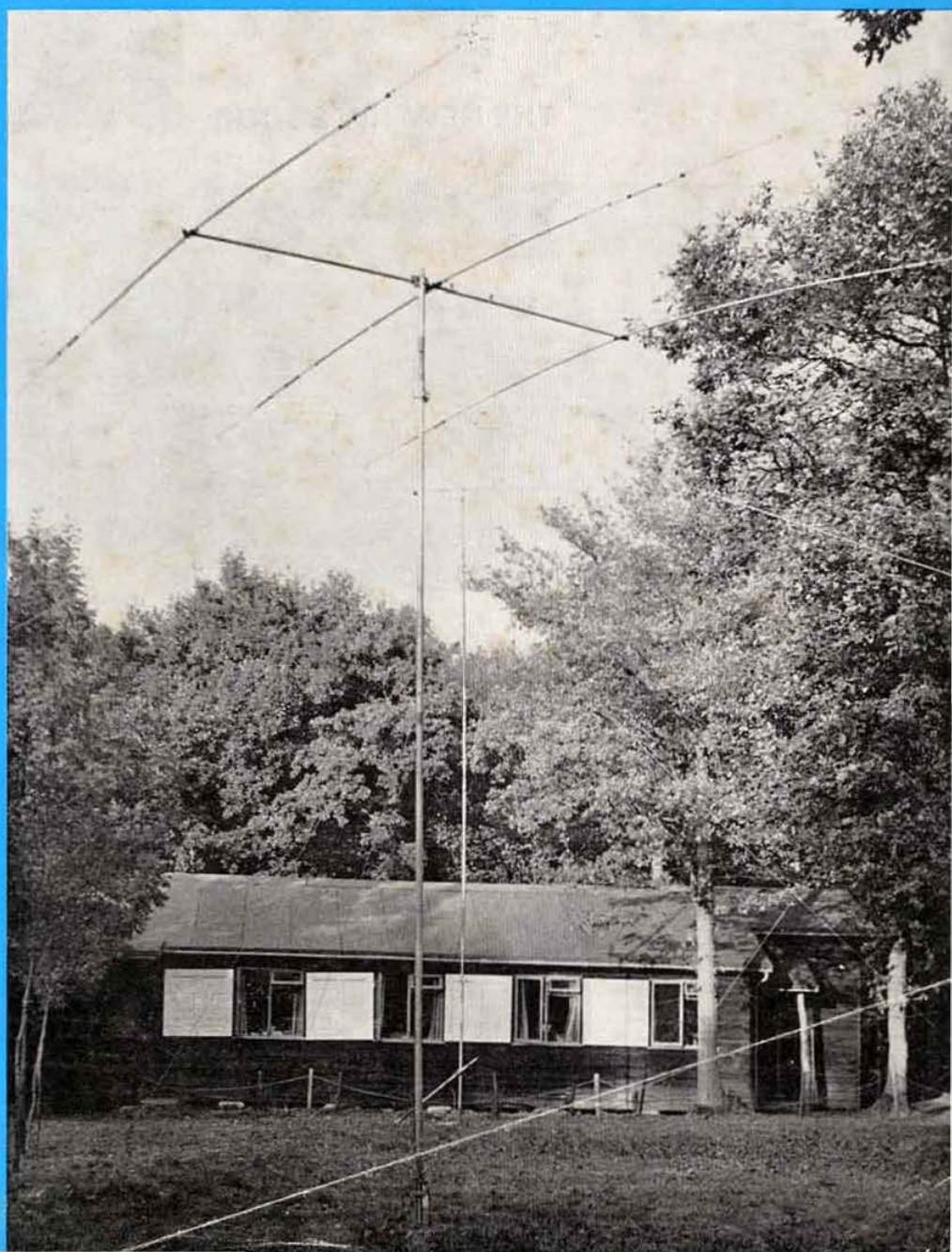
radio communication

January 1970

Journal of the Radio Society of Great Britain



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January 1970

radio communication

Volume 46 No. 1 Price 4s.

FRONT COVER
The Bushey Wood station used during the Scout Jamboree on the Air

CONTENTS

Radio Communication **(Incorporating** *The RSGB Bulletin)* **is published by The Radio Society of Great Britain as its Official Journal.**

Posted to all its members on the first Tuesday in each month

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Closing date for contributions, unless otherwise notified: 7th of month preceding month of publication.

Advertising, other than Members' Ads, should be addressed to: Mrs P. D. Harvey, Sawell & Sons Ltd, 4 Ludgate Circus, London EC4. Tel 01-353 4353

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2430 after 6		
Bill G3UBO	**Alan G3MME**	**Sim GM3SAN**

Just to remind you that if you intend flinging your hard-earned bread away on Amateur Radio in 1970, you can do a lot worse than fling it in our direction. We seem to have acquired a pretty fair old reputation for honest dealing and we do believe that what we sell is the best value for money on the market. To refresh your memory we generally have the following in stock:—

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A large SAE will get you guff on any of the above which grabs you.

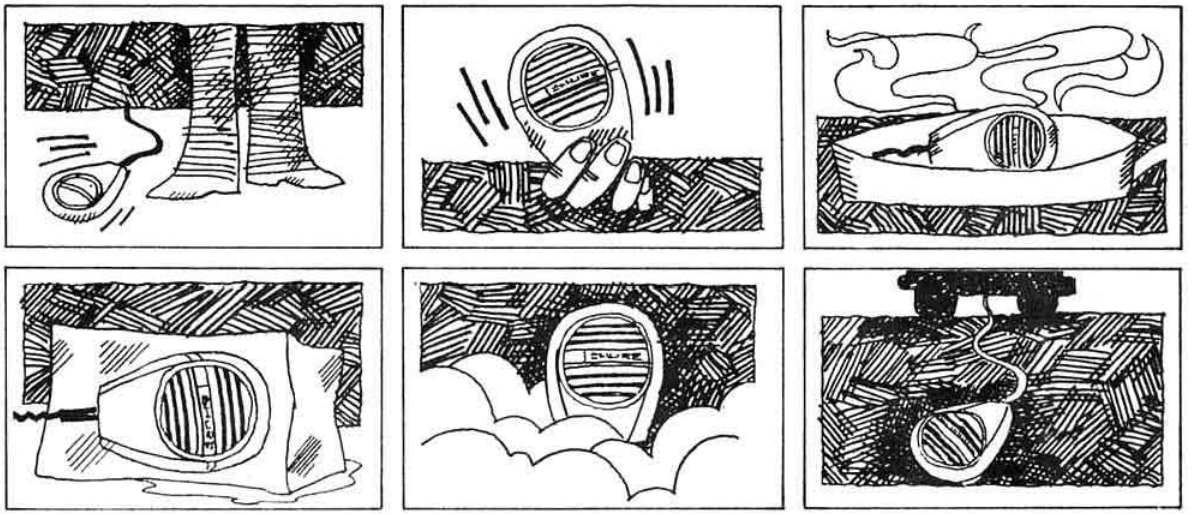
73 de Bill VE8DP/G3UBO

PS. We have just got a load of enamelled copper wire from 44 swg to 16 swg. Write for dope.
PPS. FT-500 owners—want a simple CW mod.? Drop me a line whether you bought your rig from me or not.

With deep sorrow we have to report that Vic Newport G3CHW died in the early hours of 12th December. An awful lot of people will miss him.

Before we sell you a Shure microphone we try to ruin it

just to make sure that you never will



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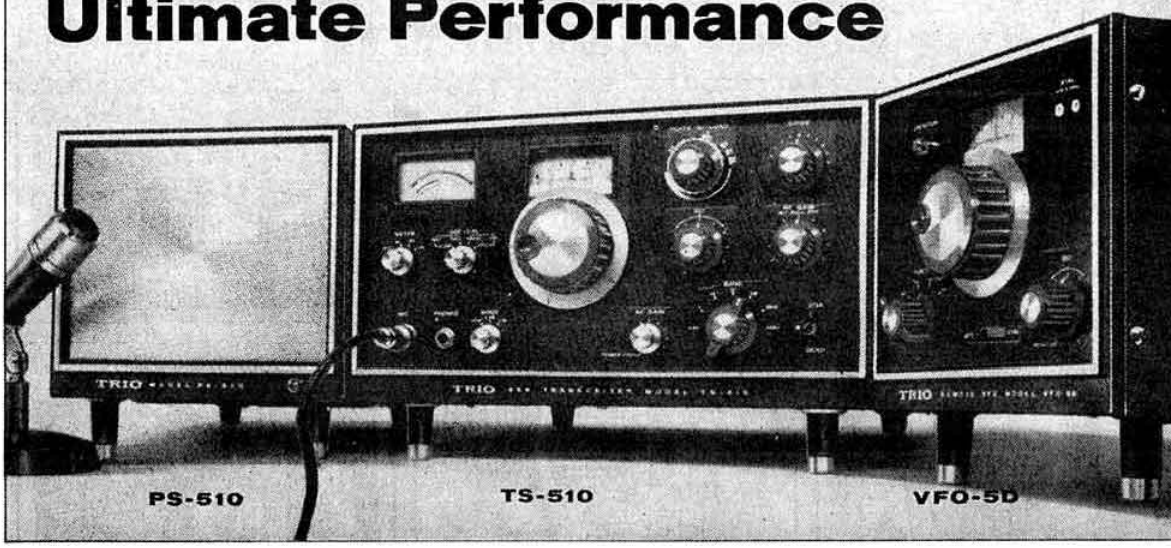

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AMATEUR RADIO UNION

PATRON: HRH THE PRINCE PHILIP, DUKE OF EDINBURGH, KG

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Dr J. A. Saxton—RSGB President for 1970

ON behalf of all members, the Council extends a sincere welcome to J. A. Saxton, DSc, PhD, CEng, FIEE, FInstP, who will be installed as the thirty-sixth President of the Society on 16 January 1970.

Before, during and after the second world war, Dr Saxton was engaged on propagation studies and research in radio meteorology. In 1960 he was appointed Deputy Director of the Radio Research Station. Between 1964 and 1966 he held the post of Director of the UK Scientific Mission and scientific counsellor at the British Embassy, Washington, DC, USA. On his return to the UK Dr Saxton was appointed Director of the Radio and Space Research Station, a position which he still holds.

Always very active in international radio science, Dr Saxton has participated in meetings of the International Union for Radio Science (URSI) and the International Radio Consultative Committee (CCIR). Recently appointed international chairman of CCIR Study Group V, the President will shortly be proceeding to New Delhi for the plenary meeting of the CCIR. Dr Saxton has also participated extensively in the activities of the Institution of Electrical Engineers and currently is chairman of its electronics division.

The Society is honoured that Dr Saxton, with his extensive commitments, is willing to accept office as its President.

QTC

AMATEUR RADIO NEWS

GW2HQ's equipment donated to University amateurs

We record the sincere thanks of the University College of Wales, Aberystwyth, Radio and Electronics Society to Mrs Fawcett, widow of Alan Fawcett, GW2HQ, who has presented the contents of his "shack" to that Society.

The equipment is based on a HRO receiver and an a.m. transmitter, the latter being home-constructed. It is strong evidence of 'HQ's skill at electrical and mechanical construction, and includes a superb coil winder made almost entirely from home-turned metal parts.

Mrs Fawcett's gift will be of great benefit to the University Society which is still very much "of tender years".

"Happy Station" retirement

Mr E. Starty, of "Happy Station" (International SW Service) Radio Nederland, Hilversum, Holland, retired on 31 December 1969. Well known to countless thousands of overseas listeners, he was appointed in charge of the PCJ station of Philips Eindhoven in 1928, and after the war developed the separate entity at Hilversum from where worldwide "happy" broadcasts originated.

We wish Mr Starty a long and happy retirement.

Aerial planning

Members are reminded that Mr G. S. Bracewell, G3EGK, will be pleased to receive details of the results of applications for planning permission and the circumstances of appeals against the refusal of planning permission. This information is being collected and held for use by the Society or members, where applicable, in future planning cases. The information should be as comprehensive as possible and should be sent directly to G3EGK at Chevington Chase, Huncote Road, Croft, Leics, LR9 6CU.

A recent successful appeal against refusal of planning permission for a 36ft mast in the garden of G3XWW at Cobham, Surrey, has been reported to the Society. In his findings the Ministry Inspector stated, "*It is not therefore considered that any impact of the proposal upon residential amenity would be such as to justify restricting the appellant's right to pursue his hobby, which incidentally is capable of leading to public benefit, and to use the land attached to his house for his own purposes.*"

Tape items

Mr Elof Kronquist of "Trees", Rogate Road, Hill Brow, Liss, Hants, thinks it would be a good idea if SWLs with tape recorders could exchange voice contacts by tape. He is willing to exchange and answer tapes with anyone, anywhere, and his machine is a Ferrograph two speed 3¾-7½ips two-track, mono.

Installation of President 1970

Dr J. A. Saxton, PhD, ARCS, FIEE, will be installed as the thirty-sixth President of the Society during the course of a social evening on

Friday 16 January 1970

at the

Bonnington Hotel, Southampton Row, London WC1

commencing at 7.30 pm

Admission will be by ticket, available on request (with sae) from Society Headquarters. Tickets are restricted to two per member.

Mr P. W. Moores, PO Box 63, Gillitts, Natal, South Africa, whose old callsigns were VQ8A, ZD8A and ZE1JA, is no longer active on radio but is a tape recording hobbyist. He would like to renew acquaintance by tape with former radio amateur friends —particularly Freddie Miles, G5ML, of Kenilworth and Dr Hector of Letchworth.

"UHF/SHF Techniques"

A special short course of lectures under the above title is to be held at Norwood Technical College over a period of six weeks, from 7 to 9pm on Tuesdays, commencing on 3 February 1970.

Topics will include: microwave propagation, reception and transmission; modern microwave components; and lasers and masers.

The fee is 15s, and applications for enrolment should be addressed to: The Secretary, Norwood Technical College, Knight's Hill, London SE27.

1970 Council election results

There were five candidates for three vacancies, and the votes each received were as follows:

E. J. Allaway, G3FKM	1,496
A. E. Dowdeswell, G4AR	1,038
J. C. Graham, G3TR	1,478
L. E. Newnham, G6NZ	1,523
E. W. Yeomanson, G3IIR	1,607

E. J. Allaway, L. E. Newnham and E. W. Yeomanson were declared elected as ordinary members.

RSGB Dinner Club

The next meeting of the RSGB Dinner Club will be on Friday 30 January 1970 at the Kingsley Hotel at 7.30 for 8.00pm. The Kingsley Hotel is in Bloomsbury Way a few minutes' walk from Holborn tube station. Ample car parking facilities are available adjacent to the hotel. The cost of the dinner is 26s and bookings accompanied by a remittance may be sent to Mrs M. Jardine at RSGB Headquarters. Arrangements have been made for the Apollo 11 moonwalk colour film to be shown at this meeting.

The RSGB Dinner Club is not a separate entity and all members of the Society are welcome at its meetings.

Radio Amateurs Examination

The next RAE will be held on Monday 11 May 1970 between 6.30 and 9.30pm.

The G8ARV 2m 2W transmitter

In connection with the article in the December issue of *Radio Communication*, the author, Mr. D. Taylor, has supplied the following amendments:

(i) Coil details for PA

Coil	Turns	Swg	I.D.	Length in mm
L1	3	18	8	8
L2	5	18	8	10
L3	3	16	12	10
RFC1	2½	26	on FX1115	

(ii) The photograph mentioned in section 3.1 was not included and the reference to it should be ignored.

Pirates caught

As a result of Post Office enquiries into the suspected unlicensed use of wireless telegraphy transmitting equipment, the following convictions have been obtained on using wireless transmitting apparatus without the appropriate licence, contrary to the provisions of Section 1 of the Wireless Telegraphy Act, 1949.

Mr J. M. Bevan, Bali Hai, Kewstoke Road, Sand Bay, Weston-super-Mare, at Weston-super-Mare Magistrates' Court on 29 August 1969. He was fined £5 with £5 costs.

Mr D. M. Hill, 2 Police Houses, Hollow Lane, Snodland, Kent, at West Malling Kent Magistrates' Court on 15 September 1969. He was fined £15 on each of three charges, plus £100 costs.

Mr G. Marks, 9 Low Wood Rise, Ben Rhydding, Ilkley, Yorkshire, at Otley Magistrates' Court on 21 October 1969. He was fined £10 on each of two charges, plus £25 costs with confiscation of equipment.

Area representative, Belfast and District Group—RSGB

The Council has accepted the nomination of Mr L. M. Lyske, GI3CDF, for the above-mentioned office for the period 1969-71, inclusive.

Silent keys

It is with regret that we record the deaths of the following radio amateurs:

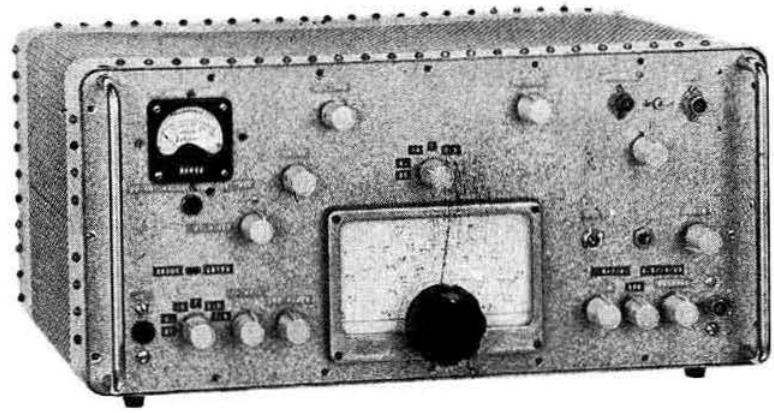
J. N. C. Bradshaw, G2NY, of Wyngarth, Bilsborrow, Nr Preston, Lancs.

J. G. Clark, ZS2BL, of 74 Main Street, De Aar, C. P, South Africa.

R. F. Oxley, G3PBP, of Ischia, North Drive, Beaconsfield, Bucks.

A. Whitelock, G3BNM, of 3 Avenue Cottages, Alne, York.

Where TVI is a problem



build this top band to ten ssb transmitter

(Part 1)

by D. G. Pinnock, G3HVA*

IT was in 1962, after much persuasion from G3MEA, that the author decided to go ahead with plans for a home-brew single-sideband transmitter. A frantic search was made through radio journals with a view to finding an easy method of producing an acceptable signal. Several constructional attempts were made, using the phasing system, and a very simple crystal filter was constructed. Results, however, were disappointing and the writer was about to give up when an article by G3BDQ in *Short Wave Magazine* caught his eye.

This article described an exciter using a McCoy 9MHz "Golden Guardian" crystal filter in conjunction with a 7360 beam deflection tube. After a month of hesitation and deep (financial) calculation, a sum slightly in excess of £20 was laid out and two months of paperwork began.

The writer had no connection at all with the electronics industry at that time and very little theoretical knowledge. All he had in mind was a basic set of requirements. These are summarized below:

1. The location being in a Channel 1 fringe area, operation had to be truly "harmonic-free".
2. All bands 1·8 to 30MHz to be available with no gaps.
3. Since operation was required on all bands, continuous harmonic monitoring facilities must exist.
4. Operating modes to be ssb and cw.
5. The transmitter must be a "table topper", with easy controls consistent with dx operating.
6. Power supplies to be separate and reasonably remote, thus reducing transmitter size as well as isolating an important source of heat.
7. Output to be 180W pep on all bands with the exception of 1.8MHz. For the latter band a low power output socket would be available.
8. Total cost of additional new parts to be minimal.

With patience and persistence a really sure-fire design has resulted which has stood the test of several years' operation, and the greatest pleasure has been obtained by being able to operate on any band at any time.

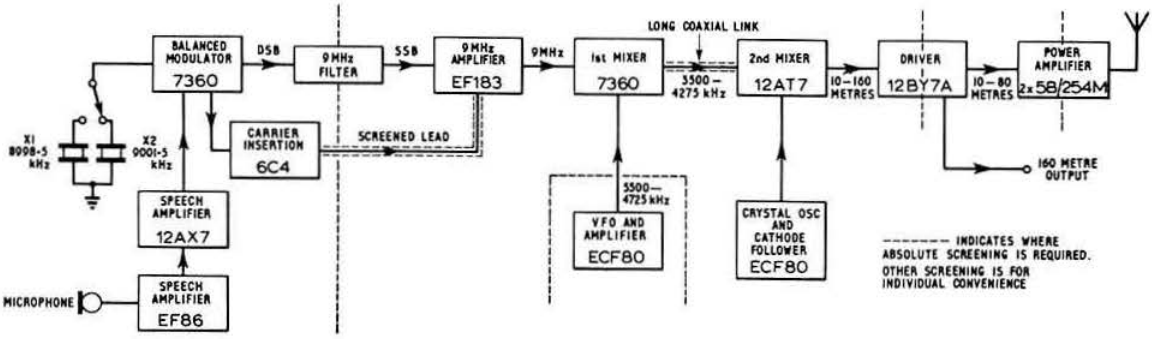
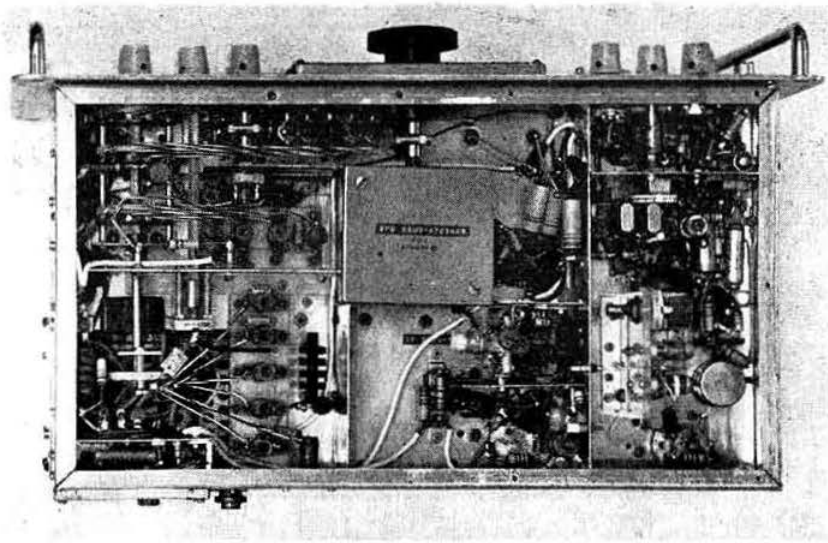


Fig 1. Transmitter block diagram

* 14 Mornington Close, Baughurst, Nr Basingstoke, Hants. (New QTH).



Under-chassis view showing clearly the screening between stages. The chassis did not quite touch rear wall of cabinet, hence the slight build out

Basic circuit

A block diagram is shown in Fig 1, and it will be seen that twelve valves are employed. The transmitter chassis was obtained from H. L. Smith & Co Ltd, of Edgware Road, London, and is their Type N having dimensions 17in by 9½in by 2in Valve positions on this chassis were only decided after long deliberation, and the following points were considered of most importance:

1. The very minimum of heat must be allowed to circulate near the vfo tuning circuit.
2. Circuitry layout should comply with desired front panel control positions.
3. Any interstage wiring should be unobtrusive for appearances' sake and, more important, must be short to avoid loss of drive.
4. Supply wiring, both ht and heater, should also be short and screened to conform with good tvi-proofing techniques.
5. The pa would need more than its share of room to allow for double screening of that stage.

Throughout the transmitter description, no wiring details of coils have been given, since it is considered that only constructors having access to grid-dip oscillators would attempt this type of work. Almost all coils are wound on 1½in by ⅜in diameter polystyrene formers (slug-tuned), which are bolted to perspex boards. These, in turn, are mounted on brass stand-offs which ensure reasonable spacing between coils and chassis.

During transmitter alignment all coils must be checked with a gdo to ensure that, when out of circuit, they do not resonate on higher frequency amateur bands and thus cause suck-out or loss of drive when these particular bands are in use. A guaranteed method of eliminating this problem is to use a shorting bar in the band-change switch, but if this is impracticable a change in ratio of L and C usually effects a cure. At the same time unwanted resonances in the local tv band can be weeded out.

The band-change switch is made up from two sources. It was found that single-pole six-way ceramic wafers could be obtained fairly easily in Lisle Street, but they were generally closely stacked on short switch units which were entirely unsuitable for band-change use. However, it was possible to purchase paxolin switches of approximately the correct spacing between wafers. Having bought both types of switch it was a simple matter to use the longer switch unit and replace the paxolin wafers with ceramic ones.

All resistors are ¼W or ½W, except those designated 6W on the circuit diagrams. Other exceptions are high-stability resistors in the vfo section.

Metal bending is a tedious occupation and not to be recommended. All screens and boxes, with the exception of the pa meter cover (which was bent) are made of flat pieces of aluminium mounted on ½in by ½in aluminium angle. This is obtainable quite easily from various sources, including hardware stores and carpet shops.

Balanced modulator and audio stages (Fig 2)

The balanced modulator uses an RCA beam-deflection tube, type 7360. This is undoubtedly fairly expensive, but in the writer's opinion it is well worth the outlay in view of the relatively easy way that the carrier can be balanced out. Indeed, with good design and careful layout a carrier suppression of 60dB can easily be achieved. But a word of warning; this part of the transmitter must be built like the proverbial battleship.

For optimum results the anode circuits must be laid out as evenly as possible to enable accurate balancing to be carried out. No untidy wiring can possibly be tolerated, and true vfo techniques must be used to ensure rigidity of wiring.

The principal points to watch when using the 7360 are:

1. Keep all sources of heat as far away as possible, thus avoiding temperature drift.
2. Use a good quality valve base, preferably ptfe.
3. Ensure that this stage, together with associated audio valves, is absolutely screened from all others. In other words no leakage whatsoever must take place, rf-wise, except via the filter itself.

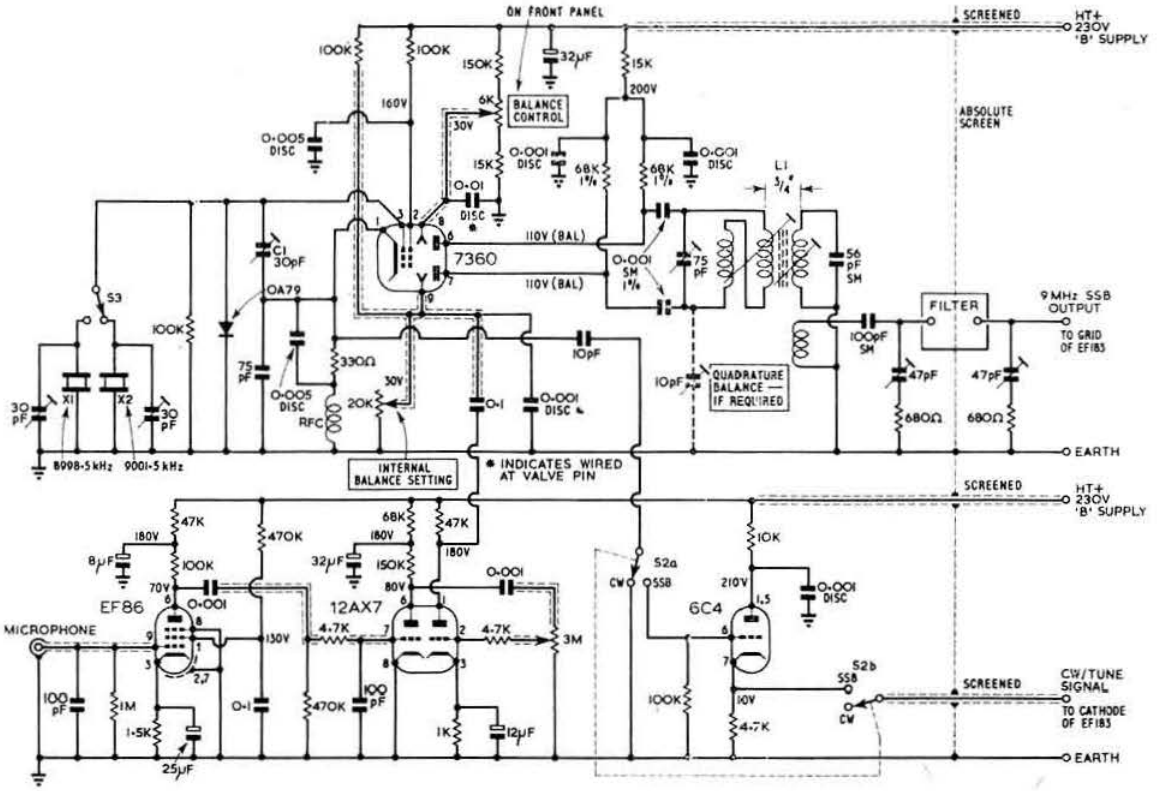


Fig 2. Balanced modulator and audio stages

4. Anode circuits must use good quality components; silver mica fixed capacitors, tight air-spaced trimmers and rigidly-wound inductors.
5. Inductors should preferably be bifilar wound, thus reducing to a minimum unwanted capacitive or inductive effects relating to the chassis or other components.
6. The maximum anode voltage of 150V should not be exceeded otherwise microphonic effects will be present. The anode load resistors must be of one per cent tolerance.
7. The diode across the grid circuit must not be omitted.
8. In case a constructor should decide to include power supplies in the transmitter itself, a good distance should be maintained between transformers and the 7360 valve, which does not like magnetic fields.

