, £5. Modified G2DAF Type SSB TX. 20m. Precision XTALS, £20; Ribbon Mike, £2; Lustraphone, MC MIC Transformer enclosed, as new, £2; Two XTAL Mikes, one MC, Lot £1; 3 in. VR139 Tube, £2; 6 in. VR517 Med. Pers' Blue Tube, £2; GELOSO VFO with valves, £4. Top Band VFO and Modulator, £2; Two each, LF Chokes, KT66, EL34, 6L6, Lot £2; Rotary & VIB Power Packs, £2 Lot.—Bolton, G3JES, 8, Dickens Ave., Canterbury, Kent.

**EDDYSTONE 750,** good working order, £25 o.n.o.—Perry, 10, Chobham Gardens, London, S.W.19.

**JUST MARRIED.** Clearing out new shack; AR88LF, professionally realigned, £35; CR100 front end modified, £10; VFIU needs attention, but O.K., £5. Buyer collects, view weekends or add carriage. Deliver 50 miles.—G30SE, Cookson, 20 Gloucester Street, Coventry.

**PORTABLE C.W. TX/RX.** Type A Mark III crystal controlled, 80-40m, £20. Wither's communicator 160 mobile TX/RX, 12 volt, little used, £49. Mohican receiver, £22. Collins TCS 10, TX and RX less P.S.U., £12 o.n.o. Prefer buyer collects.—GM3ACL. Phone CLY 2866 evenings.

**RESISTORS**
½ Watt carbon film 5%
All preferred values in stock from 10 Ohms to 10 meg Ohms 2d. each.
Send S.A.E. for free sample.

**CAPACITORS**
Mullard Miniature Metalised Polyester P.C. Mounting all 250v D.C. working 0·01mf 0·022mf 0·047mf 0·1mf 0·22mf, all 6d. each.

Please include 1/- for postage and packing on all orders under £1.

**Dept. RSGB2.**
**Brensal Electronics Ltd.**
**Charles Street,**
**Bristol, 1.**

## FOR SALE

**£40 POLAROID CAMERA,** offers or part exchange for test gear etc., all letters answered.—Stacey, (27993), 3 Westpark, South Molton, Devon.

**CLEARING OUT.** 19 set £4, 46 set 15/-, 1986 Modulator 20/-, 23cm sig. gen. £4. Home made receiver 100 kc/s-4·5 Mc/s, 10 Mc/s- 20 Mc/s, £5, RME 69 receiver 500 kc/s-32 Mc/s, 6 ranges, Xtal filter, noise lim., S meter £10. 27 Mc/s Walkie Talkies £4, all with valves etc, prefer collect but will deliver locally.—G8ANY, 67, Belvere Ave, Blackpool, Lancs.

**G3LBT** going, SB401 offers his DX100 plus SB10-U in full working order to best offer over £70. Would deliver free Home Counties.—145 The Knares, Basildon, Essex.

**SEMI-CONDUCTORS**—OA81, BA115 at 2/-. OC46, OC73 at 3/3. OC81D, OC81M, OC200 at 3/6. AC156, OC71, OC76 at 3/9. 2N2926 at 4/-. AC127, OC70, 2N706 at 4/7. OC77 at 6/-.—Glasgow Electronic Services, 21 Old Dumbarton Road, Glasgow, C.3.

**DX100U** as new, £60. AR77 RX with "S" meter, £20. T.C.S. 13 RX fitted with internal A.C. Power supply, £15. Genuine Vibroplex bug key, £5. U.M.3. mod. transformer, 50/-. Transformer 620-550-0-550-620 at 200 mA, tapped 375V at 250 mA, 30/-. Class D wavemeter, 30/-. New 813 valve with base, £1. B.M.3 mic £1. Labgear Lowpass filter, £2. Heathkit grid dip meter, £3. All genuine buys. Carriage extra. Offers by letter only to: G3FIG, 28 Sileby Road, Barrow-on-Soar, Leicestershire.

**KT340,** general coverage Rx, as new, condition. Built and aligned as handbook. Buyer collect.—G3VZM, Lily Ponds Cottage, Cottage Drive West, Gayton, Cheshire.

**R216 19 to 157** Mc/s, £30. Labgear Topbander, £10 will deliver 50 miles.—G3OEP, 72 Albany Road, Great Yarmouth.

**COMPACT MOBILE GEAR**—160m/80m, Transistor Receiver covering 160/80/M—professional built IF, S meter. Transmitter, VFO tuned, 6BW6 modulated by 6BW6; runs at 10 watts; also includes 12v dynamoter. Fully smoothed and control box with 0·5 amp RF meter. All in good working condition, £20.—G3MSW. Tel.: Brentwood, Essex 6613.

**C.S.E. 2A10 WITH MIKE.** Used only two hours, £35. Sale caused by changed plans.—Bell, 14, Aireworth Road, Stockbridge, Keighley, Yorks.