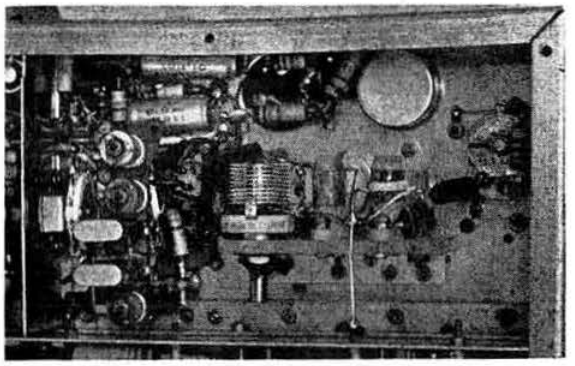
In spite of every precaution being taken, some minor difficulties did occur. For example, the carrier crystals X1 and X2 were fairly easily adjusted to their correct frequencies relative to the filter passband. This was achieved by varying the small trimmers in parallel, and very good audio quality was obtained. However, it was found impossible to tune the balance control for a perfect null on both upper and lower sideband crystals. If one was perfect the other was way out, and vice-versa. Therefore it was decided to make C1, which was originally a silver mica fixed capacitor, variable. When carefully set, this enabled a perfect carrier null to be obtained using either crystal. A further precaution was the earthing of the metal cases of the miniature crystals to lessen the possibility of direct radiation leakage. This may appear to be an extraordinary measure, in view of the fact that one pin of the crystals is grounded in any case, but it was very worthwhile.

One problem was stray capacitive effects on the 75pF anode-tuning capacitor. It was rather difficult to mount this component, due to its inherent unbalance caused by its shape. The smallest available component, consistent with quality and rigidity, was therefore chosen, and mounted on a solid Perspex bracket, taking care to maintain fixed and moving vanes equidistant from the chassis.

As can be seen from the circuit diagram, both of the beam deflection plates are manually set to 30V potential, and with no speech applied, a state of balance exists, resulting in neither carrier nor sidebands being present in the tank circuit. The slightest puff of audio from the 12AX7 driver, however, causes unbalance, and a double-sideband signal (less carrier) appears across this circuit.

Incidentally, the audio stages carry far greater gain than necessary, and, in fact, the 12AX7 alone would provide sufficient drive. However, the EF86 was included to allow the latter inclusion of a speech compressor, and consequent extra gain requirement, should it be desired.

The 6C4 triode enables the carrier to by-pass the balanced



Close up view of balanced modulator showing base layout of 7360 beam deflection tube and associated 12AX7 speech amplifier

modulator stage, and allows tune-up, with reduced drive, or full cw operation. It is essential that the grid be open circuit on the ssb position to ensure that no carrier leaks through to by-pass the filter.

9MHz amplifier and first mixer (Fig 3)

The 9MHz ssb output from the filter is extremely low level and is suitably amplified by an EF183 before being passed to the first mixer. No instability problems have been noted in connection with this valve, in spite of early misgivings, although when a 12AT7 mixer was used it was necessary to reduce the coupling capacitor to as low as 25pF.

The 12AT7 was originally included for economy reasons. In spite of the fact that it was operated in a balanced state, with great attention being given to layout, it was impossible to prevent harmonics of the vfo from mixing with the 9MHz signal and its harmonics. The resultant undesired signals were passed on to the second mixer with disastrous results, since they beat with signals from the crystal oscillator to give spurious signals which eventually arrived at the pa.

The inclusion of a 7360 immediately eliminated this problem, although the layout of this stage, having been converted, is not really balanced. However, by using a bifilar-wound coil in the tank circuit and maintaining reasonable symmetry to chassis, a far greater reduction of unwanted mixer products has been achieved.

The mixer output, namely 3,500 to 4,275kHz, is fed via a coaxial line and is the only lengthy rf link in the transmitter. The first 300kHz are used, of course, to provide fundamental 80m output and the remaining frequencies from 3,800kHz upwards for mixing purposes to provide output on the other bands. The exceptions are the 10 and 20 metre bands which overlap on to the lower segment.

To obtain maximum attenuation of unwanted mixer products, it is merely necessary, during alignment, to listen on the station receiver while the vfo is rotated. If a spurious signal is detected, rotation of the balance control will effect a drastic reduction in strength.

VFO unit (Fig 4)

The vfo is a parallel Colpitts circuit using the triode section of an ECF80, and tunes 5,500 to 4,725 kHz. The tuning circuit is mounted in a die-cast box and is coupled to the valve by a short length of coaxial cable. This practice ensures a little more distance between valve and tuned circuit and reduces the possibility of drift due to heating effects.

The vfo is extremely stable and no complaints have been received with regard to drift. Indeed, the writer has often noted considerable drift on commercially manufactured transmitters and wondered if it was a case of his signal going the other way. Such thoughts have proved to be unfounded.

A word of warning regarding the vfo. It has proved impossible, or well nigh impossible, to reduce unwanted harmonics with traps, even in the pentode section, without degrading the performance and drastically reducing fundamental output. The writer naively attempted to apply this technique with a view to retaining the 12AT7 first mixer.

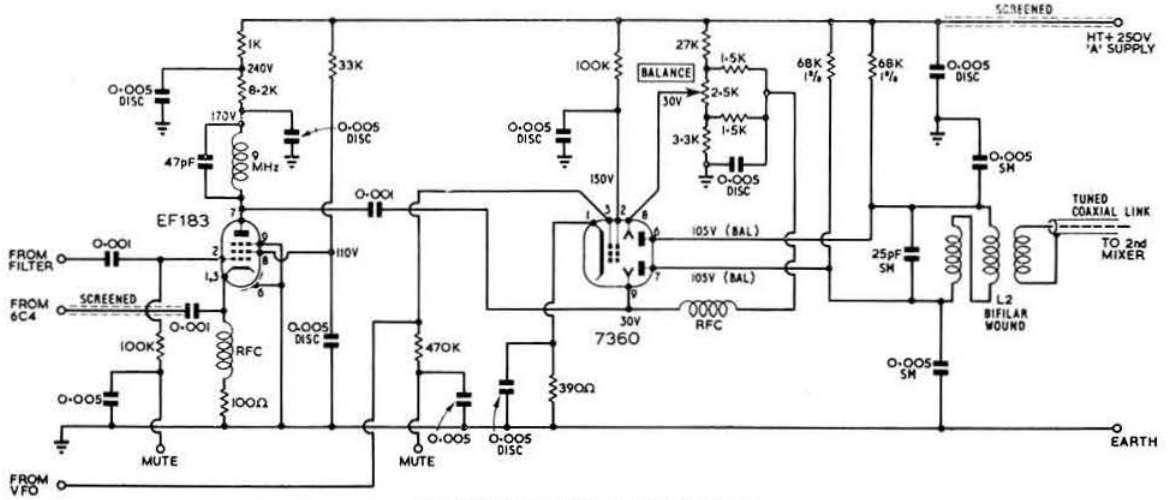
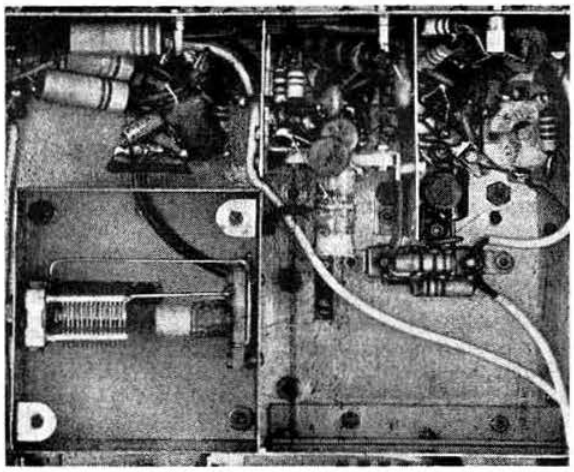


Fig 3. 9MHz amplifier and first mixer



Close up view of vfo (with cover removed), 2nd mixer and 9MHz amplifier

This was abandoned when a 7360 valve proved its superiority in no uncertain manner.

Crystal oscillator (Fig 5)

This stage of the transmitter created more than a few problems during the initial building period. Various valves were tried, together with many different combinations. It proved extremely difficult to obtain an equal, or near equal, output for all of the crystal frequencies involved. Furthermore, there was an additional difficulty with the higher frequency crystals in that they tended to oscillate as and when they felt like it.

Finally an ECF80 valve was chosen, together with a Colpitts circuit. No problems have been encountered in several years of operation, using the pentode as oscillator and the triode as cathode follower.

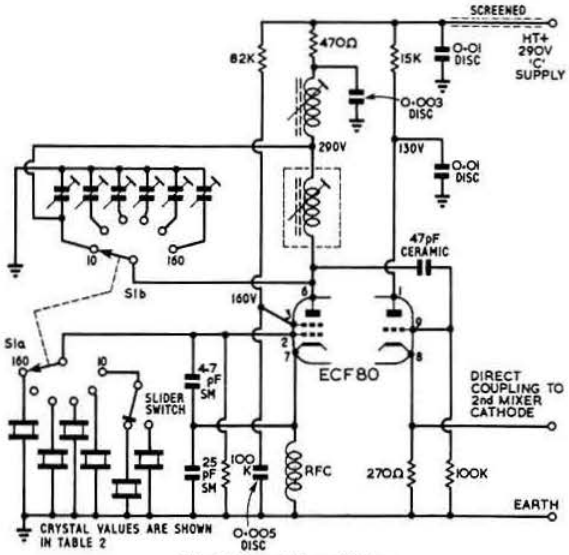


Fig 5. Crystal oscillator

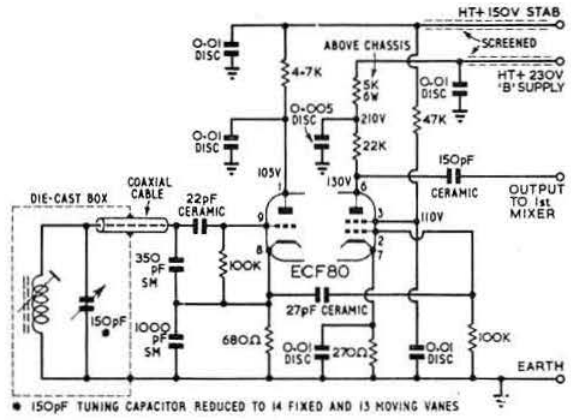


Fig 4. Vfo and amplifier

For economy only two coils are used in the pentode anode circuit. The principal coil is enclosed in an aluminium can above chassis, and it is tuned to resonance at all the crystal frequencies (or harmonic frequencies), except two, by means of switched concentric trimmer capacitors. The other coil is used for resonating the remaining two crystal frequencies for 28MHz operation, and is located under the chassis in series with the principal one. During 10m operation the principal inductance is shorted out.

Incidentally, it will be clear that, in view of the limited vfo frequency coverage (750kHz approximately), two sweeps have to be made in order to cover the whole of the 10m band. A separate slider switch on the front panel selects either the upper or lower segment of the band.

Direct coupling is effected to the cathode of the second mixer. This ensures maximum output from the higher frequency crystals where drive so easily tends to become lost.

Second mixer and driver stage (Fig 6)

No difficulties have been encountered regarding these stages of the transmitter. Due to the incoming sideband signal and the generated carrier crystals being well separated in frequency, there is no problem of spurious outputs.

Although the ssb input to pin 2 of the 12AT7 is fairly long, the fact that it is a coaxial lead, and is thus screened along its length, ensures stability at this point.

On 80m the 12AT7 acts as a straight amplifier, and would normally oscillate in no uncertain manner as a tptg circuit. However, by damping the 80m anode coil, in the writer's case a 4.7K resistor was placed in parallel, this problem was eliminated, with no reduction in output compared with the other bands.

Regarding the 12BY7A driver stage, only one real rule of thumb applies, ie absolute shielding between input and output. The metal screening was carefully cut to press tightly against the tube base, and no problem has been encountered regarding stability. It would not be advisable to leave out the anode and grid stopper resistors, and removal of the 10K damping resistor across the rf choke does have disastrous results under certain tuning conditions.

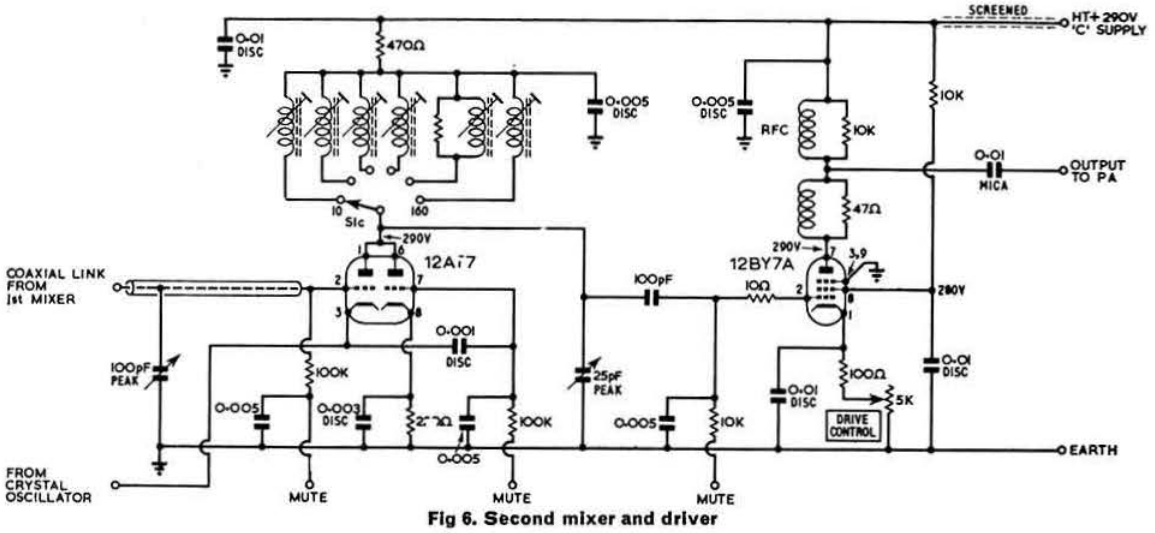


Fig 6. Second mixer and driver

No neutralization of this valve has been necessary, which is more than can be said of other valves tried, such as the 6CH6, 6CL6 and 5763.

Power amplifier (Fig 7)

A pair of 5B/254M valves was chosen because of their availability and, more important, ruggedness. After witnessing the early demise of several 6146s in commercial gear at the homes of local amateurs, it was decided to play safe and use the miniature 807, which was, in fact, designed for army tank communications where there is a fair chance of having the aerial shot away. The writer's aerial has not yet suffered this fate, but during prolonged testing, and misuse, over a period of several years, the same pair of valves has stood up manfully to its task and the power output has only marginally decreased.

The same principle has been applied to the pa as to the

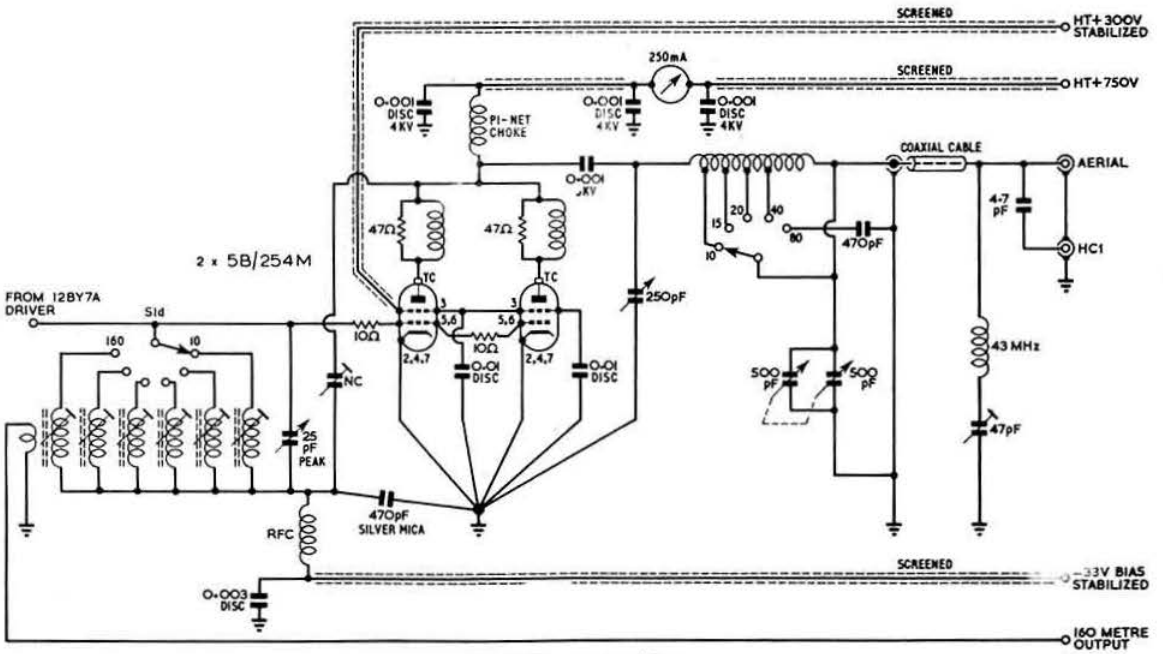


Fig 7. Power amplifier

driver stage, ie complete shielding between input and output. Also, to preclude the possibility of parasitics, 10Ω stoppers have been fitted at the grid pins, and 47Ω stoppers at the anodes.

Neutralizing is necessary on the three hf bands and the neutralizing capacitor is set up using 28MHz control settings and standard procedures laid down in the various handbooks.

Any pa stage will invariably generate a lot of heat. For this reason a small chassis of perforated aluminium is mounted 1½in above the main chassis, which is cut out at this point. This allows cool air under the main chassis to flow up through the grid compartment, past the valve envelopes and through the perforated pa cover to the outer casing.

The pa anode circuit must be completely shielded by a box inside the main transmitter cabinet, since, apart from preventing strong rf fields from leaking back to the low power stages, there is the eternal problem of tvi. But more of this later.

Layout of the pi net circuit is important. Since it acts as a filter, care has been taken to achieve a filter type layout, ie input at one end and output at the other. Thus the elongated rectangular compartment contains valves, pi-net choke, tuning capacitor, inductance and loading capacitor, in that order.

The pi-net choke in use was manufactured by Labgear Limited and originated from an LG300 transmitter.

The 1,000pF coupling capacitor must be of mica, and preferably of several kV working voltage, since any breakdown would cause the full pa ht voltage to appear at the aerial terminal.

The pi-net tuned circuit uses a Codar air-spaced coil which is extremely efficient. Care has been taken to locate this inductance at a distance of at least half its diameter from the pa compartment sides.

Since the power amplifier is located at the rear of the transmitter, it is necessary to run a short length of coaxial cable from the pa to the aerial output socket on the transmitter front panel.

(To be concluded)

Table 1—Control facilities

Control or facility	Notes
CAPACITORS	
VFO tuning	Flexible coupling to capacitor shaft to ensure stability.
1st mixer peak	Tunes coaxial link between 1st and 2nd mixer. Used for re-peaking whenever a change of frequency is made. Shaft uses flexible coupler, and capacitor is located above chassis, by pa compartment.
2nd mixer peak	Tunes anode circuit of 2nd mixer. Rarely adjusted once the transmitter is set up for a particular band. Shaft uses flexible coupler.
PA grid peak	Tunes grid circuit of pa valves. Rarely adjusted once the transmitter is set up for a particular band. Capacitor must be insulated from chassis.
PA tune	Controls 250pF variable which is almost open mesh on the hf bands. Shaft uses large flexible coupler.
PA load	Coupled to loading capacitor via a flexible shaft to allow front-panel symmetry. On 14 and 21MHz, adjustment must be made carefully to avoid disturbance of harmonic reject circuit.
Harmonic trap	Screwdriver control for tuning 43MHz reject circuit. Extremely tight fitting through front panel hole to avoid harmonic leakage.
SWITCHES	
USB/LSB selection	Due to frequency inversion, crystal X1 provides operation on 1·8, 7 and 21MHz, and crystal X2 on 3·5,14 and 28MHz. S3 on circuit diagram.
SSB/CW selection	Switches 6C4 carrier insertion valve "out" for ssb and "in" for cw. S2 on circuit diagram.
Intermediate band-change	S1 switches: (*a*) crystal oscillator grid circuit, (*b*) crystal oscillator anode circuit, (*c*) 2nd mixer anode circuit and (*d*) pa grid circuit. Ceramic construction—solid movement.
28MHz slide switch	Selects upper or lower segment of the band.
PA band-change	Switches pa to corresponding exciter frequency. Ceramic construction—solid movement.
Net switch	Long-dolly toggle switch which de-mutes the transmitter while in the "receive" position, thus allowing a signal to leak through to the pa and the aerial, the level of which is controlled by the 5kΩ pre-set potentiometer located alongside. Set correctly, this control enables the operator to talk himself on to the frequency while monitoring on his receiver and allows accurate netting.
POTENTIOMETERS	
Audio gain	3MΩ potentiometer at grid of 12AX7 speech amplifier, generally used at low setting.
Balance	6kΩ quality carbon potentiometer controlling voltage (30V) at beam deflection plate (pin 8) of balanced modulator. A further balance control (quadrature balance) is fitted beneath check point HC1 and drives 15pF variable capacitor via a flexible shaft. Once set, this control rarely needs retouching.
Drive	5kΩ wire-wound potentiometer in cathode of 12BY7A driver stage. If tvi troublesome on 14MHz, back off this control a few degrees to clear.
SOCKETS	
Aerial	Belling Lee
Harmonic check HC1	Belling Lee
Microphone	Belling Lee
Key	Bakelite socket, closed when keying jack removed. Unlike net switch, the key is only operative when in the transmit position. Keying is "grid block", and relies on switching muting system in and out.
AUXILIARIES	
Panel light	6·3V bulb in parallel with heaters—protected from full 6·3V by a 0·5ohm resistor in series. Like valve heaters is wired with screened wire and decoupled with ·005 disc ceramic capacitor.
Neutralizing adjustment hole	Located just below pa current meter. Slightly larger than 3BA(!) but allows occasional retouching of neutralizing capacitor with a knitting needle suitably shaped.

A transistor ssb transmitter for top band

By JOHN STEVENS, G3UFW*

THIS transmitter started out as a wish to do something a bit more interesting than microphone preamps, etc, using transistors. It has also been used as a set of design examples for a series of mini-lectures at the Chippenham Club.

As described here, the rig is fairly QRP, running to about 5W peak input (or 2-3W of rf out). Quite frankly, this will not show the way home to a well modulated 10W am rig; and at G3UFW a passive base transistor linear running up to full legal power is in use as well.

The line up of the transmitter is in a standard form for phasing exciters. The ssb is generated on about 450kHz and then mixed to top band with a high frequency vfo. Fig 1 shows the transmitter block diagram.

Circuit description

The audio circuits are straightforward. The microphone signals are filtered before being fed to TR1 and TR2, a Darlington high impedance amplifier. Hence via the ssb/tune switch to the audio gain control. More amplification occurs in TR3 before the signals are transformer-coupled to the audio phase shift circuit. This is lifted straight from the *Radio Communication Handbook*. C8—11 and R9—12 must be high stability components and one per cent close tolerance. I would certainly avoid the junk box and use a few new pence for these.

The outputs of TR4 and 5 are by shunt fed transformers. This avoids the bad effects of passing direct current through the primaries, ie audio response reduction and possibly unbalanced phase shifts.

There are two outputs from the phase shift network and these feed to TR4 and 5 which are high input impedance field effect transistors (fets). A balancing potentiometer RV3 in the source circuit is used in conjunction with RV2 to get the phasing right.

No polarity is indicated for the transformers, and if the upper rather than the lower sideband eventually comes out it will be necessary to swap over the connections to the primary (or secondary) of either T2 or T3. If required, a switch can be put in. More fets TR6—9, incl, are used in the balanced modulators. These follow the well-known push-pull arrangement and have balancing controls RV4 and RV5. These should be multi-turn miniature components. The outputs feed IFT1, which is a standard 450—470kHz i.f. transformer with the normal tuning capacitors removed—the capacitors marked * should be approximately double the value removed and should be closely similar to ensure good balancing. In the author's equipment the two 100pf originals were replaced by four 200pf one per cent silver micas. The carrier oscillator feed capacitors C14, 15, 18, 19 are not too critical in value but they should again all be the same, preferably to one per cent. Similarly the 100K resistors R31—34, incl, should preferably be all the same type and size.

Output from IFT1 feeds to the balanced mixer. Originally a single-ended mixer was used here, but difficulties with suppressing the vfo breakthrough led to the present circuit. RV6 is the balancing control, and it is worth making this accessible if not actually on the front panel. The mixer output coil is basically about 120 turns of 33swg close wound over 1¼in of ½in paxolin tube. This circuit is tuned with a 100pf VC1. (A Butterfly type was used in the author's transmitter to ensure good balance.) The six-turn centre-tapped primary is wound over the centre section of the tuned winding; and the four-turn secondary is finally added using plastic covered wire and leading away in a twisted pair to the driver stage. The driver output is tapped on to L5. This is rather a large component as specified and could reasonably be scaled down.

Twisted pair coupling is again used to drive the pa. This operates in grounded base which stops most of the instability

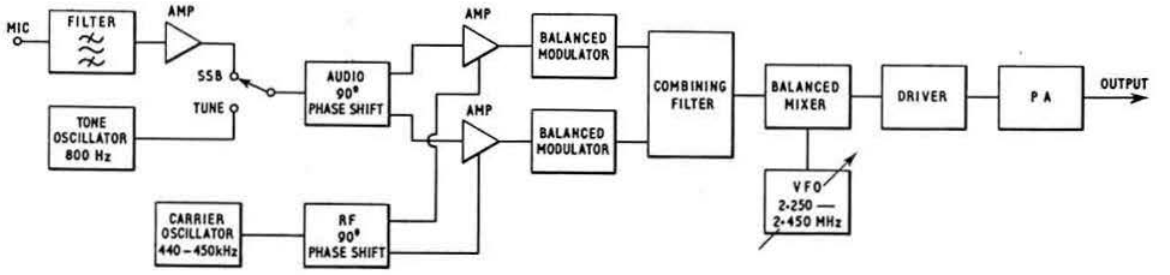


Fig. 1. Block diagram.

* "Langenhoe", Rowde, Devizes, Wilts.

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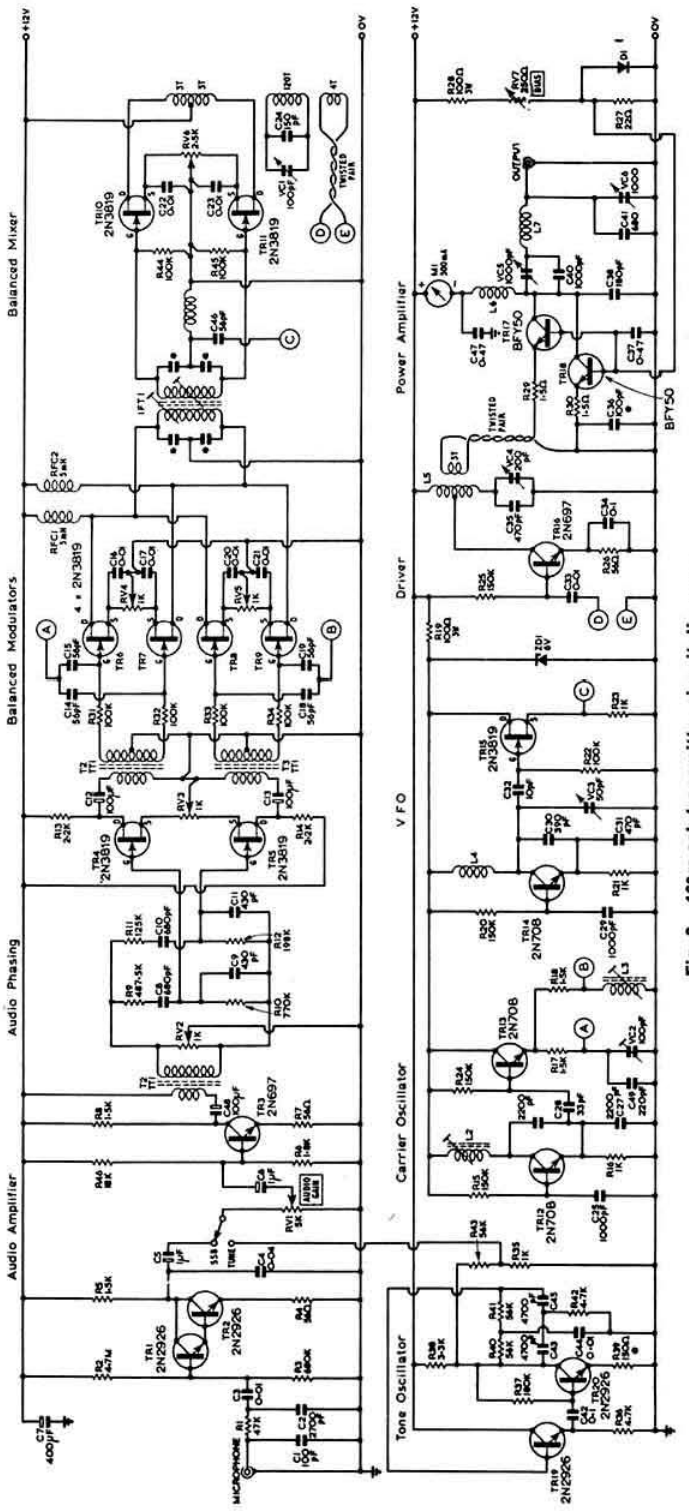


Fig. 3. 160m ssb transmitter circuit diagram.

Components List

Resistors

R1	47k	Carbon	20%	¼W
R2	4·7M	Carbon	20%	¼W
R3	680k	Carbon	20%	¼W
R4	56	Carbon	20%	¼W
R5	1·5k	Carbon	20%	¼W
R6	1·8k	Carbon	20%	¼W
R7	56	Carbon	20%	¼W
R8	1·5k	Carbon	20%	¼W
R9	487·5k	HS	1%	¼W*
R10	770k	HS	1%	¼W*
R11	125k	HS	1%	¼W*
R12	198k	HS	1%	¼W*
R13	2·2k	Carbon	20%	¼W
R14	2·2k	Carbon	20%	¼W
R15	150k	Carbon	5%	¼W
R16	1k	Carbon	20%	¼W
R17	1·5k	Metal Oxide	20%	½W
R18	1·5k	Metal Oxide	5%	½W
R19	100	W/Wound	10%	3W
R20	150k	Carbon	20%	¼W
R21	1k	Carbon	20%	¼W
R22	100k	Carbon	20%	¼W
R23	1k	Carbon	20%	¼W
R24	150k	Carbon	20%	¼W
R25	150k	Carbon	20%	¼W
R26	56	Carbon	20%	¼W
R27	22	Carbon	20%	1W
R28	100	W/Wound	10%	3W
R29	1·5	Carbon or	10%	1W*
R30	1·5	W/Wound	10%	at least *
R31	100k	Metal Oxide	5%	½W
R32	100k	Metal Oxide	5%	½W
R33	100k	Metal Oxide	5%	½W
R34	100k	Metal Oxide	5%	½W
R35	1k	Carbon	20%	¼W
R36	4·7k	Carbon	20%	¼W
R37	180k	Carbon	20%	¼W
R38	3·3k	Carbon	20%	¼W
R39	150	Carbon	20%	¼W*
R40	56k	Carbon	20%	¼W
R41	56k	Carbon	20%	¼W
R42	4·7k	Carbon	20%	¼W
R43	56k	Carbon	20%	¼W
R44	100k	Carbon	20%	¼W
R45	100k	Carbon	20%	¼W

* See text.

Capacitors

At least 20V working. 20% tol. unless marked. MF Capacitors may be Polyester or Polycarbonate.

C1	100pf	Ceramic
C2	2700pf	Ceramic
C3	0·01mfd	Metallized film (MF)
C4	0·04mfd	Metallized film (MF)
C5	1·0mfd	Electrolytic
C6	1·0mfd	Electrolytic
C7	100mfd	Electrolytic
C8	680pf	S/Mica 1%
C9	430pf	S/Mica 1% (See notes)
C10	680pf	S/Mica 1%
C11	430pf	S/Mica 1%
C12	100mfd	Electrolytic
C13	100mfd	Electrolytic
C14	56pf	S/Mica 5%
C15	56pf	S/Mica 5%
C16	0·01mfd	MF or Ceramic

Components List *(continued)*

Capacitors *(continued)*

C17	0·01mfd	MF or Ceramic	
C18	56pf	S/Mica 5%	
C19	56pf	S/Mica 5%	
C20	0·01mfd	MF or Ceramic	
C21	0·01mfd	MF or Ceramic	
C22	0·01mfd	MF or Ceramic	
C23	0·01mfd	MF or Ceramic	
C24	150pf	Ceramic or S/Mica	
C25	1000pf	S/Mica or Polystyrene	5%
C26	2200pf	S/Mica or Polystyrene	5%
C27	2200pf	S/Mica or Polystyrene	5%
C28	220pf	S/Mica or Polystyrene	5%
C29	1000pf	S/Mica or Polystyrene	5%
C30	390pf	S/Mica 5%	
C31	470pf	S/Mica 5%	
C32	10pf	S/Mica or Polystyrene	5%
C33	0·01mfd	MF or Ceramic	
C34	0·1mfd	MF	
C35	470pf	Ceramic 5 50V dc	
C36	100pf	Ceramic — See notes.	
C37	0·47mfd	MF	
C38	180pf	Ceramic or polystyrene 5%, 50V dc	
C39	1·0mfd	MF	
C40	1000pf	Ceramic or polystyrene 5%, 50V dc	
C41	680pf	Ceramic or polystyrene 5%, 50V dc	
C42	0·1mfd	MF	
C43	4700pf	MF 10%	
C44	0·01mfd	MF 10%	
C45	4700pf	MF 10%	
C46	56pf	Ceramic	
C47	0·47mfd	MF	

Variable capacitors

VC1	100pf	Butterfly	
VC2	100pf	Trimmer/airspaced	
VC3	50pf	Tuning/airspaced	
VC4	200pf	Tuning/airspaced	
VC5	1000pf	Tuning/airspaced	(Twin 500pf)
VC6	1000pf	Tuning/airspaced	(Twin 500pf)

Transformers

T1	Radiospares TTI	1 : ICT
T2	Radiospares TTI	1 : ICT
T3	Radiospares TTI	1 : ICT
IFT 1	Standard 450/470kHz if transformer with slug tuning.	

Transistors

TR1	2N2926	Yellow
TR2	2N2926	Yellow
TR3	2N697	
TR4	2N3819	
TR5	2N3819	
TR6	2N3819	
TR7	2N3819	
TR8	2N3819	
TR9	2N3819	
TR10	2N3819	
TR11	2N3819	
TR12	2N708	
TR13	2N708	
TR14	2N708	
TR15	2N3819	
TR16	2N697	
TR17	BFY50	
TR18	BFY50	
TR19	2N2926	Yellow
TR20	2N2926	Yellow
Z1	6·3V ± 10%	1·5W zener
D1	1A diode	

Inductors

L1	120 33swg on 1¼in of ¼in diam. + 6T CT + 4T.
L2	Q05 Osmor
L3	Q06 Osmor
L4	30T 28swg on ⅜in long 1in diam former.
L5	27T on 1¼in diam former 2in long spaced. Tapped about ⅓ way + 3T on earthy end.
L6	100T 33swg on 1in long ¼in diam former.
L7	16T spaced on 1¼in diam former, 2in long.
RFC1	5mH
RFC2	5mH
RFC3	10mH

Potentiometers

RV1	5k	Chassis mounting	½W
RV2	1k	Pc mounting	½W
RV3	1k	Pc mounting	½W
RV4	1k	Multiturn type ⎫ or may be combination	
RV5	1k	Multiturn type ⎭ 500 pot ± 2 × 270 fixed.	
RV6	2·5k	Chassis mounting	½W
RV7	250	Chassis mounting	1W

problems which occurred when it was operated in grounded emitter. However, a very high frequency oscillation still occurred and this was stopped by putting a 100pf capacitor at C36. This problem may well have been caused by the pa layout which was certainly not ideal. R29 and R30 are sharing resistors. The values are not critical but both should be the same.

The pa output circuit is regarded by the author, after many trials of others, to be the easiest and most reliable to use. As a rough guide L6 and C38 should form a low Q parallel circuit near band centre. C40/VC5 and L7 should form a higher Q (3-10) series circuit. The author has used such a low Q (~ 3) that the tuning control has very little effect! However, the circuit performance is quite good with about 50 per cent efficiency and runnning to 5W peak input before limiting.

Both the oscillators use a fairly standard arrangement of the Colpitts circuit. The carrier oscillator could be made crystal controlled by putting an appropriate crystal in place of C25, but this has not been found necessary. The low Q phase shift network is again lifted straight from the *Radio Communication Handbook*.

The vfo circuit is of the same type as the carrier oscillator. No trimmers were included in the author's model, C30 being

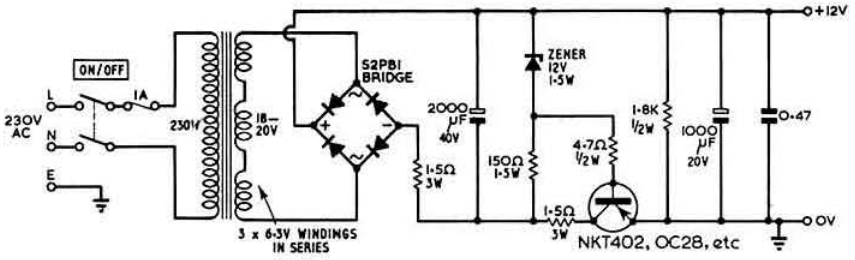


Fig 3. Suitable 12V 1A power supply.

changed until the vfo tuning range was right. A judicious choice of fixed and parallel trimmer capacitors could be used for C30 if required or if difficulties are experienced in setting up.

The tone oscillator, which is used for tuning up, is a Twin Tee oscillator at about 800Hz and taken more or less straight from the GE Transistor Manual. The only difficulty with the original circuit is the poor waveform, and this has been cured by the insertion of a resistor R39 in the emitter lead of TR20. This controls the gain and may have to be changed slightly. The best value is the highest possible without stopping oscillation, but it should be checked that oscillation is still possible if the rail voltage is reduced from 12 to 6V, otherwise erratic starting may occur.

The mains power supply, which includes some protective current limiting resistors, is shown It is useful to about 1A and handles the 500mA or so of the transmitter quite happily.

Setting up

Generally it is a good idea to read up the subject of setting up phasing rigs in the *Radio Communication Handbook* before starting.

Some sort of oscilloscope at least usable to 2MHz is necessary. A receiver with coverage over 2,000 to 3,000kHz in addition to top band is desirable.

First set the carrier oscillator on frequency. This can be checked roughly on the scope, then more accurately with a wavemeter or If receiver. 440-450kHz is recommended to keep the fourth harmonic out of top band.

Now get the vfo tuning the right range using the receiver, and then use the scope to get the tone oscillator going and make R39 right for a nice sine wave with no more than a suggestion of flattening. If all is well, switch to "Tune" but rotate the audio control to zero.

Then comes the trickiest part. Remove the +6V supply from the vfo and monitor from drain to chassis of one side of the balanced mixer TR10 and 11, with the oscilloscope on high sensitivity and ac coupled. Although the circuit is mistuned it should be possible to see some of the carrier oscillator signal. Set RV6 to approximate mid-travel. Adjust RV4 and RV5 alternately to achieve minimum signal. Set RV2 and RV3 to approximate mid-position. Increase the audio gain until a signal is seen. Peak this with the IFT1 slugs. Reduce the audio gain to zero and check the balancing of RV4 and RV5. It may be necessary to repeat this operation a few times to get the right combination of settings.

Now increase the audio gain to obtain an easily visible signal. This will probably be modulated. Adjust RV2, RV3, VC2 and L3 in turn to obtain as flat a continuous wave as possible. Note that the settings of RV2 and 3 are well away from centre—about 2/7 from one end.

Reconnect the vfo +6V supply, put a dummy load on the tx output and set the audio gain to zero. Check that the pa bias (RV7) control works; set this for about 100mA on the meter. Turn up the audio gain and adjust VC1, VC4 and the "Tune" and "Load" controls for maximum output, and check that this is in fact in the range 1·8—2·0MHz and not 2·7—2·9MHz.

Monitor the vfo frequency with a receiver and adjust VR6 for minimum. (This may not be very marked but should be visible on the S meter.)

Now monitor the output with the scope. Set the audio gain down and check the absence (or otherwise!) of a signal. If necessary readjust the balanced modulators RV4 and 5. Bring up the audio gain and finally readjust the phase shifters RV2, RV3, VC2 and L3. The modulation depth left after these adjustments should be less than five per cent of the total deflection on the 'scope.

Plug in a microphone—preferably a high output crystal type, switch to ssb and start talking. It should be possible to get over 250mA pa current if you really scream and this should provide about 2W of rf output.

Operation and general notes

No rx/tx switching has been shown, as this is incorporated in the linear amplifier. Ptt or vox have not yet been organized, although there is no reason why they should not be.

Reports on the air have been quite complimentary once an early frequency modulation problem had been resolved.

The layout of the original is not really ideal and will not therefore be described in detail.

The audio amplifier, phase shift and balanced modulators are built on a single piece of veroboard and a symmetrical layout of components was employed. The vfo/balanced mixer, and the carrier oscillator/rf phase shifters are built on two more small veroboards. The driver transistor circuit also has a small veroboard. The BFY50 pa transistors are mounted in a 2 by 1½ by ⅜in block of aluminium drilled out to take the TO5 cans. This is more of a precaution than a necessity as the power dissipation is quite low, also it does ensure pa bias stability.

Plenty of screening between the balanced mixer, driver and pa is necessary, since these are all tuned to the same frequency.

Further screening between the audio/balanced modulator circuits and the oscillator circuits and the driver pa circuits is incorporated in the author's model.

Beam recovery

by C. R. EMARY, G5GH*

THE lowering of a beam and rotator from a fixed triangular mast presents problems, and the use of brute force is no answer, especially if, like the author, you are too well built to climb the mast. This problem had to be tackled recently owing to gale damage, and a device was constructed for lowering the beam.

A couple of lengths of Dexion angle were to hand and these were bolted in series with plenty of overlap. By slightly enlarging the holes in the angle, $\frac{5}{16}$in diameter bolts could be used.

Another piece of angle about 2½–3ft long was drilled in four places: near the end (1); at a point from (1) the distance between the centre of the beam and the side of the mast (2); near the far end of the angle (3); and nearer the far end (4).

This piece of angle is bolted at (2) to the original Dexion angle, and at a right-angle. A piece of iron is bolted into (3) and brought back to the upright Dexion angle. See diagram, top right.

For want of other materials four pieces of angle about 9in long were bolted in pairs, as shown in the centre of the diagram, and a single hole drilled in one side of each pair. These brackets are bolted near to the bottom of the upright Dexion angle so that they can be clipped over two of the cross stays of the actual mast. The upright Dexion angle is positioned over the centre of the mast side so that these brackets slide into position against the mast uprights and the cross-piece goes over the beam.

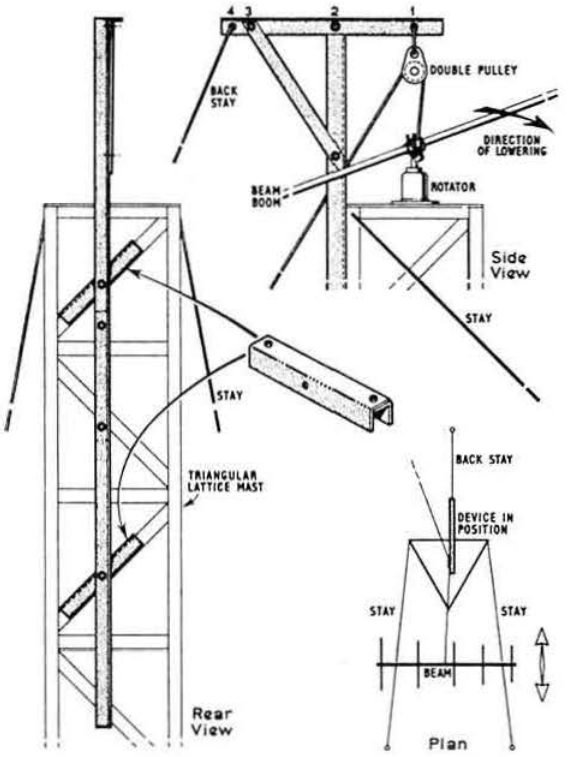
A double pulley is fixed to hole (1) in the horizontal angle and a back stay to hole (4). The whole contraption can be walked up the mast by some agile person assisted from below by a rope through a cross member near the top of the mast. The device is then fixed to the mast by the brackets and the back stay fixed to the ground.

By using a double pulley the beam may be raised and left suspended and only the rotator lowered. If both are to be lowered then both pulley ropes can be tied to the beam boom. Lowering is, of course, quite simple.

Raising the beam plus rotator presents a weight problem. This can be largely overcome by using two stays attached to the top of the mast and run in the opposite direction to the back stay and fanned out. The smaller the angle to the ground the better. With a guiding rope tied to the driver element, to assist in clearing mast guy wires, the beam boom is slid up these two fore-stays, which take its weight and allow the beam to be hoisted quite easily.

One problem remains—my QTH is very exposed. The junior op, rising 21, goes up the mast on calm days, of course. But these seem to coincide with his "dates"—any ideas?

*Westbury End, Finmere, Buckingham, Bucks.



Book Review

TRANSISTOR AUDIO AND RADIO CIRCUITS.
A Mullard manual of circuits. 210pp.
Available from RSGB Publications, 35 Doughty St, London WC1. Price 32s, postage paid.

This new publication reflects advances in electronics since the issue of earlier Mullard books devoted to the audio and radio fields. It is intended as a manual of established and practical circuits for use by engineers, manufacturers and constructors.

A wide range of circuits, from portable radios to the highest quality audio amplifiers, is presented in detail, and there is a chapter dealing with test equipment.

The complete list of chapter headings is: Silicon and Germanium Transistors; Basic HF Circuits; Radiograms; Record Players and Portable Radios; Tape Recorders; Car Radios; High Quality Audio Equipment; High Quality FM Tuners; Test Equipment.

There are also appendices covering biasing arrangements for hf circuits, BBC test tone transmissions, and charts and nomograms.

TECHNICAL TOPICS

A monthly feature by PAT HAWKER, G3VA

"FASHIONS in circuits as well as clothes tend to run in cycles. If you keep an old design on the shack shelf long enough, who knows but what you may be able to jump on the band-wagon next time it becomes popular."

So opened *Technical Topics* in January 1960, exactly a decade ago. The sentences were used to introduce some then up-dated versions of the Armstrong super-regen detector. And indeed the super-regen, especially for handi-talkies, by no means deserves to be forgotten, even in 1970.

A decade of amateur radio

But while many of the circuits and topics of the 1960 era remain of interest ten years later (for example, *TT* that month was also explaining how bridged-T filters could be used as notch filters and for Q-multipliers), there have been significant changes in circuit fashions and equipments which do not quite fit the suggestion of "cycles" (or should one say "Hertz"?).

The virtual abandoning of the high-power a.m. station on the hf dx bands; a significant transfer of interest from hf to vhf; a continuing, and to some of us regrettable, shift of majority interest in the UK away from the still supremely efficient cw mode; the acceptance, or at least the greater tolerance of, the role of the semiconductor; the impact of the ssb transceiver, although still a small minority in numbers; more rtty and mobile operation, which in 1960 was just beginning to put down roots in the UK; the arrival of field effect devices, microcircuits and silicon transistors of good vhf and uhf performance; the triumph of silicon diode rectifiers, and the practical application of varactor multipliers—the list could be expanded to show that technically this has been a progressive decade.

And we should not forget the still-developing impact of the Class B licence. The total is already rapidly approaching 2,000, with its initial aim of increasing operation on 70cm and the microwave bands now largely swept under the carpet. Also the rise in total British licences from roughly 8,600 to over 15,000—though one doubts if activity has increased in the same proportion.

However, for all these changes in equipment and licence statistics it is clear that operationally results have moved forward less decisively than one might have expected. For example, despite the world-wide growth of vhf activity, a surprisingly large number of the *QST* listings of world records continues to be linked with the Fifties: 50MHz, 12,000 miles in 1956; 144 and 220MHz, 2,540 miles in 1957 and 1959, respectively; 1,215MHz, 400 miles in 1959. The recent contributions of 1,185 miles on 420MHz (1969) and 225 miles on 2,300MHz in 1968 do not entirely overwhelm uhf results in earlier decades, although in August 1961 G3JHM and SM6ANR were able to chalk up a world record with a distance of 686 miles on 70cm. Moon-bounce and meteor scatter date back more than ten years.

Some technical developments have not worked out in the manner forecast. Apart from its improved communications efficiency, ssb was to have doubled the number of phone channels; yet one finds a recent *QST* comment by W3ASW, "The very reason we pioneered ssb was to cut down the bandwidth required for communication . . . to listen to and examine some of the signals on 20m phone is a sickening thing . . . 6 and 8kHz bandwidth with signal clippers and processors, and operators either blaming my receiver or explaining they have to make noise to be heard in pile-ups." Even when such tactics are not deliberate, a real problem with ssb is that by no means all users have the attendant means to check the operation of their equipments, which thus become virtually "black boxes."

And I recall that at the RSGB Convention at Cambridge in 1960, the forecast was made that "150W hf transistors at prices comparable to valves of equivalent dissipation are now but two years or so distant." A long two years! Although in *QST* (October, 1969) R. Jayaraman, VU2JN, presents a fully transistorised 75W transmitter for 7, 14 and 21MHz. But the 2N3950 pa devices are still not exactly at 807 prices (and the author admits to burning out at least one of these costly units during development). While in the article there is a curious echo of the Cambridge remark: "The day may not be far off when a 100W rf transistor will be put on the market at a price well below that of a 6146B." Perhaps, or perhaps not. Are low-voltage, high-current power devices really more suitable for fixed stations than high-voltage, low-current valves?

What then of the Seventies? Will the s.i.c. and the module come into general use? Will inductively-wound i.f. transformers soon be a relic of the past? Will new generators such as the Gunn and Impatt diodes really open the microwaves to amateurs? Will we see the development of simple pulse code modulation systems for uhf? Since amplitude variations have surprisingly little effect on intelligibility, amateur pcm "words" could be made up of only a few "bits", making the analogue/digital conversion much simpler and the bandwidth less than for commercial communications. Will we witness a return to receiver simplicity with extensive use of homodyne, direct-conversion techniques? Will the pressure of local authorities and town planning have a similar effect on aerial systems?

Will uhf television gradually turn tvi into a horrid memory? It was as long ago as November 1937 that the late H. A. M. Clarke, G6OT, contributed in the *T & R Bulletin* probably the first-ever comprehensive review of anti-tvi measures.

This appeared within a year of the opening of "Ally Pally", and included many, still relevant, filter techniques, and such prophetic comments as: "There is thus every probability that the strong harmonics of a 14Mc transmitter may cause serious interference with picture reception . . . the chances of interference will increase . . . it is true that a linear Class B final stage will produce less third harmonic, but even so there will always be sufficient harmonic energy to cause trouble if it is radiated . . ." None could claim that we were not fully warned by G6OT, who was one of the EMI team which developed British 405-line television. But few of us then anticipated that for more than three decades this was to be the number one problem for amateurs. Now, at last, there is a genuine hope that it may be down-graded. I would be more optimistic were it not for the poor "immunity" and small dynamic range of modern uhf television receivers—and those troublesome broadband mast-head and back-of-set pre-amplifiers.

QST has recently replaced its "25 years ago this month" feature with a "50 years ago" contribution—a good reminder that amateur radio depends more on fundamental appeal than on transient technology . . . and allows us to look forward confidently to yet another decade of technical progress, combined with the remarkable continuity and eternal vitality of the hobby.

More uses for the capacitance meter

The *TT* reference (October 1969) to the GM3DXJ/ON5GP type of simple capacitance meter has brought in some practical comments from G. R. Foggin, G3GRF. He points out that this type of instrument can, without any modification, be put to other valuable uses:

(1) If suitably calibrated it will also measure low values of *resistance* and *inductance*.

(2) When switched "off", it will act as a sensitive untuned all-band field strength meter, using short lengths of wire from the test terminals as aerial probe and earth.

(3) When switched "on", it acts as a useful crystal-controlled frequency meter with harmonics throughout the hf range. This is more applicable to the higher frequency crystals proposed by GM3DXJ, such as 2MHz or 2·5MHz.

G3GRF also explains that he originally built his meter in accordance with the GM3DXJ circuit (*RSGB Bulletin* March 1964), using a 2·5MHz crystal and 1mA fsd meter. He subsequently discovered that more than sufficient meter deflection is provided using only a single OC44 co, thus allowing the amplifier stage to be dispensed with. His unit now takes the form shown in Fig 1. As G3GRF puts it: "There you have it—one transistor co providing a capacitance, resistance and inductance meter (two ranges), field strength meter and crystal calibrator!"

Thyristor power supplies

On the supposition that the consumer goods of today are tomorrow's happy hunting ground for low-cost and salvaged components, it is always worth keeping an eye on new techniques being introduced into domestic radio and television sets. In recent months there have emerged a number of stabilized thyristor power supplies capable of providing well-regulated ht lines at the fairly hefty currents demanded by monochrome and colour tv sets. While most of these power units have been based on the transformerless, mains-connected chassis technique for long associated with tv sets in this country, some information has also been appearing

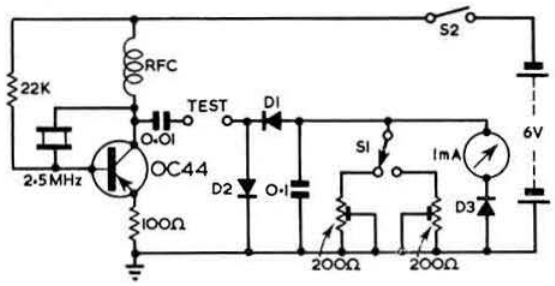


Fig 1. G3GRF's simplified version of the versatile capacitance meter. In his case the ranges are calibrated 0-50 and 0-500pF

on full-wave and bi-phase supplies which in conjunction with double-wound transformers provide fully isolated power units.

A useful collection of articles and notes by D. J. King on these new thyristor supplies can be found in *Mullard Technical Communications* (November 1969), including units capable of providing a well regulated, low impedance 200V line at up to about 700mA. Among the non-isolated half-wave circuits are several intended to provide a 145V line at 400mA maximum. A feature of these circuits is the use of a current-limiting thermistor (VA 1104) which copes with switch-on problems.

The thyristors are used as half-wave rectifiers whose conduction points are controlled to occur in the latter half of the positive half-cycle of the mains input. Since the conduction point of the thyristor determines the dc point, it is possible to obtain a stabilized and low impedance ht line in this way. Among the devices used in these supplies are the BT106 and BT100A/500R, and the BR100 diac (a diac is a bi-directional thyristor with no gate—its characteristic has a negative region which starts at a critical potential, or breakover voltage) and the BRY39.

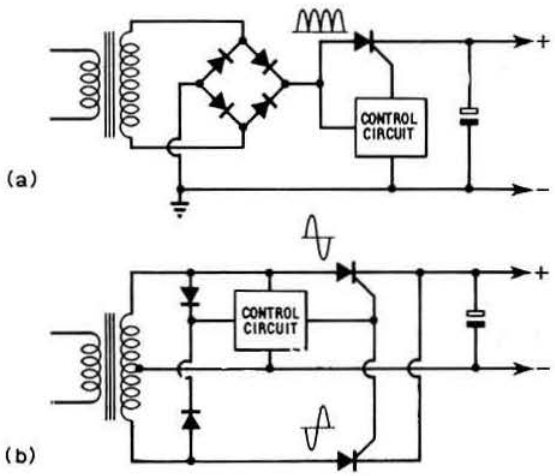


Fig 2. (*a*) Basic full wave thyristor power supply; (*b*) basic bi-phase thyristor power supply

As we have mentioned before (*TT* June 1968) thyristor-type devices in consumer applications could easily become a potent new source of rf interference. For this reason it is to be hoped that adequate interference-suppression filtering will always be included in such power supplies. The thyristor has a fast turn-on time (typically 2-3 microseconds) so that a high current pulse flows because of the sudden application of the mains waveform to the reservoir capacitor. In the Mullard circuits an air-cored rf choke (210 turns of 21swg wound $\frac{3}{4}$in wide on former with diameter of $\frac{7}{8}$in) is used to reduce radiation—though it is a shade worrying to note that it is claimed only that "radiation is lower than that produced by the time-bases". Time-base radiation, as many amateurs have discovered, is not always insignificant. While full details of several isolated and mains-connected supplies are given in the journal, Fig 2 shows the basic full-wave and bi-phase circuits.