**QSL CARDS.** We offer you cards in two colours plus black, printed on both sides for only £4 per thousand (includes postage). Samples from—Bert McHenry, GI3NSM, 54, Orby Road, Belfast 5.

**11HC 2M. Collinear** (October 1965 BULLETIN), as new. J-Beam 4 ele. 2m slot used OK together, £5. Collins TCS receiver and p/s, £6. Could deliver N. London.—G2BVN QTHR.

**TWO YEARS OLD** TA33 Junior CDR rotator complete with 40ft. mast. £30 or near offer. Buyer collect. Telephone 01-648 3668.

**36 SET** 50 watt T/X 10-15-20m. Excellent condition. Complete with Harmonic Filters; Dummy load, etc. £12.—Wilders, 28 Highbury Street, Peterborough.

## FOR SALE (contd.)

**AERIAL MAST SECTIONS.** Set of 10 x 3 ft. long x $\frac{3}{8}$ in. diameter tubular steel rods, screwed and socketed ends. Price 50/- set. Stay or Guy wires. 30 ft. lengths x $\frac{3}{8}$ in. diameter galvanized steel wire at 7/6. 60 ft. lengths ditto at 15/-.—Bradfords, Ramsey, Harwich, Essex.

**SELLING.** DX40 with VFO, £25. Tuner Unit AM912 TRC, 100 watt p.a. stage, 100/200 Mc/s, with 4X150, perfect model, £20. Wanted, Amp/Converter AM913TRC 95/220 Mc/s, will pay good price if complete and as new. G3HKV, 16 Abbey Street, Crewkerne (662), Somerset.

**HEATHKIT VALVE VOLTMETER.** Model V-7A/UK. Professionally built. Wiring and instruction manual, £10 complete o.n.o. Box No. J7333, c/o RSGB BULLETIN, 4 Ludgate Circus, London, E.C.4.

**HI GAIN** 5 band dipole, 6 through 40m, no traps, 66 ft. long with feeder, £6 10s. Also HI Gain vertical 10 through 20m trapped. Great for DX, £6 10s. 764. 2137. G3RIA.

**CREED 7A PAGE TELEPRINTER.** Complete with Marconi terminal unit. All offers considered.—M. Duce, 31 Oak Road, Grays, Essex. Tel.: Grays Thurrock 6201.

**QSL CARDS.** Attractive designs, 22/6 per 100, post free. S.a.e., samples, G3OYI, "Cotswold," Banks, Honley, Huddersfield.

**CODAR CR45 RECEIVER,** good condition, complete with coils, £6 10s. o.n.o.—Taylor, 23 Green Lane, Bayston Hill, Shrewsbury.

**FILTERS.** Improved design PZT units. PF1A/RX. 2·3 kc/s wide; PF1B/RX, 3·8 kc/s wide; PF1C/RX, 1·3 kc/s wide, for receiver applications on centre frequencies of 455 or 465 kc/s; suitable for valve or transistor circuits, £4/15/-. PF1/SB for S.S.B. exciters, 2·1 kc/s wide at 6db, frequency 457 kc/s only, £4/15/-. PZT carrier crystals, 7/6 each. Coaxial relays, Magnetic Devices type 951, 12v D.C., 50 ohms, VSWR. 1·1 tol up to 450 Mc/s, wire-in type, 37/-. FET prices reduced. TIS34, 500 Mc/s, 32/6; 2N3819, 200 Mc/s 22/6; MPF104, new n-channel, useful to 100 Mc/s as RF, or 145 Mc/s as mixer, only 12/6. UHF transistor bargains: RCA 40235, 1200 Mc/s N.F. 3db at 145 Mc/s, 10/-; Microelectronics ME3011, 800 Mc/s, 5/-; AF139, 800 Mc/s, 12/-; AF239, 800 Mc/s, 13/6; Power transistors: BUY10, 90 Mc/s, 10W., 30/-; 2N3053, 100 Mc/s, 5W., 9/6; RCA 2N4427 gives 1·2W out at 145 Mc/s, 0·5W at 430 Mc/s, only 31/-. Other items previously advertised still available. Send stamp for full details. All items except transistors 9d. postage extra.—G. Elliott, 3 Sandgate Avenue, Tilehurst, Reading, Berks.

**NPN SILICON PLANAR** Epitaxial transistors, Type P346A, TO5 case by SGS Fairchild PT, 3.0 watts; fT, 600 Mc/s, 7/6 each, 25 for £7 10s. 100 up £25 per 100—Stoneman & Turpin Ltd., 2, The Rye, Eaton Bray, Dunstable, Bedfordshire.

**EXCHANGE,** mint Cossor 1049 Mk. II, double beam scope for any good all band RX working or otherwise.—Wheeler, G3MGW, 9, Bateman Road, Brightlingsea, Essex.