Another form of stabilized power supply, but using power transistors rather than thyristors, is being used in some transistorized tv chassis; this stems from the Italian ATES concern (*Electronics International* 29 September 1969). In the simplified circuit shown in Fig 3, the purpose of ZD1/TR1 is to stabilize the dc over wide fluctuations of the mains voltage with an output in the 220V region. This voltage is then dropped to about 32V by the switching action of a pulsed power transistor, TR2. In the tv arrangement this is pulsed from the line-flyback. However, it is worth noting that the ratio of on to off time sets the ratio between input and output voltages, so that by pulsing from a generator having variable mark/space ratio it would be possible to develop a well regulated, variable voltage supply.

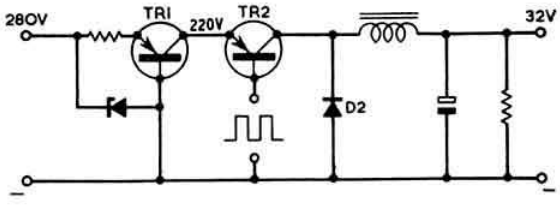


Fig 3. Simplified circuit diagram of the ATES technique for providing stabilized low-voltage rail for transistorized tv receivers. TR1 stabilizes the dc output despite line fluctuations. TR2, switched on and off by flyback pulses, drops the power to 32V. D2 acts as a switch to discharge the inductance

Safety first and foremost

As we have just noted, domestic tv receivers (and many domestic radios) use mains-connected chassis, either transformerless or with an auto-transformer. From time-to-time such techniques have been used in amateur radio designs, and they can be safe *if*—but only if—great care is always taken to ensure that the chassis is *always* connected to the neutral mains lead. Recently we have been reading the very depressing Report by the Electrical Adviser to the Home Office on household electrical fatalities for the year 1968, with its detailed account of just how some 100 fatal accidents occurred. Fortunately, none of these was directly connected with amateur radio, but a number did relate to tv and radio, and others to the use of power tools and to the type of do-it-yourself wiring and modifications that come perilously near our orbit.

The accidents vary all the way from the almost incredible case of a youngster of 16 attempting to change, with a pair of pliers, a wavechange switch (control knob missing) of an ac/dc set *while in his bath*, to many that makes one feel that "there but for the grace . . ." There is also the shattering feeling that for every fatality there must be innumerable narrow escapes. Few amateurs could truthfully say that they have never had a narrow squeak.

The report emphasizes that the major cause of these deaths is not the appliance, but the user in failing to maintain, misusing, or doing work for which he is not competent. The pertinent question is raised whether more attention should not be paid to protective devices in the installation, rather than trying to make every appliance absolutely foolproof. The comment is made that we do not know in how many thousands of cases fuse operation takes place and protects the user, "but we do know that in the majority of deaths fuse operation has not taken place, and some form of earth leakage protection (such as that provided by a high-sensitivity high-speed current-operated earth leakage circuit breaker) would usually have prevented death."

While the report avoids putting blame on the use of appliance earthing (for example by three-core cables) and mains connected chassis, it does point out that where reliance is placed on the use of appliance earthing, failure of such earthing obviously increases risk. And the comment is made that, "there is, however, no doubt that *properly constructed double or all-insulated appliances provide a greater degree of safety than earthed appliances.*" Certainly, for the average amateur any risk of the chassis and/or the aerial becoming "live" is one to be avoided at all costs. We once had an experience of this condition arising due to the failure of insulation in a double-wound mains transformer, with the fuse not blowing due to excessive earth resistance.

In the field of radio and tv, the report notes that such appliances "receive disproportionate publicity when involved in accidents". Nevertheless such publicity surely helps make others more aware of the potential hazards. The report states that, "whilst misuse remains an important factor in such accidents, failure to realize that the set *fails to danger* is probably a greater danger". A mains-connected chassis with a broken control knob is so much more dangerous than say a broken knob on an electric cooker, yet only a tiny minority of users would recognize the significant difference between these two forms of damage—a British Standards committee is again wrestling with this thorny problem.

The report also highlights the danger of old house-wiring, suggesting that all pre-war houses now require to be rewired, and that this often applies also to post-war houses built in the pre-pvc era. Yet another factor is that there are still far too many three-pin sockets incorrectly wired, sometimes even in new houses, or where repairs have been made. Fig 4 is a revision of one which we gave many years ago in *TT* to remind readers to check with a neon that the right pin is the "line" (live) one in their own shack, and that the earth pin really is earthed.

It is also worth reminding readers of the new international colour code for appliance wiring: *brown* (no longer red) for the line (live) lead; *blue* (not black) for neutral; and twisted *green and yellow* (not green alone) for earth. For 13A flat pin plugs, the cartridge fuse code is *blue* for 3A fuses (for loadings up to 720W), and *brown* for 13A fuses (for loadings

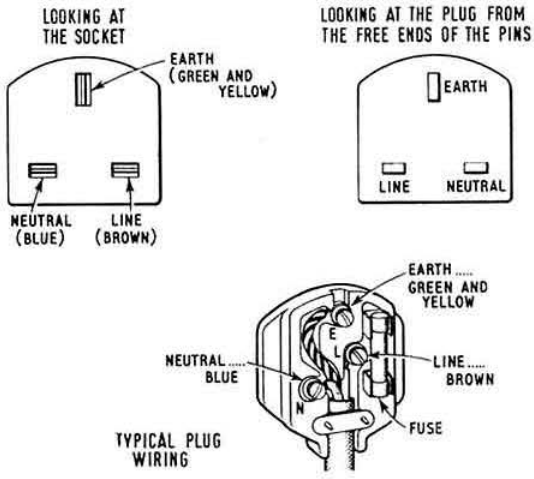


Fig 4. The correct wiring for three-pin plugs and sockets. To test that *your* socket is correctly wired, a lamp should light if connected between "L" and "N" or "L" and "E". A neon bulb should glow when touched against "L" but not against any other pin

between 720 and 3,000W). Quite a number of the 1968 accidents occurred where wrong fuses were being used.

While such reports may make depressing reading, they do indicate the need for amateurs to be extremely careful, not only for their own safety but also for that of other persons who may be involved. The report makes it clear that most fatalities are among the very young and the very old, and indeed among those of any age who still remain completely ignorant of how appliances may become dangerous—or, on the other hand, how they may be operated with almost complete safety.

A note on transistor mixers

The multi-conversion receiver, the ssb exciter, the product detector, the direct-conversion receiver, the heterodyne-vfo and many other current requirements all place increasing demands on effective mixer stages, including balanced mixers and double-balanced mixers and modulators. Yet only occasionally does one see in amateur publications much explanation given other than the bare essentials of this all-important process. *Ham Radio* (October 1969) has several useful articles on various aspects of the subject, including the hot-carrier diode product detector given later.

At an appreciably stiffer technical level is "Distortion phenomena in a switching transistor mixer", by Dr J. G. Gardiner and D. C. Surana (*Proc IEE*, November 1969) which analyses mathematically the question of intermodulation and crossmodulation in transistor mixers. This reference stresses the severely practical point, referred to previously in *TT*, that an overall improvement in the linearity of a bipolar transistor mixer can be obtained by increasing the local-oscillator drive level; this also increases the conversion gain.

When several hundred millivolts of oscillator drive is applied to a transistor mixer, its mode of performance changes from that associated with low oscillator drive. The oscillator voltage is often sufficient to turn the transistor off completely for half the oscillator cycle while permitting a linear gain for the other half. Thus, as in four-diode mixers, the device behaves essentially as a *switch*. In a transistor mixer in this condition, the local oscillator sweeps the operating point of the transistor through the expotential region of the base-emitter diode characteristic in a very small fraction of the complete oscillator period. It is shown that for such mixers much of the theory relating to low-level mixing is not applicable.

The paper considers *intermodulation* distortion (that is, distortion generated by the interaction of two large out-of-band signals having particular frequency relationships), and *crossmodulation*, the effect of which is to transfer modulation from a large unwanted input signal to the small signal forming the wanted i.f. output, regardless of any particular frequency relationship between wanted and interfering signals. Graphs are presented which indicate very clearly that both intermodulation and crossmodulation decrease (fairly linearly) with increasing oscillator drive; conversion gain increases quite dramatically as the oscillator drive increases to about 500mV, then flattens out and eventually falls again. All these results add up to one main conclusion: if you use a bipolar transistor as a mixer, ensure that you have about 500mV of local oscillator drive, even though the stage will operate with far less than this.

The ability of a mixer to handle a large dynamic range of signal powers while producing low spurious products is almost always improved by using some form of balanced arrangement, rather than just a single device. Fig 5 outlines what would appear to be a useful balanced mixer formed by using one of the dual-fets (U257) made by Siliconix, although the same arrangement could be used with two discrete fets though probably with some loss of balance. Siliconix advertisements claim that, apart from the greater dynamic range, oscillator power drive requirements are extremely low, thanks to the high input impedance of the fets. Dual fets in this range are stated to be suitable for use up to about 450MHz.

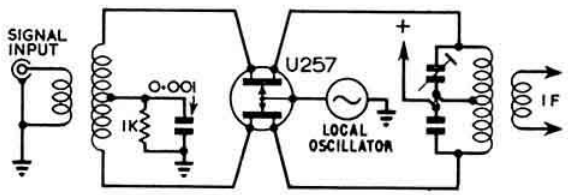


Fig 5. A balanced rf mixer using a dual-fet to achieve wide dynamic range and low spurious outputs

Hot-carrier-diode product detector

The October 1969 issue of *Ham Radio* carries several constructional articles featuring the use of the relatively low-cost hot-carrier diodes which have been introduced by Hewlett-Packard (HP-2800, matched HP-2804, HPA-2900 etc). The advantages of these metal-on-semiconductor diodes with low storage times over the more conventional point-contact diodes have been indicated in a number of earlier *TT*. Apart from low-noise characteristics, in frequency-conversion applications they have a conversion loss

of only 2 to 3dB (ratio of i.f. power to signal power); another advantage for home construction is that they are relatively non-critical of local oscillator drive voltage.

They make possible several simple receiving techniques (eg the direct-conversion receiver given in *TT* February 1969) including a simple form of 144 MHz converter described by G. V. Haagen, K8CJU, in which the aerial signal is fed directly to a four-diode double-balanced mixer, with a 6CW4 nuvistor crystal-oscillator plus multiplying diode to provide a 130 MHz local oscillator signal, resulting in an i.f. of 14-17MHz. No rf stage and conversion loss may seem unusual for 144MHz, but with a typical hf receiver it will cope with a 1·6-2μV signal for 10dB (s+n)/n. Dynamic range should be a useful improvement over that of many more conventional vhf converters, though one would like to know whether, using 14-17MHz i.f., breakthrough of hf signals is any real problem.

In the same issue, Mike Goldstein, VE3GFN, gives a useful description of product detector operation, showing how ideally these should be driven by a square-wave switching signal rather than a sinewave bfo. Fig 6 shows his balanced hot-carrier diode product detector which he claims gives a good account of itself even with a sine wave switching voltage (ie bfo). Audio output is approximately half the amplitude of the i.f. input (6dB attenuation) and it is stated that the performance compares favourably with beam-deflection-tube product detectors. In the USA the hot-carrier diodes are available at the equivalent of about 12s 6d each—this price also applies in the UK.

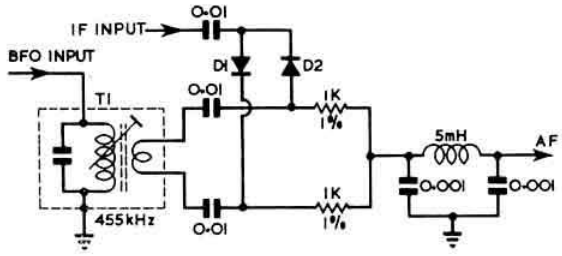


Fig 6. High-performance product detector using two Hewlett-Packard 2800 hot-carrier diodes. The bfo input level should be 8V peak to peak (preferably square wave). The i.f. input level is 0·3V maximum. L1 and the two 0·001μF capacitors form a low-pass audio filter

Valve receiver thoughts

Jim MacIntosh, GM3IAA, is one of many who still believes that valves can do a very adequate job in hf receivers, and reports some of his work with what is basically a G2DAF receiver. For rf amplification he finds the EF183 or 6F25 excellent. After trying a number of different valves as mixers (6BE6, ECH81, ECF804), he fitted a 6F24 frame-grid pentode with injection to grid 3 (pin 9) via 75pF capacitor, with a cathode resistor of 500 to 600Ω. The grid 3 current to earth (via 100K) varies from about 38μA to 48μA on different bands. He comments, "The 6F24 is undoubtedly the best mixer I have tried in my G2DAF receiver and an improvement over other rf pentode mixers such as EF80, EF184".

On the question of drift, this was initially reasonable, but when one of the newer type oscillator coils with built-in capacitors was fitted, drift became a problem. He found that while the new type of formers represented an improvement, the same could not be said for the capacitors. By fitting new capacitors and experimenting with negative and positive co-efficient types, he has been able to bring drift down to a very low figure. This is helped by GM3IAA following his usual practice and putting the power pack in a separate cabinet. There is little doubt that given reasonably constant ambient temperature conditions, the valve oscillator can still give a good account of itself—although as we noted last month this is an area in which the fet can score, even where the signal path of a receiver is based on valves.

Components of the Seventies

Looking through the advertisements and announcements of recent additions to component ranges, one sees a growing number of monolithic crystal filters (see *TT* July 1968) appearing on the market, some in very compact form. In the filter field one also notes the 17-disc ceramic ladder filters by Clevite include a unit with 2kHz bandwidth at −6dB and 5kHz at −60dB, though the price in the USA is rather more than $50. But certainly the signs are that the conventional wound i.f. transformer will be gradually superseded by a solid-state block filter followed by untuned amplifiers.

Mullard have recently announced a new BLY85 vhf power transistor designed to operate from 13·8V car batteries and typically providing an output of 4W fm at up to 175MHz for an input of 0·4W. In the same 12V category, RCA have a new TA7477 "overlay" device giving 2W output, with 7dB at 470MHz or with 13dB gain at 175MHz.

Quickies

L. C. Snowden, G2BW, has been using successfully the aerial technique (see "2PL Special", *TT* July 1968) of a 28MHz quad suspended on its side about 5 ft above the roof of a reinforced concrete building in London's West End. He is well pleased with results—swr 1·5 : 1 and signals getting out very well, and suggests that the logical title for the system is "The Lazy Quad".

Brian Sandall, G3LGK, draws attention to the problems posed by the new mid-band vhf allocations now being made available for the mobile services of the fuel and power

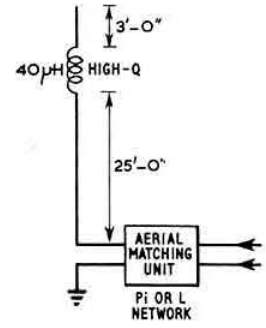


Fig 7. G3TPG's multi-band vertical

industries. The fixed base stations operate between 138 and 141MHz and can thus result in a clobbering image response on any 2m converter operating with an i.f. of 4MHz or below. There also seems growing evidence that the increasing occupancy of vhf and uhf by various users, including high-power uhf television, is bringing in its train a new crop of spurious responses due to local oscillator harmonics, intermodulation and crossmodulation. It looks as though it may soon be as necessary to pay as much attention on vhf and uhf to this problem as on hf. On vhf the average *Q* of front end tuned circuits is much lower, making the problem more difficult to solve.

J. R. King, G3TPG, reports a simple multi-band "trap" vertical (Fig 7) which seems to work out quite successfully on 3·5, 7, 14, 21 and 28MHz. The system has a reasonably high impedance feed thus resulting in lower earth resistance losses. Removing the high-Q loading or trap coil has no noticeable effect on the transmitter loading on 14, 21 and 28MHz, but its presence on 7MHz and lower seems to improve performance considerably, he finds.

I am relieved to report that my strictures last month on the Robinson Crusoe type of award have been taken in very good part by the Hull ARC who issue this particular piece of wall-paper no more illogically than many other current specimens. . . . I am now ready and willing to submit my brand-new honorary Robinson Crusoe certificate in application for new amateur frequencies! I only hope that the No 13 is not intended to bring silence in reply to my CQ calls.

TVI TIPS

by B. Priestley, G3JGO

Aerial coupling and tvi

The system of aerial coupling in use at a station can have a marked effect on tvi, both from harmonics and fundamental overload. The reasons for this are not always clear as several factors are involved.

First of all, if the output amplifier is not loaded by its correct resistance then even if the pi tank can be manipulated to give the correct power input the loaded Q is affected, and with it the harmonic attenuation. A low pass filter acts like an extra piece of coaxial feeder, and can therefore modify the load impedance if there is an appreciable swr. For these reasons a low swr is desirable either by matching correctly at the aerial end of the feeder or interposing a matching unit between the base of the feeder and the lpf. Since the peak voltage produced in a 75Ω system by 400W pep is 245V by swr, obviously the effect of mismatch could be disastrous.

Standing waves on the feeder increase the feeder loss, and if accompanied by radiation can increase the strength of unwanted signals at a tv receiver near the feeder. Radiation is caused by unbalance of the currents in twin feeder, or the corresponding condition current on the outside of coaxial feeder. Both can be minimized by the use of a balun at the appropriate points, ie between a dipole and coaxial feeder or between a pi tank and twin feeder. If it is installed carefully there is little to choose between coaxial and twin feeder.

An end fed wire aerial is always liable to feed rf back into the mains earth via the coaxial outer between the atu and transmitter. This can be minimized by using a good rf earth (or counterpoise) directly under the aerial, and if necessary insulating the rf earth from the chassis. If the rf earth is also the safety earth it can be linked to the chassis via a hefty rf choke. A rule of thumb for a good earth system is to provide a low resistance path back to the feed point from any place the aerial could fall on in a high wind, bearing in mind that even at 1·8MHz the skin depth is only a few inches so that a few lengths of 16swg copper dug in an inch or two are much better than a 6ft spike.

Lastly, the influence of aerial coupling on filtering. An atu acts as a bandpass filter and reduces harmonics, but the trade-off between filter dissipation and attenuation is much less favourable than for a low pass or high pass filter. Consequently, although the harmonic attenuation of an atu may be useful, it is not a substitute for a lpf.

Although a matching unit removes swr at the operating frequency it has no predictable effect at harmonics. The influence of this mistermination on the filter performance is not predictable, but is not likely to be serious with a good filter. If a filter has an attenuation of 60dB on a wideband resistive load, then it produces a swr of 2000 : 1. Clearly this is hardly going to be appreciably changed by a load swr of even 10 : 1 on the far side of the filter!

Diodes and harmonics

It is well known that a variable capacitance diode can produce harmonics. A diode used as a rectifier can also frequency multiply, although less efficiently—think of the 100Hz hum generated by a full wave rectifier. It can be shown that the conversion efficiency is theoretically $1/n^2$ where n is the order of the harmonic, and in practice about half of this can be obtained. This means that the conversion loss as a doubler is about 9dB, as a tripler 13dB, as a quadrupler 15dB, etc. Bearing in mind that harmonic radiation 100dB down from a transmitter can cause trouble, it is clear that diode output meters and swr bridges will cause harmonic tvi in fringe areas. The cure for this is either do not use the device in tv hours, or measure the swr between the transmitter and low pass filter, so that harmonics produced will be attenuated by the filter.

Rectifying junctions can also be formed by metals in contact in a damp atmosphere, hence, the name "rusty joint effect". Typical cases are drain pipes and wire fences. These cannot be screened or filtered, so the only cure for this sort of tvi is to locate the offending joint and either insulate the two metals from each other, or ensure a clean, perfectly conducting joint by either scraping the surfaces clean or bypassing with the shortest possible copper strap.

The chore of finding the joint may be reduced by radiating two signals, say 28·1 and 28·9MHz, when the joint will act as a diode mixer and radiate the 800kHz difference. The source(s) of this can then be tracked down without wondering if the harmonic is produced by the joint or the transmitter. Further information can be found in *QST* January 1953, pp 11–18 and 108.

FOUR METRES AND DOWN

A monthly account of vhf activity and news compiled by JACK HUM, G5UM*

"73 and best DX for 1970"

No better wish than the above could be offered to all readers of this column. It does not matter that the origins of the terms "73" and "dx" are buried in the mists of radio antiquity; even the owner of the most up-to-date, far-out and ultra-modern station in the kingdom, with no valves in sight and no power pack voltages above 25 dc, is proud to use these expressions of goodwill. And so are the rest of us.

It is said that the abbreviation "dx" goes back to pre-first world war spark days when amateur and professional were as one and used the same language. As for "73", this was originally a simple symmetrical sound (two longs, six shorts, two longs) that went well on the telegraph senders in the early days of rail as a brief and unofficial greeting to the next lonely signalman down the line. It probably was not until later that someone noticed that it made "73" in the new Morse code.

As for Morse itself, its inventor Samuel died as long ago as 1872—which is not the slightest excuse for alleging that the mode is . . . well, outmoded (we have always regarded it as a happy coincidence that the old boy's middle initials were F. B.).

"Seventy-three and good dx to all," then; but let us go on to examine this dx business a little more closely, more especially in its metre wavelength context . . .

Nearly always normal

Dx is doing the mostest with the leastest. On vhf dx is getting the farthest with the lowest, and in this respect "lowest" means *low power* to circumvent tvi and *low site* because of the presence of urban clutter in the environments where most of us do our amateur radio (a 400ft eminence in crowded North London could well be lower electrically than a 40ft pimple in the lonely Fens).

There are two kinds of dx where vhf is concerned, the anomalous propagation kind (popularly, "the band's wide open"), and the normal conditions kind where the use of cw or ssb permits penetration well beyond the horizon-plus that represents metre wavelengths' normal service area.

But as we look at the vhf scene at the start of the Seventies the use of cw and ssb is decidedly the exception rather than the common-place, and to most people there is no dx when the anomalous propagation gives out. The more pessimistic types say that conditions are rock bottom, but this is rarely true. A deceptive appearance of rock bottomness comes about simply because nobody, hearing nobody on, bothers to put out a CQ call.

Accepting that normal conditions prevail for most of the time the vhf worker quickly learns to make the best of them rather than take himself off to other bands or to other re-creations. And making the best of them consists largely of improving operating techniques beyond the straightforward out-and-back simplex contacts which are still the norm on Two. Enough commentators have made the point over the last couple of years or so that there ought to be more use made of VFOS (*good* VFOS) for co-channel calling that we will not develop the point further now. Apart from this there are two directions (at least two: readers may think of others) where metre-wave working in the amateur allocations is capable of improvement. Neither of them is new; one of them is duplex, the other net operation.

As a method of passing the maximum amount of information in the minimum of air-time duplex is the equal of vox, perhaps its superior. To use talk-through from 2m to 70cm seems such a "natural" that it is surprising that more people do not adopt it. Only the alleged difficulty of getting on Seventy can be the stumbling block, and it is a very small one at that. To anyone who can afford a couple of 3/20A valves the *Radio Communication Handbook* design of transmitter, page 7.34, is ideal, and as for converters the quickest-starting one in the world, the G2DD on page 5.34, still does not date—although it may be a sign of the times that two of its valves are reaching the hard-to-come-by category. If you want to go straight to transistors for 70cm try the converter on page 5.38.

With straightforward equipment, and co-sited aerials for 2m and 70cm beamed on to your partner at the other end, you are in the duplex business. Both the licensing authority and your neighbours on the bands will know who you are from frequent announcements of the callsign of each operator stating who is in which band and taking care that neither is retransmitted through the other's microphone.

All too easy? Right, go on to try multiple duplex on two bands with omni aerials without getting into a heck of a tangle if half a dozen stations are in on it. It *can* be done, but at all times identification must be clear and unequivocal.

Which brings us by easy stages to the subject of net operation . . .

Checking in

"Nets? I'll have none of them!" The man who made this remark had overheard some of the inanities perpetrated on amateur nets on the . . . oh, well, you know where . . .

* Houghton-on-the-Hill, Leicester, LE7 9JJ. Send reports for the February issue to arrive not later than 12 January, and for the March issue not later than 9 February.

and he had developed a considerable allergy towards them. Plucking a hair from the dog that bit him he should have gone on to start a 2m net himself to show how it can be done. Perhaps he has. For there is no gainsaying the fact that net operation is one of the more enjoyable forms of activity within amateur radio and satisfies in a special way the gregariousness which is a built-in part of most radio amateurs' make-up.

Three or four operators on discrete frequencies on Two do not constitute a net. On a *common* frequency they do, otherwise it is a multi-way. Getting on a common frequency means using a vfo or persuading a crystal supplier to quote you a cut (!) rate for bulk supplies for the dozen or more local operators who may wish to participate. Another essential component every participant will need is a small (say 12pF) trimmer to go across the crystal to achieve exact netting.

Comes the magic moment when, the bulk crystals having arrived, the net swings into action. Pandemonium reigns for a while until discipline dictates that operators should transmit in RSGB *Amateur Radio Call Book* order. Thereafter everyone knows his position in the queue, the G2s first, then the G3s and so on. What also becomes obvious is that if a net of some size builds up it is common courtesy to keep overs short so that Tail-end Charlie does not wait half an hour for his turn to come round. Some of the larger groups and clubs may indeed find it necessary to create a Net A and a Net B, with a crossover arrangement to enable members of one to talk to those in the other during the course of the week.

Nets are a means of keeping in touch. Long technical discussions are usually not on. Where one member wishes to talk with another about a specific point *in extenso*, a note is made to set up a separate QSO after the net has closed.

All of which means that some form of net control, although by no means imperative, often turns out to be desirable. A net widely scattered geographically may put some members out of audibility to others; this is where a centrally placed operator who can hear the lot is useful. Nominate him net controller for the evening, but avoid that one-upmanship term "master of ceremonies" (this is radio communication, not a Masonic dinner). And remembering that all in a net are equal, nominate a different controller the following week, so long as there is another member who can hear all the others.

* * *

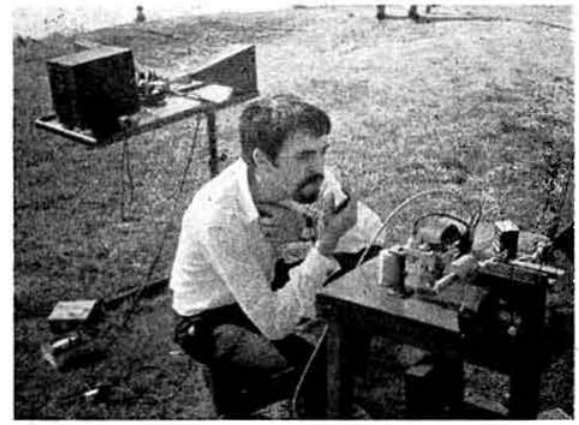
Always A3 for net operation? No doubt for most local keeping-in-touch requirements this is the preferred mode. For longer hauls A1 has a good claim. Visualize a London, Midland and Bristol, or London, Midland and Norfolk, sub-national 2m network with baselines about 100 miles long all done on telegraphy. That bottom end of Two is there waiting for something like this to be started.

Getting back to an A1-mode mood brings us to where we came in, and the postulate: "What is dx?" . . . and so by easy stages to something which really is . . .

OY via meteor shower

"Look out for dx produced by the Leonids," advised Ron Ham, BRS15744, last month, adding that the peak should be occurring 15-17 November. Surely enough, it did.

Early on the morning of 15 November, Johnny Stace of Scunthorpe, G3CCH, succeeded in raising OY2BS in the Faeroe Islands on 2m telegraphy. Much patient planning



The French end of the historic 10GHz G—F contact of 5 September, made between G3RPE/P near Dover with F2FO/P on the cliffs at Cap Griz Nes. Here is F5BO operating the 3cm transmitter: the receiving equipment is in view behind him; and—

—here is F2FO at the receiving end, copying the 'RPE signals. This receiver employed a balanced mixer in conjunction with a 2K25 klystron oscillator to provide an i.f. which was 5MHz wide at 50 MKz, starting off with a low noise 417A cascode followed by five 6AK5 stages. The horn aerials included in these illustrations produced a gain of 24dB.

with the Leonids in mind as the next likely target had paid off by producing the first OY-to-G contact on Two and, to G3CCH himself, his 25th country worked on this band.

Next day at much the same time period (0300-0500 gmt), the same Faeroese station was worked by Peter Blair, G3LTF, of Chelmsford. And G3CCH worked him again that day. Path distances are about 700 miles out from Chelmsford and 640 miles from Scunthorpe.

Ron Ham used the Leonids manifestation to do some checking on Gdansk on 4m. Setting up his chart speed to run at 30in per hour he was able to construct histograms that showed on each of the days 15, 16 and 17 November a steady build up towards midnight of meteor pings on the fm station's signal. This information, like much else that BRS15744 gleans from his vhf observations, is sent to the Society's Scientific Studies Committee, to the British Astronomical Association and to the Society of Amateur Radio Astronomers.

His solar observations during November are worth comparing with *your* vhf log at the stated times to note whether any unusual propagation phenomena occurred. The dates of 10, 11 and 12 November, as well as 25, 28 and 30, produced noise storms in Ron Ham's home-constructed radio telescope trained on the sun. On 24 November one noise burst lasted for as long as 27 minutes; on 27 November between 1254 and 1354 gmt three large bursts were recorded lasting 7 minutes, 19 minutes and 18·5 minutes. "The sound was like living at the seashore and hearing the waves roll in," as Ron Ham picturesquely puts it.

* * *

Back to meteor scatter dx. By the time this journal appears the Quadrantids, due on 3-5 January, will have come and gone. Because the next major meteor shower, the Lyrids, is not due until 19-23 April, this should not discourage operators from keeping a watch in the cw end of "Two" for fleeting pings on dx signals: as G3MNQ pointed out in his classic *opus* on this subject, meteor-scattered radio signals can be detected very much more often than people suspect.

It cannot be too strongly emphasized, says G3CCH, that a proposed m-s circuit between two dx stations should be set up in advance *on precisely known frequencies*, and that 144·1MHz should not be used for random CQ calls. Johnny Stace goes on to tell us that he will supply to interested m-s operators in the UK the names and addresses of operators on the Continent who are in a position to attempt meteor-scatter contacts with this country. Conversely, G3CCH is keen to hear from any additional operators outside the UK prepared to set up meteor-scatter circuits with British Isles stations.

Project Trident

When the Society's VHF Committee dispersed late on the evening of 10 December after its last meeting of 1969, Chairman Geoff Stone departed from Doughty Street carrying a fat file of letters from members giving enthusiastic support for Project Trident. Some of these letters were précised here last month. Many more have been received since—in such volume, in fact, that it has not yet been possible to acknowledge them individually.

This order of enthusiasm, G3FZL told the VHF Committee, shone out from the several meetings up and down the country which he had attended to talk about the project. "There is tremendous enthusiasm, and many offers of practical help have been made," he said. He reported that the RSGB Council had approved the setting up of an independent project group which, as was stated here when "Trident" was announced, will be centred on the South Coast VHF Group, and is to be self supporting.

Plans are now in hand to hold a meeting at a large central venue in London as soon as possible, open to all members interested in any way in Project Trident. More details about this gathering will be given "at our earliest"—and we hope that means in the next *Radio Communication*.

The zones, geographically

The new vhf/uhf zone plan, now a few days old (see this page, October), seems to enjoy the approval of a great majority of users of the 4m and down spectrum. The simple concept of just four zones on "Two" ("A" is the South West of the UK, "B" is South East, "C" the Midlands and "D" the North) has the virtue of being both easy to remember and affording an operator increased room to move around frequency-wise.

On 70cm the geographical divisions are smaller in area, greater in number and more difficult to remember than those on "Two". Many users have said it would be a service if "Four Metres and Down" printed a table giving the names of the counties which make up each zone. This we now do—and to make the job complete we include the counties that constitute the four zones of "Two".

We will not ask you to cut out and keep the tables printed here; people do not like chopping up *Radio Communication*.

The band plans

4m band

70·025—70·1MHz	CW only.
70·1—70·675MHz	All modes, including ssb.
70·675—70·7MHz	Beacons.
70·26MHz	National mobile net calling.
70·56MHz	RTTY.

2m band

144·00—144·15MHz	CW only.
144·15—144·5MHz	Zone A, the South West. (*Berks, Cornwall, Devon, Dorset, Hants, Somerset, Wilts, Channel Is., Brecon, Cardigan, Carmarthen, Glamorgan, Gloucester, Hereford, Monmouth, Pembroke, Radnor, Worcester.*)
144·5—145·1MHz	Zone B, the South East. (*Kent, Surrey, Sussex, Beds, Bucks, Essex, Herts, London, Middlesex.*)
145·1—145·5MHz	Zone C, the Midlands. (*Cambs, Hunts, Leicester, Norfolk, Northants Oxford, Rutland, Suffolk, Warwickshire, Anglesey Caernarvon, Cheshire, Denbigh, Flints, Merioneth, Montgomery, Shropshire, Stafford.*)
145·5—145·95MHz	Zone D, the North, Scotland and Northern Ireland. (*Derby, Lancs Lincs, Notts, Yorks. all Scottish and Northern Ireland counties, Isle of Man, Cumberland, Durham, Northumberland, Westmorland.*)
145·95—146·00MHz	Beacons.

70cm band

432·0—432·1MHz	CW only.
432·1—432·2MHz	Zone 1. (*Berks, Cornwall, Devon, Dorset, Hants, Somerset, Wilts, Channel Is.*)
432·2—432·3MHz	Zone 2. (*Brecon, Cardigan, Carmarthen, Glamorgan, Gloucester, Hereford, Monmouth, Pembroke, Radnor, Worcester.*)
432·3—432·5MHz	Zone 3. (*Kent, Surrey, Sussex.*)
432·5—432·7MHz	Zone 4. (*Beds, Bucks, Essex, Herts, London, Middlesex.*)
432·7—432·9MHz	Zone 5. (*Cambs, Hunts. Leicester, Norfolk, Northants, Oxford, Rutland, Suffolk Warwickshire.*)
432·9—433·1MHz	Zone 6. (*Anglesey, Carnarvon, Cheshire, Denbigh, Flints, Merioneth, Montgomery, Shropshire, Stafford.*)
433·1—433·3MHz	Zone 7. (*Derby, Lancs, Lincs, Notts, Yorks.*)
433·3—433·45MHz	Zone 8. (*all Scotland, Northern Ireland, Isle of Man, Cumberland, Durham, Northumberland, Westmorland.*)
433·45—433·5MHz	Beacons.
433·5—434MHz	Television sound.
434 to top of band	Video.

23cm band (narrow band communication segment)

1,295—1,296·15MHz	CW only.
1,296·15—1,297·95MHz	All modes (narrow band).
1,297·95—1,298MHz	Beacons.

Special services

2m band

144·09—144·10MHz	CW for random meteor scatter contacts, but not held exclusively for this.
144·1—144·15MHz	SSB *only* when artificial satellites or translators are operational.
145·85—145·95MHz	SSB *only* when artificial satellites or translators are operational.
145·0MHz	Mobile calling channel (international).
145·3MHz	RTTY international and UK north.
144·6MHz	RTTY UK south.
145·41MHz	SSB calling channel (international).

70cm band

433·3MHz	RTTY international and UK north.
432·6MHz	RTTY UK south.
432·1MHz	SSB calling channel (international).
425—429MHz	Self excited transmissions.

Instead, seek out someone in your club or group who has access to a Xerox machine and ask him to run off a few copies for all your locals.

TV demo at Dunstable

We referred last month to the manner in which pockets of amateur television activity develop along self-perpetuating lines, ie the presence locally of perhaps no more than one solitary "Stroke T" operator has the effect of stimulating others to have a go, sure in the knowledge that there will be something to receive if a wideband 435MHz converter is commissioned.

There is news of another such pocket in the county of Bedford, with the promise of a decided widening of the extent of interest as the result of a television demonstration which is to be laid on later this month. This will be on 30 January, and the sponsor is the Dunstable Downs Radio Club, whose spacious meeting room is a couple of hundred yards south of the traffic lights in the centre of Dunstable, on the east side of the A5.

The plan is for G6AEV/T out at Toddington, five miles away and 480 feet up, to transmit television on 437·2MHz with 30W, 405 lines and an 18-element parabeam, with the sound accompaniment on 23cms. There will be a talk-back channel on 2m or 4m. If everything clicks into place there might even be some colour info transmitted from a test generator, says 'AEV (better known perhaps as G3VZV, Graham Shirville).

At nearby Luton G8AYB is one of several mid-Bedfordshire members now equipped to receive video on 70cms. Using a portable television set as the final link in the chain prompts him to consider the possibilities of going out portable "Stroke T Stroke P" up on the Dunstable Downs come the summer. Both he and G3VZV/6AEV/T have constructed vision modulators that use only two transistors and a 105V positive stabilized supply, said to be evolved from a design in *73 Magazine*.

Others in the area who are helping to foster the interest in amateur television are G8ADC, up in the hills at Caddington, and G8BAK of Luton, both of whom have good video receivers in operation.

Interest has already extended beyond the immediate environs of mid-Bedfordshire, for viewable signals have been resolved from G6ADM/T (widely known also as G8BBB) who is out in Cambridgeshire, a distance of 40 miles. The possibilities of a tv tie-in to the famed Fenland Net seem promising.

Ireland's 4m beacon

After an extended period of testing, the IRTS beacon on 4m was officially inaugurated early in November. Located 2,133ft up, it is on the television site of Radio Telefis Eireann at Mullaghmore in Co Cork. The actual position is 51° 59′ N 09° 07′ W.

In conveying this news Terence Deegan, EI4BK, tells us that the Limerick Radio Club will be responsible for the beacon's maintenance and operation. Reception reports will be particularly welcome and should go to EI4E, Avenue House, Countess Road, Killarney, Co Kerry.

When commissioned, the EI4RF beacon radiated its callsign four times followed by a 22sec dash into a four-element Yagi beaming north. By now the east facing Yagi should be installed. It will radiate "EI4RF" three times followed by a 33sec dash. Members living on either beam's line of shoot should set up receivers on 70·325MHz and wait until the keying cycle favours their direction—which will not be longer then 2min 22sec.

The beacon's emission is A1, the input 10W and, says EI4BK, ". . . it is at an ideal site." Its advent is welcomed by all who use "Four", whether EI or UK operators, and—you never know—by others farther afield.

The month's contests

Whether you are a sidebander, a cw-slinger or a 70 centimental (or all three) there are contests this month to engage your interest. The first vhf contest of the Seventies is the 144MHz SSB on Monday 12 January. This, like the 144MHz CW on Sunday, 25 January, should produce extended range contacts irrespective of conditions.

Especially important this month are the 70cm Cumulatives, which to the majority of G8C- - licensees will be something quite new, and maybe will give opportunity for collecting fresh counties for the RSGB Award (to date there is no G8C- - in the 70cm table . . . come to that, none in the 2m one either). A couple of years ago there was a suggestion to abolish the 70cm Cumulatives for apparent lack of support, but such a protest went up from 432MHz adherents that the VHF Contests Committee was persuaded to restore the event the following year. This year the committee has gone a stage further in encouraging participation; they have planned the Cumulatives to take place on different days of the week and not always at the weekend.

So note January's dates are Friday 16 and Thursday, 29 January.

The rules for all the four January events appeared on page 884 last time.

Tech corner

From G2AIW (Fred Lambeth, of Whitton, Twickenham). Interest has been expressed in the 2m transistorized transmitter which has been used for some time now by G2AIW. The equipment was evolved by G3LIM over a period of time; it just grew.

The transmitter breaks down conveniently into the three sections of audio, driver and power amplifier. In the audio section (Fig 2) there are five transistors in all, with crystal microphone input and some tailoring of the audio response.

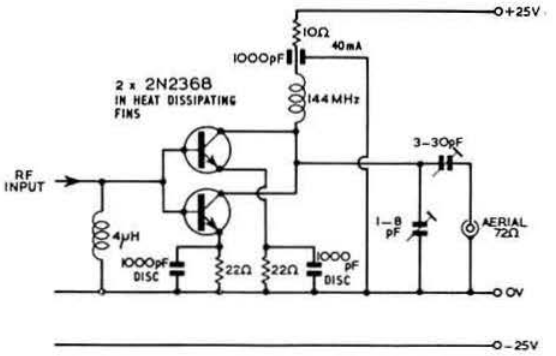


Fig 1. The pa section of the G2AIW transistor transmitter utilizes two 2N2368 in parallel, accommodated in heat sinks

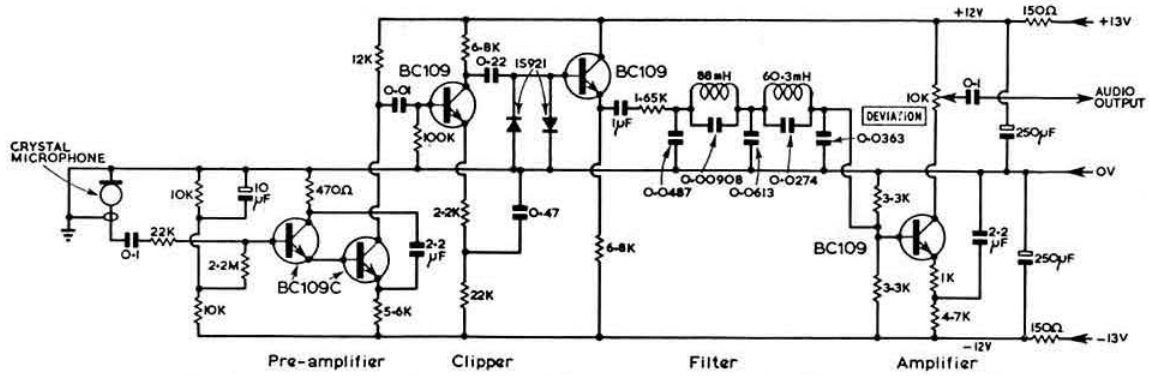


Fig 2. The audio section of the all-transistor transmitter described herewith by G2AIW

Output is via the 10K deviation control and a 0·1µf capacitor to a 16MHz crystal oscillator unit.

This in turn is followed by a tripler to 48MHz and another tripler to 144MHz. Base biasing of the last two transistors is by a 4mH rf choke (Fig 3).

The output of the 144MHz buffer is optimized by the 1—8pf capacitor which couples into the power amplifier. The two 2N2368 of the pa are paralleled, and require a heat sink. Here again base biasing by rf choke and capacitor matching of the output are employed (Fig 1).

No claims are made for this rig beyond the fact that, given the right conditions, it appears to operate with substantially better results from a poorish location than similar low-powered valve equipments, although these latter are probably usually simpler.

The audio side was taken care of by the use of nbfm. Only when the received signal is very weak does the modulation present difficulties; if necessary resort may be made to cw. On either mode some of the signal reports have been very encouraging.

Coupled to an 8 over 8 slot aerial (top at about 40ft) in an area about 60ft asl, stations had been worked (mostly on phone, but sometimes on the key) in six countries and 35 counties up to early November. The greatest distance so far worked on phone is about 200 miles, and on cw about 250—granted, in good conditions! Some operators will not believe that the input is approximately 1W.

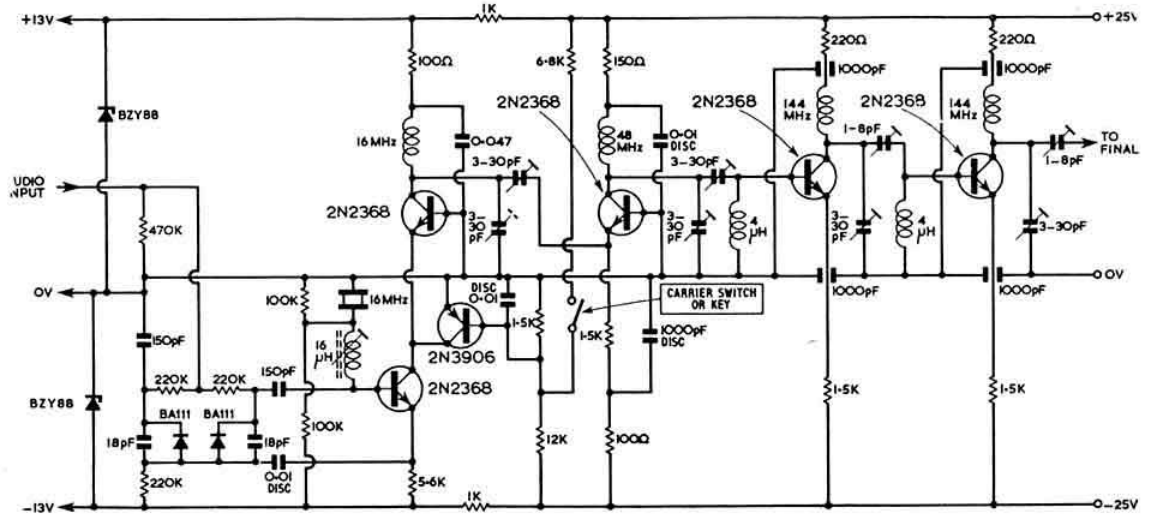
The station has never been operated outside the correct zone, and proves the point that patience and perseverance do eventually bring results, although it may sometimes be frustrating to hear everyone else working the dx first. The value of such equipment for portable/mobile use is obvious.

Xtal Xchange

G3ANG offers an 8010kHz crystal in exchange for a 100kHz bar or one at 10·5MHz. Write J. W. Emmott, QTHR.

G3YJC writes: "I have a hoard of crystals which may be of use to other people, mainly for 21-29MHz i.f. use, but

Fig 3. The oscillator-driver section



including some multiplying into the 144 and 432MHz bands." These are HC6U third overtone and HC18U fundamental. He is in need of eleven crystals mainly in the 45-48MHz region. He is prepared to exchange or, if all else fails, to sell at 5s each. As the list is too long to print in full a copy of both the "for sale" and "wanted" crystals will be furnished by G5UM to any member who sends an sae.

Here and There

If it has not happened by now, the launching of Australis-Oscar 5 is likely to take place on or around 9 January. For latest news monitor GB2RS on Sundays and G2AOX, the AMSAT co-ordinator, on 145MHz, whose article about the project appeared last month on page 882.

* * *

Another 1970 date to note: the BATC amateur television convention is billed for 24-26 July at Cambridge University. Full details nearer the time.

* * *

"Omni aerials for net operation" is the subject for the 15 January meeting of the Leicestershire VHF/UHF Group: G8BTU and G8ADJ will discuss all-rounders for 2m and 70cm respectively. Leicester Poly, 7.30pm.

* * *

Upon G3TPF, still at Cambridge University, falls the mantle of his brother, G3SKT, who was up at Cambridge until 18 months ago and organized the last two GD trips run by the University Wireless Society in 1966 and 1967. This year's I.o.M. expedition dates are 16-24 March. Sideband and cw are planned for 2m, 70cm and 23cm. It is not too early to write for schedules *now*, to S. C. Cripps, Jesus College, Cambridge CB5 8BL.

VHF Personalities No 13.

C. L. Desborough, G3NNG

The subject of the portrait herewith is C. L. Desborough, G3NNG, of Faringdon in Berkshire. The occasion on which it was taken was last June's Midlands VHF Convention at Wolverhampton, and the piece of equipment in view is the receiver unit for 2m, 70cm and 23cm about which "Des" had been lecturing that afternoon.

The lecture was professional sounding: the equipment was professional looking. In fact, G3NNG is not in radio professionally at all. As an engineer at the Atomic Energy Research Establishment at Harwell his primary activity is investigating very low energy X-rays; his nearest workaday contact with radio has been allied to electronic methods of reactor material inspection.

Popular as a lecturer in the field of X-ray microscopy he is much in demand outside of work as a lecturer on amateur radio topics, and even more so since he was appointed as the RSGB local area representative. *Obiter dicta* seem to flow from Des with an ease that is the envy of the less eloquent; and as many of his sayings bear so accurately upon the amateur radio scene of today we are sure he will forgive us for quoting a few:

"Radio is purely a hobby with me. I am a firm believer that straightforward thinking is all that is required to build gear, but most people are put off by all the rubbish spoken on the air by people who think they know better than most (a pet hobby-horse of mine, I'm afraid, prompted by the fact that visiting swls have so often remarked: 'G3 —— said so and so, and it must be true'. To many, the transmitting amateur is a person they look to as the fount of wisdom!)"

"Contests are the logical way to see if the end result of one's trying out new experimental ideas on vhf are worthwhile and working as predicted. I am very keen on contests and enjoy my outings to White Horse Hill."

Few who have experienced the "obsolete transistor" syndrome will fail to sympathize with this:

"The shed I use as a shack is littered with the debris of abandoned projects where new techniques have arrived before the old ones were completed."

All who have heard Des in full flood will remember many other equally apposite epigrams.

It was ten years ago that G3NNG "arrived". He operated on 144 and 432MHz after some years as a listener on those

bands; few stations apart from G5DT and G6NB were heard on "Seventy". As for other bands, a characteristic G3NNG comment is:

"I did operate 1W cw on 160m for four hours, but am completely cured now! The nearest I get to the lf bands is a 50c/s battery charger. (The only advantage of 160m is that the signal is halfway there before it leaves your aerial.)"

All his inclinations are in the direction of frequencies still higher than those he has already mastered: his regular contest activity on 70cm has in recent years been matched by considerable success on 23cm, where the excellent take-off from the Berkshire Downs gives the superbly built G3NNG hardware plenty of opportunity to impress itself on distant ears.

As a family man, G3NNG lives with his wife and two daughters (ten and seven) on the outskirts of the little town of Faringdon not far from the county's border with Gloucestershire and Wiltshire. And as if radio was not engaging enough in time, he is an instructor with the local Air Cadet Corps on several subjects.

THE MONTH ON THE AIR

A monthly feature by JOHN ALLAWAY, G3FKM*

SINCE the last *MOTA* appeared we have moved into another decade, the first years of which are due to bring a deterioration in conditions on the hf bands. Not a cheerful thought, but one which should be tempered by the knowledge that with the vastly improved equipment now available contacts will be made at times and on bands which would not have been possible during the last sunspot minimum. One who will not be daunted is Les, G2FQP, who reports the completion of his *one thousandth* contact with ZL3UY on 14MHz ssb; this is a remarkable achievement and seems to your scribe to have a very good chance of being a record.

Two correspondents report that their callsigns are being used by unauthorized persons. G3CNY is receiving QSL cards for contacts on 40m phone, and G3YFM for QSOs on 40 and 80m cw. Neither station normally operates on these bands or modes, and the MPT has been duly notified. It might perhaps be mentioned here that the correct thing to do on receiving information that one's call is being pirated is to notify the Ministry, giving all possible details.

Nigel Peacock, A 5489, (13 Correnden Rd, Tonbridge, Kent,) offers his services as QSL manager for anyone who would like to contact him.

Readers attention is drawn to a small but very important item on page 868 of December *Radio Communication*. Under the heading "Expansion of the American 'phone bands" it is pointed out that by the terms of the current Geneva Regulations cross-band communication between US amateurs in the section 7,100 to 7,300kHz and UK amateurs below 7,100kHz is not permitted!

A reminder that final scores for the 1969 Countries Table must be received no later than 14 January. There will be no 1970 table.

News from overseas

Eloy Marez, YS1XEE/HU1P, has notified G2MI that the Salvador bureau recently received a large batch of QSL cards from RSGB which had become soaked in water somewhere *en route*. They were all stuck together and most were totally illegible. As Eloy believes in answering all cards received he asks all who have sent a card to him without receiving his to send another. His address is c/o US Embassy, San Salvador, El Salvador; or application may be made to his QSL manager, WB4BOJ, 1028 So. Court St, Montgomery, Ala, USA 36104. Please enclose sae and IRCs and mark times in gmt (over 20,000 QSOs have been made in just over two years) QSLs received without these will be answered via the bureau.

Latest news of the amateur radio situation in Laos has been provided by Feng, XW8BP, who is very active on all bands. He works at Vientiane airport as a radio technician with "Air America" and usually manages to get on 10m when he returns from work at 1000. Feng first became interested in radio in 1935, obtained the call XU8JF in 1938, and managed QSOs with other stations in the Far East. In 1947 he became C1JF and worked a number of European and UK stations with his 6V6-807 COPA transmitter. He then went to Taiwan before going to Laos in 1961. There is one other station besides XW8BP active mainly on cw, this being XW8CR. XW8CZ is mainly cw, but presently inactive. XW8s AL, BS, BJ, CS, and CN are mostly to be found on ssb. XW8CS is the most active, but both he and XW8CR (who are at the US Embassy) will be leaving in April and Laos will then become quite rare. Feng wishes it to be known that his QSL manager is now DL7FT.

The Secretary of the RAF Amateur Radio Club, Sharjah, (MP4TCE), informs your scribe that they are no longer able to use the services of Eric Chilvers, BRS 26222, as their QSL manager. This appears to be the result of orders from "higher authority". In future all correspondence should be sent to PO Box 176, Sharjah, Trucial States, Arabian Gulf. This address is also correct for MP4TCZ, who has now left, but correspondence will be forwarded to him. This PO Box number is temporary and may be changed very soon. The club sends its best wishes to all for 1970.

The members of the RAF Club station, MP4TCE, Sharjah, August 1969. L to r Rod, Cy MP4TDE, Michel MP4TBD and Spider MP4TCS.

Singapore amateurs have now registered a new and separate society called the Singapore Amateur Radio Transmitting Society (SARTS), and all correspondence for 9V1 members of the Society should be directed to PO Box 2728, Singapore 1. The inward QSL manager is 9V1LG, and the outward manager, 9V1OK. President is 9V1JG; Vice-President,

* 10 Knightlow Road, Birmingham 17.

9V1PB (alias G3NAC), secretary, 9V1CN; treasurer, 9V1OF, and 9V1s LG, NQ and OK, and SWL Ted Chwee Lock make up the committee.

According to *NARS News* G3MWM, who used to be in Nigeria, suffered a most unpleasant experience when he arrived in Benghazi to take up a post at the time the revolution took place. He was detained in prison for nearly three weeks as a potential spy because of his amateur equipment and this was confiscated and destroyed. He was very badly treated by the Libyan authorities and deported at the end of September minus almost all his gear.

The amateur radio population of Iran seems to be dwindling quite rapidly and now appears to be down to four. It is unlikely that licences will be renewed when they expire.

The mystery of the HH9DL cw contacts continues to grow. Your scribe has received a photocopy of what is obviously a genuine QSL card confirming two cw contacts on 21MHz with ZS1ACD in late 1968. Some light may be thrown on the matter by a paragraph in the *West Coast DX Bulletin* in which Don, HH9DL, is quoted as saying that as he is away from home so much his secretary does most of the QSLing for him. When the cw cards began to be received she was taken by surprise and replied to them. HH9DL is the only active Haitian station and is honorary president of the Haitian Radio Club—a position he has held for over 20 years.

Louis Varney, G5RV, reports that during his recent visits to Colombia, Venezuela and the West Indies he had the pleasure of operating as a "guest operator" in HK3 and YV5, and renewed his licences in Trinidad (9Y4RV) and Barbados (8P6DF). Operation was on 14 and 21MHz, mostly cw but some ssb. He says that he would like to record his appreciation of the true amateur spirit and hospitality of HK3s AH, AFB and RQ, YV5DCH, YV5JO, 9Y4AR, 9Y4CRV, 9Y4LP, 9Y4MM, 9Y4TX, 8P6AR and 8P6CC. He also has a word of praise for the majority of operators who were chasing him as a rare cw station from these countries, for their courtesy and patience in waiting for their turn. QSLs for these contacts should be sent to G5RV's new home address which is in *QTH Corner*.

G3MKR reports a strange coincidence when he worked K2MKR/MM on the ss *Expo Delta* in 1967 and then found a cruise ship on which he was holidaying this autumn tied up alongside the American hospital ship ss *Hope* in Tunis harbour. Needless to say K2MKR was found to be the operator on board the *Hope*!

Ray Parsons, ex-G3MTL, is now on the air from Sierra Leone with his 9L1RP call. His gear consists of a Swan 350 with a vertical antenna, and he will be there until late in 1970. QSLs should be sent via GW3AX (see *QTH Corner*). He will be on 14,200kHz on Sunday afternoons looking for UK stations, and he says that he is hearing European signals very well on 80m between 2100 and 2200.

J. W. Stratton, formerly ORS30978, is now ZC4JW, and asks for cards via the address in *QTH Corner*.

Contests

The CQ WW 160 Contest. 0000 24 January to 1500 25 January.

This is cw only, and contacts with one's own country count two points. Contacts with other countries are worth five points, and those with W/VE/VO ten points. There is a multiplier of one for each country, US state, or Canadian province worked, but note that the USA and Canada do not count as multipliers as well and that for the purpose of the contest KV4 QSOs are only worth five points. Exchanges consist of rst plus serial number of QSO (starting at 001). Log sheets may be obtained from the contest chairman, Charles M. O'Brien, W2EQS, 48 Prospect Avenue, Westwood, NJ, USA 07675, and they should be returned to him postmarked no later than 28 February. Duplicate contacts logged in excess of three per cent, or violations of the regulations relating to amateur radio in the entrant's country will result in disqualification.