**EXCELLENT** VHF QTH (22 countries worked on 2m.). 3 bed detached house, full central heating, garage. Room for 500 ft. long wire. 40 mins. Euston, £7,300. Ring G3LAS, Berkhamsted 3809.

## FOR SALE

**HEATHKIT RA 1** in mint condition with aluminium knobs and xtal calibrator. Working perfectly. £30 (carriage paid U.K.). Bert McHenry, GI3NSM, 54 Orby Road, Belfast 5. Tel. 59743.

## WANTED

**COMPASS,** ex-Marine type P11, Receiver, coverage to 125 Mc/s, in good condition. Details of price and coverage to: Box No. J7339, c/o R.S.G.B. BULLETIN, 4, Ludgate Circus, E.C.4.

**WANTED FOR CASH.** Certain types of scrap relays and contact springs from G.P.O. type relays. S.a.e. to " Lanco " 76 Sedgemoor Road, Willenhall, Coventry, Warks.

**EARLY VALVES.** Receiving or transmitting types before 1940 wanted, also early wireless books and magazines. Please describe and price. K8IKO, Box 327, Worthington, Ohio, 43085, U.S.A.

**SMALL** Transistor Receiver 160/80 or 160 only. Price about £5.—M. Sheridan, 6 Woodlands Road, Stratford-on-Avon, Warks.

**AR88D** any condition, working or not, but complete. G3GCO, 31 The Crescent, Donnington, Wellington, Salop.

**DISCONE ANTENNA** wanted for V.H.F./U.H.F. work. Details please.—Box J7337, c/o RSGB BULLETIN, 4 Ludgate Circus, London, E.C.4.

**RSGB ANNUAL, 1928;** Guide, 2nd (1934) Edition; " BULLETINS," July 1933 and January 1944, with covers.—G3IDG, 96, George Street, Basingstoke, Hampshire.

**B2 TRANSMITTER** Power Supply, also BC348 Receiver. Good condition essential. Details, including price to G3I0Z, 11, Fleet Crescent, Rugby.

**4E27A-5/125B VALVES.** State price or will swop new 813's.—G3RNV, 105, Dumbarton Road, South Reddish, Stockport.

**WATERS** Q-Multiplier/Notch Filter, Model 337-M2 or 340/A for Collins KWM-2.—Box No. J7338, c/o R.S.G.B. BULLETIN, 4. Ludgate Circus, E.C.4.

## MISCELLANEOUS

**DX-PEDITIONS OR HOLIDAYS.** Bed & Breakfast. 17/9 Single, 32/- Doubles, near Sea, Car Ferry/Mail Boat. Write E1GAS, 92, Glenageary Estate, Dun Laoghoire, Co. Dublin.

## EDUCATIONAL

**RADIO,** City & Guilds, R.T.E.B. Certs., etc., on " Satisfaction or Refund of Fee" terms. Thousands of passes. For full details of exams and home training Courses (including practical equipment) in all branches of Radio, Electronics, etc., write for 132-page Handbook—*Free.* Please state subject. British Institute of Engineering Technology (Dept. 200K), Aldermaston Court, Aldermaston, Berks.

# Radio Society of Great Britain

(Incorporated 1926)

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

## *Application for Corporate Membership*

**Radio Society of Great Britain**
**28 Little Russell Street**
**London, W.C.1**

I hereby apply for election as a Corporate Member of the Society and enclose a remittance for £2. 10s. 0d. being the amount of my first annual subscription.

I, the undersigned, agree that in the event of my election to Membership of the Radio Society of Great Britain, I will be governed by the Memorandum and Articles of Association of the Society and the rules and regulations thereof as they now are or as they may hereafter be altered; and that I will advance the objects of the Society as far as may be in my power; providing that whenever I shall signify in writing to the Society addressed to the Secretary that I am desirous of withdrawing from the Society I shall at the end of one year thereafter after the payment of any arrears which may be due by me at that period be free from my undertaking to contribute to the assets of the Society in accordance with Clause 8 of the Memorandum of Association of the Society.

***Date***..... ***Signed***.....

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### PERSONAL DETAILS TO BE COMPLETED BY THE APPLICANT

Surname (BLOCK LETTERS).....

Christian Names in full (BLOCK LETTERS).....

Address for all correspondence (BLOCK LETTERS).....

.....

Nationality..... Age (if under 21).....

Current Call-sign (if any).....

Details of previous membership (if any).....

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### DETAILS TO BE COMPLETED BY THE PROPOSER*

I wish to propose.....for Corporate Membership.

Proposer's Name (BLOCK LETTERS).....

Address (BLOCK LETTERS).....

Call-sign (or BRS No.).....

*Signed* .....

*If the applicant is not acquainted with a Corporate Member willing to propose him for election he may submit a suitable reference in writing as to his interest in Amateur Radio.

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# VALVES

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