A group of Tunisian amateurs showing most of that country's amateur population. L to r 3V8AL F2QA 3V8AB TU2AF F5QQ F5ZK F2YZ and 3V8AC. F2QQ F2YZ F5QQ and F5ZK were operating 3V8AA at the time.

Results of the **1969 CQ WW 160 Contest** are as follows:

GC3UJE	**28,518 points**	G3PVA	5,324 points.
G3SED	**19,665** "	G3UXB	3,674 "
GM3KMR/A	**16,224** "	G3TR	3,586 "
G3IGW	11,072 "	G3SXW	3,531 "
G3KAC	10,744 "	G3JVJ	2,244 "
G5RP	9,870 "	G4RS	1,720 "
GW3XSQ/A	**7,672** "	**GI3WSS**	**1,631** "
G3SVW/A	6,636 "	**GD3TNS**	**1,440** "
G2DC	6,331 "	G3PKS	592 "
G3VIP	5,785 "		

World winner was KV4FZ (78,750 points), and the top European was DL9KRA who achieved the highest number of contacts in this contest to date (226) to score 45,942 points. Congratulations to the winners listed in bold type.

Chiltern ARC Top Band Phone Contest.
1000 to 1200 1 February.
Non CARC members work as many members as possible. Club members use counties as multiplier and are being asked to avoid interference with stations not interested in contests. Send logs to G3IQF, 85 Oxford Rd, Marlow, Bucks.

The 1970 ARRL International DX Competition.
0001 7 February to 2400 8 February
0001 7 March to 2400 8 March
} Phone

0001 21 February to 2400 22 February
0001 21 March to 2400 22 March
} CW

DX stations QSO the contiguous US states, plus VO and VE1 to VE8—a total of 57 multipliers on each band. Each complete QSO counts three points, incomplete ones two

QTH Corner

CP1GN	via W9JT, George W. Fyler, 343 W. Windsor, Lombard, Ill, USA.
ex-FH8CD	Andre Lienard, Moulin de Triangle, 77 Coulommiers, France.
FM7WE	via K4CFB, 8713 McNair Drive, Alexandria, Va, 22309, USA.
FR7ZU/E	J. Quillet, 6 Ave de la Gare, St Andre, Reunion Is.
FY7YR	via VE3BYN, J. K. Ritchie, 449 Dovewood Drive, Niagara Falls, Ont, Canada.
G5RV G5RV/HK3 G5RV/YV5	(New QTH) Louis Varney, 82 Folders Lane, Burgess Hill, Sussex
GD3TXF	G3TXF, Holt Cottage, Kingston Hill, Kingston upon Thames, Surrey.
GW6GW	via GW3XNI, 21 Gladstone St, Crosskeys, Newport, Mon., NP1 7PA
UA9VH/JT1 JT1AG	Box 639, Ulan Bator, Mongolia.
JW7UH	Erling Oyan, N-9173, Ny-Aalesund, Svalbard, via Norway.
KG4DS	via VE3BYN (see FY7YR).
PJ0CW	via W1FJJ, 180 Den Quarry Rd, Lynn, Mass, USA. (sae + irc).
TR8DG	G. Delas, PO Box 356, Libreville, Gabon.
TR8MC	via Joseph Hellman Sr, 65-33 78th Street, Middle Village, NY, 11379, USA.
G3TIF/VE6	32 Belmont Trailer Park, Edmonton 23, Alberta, Canada.
VK0HM	via WA6EAM, Hugh Milburn, 570 Al-Hil Drive, San Luis Obispo, Cal, USA.
VP8JV	via DOTM, Box 7388, Newark, NJ, 07107, USA.
VR4EJ	P. Butler, c/o BSI Broadcasting Stn, Honiara, Br. Solomon Is.
W2MZV	(New QTH) Hermann A. Bohning, PO Box 102, Yonkers, NY, 10702, USA.
ZF1AN	via W2SUC, Aaron Spire, 3239 Corsa Av, New York 69, NY, USA.
ZC4JW	J. W. Stratton, AIS.ECL, 103 MU, RAF Akrotiri, Cyprus, BFPO 53.
ZD8AB	via W8BMS, 425 N Sixth St, Cambridge, Ohio, USA.
ZD9BN	via GB2SM, Science Museum, South Kensington, London SW7.
ZM3PO/C	via ZL2AFZ, 48 Nuffield Avenue, Napier, New Zealand.
4M1A	via DOTM (see VP8JV).
8P6DF	via G5RV.
9L1RP	via GW4AX, S. Thomas, Belle Vue House, Higher West Cross Lane, Swansea, Glam.
9N1RA	via K60E, D. D. Kahle, Box 507, Pacific Grove, Calif, USA.
9Y4RV	via G5RV.
	RSGB, QSL Bureau, G2MI, Bromley, Kent.

points. DX stations send their report followed by their input power (eg 599150), and US/Canadian stations send report and state/province. The final score is the total QSO points multiplied by the total number of multipliers gained from each band added together. Special certificates will be awarded to the top entrants in each section in each country, and a plaque to continental top scorers. If three or more multi-operator stations enter, a certificate will also be awarded to the top scorer among them. Summary sheets are available from G3FKM, as are log sheets (100 QSOs per sheet).

The REF Contest.
1400 31 January to 2200 1 February (CW)
1400 28 February to 2200 1 March (Phone)

Only 24 hours operation may be counted for points, the remaining eight hours may be taken in up to three periods off the air and must be shown in the log. The object is to work stations in F, HB, LX, ON, 9Q, 9U, 9X, and DUF countries. RS(T) plus serial number of QSO should be exchanged, each QSO counts three points and the final total is obtained by multiplying total QSO points by the number of French departments, DUF countries, Swiss cantons, Belgian provinces, 9Q, 9U and 9X worked. Contacts in this contest may be used in claims for the DUF, DDFM, DPF and DTA awards if application is made within two years. Logs should be sent to: REF, Boulevard Bercy 60-75, Paris 12, France.

The results of the **1969 SP DX Contest** are now to hand. **G3ESF** (29,187 points) and **G3NSY** (11,872 points) won certificates in the all band and 14MHz sections respectively. The 1970 event will be held on the first weekend in April, full details will appear in a later *MOTA*.

Awards

The D.A.S. Award. (Diplome Albert Schweitzer).

Issued by REF Section 68 to all amateurs/listeners who have proof of communication with Department 68 (Haut Rhin) (two QSOs), Gabon (TR8) (two QSOs), and 26 QSOs with stations in the following cities: Santiago, Montevideo Berlin, Madrid, London, Berne, Bogota, Rome, Tokyo, Honolulu, Cordova (KL7), Oslo, Buenos Aires, Vienna, Helsinki, Brussels, Copenhagen, Amsterdam, Brazilia, Stockholm, Warsaw, Moscow, Ottawa, Canberra, Washington, Mexico City, Belgrade, Caracas, Wellington and Cape Town. All contacts must have been made since 1 October 1969 and a log extract certified by two amateurs, five IRCs and the applicants own QSL (blank) should be sent to F9KJ, 4 rue de la Wanne, 68 Flaxlanden, France. QSLs must be held but do not have to be submitted.

The **W.A.W.A.** (Worked All Westfalia Award)
Custodian: DJ8CR, Willi Nietmann, 4793 Bueren, Brilonerstr. 33, Germany.

Contacts with Westfalia since 1 January 1966 on any band/mode as follows: (1) German stations need to work 45 DOK districts, (2) European stations need 30 DOKs, and (3) all others need 15 DOKs. The relevant DOK districts are N 01 to N 29, Z 14, O 01 to O 34, and Z 03. If made on vhf applicants need 35, 20, and 5 DOKs only. Applicants should include the appropriate QSL cards and ten IRCs and should be sent to DJ8CR. This award is available to listeners.

The Gandhi Centenary WRI Award.
Issued by ARSI, PO Box 534, New Delhi 1, India.

This is obtained by scoring 50 points from contacts with Indian stations between 26 January 1950 and 30 September 1970. At least one contact with a VU0 or VU2 station between 1 October 1969 and the closing date must be included. Points are counted as follows: with different VU stations up to 30/9/69—one point; with different VU0 stations (other than those included in the last list) ten points, and with any other VU2s in the period 10 October 1969 to 30 October 1970 four points. (All must be *different* stations—eg VU2CZ and VU0CZ are the same). QSOs may have been on any mode/bands. Applications should consist of the QSLs, log extract or QSL list certified by an IARU member society and should be accompanied by ten IRCs or four rupees (Indian). They should be mailed before 31 December 1970 to the address above. Note that this new award does not alter the rules of the existing WRI Award.

DX news

The operator of VK0MI, **Macquarie Is,** has now returned to Australia and his position has been taken by another licensed amateur—this time a ZL3. It is not known whether he will use the VK0MI callsign or a new one. VK6HD reports that VK6LJ will soon be in **Tonga** and should be there for two years. There appears to be fresh activity from **Heard Is** in the form of VK0HM who has been reported on 14MHz ssb between 14,170 and 14,200kHz between 1600 and

1700. There seem to be two operators and they should be on for about five months.

Dxpedition of the Month reports that 3V8MOL logs for the period 18 to 22 August have now been received and that QSLs will be on the way by the time this appears. Logs from CR5SP for the periods 11 September to 21 December 1967, 25 February to 6 April 1968, and since 30 June 1968 have still not been received but are still being sought. DOTM is dealing with all QSLs for DJ6QT/CT3, I1MOL and 4M1A contacts made during the recent CQ WW DX Phone contest.

The KH6NR/Kure dxpedition operators found the logs belonging to the former KH6EDY and also many unanswered QSL cards. They have arranged for these to be shipped back to Honolulu and will then try to help out with confirmations.

Raju, VU2NR, hopes to be on the air soon from the **Republic of South Yemen** (formerly Aden). He will be there for a year or so and should have a 7O (7 Oscar) call. His QSLs will be looked after by G3MVV.

VP2EQ is Dave, ex-ZB2A, on the island of **Anguilla**. He has an HW100 and a TA33Jr beam and is often to be found in the Royal Signals Nets on 14,170kHz at 1900, 21,380kHz at 1200 and 28,550kHz at 1330. VP8JV has now come on the air from **South Georgia** and has an SB100 transceiver with quads for 10, 15, and 20m and long wire antennae for 40 and 80m. He favours 14,200 to 14,250kHz ssb after 2300 and is often in the VP8 Net with W3DJZ on 14,217kHz at 2300. His QSLs are being dealt with by DOTM.

XT2AA is now on leave in France and expects to return to Upper Volta in mid-April. There seems to be no further news of his projected trip to Mali.

PY4AP seems to be dealing very efficiently with the backlog of PY0BLR confirmations and is dealing with all the cards which have been sent to PY4BK. Anyone still waiting is invited to write to Box 484, Belo Horizonte, MG, Brazil.

FR7ZL has now left Tromelin Is and is back in Reunion. This news was received from FH8CD who was himself leaving Comoro for France during December—his call there will be F2LI. FR7ZO/T has now been heard on 14MHz ssb.

The HQ of the telecommunications section of the Kenya/Uganda/Tanzania Post Office has now moved to Kampala, according to 5H3LV. This means that a number of 5Z4 licence holders have now moved to Uganda and that Terry, 5X5FS, who is at present the only legitimate 5X5 station active, may soon have company.

CT1FL will not now be going to Portuguese Guinea but will go to Angola instead. However, CR3KD should be back on the air by now.

Activity from **Thailand** seems to be on the increase—both HS1JN and HS3NT have been worked on cw, and HS1CB has been heard on ssb. Zone 23 also appears to have been in evidence recently with UA0s YD, YE, and YT, and UK0A the special station on during the CQ Contest, as well as JT1AG who has been on ssb.

VQ9B has been worked on cw recently, as has VQ9V. VQ9W has been active on ssb. PO Box 191 Mahe, Seychelles, seems to be an often quoted QTH for QSLs.

Top Band news

The Beverage antenna, mentioned in earlier *MOTA*s, may be of interest to 160m enthusiasts who have a large amount of space available. This type of aerial was used for the first-ever transatlantic top band amateur QSO. The one currently in use by W1BB is 1,200feet long, 10 to 15 feet above ground, and grounded to a good earth or radials at the far end via a 600Ω resistor. He uses four 133ft radials and has the wire pointing in the direction he most wishes to receive from (ie Europe). The near end goes straight into Stew's receiver, which is grounded. Antenna length is not critical, 1,000 to 1,300 feet being usual, and directivity increases with length although further increase does not seem worthwhile. W1BB finds an actual drop in signal strength of received signals but

1969 Countries Table

	1·8 MHz	3·5 MHz	7 MHz	14 MHz	21 MHz	28 MHz	Total
G3LNS	—	102	123	186	113	131	705
G3XYP	—	38	68	193	137	102	538
G3KDB	—	47	102	158	115	79	501
G3TZU	5	37	64	132	143	167	548
G2MI	1	42	51	138	122	75	429
G3TXF	8	52	51	103	53	76	343
G3JVJ	12	76	27	114	18	29	276
G3XBY	3	44	58	68	71	76	312
G3KS	1	31	29	95	84	87	327
G3VUM	4	22	17	106	80	62	291
G3UML	—	63	22	101	23	18	227
G3HCT	—	85	73	47	61	111	377
G3VPS	3	15	19	84	30	33	184
G3VLM	1	16	25	71	39	48	200
G4RS	4	25	10	63	66	21	189
G3WPO	17	10	37	31	1	23	109
G3PEJ	4	5	21	43	59	38	170
G3ING	8	17	21	38	22	20	126
G8VG	3	25	28	30	57	45	188
G3IAR	2	23	21	25	23	26	120
G3PQF	6	13	12	30	8	5	74
G3VJG	—	9	26	13	10	54	112
G3JHI	—	10	16	19	19	13	77
BRS25429	4	75	98	167	126	95	565
A5390	10	90	69	181	170	107	617
BRS24529	4	55	80	153	94	75	380
A6248	8	91	79	134	109	130	551
BRS26870	5	65	65	135	103	108	481
ORS31427	—	3	13	153	114	72	355
BRS31164	4	52	47	127	107	81	418
A6278	2	30	32	130	75	20	289
A5662	18	31	31	127	114	86	407
A6254	6	53	26	128	160	98	471
A6337	5	52	43	104	108	51	363
BRS30694	9	31	40	98	129	67	374
A5489	—	59	33	103	95	55	343
A5154	2	35	18	111	83	62	314
A6143	4	36	49	74	111	62	336
A6431	9	34	31	92	83	46	295
A6220	1	16	24	95	15	18	169
A6444	3	26	18	85	27	19	178
BRS31172	8	26	30	74	62	37	237
A6242	2	23	13	88	70	43	239
A5466	8	46	38	58	36	69	255
A6201	1	43	31	60	37	31	203
A6593	7	17	14	75	74	45	232
A6023	7	40	16	72	70	42	247
BRS27806	6	35	20	67	64	4	236
A6179	4	18	15	65	35	9	143
A6144	—	4	15	62	—	—	81
A6098	5	18	30	46	27	14	140
A6003	5	25	24	46	93	61	254
A6923	4	29	14	54	40	27	168
A6553	2	13	8	41	92	60	216
A4255	1	14	8	32	31	15	101
A6498	4	14	4	35	9	11	77
A6590	2	55	—	38	87	111	294
BRS28198	2	27	32	1	—	20	82

(This month's table is in order of 7 plus 14MHz totals. Next month's will be the last of the 1969 tables)

W1BB Photo

Arthur Robinson, G3MDW, secretary of the Northern Heights ARS visits W1BB/1. 160m dx station at the "Tower," Winthrop (Boston), Mass, USA during his recent visit to the US.

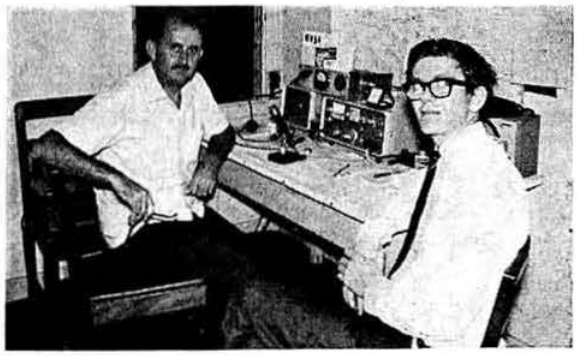
a much greater drop in noise level, which means an effective increase in signal readability. This is, of course, a receiving antenna.

G3IGW reports that the owner of the various callsigns including "GN" (mentioned in last month's *MOTA*) is reputed to be an unlicensed /MM operator running very high power and operating from areas quite near to the adopted prefixes. The individual concerned has used TN8GN/ZD7, TN8GN/ZD8, ZS8GN/ZS3 and ZS8GN/ZS1 in addition to the callsigns mentioned last month.

ZB2BO is now on 160 and 80m running 10W input to a 200ft end-fed wire aerial, and so far has worked ten UK stations on the former band and 20 on the latter this season. He would be pleased to arrange skeds on either band between 0600 and 0640, preferably around 1,820 or 3,520kHz, and his address is: John Patrick, Flat 9, Sandpits, Gibraltar. He comments that not one of the 11 UK stations worked on 160m last year has QSLd!

KP4TL's callsign is being pirated on top band. A letter from Art to G3CFV says that he was not on the air on the night of 26 October, and that he has also received listener reports which do not tally with his log.

G3OLI is keeping skeds with HR2HH but has so far been unlucky. He says that K1PBW and W1BB have been good signals almost every Sunday morning and that he heard 4M1A during the CQ Contest. KV4FZ has also been heard on 1,803kHz. G3XDY reports hearing ZC4TK being called by OK1ATP on sked, although no sign of the ZC4 station was heard. He also says that ZD9BM is on the band and transmits on 1,827kHz, and that G3UGK is trying to arrange skeds with him.



Les, VR2FT, and G3RJS/MM take time out to discuss how best to work the UK through the YJ8, KJ6 and other local QRM

Dxpeditions

The Cambridge University Wireless Society will be embarking on its annual trip to the **Isle of Man** on 17 March. They hope to be operating for a week or ten days from this date on all bands 160m to 70cm. The vhf equipment will be located on a hilltop, and the rest of the expedition near Port St Mary. There will be about ten operators and ssb will be the chief mode used, but some cw contacts will be made by GD6UW. In view of previous experience, no pre-arranged skeds will be arranged as this tends to disorganize the holiday atmosphere of the trip.

Rumours continue to circulate concerning the possibility of a visit to **Clipperton Is** (FO8) by various groups. The strongest concerns a group with a French licence and a leader who has operated in the Caribbean. They are thought to be aiming for a trip there during February. One of the snags in such a project is the great difficulty of approaching the island by sea.

G3LNS reports that all QSLs have now been despatched for contacts made during his GD3LNS operation last summer.

VQ9B now has a new boat and may be travelling around the Indian Ocean during 1970. He may possibly take the opportunity to operate from some of the rarer places. FR7ZG may be going to Comoro Is (FH8) during January or February. It is understood that the staff at the weather station on the Glorieuse Is (FR7/G) is changed every four months and that the next group contains a licensed amateur.

The Sultan of **Qatar** has now given permission for a group of amateurs to operate from his country for a period of one week. It is understood that Dave (MP4QBK), Tom (MP4BHH), Henry (MP4BHV), Don (SV0WI), and possibly Bob (OD5BZ) will be on the air from 20 to 28 February using the callsign MP4QBK. They will have vertical antennas and a rotary beam for 15 and 20m. Ten metre operation may take place also, and some 40 and 80m activity is planned if it is possible to erect dipoles. They will have two QSL managers and details of these and their intended operating frequencies will be announced later.

Band reports

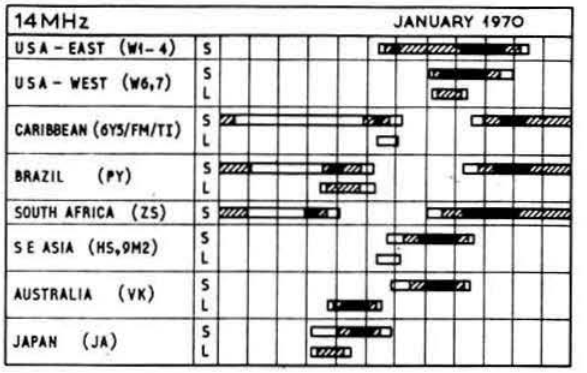
Mid-winter conditions are now with us and all bands higher than 7MHz are useless for dx working during the greater part of the hours of darkness; the fall off in conditions on 14MHz between the phone and cw sections of the CQ WW DX Contest being most marked. QSOs with VK, ZL and JA during the 1700 to 1800 period on 3·5kHz have been reported, and ON4UN is said to have QSOd ZL1BHO on this band on ssb at 1645. Unfavourable comments have been received about certain VK stations who regularly work into the UK on ssb in the cw section of 21MHz, and also about the US novice stations which are now permitted to use up to 21,250kHz and thereby causing a great deal of interference to Canadian amateurs and others. The prospect of an extension of the US phone band on 21MHz also seems to have met with criticism, but it must be remembered that listened to from some parts of the world there is a lot of empty space on 21MHz and that occupation of any of our frequency allocations is imperative if they are to be retained for amateur use.

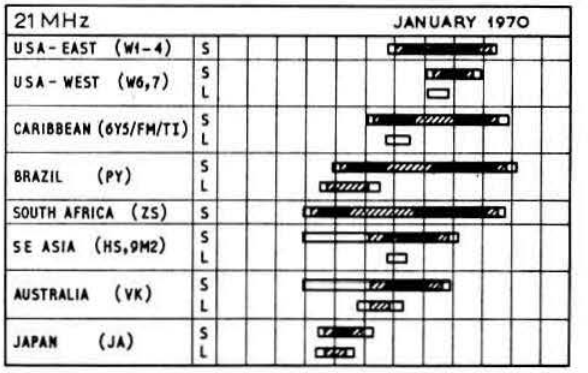
Propagation Predictions

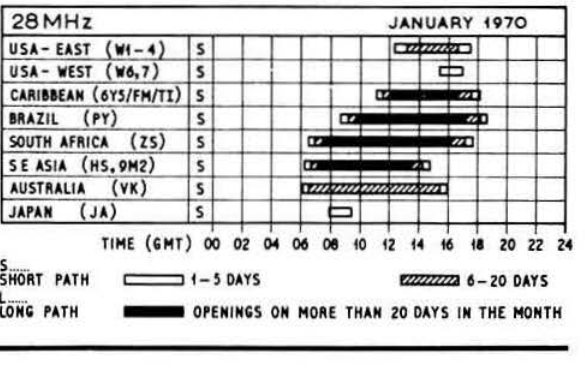
In January conditions will differ little from those of the previous month. Towards the end of the month the hf bands should remain open a little longer in the evenings. Otherwise the forecast given in the December issue will still hold good for all the bands mentioned. It is pointed out that the times in the tables are given in gmt. This is done to facilitate conversion into local time of various dx countries such as Western USA, Asia and Australia.

The RSGB is happy to again acknowledge the help received from Dr G. Lange-Hesse of the Max-Planck Ionospheric Institute, Lindau, West Germany, who makes available the propagation prediction tables that are published each month.

The provisional sunspot number for November 1969 was 87·8, with the period of greatest activity occurring between the 20th and 28th of the month. The predicted smoothed sunspot numbers for March, April and May 1970 are 82, 80 and 79, respectively. Acknowledgement is made to the Swiss Federal Observatory for permission to reproduce the monthly sunspot information.







Sincere thanks to all those who have written with logs and information, and especially to the following: G2BW, G2BOZ, GW3AX, G3AAE, GM3CSM, G3HCT, G3IGW, G3ING, G3JKY, G3TVW, G3VJG, G3XVY, G3XYP, GM4QK, G5JL, BRS2098, BRS26870, BRS31172, A5489, A6098, A6143, A6148 and A6254.

Calls listed in italics represent stations on cw, all others on ssb unless otherwise stated.

3·5MHz. **0200** *PJ0CW* **0300** *ZF1AN* **0400** *W0NA* **0600** *KZ5WJ*, *OX3ZO*, VP2VP, *VP9GJ*, *ZB2BO*. **0700** FG7XX, XE1KS, Ws. **0800** ZL4NH. **1600** *KR6NG*, *VK2EO*. **1700** *UK0A* (Zone 23). **1800** *XW8CR*. **1900** *VK3APN*. **2000** *UI8KBA*, *UK0B*. **2100** JW1CI, OH3XZ/OH0, TF3ST, UA0BP, ZB2BX, ZS1ER, 5Z4s KL, LY, 9G1FF. **2200** CR7FM, FP8AP, OD5BZ, *UA0AG*. **2400** *FB8ZZ*, *UL7BB*, *UM8FM*.

7MHz. **0300** *ET3USA*, *KV4FZ*, *PJ0CW*. **0500** *HK5QS*, *OX5BM*, *W7DI*, *5N2AAF*. **0600** *OY6FRA*. **0700** XE1WS. **1000** *ZF1AN*. **2000** EP2BQ.

14MHz. **0200** *UA0s YD*, *YT*. **0400** *KH6s IJ*, *RS*, *VE8NWT* (Zone 1). **0500** CE8AE. **0600** 7Z3AB. **0700** C21JW, *KL7MF*, VK9LB (meets SV0WI on 14,185kHz at 0700 every Sunday), ZD7SD. **0800** EA9AI, FK8AC, JAs, *VK9RH*, VK9KS, *VU0LO*, *ZM1AAT/K*, ZM3PO/C. **0900** CE0AE, *YJ8JM*, *ZM1BN/A* (VK6HD reports licence issued by NZ Antarctic territories department—? therefore count as Campbell Is). **1000** *HS3NT*. **1400** *FB8ZZ*, *VK6HD*, *YS1O*, *9N1RA*. **1500** *UA1KED* (Fr. Josef Land). **1700** MP4BHH, VK0HM, *VQ8CFB*, ZS2MI (on a.m.). **1800** FP8CS, FR7ZU/E, 5VZDB, 8R1U, 9L1RP. **1900** *KG6AAY* (over North Pole), VP2EQ, *VS9MZ*. **2000** FM7WW. **2200** PJ7JC, 5H3KJ.

21MHz. **0700** *VQ8CR*, *ZE8JN*. **0800** *HL9VQ*, *MP4BHQ*. **1000** JAs, *KR6HX*, *XW8CS*, *4U1ITU*, *9M2LN*, *N9IRA*. **1100** *UK0A*, *VS6AF*, *VS9MB*, *YN1AA*, *4M5ANT*, 5L2AK. **1200** HR3AC, U4L/3 (Stn celebrating "Lenin activity"), VK2WX/VK9, 9X5AA. **1300** *HC2GG*, YB0AAC. **1400** *HS3NT*, YB0AAF (QSL via DL1SU). **1600** HR1EMM (QSL to PO Box 18C Tegucigalpa), OX3FD, *VE8NWT*. **1700** *CV2AA*, *HC2GG/1* (QSL DL2GG), *PJ2HT*, *TG4SR*, *9Y4AA*. **1800** *CE1AD*, *HP1IE*, *OA4MS*, G3UHR/VO2. **1900** 7Q7CZ (PO Box 65, Limbe, Malawi). **2200** *W7s* in QSO with JAs.

28MHz. **0700** DU7GB, *ET3USA*, *VU0OL*, *9N1RA*. **0800** *HS3NT*, *5H3KJ*. **0900** KG6AQY, *SU1IM*, *TA2E*, TR8DG, VK6HD, *ZM3GQ*. **1000** *MP4SA*, VK9XI, VS6AD, VQ9EP. **1100** *CT3AS*, MP4TCE, *TJ1AK*, VKs, VQ8CG, *XW8s BP*, *CR*. **1200** FL8MB, FR7ZN, *OA4PK*, *UI8AI*, *VQ8CC*, *9Y4AA*. **1300** FY7YQ, KV4s AM, FZ, *TA2E*, *8R1J*. **1400** FH8CD, VP2VP. **1500** ET3REL, HC2HM, XT2AA. **1600** *HP1IE*, KG4DS, VP2LX, *ZD8RC*. **1700** CT2AS, *CX2SS*, *XE1AX*, YN1HSM, ZD3K. **1900** VP2VJ.

Many thanks to the following for information obtained from their publications: **Long Skip** (*VE3DLC*), **On the Air** (*ON4AD*), the **West Coast DX Bulletin** (*WA6AUD*), **DX-press** (*PA0TO*), **DX News Sheet** (*Geoff Watts*), the **DX'ers Magazine** (*W4BPD*), the **Florida DX Report** (*W4BRB*), **CQ DX** (*ARI*), and **NARS Newsletter** (*5N2AAF*).

Please send all items for **February** issue **to reach G3FKM** by **14 January**, for **March** by **11 February**, **and for April** by **11 March.**

Interference and the amateur

By E. M. WAGNER, G3BID*

THE excellent article "Television and Radio Interference Trends", by G3VA (*Radio Communication*, October 1969) with the analysis of the Post Office statistics deserves careful study. It raises certain very important issues.

As G3VA rightly points out, the radio amateur "more than any other user suffers in his search for weak signals from the pollution of the radio frequency spectrum by electrical apparatus and power lines . . ."

It is in this connection that the analysis deserves very careful study.

Interference from overhead power lines from 11kV to 66kV amounting to no less than 3,628 cases in Band 1, almost exactly five times the number of cases of interference in this band from amateur transmitters.

Interference from power lines now comes third of the identified sources; coming only behind such obvious causes as contact devices and electric motors.

It is probable that the majority of this interference is caused by the 11kV lines which are being brought ever nearer to people's dwelling places, especially in country districts. Frequently the line is brought right up to the house and a transformer fitted on a pole just outside. These terminations are liable to cause interference, especially in coastal areas where the salt pollution in the atmosphere is likely to corrode the terminations and encrust the insulators with salt. The interference may well be at its worst in foggy or misty weather.

The amateur is likely to suffer severe interference from this cause, but, unfortunately, he cannot, at present, enlist the free assistance of Post Office engineers to locate and remedy the interference if it is experienced only on the amateur bands.

Interference from power lines, especially the 11kV and higher voltages, is usually also experienced on Band 1 television, as the Post Office statistics show, and also to some extent on medium and long wave am programmes. The small number of cases reported on lw/mw by the Post Office may be due to the fact that listeners on am probably do not report these cases as they have become used to interference and are perhaps less critical.

Whenever an amateur experiences interference which he suspects is being caused by power lines he should immediately monitor the television frequencies and the sound broadcast frequencies, especially am. Often interference will be noted on one or other of these frequencies as well as on those of the amateur, and he can then enlist the aid of the very competent Post Office engineers to sort out the interference caused to television or sound broadcasting, and in most cases this will solve the interference on the amateur bands.

Co-operation with neighbours in these cases is also very beneficial, since they may well imagine that the interference they are experiencing is caused by the amateur but have hesitated as yet to complain. Liaison with the neighbours will:

(a) Convince them that the interference from which they are suffering is not caused by the amateur, and that he is suffering from it himself. This improves relations considerably.

(b) Enable the Post Office engineers to deal with several complaints at the same time in one investigation and will save them time. Any neighbours who experience power line interference should complain through the Post Office at the same time as the amateur whose television and/or sound radio are affected, giving full details of time, nature of the interference and which programme—BBC1 or 2, or ITV, or Radio 1, 2, 3, or 4, are suffering interference.

It is helpful if weather conditions at the time are noted. It is also helpful if one switches quickly to the other programmes to see if they are clear of interference, or not. This information often helps Post Office engineers to diagnose the interference more quickly. It is really not very helpful just to say "We were getting interference on TV", without specifying which channel, what time, which day, etc.

If this power line interference is not checked before it grows further, it may well become one of the most serious menaces to amateur radio.

In urban areas interference from central heating plants is also growing where the ignition of oil-fired systems is sometimes by arc or spark ignition and the suppression is not adequate, or where the system has not been properly maintained. The same procedure should be adopted here, as with power line interference, checking on television and radio broadcast channels, co-operating with neighbours, and careful noting of times, which channels are suffering interference, and reporting to the Post Office.

* 5 Ferncroft Avenue, London, NW3.

Looking Ahead

16 January 1970—Presidential Installation. Bonnington Hotel, WC1.

30 January 1970—RSGB Dinner Club, Kingsley Hotel, WC1.

25-26 July 1970—British Amateur Television Club Convention Cambridge.

YOUR OPINION

The Editor

Radio Communication

Sir,—The amateur radio movement in Britain must present a united front if the hobby is to prosper. The matter which provoked a letter of strong protest from the President of the RSGB to the editor of *Short Wave Magazine* (reprinted in *Radio Communication*, December 1969) must not be allowed to cause an ever-widening rift to develop between amateur radio's two leading voices in this country. We have always been particularly fortunate to have in Britain two thriving publications devoted entirely to amateur radio and it would be a pity to see blessing turned into embarrassment.

The fact that *Short Wave Magazine* exists is to the good of amateur radio in the UK. I am sure that members of the Council of the Society appreciate the advantages in having a voice other than their own to speak on amateur radio policy in this country.

Clearly, however, that voice does not always speak with prudence. If *Short Wave Magazine* really stands "for the radio amateur and amateur radio", let it demonstrate this now by attempting to end amicably the wrangle it has so tactlessly begun. If it does not, the stubborn and autocratic nature of the magazine's "complete independence" will force us to view that independence not as a source of strength, but as its overriding weakness—to the loss of us all.

Yours faithfully,

Robert McHenry, G3NSM

University College, Oxford.

December 1969.

Several other letters on this subject have been received, but it is regretted that because of lack of space we are unable to publish them.

—Editor.

Obituary

Waldo B. Hartog, G3JEJ

It is our sad duty to record the death of Wal Hartog, G3JEJ, on 4 October 1969. A senior engineer at the ITA transmitting Station, Belmont, Lincs, he was a congenial colleague and a valued friend.

His interest in amateur radio was aroused during a period he spent in Canada during his early teens. After returning to the UK he gained his licence in September 1953, shortly after his sixteenth birthday. He was always enthusiastic and devoted much effort to construction. But while the building of apparatus was his main interest, he spent many hours on the air, to which his pile of log books bears witness.

Wal brought his professional approach to amateur radio. This, coupled with an amazing ability to create a piece of gear from almost nothing, resulted in his being equipped with home-built apparatus for all bands from 160m to 23cm. He was in the process of going over to transistors, and, excluding 10m, could transmit on all bands up to and including 2m.

Only recently had he started to publish any of his work, but other articles were under preparation at the time of his death. With his passing our fraternity loses one of its keenest adherents.

We extend our heartfelt sympathy to his widow, Tessa, and his children, Simon and Cathy.

J. T. A. J.

Mobile Rallies

19 April 1970—North Midlands Mobile Rally.

10 May 1970—Ealing and District Amateur Radio Society rally, Hanwell Community Centre, Westcott Crescent, Hanwell, London W7.

21 June 1970—University College of Swansea Amateur Radio Society's annual rally, Singleton Park, Swansea.

28 June 1970—Longleat Safari Mobile Rally, Longleat House, Near Warminster. Organised by the City & County of Bristol RSGB Group.

5 July 1970—1970 South Shields Mobile Rally.

12 July 1970—Worcester and District Amateur Radio Club rally.

HF Contests Calendar, 1970

Contest	Date(s)
AFS	10–11 January
1st 1·8MHz	14–15 February
BERU	7–8 March
Low power 80m	5 April
NFD	6–7 June
Summer 1·8MHz	4–5 July
High Power Field Day	11–12 July
80m Field Day	13 September
28MHz	10–11 October
7MHz CW	24–25 October
7MHz Phone	7–8 November
Second 1·8MHz	14–15 November

Contests

31 January–1 February—1970 French Contest, CW.

7–8 February 1970—ARRL Phone Contest (first part).

21–22 February—ARRL CW Contest (first part).

28 February–1 March—1970 French Contest, Phone.

28 February–15 March—IARC Propagation Research Contest (cw and rtty).

7–8 March—ARRL Phone Contest (second part).

21–22 March—ARRL CW Contest (second part).

28 March–19 April—IARC Propagation Research Contest (phone).

Disqualification of the Billericay NFD Group

Investigations by the HF Contests Committee have brought to light irregularities in the operation of the single station entry by the Billericay NFD Group.

As a result, this Group, which was placed 2nd in the single station section, has been disqualified.

The placing's of all Groups below Billericay NFD Group should be moved up by one place.

G3OXD, not G3OXO

Apologies to Albright and Wilson ARS, winners of Section B in the August 70MHz CW Contest. Their callsign is G3OXD not G3OXO as given in the report last month.

SOCIETY AFFAIRS

A brief report of the Council meeting held at Society HQ on 8 November 1969, commencing at 10am

Present: *Messrs J. W. Swinnerton (President, in the Chair), B. Armstrong, J. Etherington, J. C. Graham, R. J. Hughes, A. F. Hunter, E. G. Ingram, G. R. Jessop, H. E. McNally, L. E. Newnham, J. R. Petty, R. F. Stevens, G. M. C. Stone, F. C. Ward, E. W. Yeomanson, (Members of the Council); Dr J. A. Saxton, President-elect; R. G. B. Vaughan, general manager, and A. W. Hutchinson, editor.*

Apologies for absence were received from Messrs N. Caws and G. Twist.

Illness of Mr N. Caws

The President reported that Mr N. Caws had been indisposed but was making good progress. Council asked that the President should convey its good wishes to Mr Caws.

Membership and affiliation

It was resolved: (i) to elect 121 corporate members and 32 associate members;
(ii) to grant corporate membership to seven associate members;
(iii) to waive the subscriptions of six members due to blindness or other disability;
(iv) to grant affiliation to the Melton Mowbray Amateur Radio Society; the Pentlands Radio Club (University of Edinburgh), and the Yorkshire Television Amateur Radio and Television Society, Leeds.

An application for affiliation from the Heanor Aldercar Secondary School, Langley Mill, Nottingham, was refused as the school was unable to provide a constitution. Mr Ward agreed to visit the school and explain the difficulties to the headmaster, Mr Cliffe.

Membership records

Mr Yeomanson said that while considerable help in bringing the records up to date had already been forthcoming from various voluntary sources, a tremendous amount of work still remained to be done. Messrs Graham, Jessop and Stone volunteered to assist with this work.

CW for Class B licensees

Mr Stevens reported that an approach to the Ministry of Posts and Telegraphs had revealed that they were not prepared to grant a cw facility for Class B licensees. He had also investigated the status of the Class B equivalent in Holland and Germany and had been told that no cw facilities had been granted.

The general manager was instructed to write to Mr G. Rogers, G8ABB, informing him that no purpose would be served in submitting a formal application to the Ministry of Posts and Telegraphs.

Nomination of area representative

Council approved the nomination of Mr L. M. Lyske, GI3CDF, as area representative for Belfast and District.

Preparation of "Society Affairs"

Mr Graham said that while for some time "Society Affairs" had been prepared by Mr McNally, it was obviously desirable that this task be undertaken at headquarters. Council agreed that "Society Affairs" should be prepared by the general manager and the editor. Council recorded a vote of thanks to Mr H. E. McNally for his work in preparing "Society Affairs" in the past.

IARU Region 1 VHF/UHF Contest 1968

Mr Stone reported that the results of the 1968 Contest had now been circulated, and the absence of entries from Great Britain had been specifically mentioned. It was agreed that the proposed new rule for the 1970 VHF/NFD Contest, requiring entries for the IARU Contest to add the contact distance, would cover this point.

Presentation of awards at AGM

Council was asked to decide on the type of permanent record to be presented to award winners at the 1969 Annual General Meeting. It was agreed that miniatures of their awards should be presented as in previous years.

Mr Stevens proposed that the Society's draughtsman, Mr D. E. Cole, be asked to prepare a design for a suitable certificate as a permanent record in accordance with the views expressed at the Regional Representatives Conference.

Council election

Mr Graham drew Council's attention to the remarks concerning Mr Dowdeswell's candidature for election to the 1970 Council published in the November issue of *Short Wave Magazine*. Various Council members reported complaints from members concerning this feature.

Council resolved that the President should write to the editor of *Short Wave Magazine*, and that this letter should be published in the December issue of *Radio Communication*.

President's visit to Utrecht

The President reported that he had been invited to a VERON meeting at Utrecht on 16 November 1969. Council agreed to endorse Mr Swinnerton's provisional acceptance of the invitation.

Revised scheme of representation

Mr Hunter submitted a draft of the revised scheme of representation discussed at the Regional Representatives' Conference. Council approved for publication an amended draft of this revised scheme, and Mr Hutchinson agreed to publish this in the December issue of *Radio Communication*.

Trophies

Council approved the award of:
(i) the Milne Trophy to S. J. Heard, GC3IEW, as the leading UK station (other than "G") in the ARRL contest;
(ii) the Braaten Trophy to W. A. Roberts, G2RO, as the leading "G" station in the ARRL DX Telegraphy Contest.

Reports

Council approved
(i) the supplementary report of Council for the period 1 July 1969 to 30 November 1969;
(ii) the President's report on the Northern Ireland ORM.

Minutes of committee meetings

Council approved the minutes of the Scientific Studies Committee meeting held on 13 October; the VHF Contests Committee meeting held on 14 October, and the Membership and Representation Committee meeting held on 17 October.

"Radio Communication"

Mr Hunter enquired when the "profile" of the Membership and Representation Committee would be published in *Radio Communication*. Mr Stevens said that shortage of space had prevented publication up to the present time, and it was agreed to leave this matter to the discretion of the editor.

Mr Ward said that he understood obituaries had been omitted from the November issue of *Radio Communication*. Mr Hutchinson replied that these had been type-set for that issue, but that they had to be held over because of pressure on space.

RSGB Operating Certificates

Mr Stevens displayed the designs prepared by Mr Cole for new RSGB Certificates. Council agreed that a sub-committee, consisting of Messrs Graham, Hughes, Stevens, Emary and Allaway, should consider the designs and report to Council.

Council was in session for 4½ hours.

Presentation of awards at AGM

At the Society's annual general meeting held in London on 5 December 1969, the President for 1969, Mr J. W. Swinnerton, presented trophies to winners of various awards during the year.

Right: A. K. Russell, G8AWS, and C. Sharpe, G2HIF, (on behalf of C. L. Desborough, G3NNG) receive the 1951 Council Cup.

Centre, left: M R. A. Vanmuysen, ON4VY, is presented with the Calcutta Key.

Centre, right: Mrs Nina Martin, xyl of G3PGM, receives the Bristol Trophy on behalf of the Durham City ARS.

Bottom: A group of trophy winners after the ceremony.

Photos: Hutchinson

RADIO AMATEUR EMERGENCY NETWORK

By S. W. LAW, G3PAZ

Traditionally the advent of a New Year is regarded as an occasion worthy not only of capital letters for its title but of a pause for a certain amount of introspection. Have we, as an organization, made satisfactory progress in the past year? Is it likely to continue? What of the future? Let us, then, examine these points.

In 1969 the RAEN Committee, despite some inevitable changes in personnel due to private commitments and other unavoidable circumstances, has continually worked to further our aims. Much that has been done is in the nature of foundation work which will not show up for some time and which, by its very nature, cannot be discussed here and now. Certain negotiations are under way for which the keynote is diplomacy, and these are in the best of hands. Membership has shown a steady growth and at this time is tending towards a figure of some 1,500 in the near future.

There is a continual flow of enquiries for information on the formation of new groups in Great Britain and, as our reputation spreads farther afield, a number of requests for help and information rom prospective emergency groups of radio amateurs in other countries.

On the other hand our existing groups show a certain diffidence in acquainting the committee with their activities. A recent questionaire sent out by the chairman has to date only elicited a response of just over 25 per cent. It is difficult to see why this should be so. Our thanks to Liverpool and S.W. Lancs, Essex, Kent, Mid-Severn, SE London, Mid-Lanarks, Norfolk, S Cumbria, Manchester, Pembroke-Carms and Newquay for their reports and information. As to those who have even now failed to send in their cards for re-registration, we can only say, "Do it now!"

This year should see an even greater expansion of our preparedness, and an awakening on the part of the authorities to the role which we can play in the community if given a sympathetic ear towards our difficulties.

RAEN Committee

The RAEN Committee held the last meeting of 1969 on 29 November. A letter was received from Ron Ledgerton, G2ABC, reporting progress on the operation to his eye. We wish Ron a successful recovery from this hazard. The meeting was honoured by a visit from the RSGB President, G2YS. Some brisk discussion took place on the growth of RAEN and some aspects of future development. The perennial question of message procedure was again given an airing. Membership figures to date were quoted at 1,079 registered and 250 non-registered, with new applications still coming in. Arrangements are being made for an increased supply of armbands to cope with the demand, and the problem of a further print of the *RAEN Manual* was discussed. The meeting was in session for 5½ hours.

Group of the month

Space permitting, it is proposed to feature particulars of one RAEN group each month. In order that this may be a true picture it is of course essential to have all the data to hand. Would controllers please send information to the hon chairman, G3BPT (QTHR).

New groups

A RAEN group is in formation by G3CNV in the Sutton Coldfield area and at present numbers 20 members. Organization is forging ahead and prospective members in the area should contact G3CNV (QTHR).

* 130 Alexandra Road, Croydon, Surrey, CRO 6EW.

Hands across the sea

We shall await with interest the information which G3MBQ will be bringing back from his forthcoming visit to the wilds of YU-land. His wide experience of RAEN organization and active operation will be much sought after by our opposite numbers over there.

Exercises

Message handling was the theme of the Surrey Group when it liaised with a prospective user service on 2 December at Carshalton. Essex Group spread itself on a simulated air crash in conjunction with all three user services on 19 November. Manchester will be holding yet another of its well thought out exercises on 18 January. Sussex Group is still continuing with its series, but we have now lost count of the serial letters!

Honorary Registrations Secretary:
Mrs. Jane Balestrini, "Merrivale", Willow Walk, Culverstone, Gravesend, Kent.
Honorary Secretary, RAEN Committee:
Mr. E. R. L. Bassett, 57 Upper St. Helens Road, Hedge End, Southampton, SO3 4LG.

RAEN Group of the Month

by P. Balestrini, AMITE, MIOM, G3BPT, (Chairman, RAEN Committee)

This is the first of a series of short biographies on raynet groups based on information supplied by the controllers in reply to the recently circulated questionnaire. It is intended to show that RAEN is an active body and to encourage radio amateurs to join the network. Remember . . . disaster can strike anywhere . . . it could happen to you . . . and this is the one way in which the amateur can use his knowledge and expertise in the art of communication as a service to the community while at the same time preserving and improving the amateur's public image.

The Mid-Severn Valley Raynet Group

Controller: G. W. Tibbets, G3NUE **Assistant Controller:** B A. Jones, G8ASO.

The MSV Raynet Group held its inaugural meeting under the chairmanship of A. G. Blackmore, G3FKO, in October 1967. During November of the same year, with a membership of 20, practice nets were started on 160m. Successful signals exercises were held during 1968, culminating in a joint British Red Cross exercise in September when it was decided to adopt 144·486MHz as a 2m channel.

Detailed negotiations were commenced with the county director of the Worcestershire branch of BRCS, and preliminary negotiations started with the West Mercia Police Force. Close co-operation is now in force with BRCS at county level, and MSV Raynet is also "written in" to the newly formulated plans for disaster relief in Worcestershire.

MSV Raynet, with a membership of 38 licensed and 7 swl members, is a young group with a fine record of progress. Thirty-two of these stations can operate from their home QTH on the group 2m channel, 16 can operate mobile, and a further seven can operate portable. Regular practice nets are held under the critical eyes and ears of a duty net controller, and a guaranteed fixed station at HQ with four mobiles can be provided within four hours of call-out. Watch also for MSV Raynet on 70·225MHz.

Congratulations on a job well done.

CONTEST NEWS

80m Field Day, 1969

The weather for the 1969 80m Field Day was considerably better than that which the previous year's competitors had to endure. The encouraging weather doubled the number of entries from seven in 1968 to 14 in 1969.

The leading station was G3VOC/P, operated by A. E. H. Swindon, G3ANK, and C. J. Linnell, G3VLT. Their equipment consisted of a home-brew transmitter running 10W to a TT11 pa, an HRO receiver and a dipole. Second place was taken by S. H. Andrews, G3OGY, who was assisted by J. S. Hallat, G3DBY. They used a home-brew EF91/EF91/5763 transmitter a modified PCR receiver and a half-wave dipole. Not far behind, in third place, was B. Clark, GW3HGL, with co-operator C. J. Watson, GW3CW. They had two inverted V aerials on one 36ft pole, an EA12, and ran 10W to a 5763 pa.

G3WTP had the only fully transistorized station, which he described as a direct conversion transceiver with a 2G240 pa. Most stations ran between 6 and 10W, the only exception being G3JKY who used about ¼W. G3GDW was assisted by his son, G3LHJ.

Comments from competitors: "A very enjoyable contest . . . pity it does not get greater support,"—G3OGY. "Quite hard graft at first . . . percentage replies was *very* small,"—G3JKY "Was very surprized by the lack of GM stations . . . heard no Europeans at all,"—GM3DOD.

A few entrants commented on the omission of the scoring system from the rules published in the August issue of *Radio Communication*. This error was in fact remedied in September's *Radio Communication* and by an announcement over GB2RS. A couple of entrants did not record the names and callsigns of the operators on the cover sheet, as is required by General Rule 4 (b)(iii) in the case of multi-operator stations. This is requested to enable the committee to check that all operators are members of the RSGB. On this occasion the disqualification stamp was not to hand—but be warned!

The Houston Fergus Trophy will be presented to G3VOC, and Certificates of Merit will go to G3OGY and GW3HGL.

Check logs from G3GXI, G3OOU/A and BRS30033 are acknowledged with thanks.

Position	Callsign	Points	Aerial
1	G3VOC/P	346	Dipole
2	G3OGY/P	323	Dipole
3	GW3HGL/P	320	2 inverted Vs
4	G3IGU/P	309	270ft
5	G3VW/P	306	¼ wave ef
6	G3WTJ/P	302	inverted V dipole
7	G3WTP/P	287	inverted V dipole
8	G3AGX/P	253	132ft ef & dipole
9	G3TAK/P	243	?
10	G3UJG/P	221	dipole
11	G3JKY/P	153	dipole
12	GM3DOD/P	142	137ft ef
13	G3GDW/P	136	dipole
14	G5DZ/P	93	180ft ef

November 1969 144 MHz SSB Contest

This event produced more activity than any previous similar contest, and although the entries are only a few up on previous ones, it is quite evident that interest is growing in vhf ssb.

Well over 50 stations are known to be active, and it is a great pity that only 15 troubled to send in their entries. Also, it is noted that some of the past staunch supporters have dropped out, such as G3BA, G3BHW and G3JWZ, just to mention three. It should be remembered that although there can be only one winner, the entry logs do considerably help in the task of accurately checking the results.

Comments were conspicuously few but those which were made by entrants generally agreed that conditions were good and the three-hour period was very popular.

G6RH would like to have a county multiplier, but it is felt that while the number of entries remains at the present low, but growing, level, it is better to keep the rules as simple as possible.

GI5ALP experienced very tough conditions but it is nice to see his entry.

Posn	Callsign	Points	QSOs	Km. (Best).	QTH	Pep.	Aerial
1	G3GZJ	450	31	485	CL	125 Out	6 × 6 jb
2	G8BBB	336	45	440	CE	200 —	10 el
3	G3NEO	301	36	435	YS	150 —	5 × 5 yagi
4	G3DAH	286	37	465	KT	200 —	10 el
5	G3OXD/A	261	35	505	WR	30 —	6 × 6 slot
6	G3AWK	239	29	414	LM	150 —	10 el
7	G8AWO	197	30	392	HF	150 —	10 el
8	G6RH	190	31	358	KT	300 —	9 el yagi
9 *	G3LNP	169	30	340	HF	50 Out	10 el yagi
10	G3MCS	167	30	—	BS	60 In	10 el & 5 el
11	G3TCG	166	26	412	EX	120 —	6 × 6 jb
12	G8AJC	150	22	325	KT	100 —	8 el yagi
13	G3COJ	123	20	345	BS	200 In	8 × 8
14	G3VXK	59	8	370	LE	60 Out	10 el
15	GI5ALP	32	2	440	LY	240 —	20 el colinear

Check log appreciated from G8AYN.

* G3LNP failed to log QTHs, possibly due to definition 27 being erroneously omitted from the rules published.

February 1970 70 MHz Fixed Station Contest

0900 to 1500 gmt on 8 February

All entries and checklogs must be sent to the adjudicator addressed to: VHF Contests Committee, c/o G3JKY, 60 Merlin Grove, Beckenham, Kent BR3 3HU. The following General Rules, as published in this issue of *Radio Communication*, will apply: 1, 2, 3, 4b, 5a, 6a, 7a, 8b, 9a, 10, 11, 12a, 13-24.

March 1970 144 MHz Open Contest

1700 gmt on 7 March to 1700 gmt on 8 March

All entries and checklogs must be sent to the adjudicator addressed to: VHF Contests Committee, c/o G3EDD, 39 Angle End, Great Wilbraham, Cambridge. The following General Rules, as published in this issue of *Radio Communication*, will apply: 1, 2, 3, 4a, 5a, 6a, 7a, 8a, 9a, 10 11, 12a, 13-24.

First 1·8 MHz Contest 1970

RULES:

1. The General Rules for RSGB HF Contests, published in this issue of *Radio Communication*, will apply.

2. When: 2100 gmt on Saturday 14 February 1970 to 0200gmt on Sunday 15 February 1970.

3. Contacts: Cw (A1) only in the 1·8-2·0 MHz band. County code letters, as published on page 48 of *Radio Communication*, must be sent after the report-serial number group, eg for a contact from Rutland, 569001 RD.

4. Scoring: Six points for each of the first six contacts with stations in any one county; three points for the seventh and subsequent contacts with stations in that county. Six points for each contact with a station outside the British Isles.

5. Logs: Column (5) must be headed "County Code Letters Received" Entries must be addressed to the HF Contests Committee, c/o R. Biggs, G2FLG, 29 Lord Avenue, Clayhall, Ilford, Essex.

6. Trophies: The Somerset Trophy will be awarded to the winning station. The Maitland Trophy will be awarded to the Scottish member with the highest aggregate number of points in this contest combined with the Second 1·8MHz Contest 1969.

General Rules for RSGB HF Contests

The **General Rules** for all RSGB hf contests are given below. For each contest throughout the year a short supplementary set of rules will be published which must be read in conjunction with the General Rules.

Reprints of these General Rules will be available from HQ upon request.

Your attention is drawn to important changes in Rules 6, 10 and 11. There are minor changes to other rules.

1 Entrants must operate in accordance with the terms of their licence.

2 Contacts with unlicensed stations will not count for points.

3 Only one contact on each band may be claimed with a specific station, whether fixed, portable, mobile, or alternative address. Duplicate contacts must be logged and clearly marked as duplicates without claim for points. Cross band contacts may not be claimed. Proof of contact may be required. Simultaneous operation on more than one band is not permitted.

4 (a) A **fixed station** must operate from the address shown on the licence.

(b) A **portable station** must operate from the same site for the duration of the contest and may not be located in a permanent building or use public mains. Power for all equipment may be derived only from a portable generator on the site, accumulators or batteries. No equipment or aerials may be installed or erected on the site prior to 24 hours before the start of the contest. This does not apply to the storage of equipment.

(c) A **mobile station** is a station installed in a motor vehicle, or vessel on an inland waterway, so equipped that the station may be operated in motion without alteration.

(d) An **alternative address station** is a station at a location not named on the licence, other than a portable or mobile station.

5 Unless otherwise stated, single operator entries only will be accepted.

(a) A **single operator station** is one manned by an individual operator who receives no assistance whatsoever in operating, log keeping or checking, etc, from other persons during the contest period.

(b) A **multi-operator station** is one which does not conform to the definition of a single operator station given above. In those contests where multi-operator entries are allowed, such entries will only be accepted provided that:

(i) The declaration is signed by only one operator, who will be regarded as the entrant,

(ii) The callsign of the operator concerned is indicated for each contact,

(iii) The names and callsigns of all operators are listed on the cover sheet, and

(iv) For stations located in the British Isles, all operators must be fully paid-up members of the RSGB.

6 Eligible entrants. Unless otherwise stated, only fully paid-up members of the RSGB resident in G, GC, GD, GI, GM and GW may enter. In those contests which are open to radio amateurs elsewhere, British Isles entrants (as defined above) must be members of the RSGB. Entries from GB stations, aeronautical mobile and maritime mobile stations will not be accepted.

7 A **contact** consists of an exchange and acknowledgement of contest information. This consists of an RS report on telephony, or an RST report on telegraphy, and a three-figure serial number starting with 001 for the first contact and increasing by one for each successive contact throughout the contest, irrespective of the band or mode in use. The supplementary rules for specific contests may call for additional information to be exchanged.

8 Form of entry.

(a) Entries must be clearly written or typed on one side only of RSGB Contest Log Sheets or International A4 paper. Columns must be headed as shown in the example below.

(b) *Separate log sheets must be used for each band.*

(c) Logs must be kept, and entries submitted in gmt.

(d) Each entry must include a cover sheet in the form shown below incorporating a signed declaration.

HF Contest Entry Cover Sheet

Contest ..... Date ..... Score .....
Section (if any) ..... Callsign .....
Name .....
Home Address .....
.....
Name of Club or Group (if applicable) .....
.....
Address of station, or portable location (if other than home address above) .....
National Grid six-figure reference, county code letters, or other co-ordinates (see contest details) .....
Transmitter ..... Input power .....
Receiver .....
Aerial(s) .....

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

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

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

RSGB Contest Log Sheets and Cover Sheets may be obtained from HQ upon request. The request must be accompanied by a large sae.

(e) All entries become the property of the Radio Society of Great Britain. In the event of any dispute the ruling of the Council of the RSGB shall be final.

(f) All entries must be postmarked not later than 15 days following the contest. If acknowledgement of receipt is required, British Isles entrants should include a stamped addressed postcard which will be returned to the sender. Overseas entries will not normally be acknowledged.

(g) Unless otherwise stated, entries must be addressed to the HF Contests Committee, Radio Society of Great Britain, 35 Doughty Street, London WC1, England.

9 For scoring purposes, aeronautical mobile, and maritime mobile stations will count as mobile stations in the country of origin.

10 Awards

(a) Awards are made at the discretion of the Council of the RSGB and may consist of trophies, plaques or certificates. Awards are, where possible, presented at the Annual General Meeting following the contest.

(b) The standard award format for contests is as follows: Some winners and section leaders will be the holders of particular trophies, and these will also receive a special framed certificate. Certificates of Merit will be awarded to the entrants placed first, second and third in each section of the contest, from (i) the British Isles and (ii) overseas.

11 Automatic disqualification Entrants will automatically be disqualified on any one of the following counts:

(a) Failure to complete and sign the declaration.

(b) Frequent tone reports of T8 or less.

(c) Failure to record operators' callsigns against log entries (multi-operator entries only).

(d) Failure to use separate log sheets for each band.

(e) If more than five per cent of the log entries are unmarked duplicate contacts for which points have been claimed.

(f) Failure to observe the terms of the entrant's licence.

Failure to observe and comply with other rules may also entail disqualification.

RSGB CONTEST LOG SHEET Band .....

Contest ..... Sheet No. ..... Callsign .....

Date and time (gmt)	Callsign of station worked	My report on his signals and serial No. SENT	His report on my signals and serial No. RECEIVED	(5)	(6)	(7)	Points claimed
					Total from	previous sheet	.....

General Rules for VHF/UHF Contests 1970

The following are the General Rules for all RSGB vhf/uhf contests for 1970, with the exception of VHF NFD (The rules for VHF NFD will be published separately). The rules for any vhf or uhf contest will be made up from these General Rules, which will be referred to by number. The results of all vhf and uhf contests will normally be announced on GB2RS, three to four weeks after the contest.

Entrants should always use RSGB Log Sheets and VHF/UHF Contest Cover Sheets. These are available from RSGB HQ upon receipt of a large stamped addressed envelope. The VHF/UHF Contest Cover Sheet goes under the name of " Form 427"; ask for this when writing to HQ.

A particular point which the VHF Contests Committee would like to stress is that no phone operation should take place in the recognized CW Zones in the vhf bands.

1 **Date and Time.** See individual contest details.

2 All entries must be sent to the adjudicator of the contest at the address given with the rules of the contest. Entries that are not sent to the address given with the rules of the contest will be disqualified.

3 All operators must be fully paid-up members of the RSGB.

4 **Awards**

(a) In each section of the contest there will be an award to the highest scoring station. An award will be made to the runner-up in each section in which there are ten or more entries.

(b) Awards will be made to the highest scoring station and the runner-up.

N.B. All awards are certificates. In addition, trophies will be awarded to the highest scoring stations in the following contests.

Trophy	Contest
VHF Manager's Trophy	April 1970 70MHz Open Contest
Mitchell Milling Trophy	March 1970 144MHz Open Contest
The Council Cup	May 1970 432MHz Open Contest

5 **Scoring system**

(a) Contacts made between the distances shown in the table will score as indicated. Contacts on borders between scoring rings score low.

km	Points	km	Points
0–50	1	500–600	22
50–100	3	600–700	26
100–150	5	700–800	30
150–200	7	800–900	34
200–300	10	900–1,000	38
300–400	14	over 1,000	50
400–500	18		

(b) Contacts will be scored at one point per kilometre.

6 **Location**

(a) Entrants may not change the location of their stations during the contest.

b) Entrants may change the location of their stations during the contest on one occasion provided that only the highest scoring contact with a given station is claimed in the event of a repeat contact. Repeat contacts must be clearly marked as such in the contest log.

7 **Crossband contacts**

(a) Cross-band contacts do not count for points.

(b) Cross-band contacts where one station is transmitting on the band named in the title of the contest will count for half points. Only one cross-band contact may be made with a given station. Cross-band contacts must be clearly marked as such in the contest log.

8 **Sections**

(a) There are three sections:
Section A—Single operator, fixed stations.
Section B—Club stations, other multi-operator fixed stations and temporary stations.
Section C—Portable stations.

(b) Single operator fixed stations only.

(c) Portable stations only.

(d) All classes of station with no separate sections.

9 **Modes**

(a) Contacts may be made on all permitted modes.

(b) Entrants may transmit only A1 (cw) or F1 (fsk) and contact only other stations transmitting these modes.

(c) Entrants must make 2-way A3j (ssb) contacts only.

10 Stations using telephony in the recognized cw sub-bands 70·025–70·1MHz, 144·0–144·15MHz, 432·0–432·10MHz and 1,296·0–1,296·15 MHz are liable to disqualification.

11 **Contest exchanges**
The contest exchange shall consist of:
(i) RS or RST report followed by serial number.
(ii) Both QRA Locator and QTH.

12 **Repeat Contacts**

(a) Only one scoring contact may be made with a given station. (ie callsigns that are fixed, /P, /A, or /M all count as one station). If a station that has changed location is contacted for a second time, only the highest scoring contact may be claimed.

(b) One contact may be made with a given station during each activity period. Only three out of the five activity periods will count towards the final score. However, logs for all periods should be sent to the adjudicator for the purpose of checking. To be eligible for an award, an entrant must take part in a minimum of three activity periods.

13 **Entries**
Logs must be made out on RSGB Contest Log Sheets and tabulated as follows:
(i) Date and time (gmt).
(ii) Callsign of station worked.
(iii) My report on his signals and serial number sent.
(iv) His report on my signals and serial number received.
(v) QRA Locator received.
(vi and vii) QTH received.
(viii) Points claimed.

14 **(i)** Entries must be postmarked not later than 15 days following the termination of the contest.
(ii) The RSGB VHF/UHF Contest Cover Sheet (Form 427) enclosed with the log must be correctly made out and the declaration signed.

15 An entrant must operate within the terms of his or her licence.

16 Special event callsigns (eg GB) may not be used.

17 Stations that persistently overmodulate, or radiate key clicks or poor quality signals, render themselves liable to disqualification.

18 Contacts with unlicensed stations will not count for points.

19 All entries become the property of the RSGB and will not be returned. Entrants must keep their own log records in accordance with licence requirements.

20 Contacts made by EME reflection, man-made satellites (active or passive) or any relaying device will not count for points.

21 Proof of contact may be required.

22 Gross errors in claimed score render the entrant liable to disqualification.

23 Failure to comply with any of the rules given for a particular contest will result in disqualification.

24 The ruling of the Council of the RSGB shall be final in all cases of dispute.

Definitions

Portable stations may not be located in a permanent fixed building or use public supply mains. Power for all equipment may only be derived from an on-site portable generator or battery. All equipment, including aerials, must be installed on the "portable site" within the 24 hours preceding the contest or during the contest. This does not apply to the storage of equipment.

A fixed station is any station not using a suffix as /A, /P or /M. Temporary stations are those using the /A suffix.

Club stations may not enter Section A of these contests (see Rule 8(a). When a Club station is operated from a portable site the entry must be in Section C.

Multi-operator stations are those stations where the transmitter and/or receiver are operated by more than one person.

Site (ie "portable site") is defined as a circle drawn with a radius of 1km from the operating position during the contest.

QRA Locator is the standard five symbol location system.

QTH must be given as a point identifiable on the Ordnance Survey ten-mile map or as a bearing and distance in kilometres (not exceeding 25) from such a point, to the nearest kilometre.

Serial numbers start at 001 for each band and advance by one for each contact. In the Cumulative Activity Contests the serial commences at 001 in each activity period.

County Code Letters for RSGB Contests

County Code Letters	County
AD	Alderney
AG	Anglesey
AL	Argyllshire
AM	Antrim
AN	Aberdeen
AR	Armagh
AS	Angus
AY	Ayrshire
BD	Bedfordshire
BE	Berkshire
BF	Banff
BR	Brecknock
BS	Buckingham
BU	Bute
BW	Berwick
CA	Cardigan
CD	Cumberland
CE	Cambridge
CH	Cheshire
CL	Cornwall
CN	Clackmannan
CR	Carmarthen
CT	Caithness
CV	Caernarvon
DB	Denbighshire
DF	Dumfries
DH	Durham
DN	Devon
DT	Dorset
DU	Dunbarton
DW	Down
DY	Derby
EL	East Lothian
EX	Essex
FE	Fife
FH	Fermanagh
FT	Flintshire
GN	Glamorgan
GR	Gloucester
GY	Guernsey
HD	Hereford
HE	Hampshire
HF	Hertford
HN	Huntingdon
IM	Isle of Man
IS	Inverness
JY	Jersey
KB	Kirkcudbright
KE	Kincardine
KS	Kinross
KT	Kent
LD	London (Postal District)
LE	Lancashire
LK	Lanark
LN	Lincoln
LR	Leicester
LY	Londonderry
MG	Montgomery
MH	Monmouth
MN	Midlothian
MR	Merioneth
MX	Middlesex
MY	Moray
ND	Northumberland
NK	Norfolk
NM	Nottingham
NN	Nairn
NR	Northants
OX	Oxford
OY	Orkney
PB	Peebles
PH	Perth
PK	Pembroke
RD	Rutland
RH	Roxburgh
RN	Radnor
RW	Renfrew
RY	Ross & Cromarty
SD	Stafford
SE	Shropshire
SF	Suffolk
SG	Stirling
SK	Selkirk
SL	Shetland
SR	Sark
ST	Somerset
SU	Sutherland
SX	Sussex
SY	Surrey
TE	Tyrone
WD	Westmorland
WE	Wiltshire
WG	Wigtown
WK	Warwick
WN	West Lothian
WR	Worcester
YS	Yorkshire

Rules for VHF/UHF Listeners' Championship, 1970

The rules for the championship are virtually identical with those for the 1969 event. It is hoped that support for this championship will improve, and all listeners are urged to submit their logs.

1 Eligible entrants. The championship is open to all non-licensed fully paid-up members of the RSGB. Only the entrant may operate his receiving station. Entries will be accepted from newly licensed members provided that the entrant was unlicensed at the time of his first entry in 1970 and that no transmitter is used during any period for which he submits a listener log.

2 Location of stations. The same site need not be used for each contest in the championship but the station may not be moved during a contest, with the exception that in events on 1,296MHz or higher frequencies the station may be moved within a 10km radius. Portable operation is permitted.

3 Duration. The championship will run throughout 1970 on those dates and times when RSGB vhf and uhf contests occur. Cumulative activity contests will not count towards the championship.

4 Entries. Entrants may submit logs for any or all of the RSGB vhf and uhf contests with the exception noted above. The scores of the best six logs from each entrant will be totalled at the end of the year. Not more than four of these logs will be for vhf (70 and 144MHz) For this purpose, VHF NFD will be treated as two separate contests, one vhf and one uhf. Entries must be set out on one side only of foolscap paper or RSGB Contest Log Sheets (available from HQ or adjudicators on receipt of an sae). Entries must be sent to the adjudicator for the appropriate transmitting contest at the address given in the rules for that contest, and must be postmarked not later than 15 days after the date of the contest. Entries for the 70MHz and 144MHz Listeners' Contests will be automatically credited to the championship.

5 Logs. Logs must show in columns: (*a*) Date/time (gmt). (*b*) Callsign of station heard. (*c*) My report on his signals (including any defects such as overmodulation etc). (*d*) Report and serial number sent by station heard. (*e*) Callsign of station being worked. (*f*) Location given by station heard. (*g*) Points claimed. A given callsign may only be logged in column (*b*) on one occasion during each contest. In the case of multi-band events such as VHF NFD, separate logs are required for each band and stations may be logged once on each band. CQ or test calls will not count for points and should not be logged.

6 Scoring. Points are to be scored as shown in Rule 5a of General Rules for VHF/UHF Contests 1970, published in this issue. Scoring on 1,296MHz and higher frequencies will be at the rate of 1 point per kilometre. The score on 432MHz will be multiplied by 3 and that on 1296 MHz by 8. The score on any higher frequency bands will be multiplied by 25.

7 Awards. At the discretion of the Council the Hanson Trophy will be awarded to the leader of the championship and Certificates of Merit will be awarded to the runner-up and for particular meritorious logs for individual events. These awards are in addition to the awards for the Listener Contests.

CLUB NEWS

Region 1 RR B. O'Brien, G2AMV

Merseyside Luncheon Club—Good attendances continue. First Monday in each month on HMS *Landfall*, 12.30 for 12.45 meal. If you wish to attend, please advise *G3VQT* or *G2AMV* beforehand.
Ainsdale (ARC)—7 and 21 January, 4 February, 8pm, "Morris Dancers", Scarisbrick.
Allerton (Liverpool)—Scout Amateur Radio Society, North West Region—First and third Thursdays each month, 8 pm, Liverpool County Scout Headquarters, Richmond Street, Liverpool.
Blackburn—East Lancashire Amateur Radio Club—8 January ("Certificate hunters club; Flying hams club," talk by Tony and Ruth Unwins G3VNX/G3TNN), 5 February (Surplus equipment and junk sale), 7.30pm, Edinburgh House, Shearbank Road, Blackburn. Further details from *G4JS*.
Blackpool (B & FARS)—Mondays, 8pm, Pontins Holiday Camp, Squires Gate. Morse tuition from 7.30pm.
Bury (B & RRS)—13 January. Additionally an informal meeting is held each month two weeks after the main meeting. All at 8pm, at The George Hotel, Market Street, Bury. Club secretary: *G3VVQ*, 411 Holcombe Road, Greenmount, Bury.
Cheshire (Mid Cheshire ARC)—Club nights every Wednesday, 7pm, to 9.30pm. Club headquarters—Technical Activities Centre, Winsford Verdin Grammar School, Grange Lane, Winsford. Beginners and rae instruction Wednesdays 7pm to 8pm. Send sae for club programme to *G3JWK* or *G3SIQ*, QTHR.
Chester (C & DARS)—Tuesdays, 8 pm, YMCA.
Crewe and District—Local interest is being kept alive by R. Owen, BRS 26847, the local representative. He welcomes calls at his home from local enthusiasts and is searching diligently for a new meeting place. His address is 10 Circle Avenue, Willaston, Nantwich, Cheshire.
Douglas (D & DARS)—2nd and 4th Wednesday each month, 7pm, 19 Rosemount, Douglas. Further information from W. T. McEvoy at same address. Telephone, Douglas 6146.
Eccles (E & DRC)—Tuesdays, 8pm, Bridgewater School, Worsley, Lancs. Every Thursday club top band net 2030 hours.
Leyland Hundred Amateur Radio Group—Thursday night net at 2000 gmt on 1·915MHz.
Liverpool (L & DARS)—Tuesdays, 8pm. Conservative Association Rooms, Church Road, Wavertree. Secretary: H. James, G3MCN, 448 East Prescot Road, Knotty Ash, Liverpool 14.
Liverpool (NLRC)—2, 16 and 30 January, 8pm, Labour Party Headquarters, 13 Crosby Road South, Liverpool 22. Secretary: Peter Jeffs, 38 College Road North, Liverpool 23. Telephone 051 924-3020.
Macclesfield (M & DRS)—13 and 27 January, 10 February, 8 pm, The George Hotel, Jordangate.
Manchester (M & DARS)—Wednesdays, 7.30pm, 203 Droylesden Road, Newton Heath, Manchester 10. Hon secretary, G. Tillson *G3TJK*, 95 Kelverlow Street, Oldham, Lancs.
Manchester (SMRC)—Fridays, 8pm. Conservative Association Divisional Office, 449 Palatine Road, Northenden, Manchester 22.
North West VHF Group—Meetings take place every Monday at 8pm, in the Club Caravan, Greeba, Shady Lane, Manchester 23.
Preston (PARS)—8 and 22 January, 5 February, 8.30pm, (Private Room) "Windsor Castle", St Paul's Square. Hon secretary George Windsor, 26 St Gregory's Road, Preston.
Salford (Dial House Radio Society)—This organization, which is confined to GPO engineers, meets every Wednesday at 6pm on the 8th floor, river end, of Dial House. Anybody interested, who is a GPO engineer, should write to the secretary at Dial House, Chapel Street, Salford 3.
Southport (SRS)—Wednesdays, 8pm, and Sundays 2.30pm, The Esplanade. Secretary: S. Miller, 72 Station Road, Banks, Southport.
Southport (73 SSB Society)—Thursdays, 8pm (All commencing with a talk on part of the rae syllabus), 73 Avondale Road North, Southport. On 20 November, by arrangement with the GPO Preston, Mr J. Hallatt (G3DBY) and a representative (or official) of the radio dept. kindly gave us a most instructive and interesting lecture on radio interference suppression, including aerial filters. We were particularly grateful for the comprehensive explanations he gave to our many questions. The co-operation of the Post Office area engineer is very much appreciated by our Society.
Stockport (SRS)—7 and 21 January, 4 February, 8pm, The Brookfield Hotel, Wellington Road South, Stockport. New members are always welcome. Further details from the secretary, D. I. Lunn, *G3LSL*, 4 Farnham Avenue, Macclesfield (Tel 7903).
Warrington, Culcheth (CARC)—Fridays, 7.30pm, Chat Moss Hotel, Glazenbury. All visitors will be welcome. Secretary: K. Bulgess, 32 Hendon Street, Leigh.
Westmorland—Fridays, 7.30pm. All meetings include a Morse practice conducted by Brian Shaw, G3CRJ. Readers will be interested to know that the club has now obtained its own licence—G3YWR Please note, the new secretary is Jim Forrester, 44 New Street, Carnforth, Lancs.
Wirral (WARS)—First and third Wednesdays each month, 7.30pm, at former Civil Defence HQ, Upton Road, Bidston, Birkenhead. The new antenna erected at the club's HQ is proving most satisfactory and good progress is being made with the 70cm gear which the club is now working on for use in 1970. Likewise the club's working party dealing with field power supplies is achieving much success in rehabilitating the equipment for the outdoor season. Secretary: Alf Fisher, *G3WSD*, 34 Glenmore Road, Oxton, Birkenhead.
Wirral (Wirral Dx Association)—Meets on the last Wednesday in each month at members' houses. In January, the annual general meeting will take place at G3OKA. In February we will be at G3VUY, where Dave will describe and demonstrate his transistor 160 and 20 mtr ssb transceiver; and at the March meeting, G3VVA, is to give a talk with slides on his visit to British Columbia (VE7). On 4 January we will have a top band phone contest between 2 and 5pm; all local secretaries have been advised of rules etc, and we hope to have a good turn out. Secretary: G3OKA, QTHR.

Region 2 RR K. Skethaway, BRS 20185

Barnsley (B & DARC) — 9 January ("Power supplies," by D. McCrum, G8BLF), 23 January ("The RSGB and you," by Jack Petty, G4JW), 7.30 pm, King George Hotel Peel Street, Barnsley. *G3LRP*.
Bradford (BRS) — 20 January ("HF band technique," by M. S. Gaunt, G3WGW) 3 February ("The blacksmith and his art", by H. Moore, G3WVD), 7.30pm, 10 Southbrook Terrace, Great Horton Road, Bradford.
Durham (DCARS)—15 January ("The oscilloscope", by G3PDM), 7pm, Durham University's Elvet Riverside Arts Block, New Elvet, Durham.
Halifax (NHARS)—7 January (A musical evening; hi fi by Paul Allen, G3USH), 14 January (Film show, veteran car club rally, home made car, gemini, advance into the unknown), 28 January (VHF", by A. D. Benn, G8AFV, and L. L. Cobb, G3UI), 11 February ("CW procedure on the amateur bands", by J. S. Denby, G3TSA), 7.45pm, Peat Pitts Inn, Ogden, Nr Halifax.
The new QTH is a result of alterations to the premises where the club meets, and alternative arrangements have had to be made for the meetings. When the alterations are finished we should be back at the old QTH of the Sportsman Inn, Ogden. *G3MDW*.
Scarborough (SARS)—Thursdays, 7.30pm, c/o RAF Association, Fulbeck House, 3 Westover Road, Scarborough.
South Shields (SS & DARC)—9 January ("Transistorised receiver", by G3LWW), 8pm. Trinity House, Social Centre, Laygate, South Shields. *G3KZZ*.
Sheffield (SARC)—27 January (Second W1BB recorded lecture), 24 February (Junk sale and display of ham gear), 7.30pm, Cross Scythes Hotel, Totley, The first of the W1BB recorded lectures was enjoyed by 18 members in November. The SARC top band contest will be held on 28 February. *G8NN*.
Spen Valley (SVARS)—8 January ("Light beam modulation", by Mrs M. I. Shaw, G3OMM), 22 January ("Receiver alignment",

by W. Ripley, G4AD), 29 January ("Transmitter for 420MHz, by P. Billington, G8AAC), 7.30pm, The Grammar School, High Street, Heckmondwike.
Sunderland (SARS)—First and third Tuesdays, 7pm, Sunderland Technical College, *G3XID*.
York Amateur Radio Society—Thursdays, 7.30pm, in the British Legion, 61 Micklegate, York.

Region 3 RR R. W. Fisher, G3PWJ

Birmingham (MARS)—13 January, 7.45pm, Midland Institute, Margaret Street, Birmingham 3.
(South)—First Wednesday in the month, 8pm, The Scout Hut, Pershore Road, Selly Park, Birmingham 29. *G8BHE*.
Bromsgrove (B & DARC)—9 January ("Vhf! Why? How?", by Mr T. P. Douglas. G3BA), The Royal Oak, Barley Mow Lane, Catshill, Bromsgrove, The club's annual dinner held on 28 November was a great success. The club's chairman, G2CLN, announced results of the swl contest; J. Harvey, the club's treasurer, won the trophy. Runner up was J. Whitehouse.
Coventry (CARS)—2 January (Open meeting), 9 January (Night on the air; rae), 16 January ("2 and 4m converters", by G5UM), 23 January (Night on the air; Morse practice), 30 January (16mm film show from BP film library), Scout HQ, 121 St Nicholas Road, Radford, Coventry.
Dudley (DARC)—13, 27 January, 8pm, Central Library, St James', Dudley. The club station, G3RXK, is now operational from an old windmill 680ft asl with antennas 40ft above the ground. The station is equipped for 2m and hf band working and also for reception of amateur tv in the 70cm band. A rae and Morse code course is well under way every Friday evening. Club meetings are still held fortnightly on Tuesday evenings at the Central Library and all are welcome to come. *G3PWJ*.
Hereford (HARS)—First and third Fridays of each month, Civil Defence HQ, Goal St, Hereford. *G3RJB*.
Lichfield (LARS)—First Monday and third Tuesday of each month, The Swan Hotel, Lichfield. *G3NAS*.
N. Staffs (NSARS)—Meeting every Tuesday night, 7.30pm, The Royal Oak Hotel, Fenton, Stoke-on-Trent.
Redditch (EWARG)—8 January (AGM), 8pm, Old People's Centre, Park Rd, Redditch. *G3EVT*.
Solihull (SARS)—20 January (Questions and answers session with short lectures by members on their favourite topics), 8pm, The Manor House, 126 High Street, Solihull. *G3YOY*.
Shrewsbury (SARS)—8 January, 15 January ("Weather satellites", by G. Medlicott), 22 January (Club station), 29 January ("Transformers", by B. Simmonds), 7.30pm, Shrewsbury School Signals Hut. *G3UDA*.
Stourbridge (STARS)—6 January ("Transistor basics", by K. Linney, G3UDA), 20 January (Informal at "Shrubbery Cottage",) 3 February ("Know your band", by T. Cashmore, G3BMY), 7.45pm, Longlands School, Stourbridge. *G3HGI*.
Stratford (SuAARC)—9 January ("Night on the air", by G3RPJ), 23 January ("The manufacture of copper clad laminates", by G3XFV), 7.30pm, Halls Croft, Old Town, Stratford upon Avon. *G3XFV*.
Wolverhampton (WARS)—5 January (New Year's party at the Black Horse Hotel), 12 January (Natternite), 19 January ("Oscilloscopes and test gear", by G3UBX), 8pm, Neachells Cottage, Stockwell Rd, Tettenhall. *G3UBX*.
Worcester (W & DARC)—Every Wednesday and Saturday, 7.30pm Perdiswell Park, Droitwich Rd. Since the club agm the following club officers have been elected: Secretary, Mr A. Ryan, G3VJN; treasurer, Mrs M. W. Ryan. The date of the annual Worcester mobile rally will be Sunday 12 July. *G3VJN*.

Region 4 RR T. Darn, G3FGY

Derby (D & DARS)—7 January (Surplus Sale), 10–11 January (AFS contest), 14 January (General discussion—aerials and aerial tuners), 21 January (Open evening in sub-basement—the short wave listeners), 28 January (Technical film show), 7.30pm, Room 4, 119 Green Lane, Derby. Members are reminded that the AGM will be on Wednesday 4 February and that tickets for the annual dinner and dance to be held at the Derbyshire Yeoman, Kingsway, Derby, on Saturday 14 February are available at 27s 6d each. *G2CVV*.
Lincoln Short Wave Club—6 January ("A conducted tour of ARRL headquarters", a tape and slide lecture), 13 January ("The causes and cure of tvi"), 20 January (Film show), 27 January (Open night). The club meets every Tuesday evening at 7.30pm No 2 Guardroom, Sabraon Barracks Breedon Drive, off Burton Road Lincoln.
Melton Mowbray—16 January (Any questions night). The club meets at 7.30pm, at the St John's Ambulance Hall, Holwell Works, Asfordby Hill, Melton Mowbray.
South East Derbyshire—5 January ("Power packs for transistorized equipment"), 12 January (Sale of members' surplus equipment). All meetings held at 7.30pm, College of Further Education, Ilkeston Rd, Heanor.

Region 5 RR S J. Granfield, G5BQ

Bedford (B & DARC)—Thursdays, 1 January (Informal, but bring your choice QSL cards), 8 January (Quiz), "The Dolphin", Broadway, Bedford. Further particulars from the new hon sec, John Bennett, G3FWA, 47 Ibbett Close, Kempson, Bedford. Tel Kempston 2427.
Bishop's Stortford (BS & DARC)—19 January (AGM with supporting programme, probably film show), 8 pm, at the British Legion Club, Windhill, Bishop's Stortford, Hertfordshire.
Cambridge (C & DARC)—2 January (QSL night—bring along your ten most interesting QSL cards), 9 January (Informal), 16 January ("Portable operating", by G3WUW and G8BXA), 23 January (Informal), 16 January (Grand junk sale—ten per cent for club funds). Fridays, 7.30pm, Club Headquarters, Victoria Road, Cambridge.
Dunstable Downs (DDRC)—Meetings on Fridays, 8pm, at Chew's House, Dunstable, Bedfordshire.
March (M & DARS)—Meetings on Tuesdays at old Police HQ, March, Isle of Ely.
Peterborough (PARS)—First Friday in each month, 7.30 pm, lectures in Peterborough Technical College, Eastfield Road, Peterborough. Hon Sec: D. Byrne, *G3KPO*, Jersey House, Hodney, Eye, Peterborough, Hunts.
Shefford (S & DARS)—1 January ("Operating the HRO" by G2AUA), 8 January (Antennas; club discussion), 15 January (AGM), 22 January (Talk by Neosid), 29 January (NFD planning). Hon sec is C. W. Stedman, G3XWS, 10 Wychwood Avenue, Luton, Bedfordshire.
Shefford may be a little off the beaten track, but when it came to organising their 21st Annual Dinner on 29 November, the club really went to town. Held in the local Church Hall, which was filled to capacity, the guest of honour was John Swinnerton, G2YS, (President of the RSGB), accompanied by Mrs Swinnerton. Also present were Mr Howlett (Club President) and Stan Granfield, G5BQ (Region 5 representative). After an excellent meal and presentation of trophies won by members during the year, there followed a varied entertainment, which included colour films of club activities by G2DPQ and G3XWS, a demonstration of magic and hypnotism by G3RZB, and organ music played by J. Rachley on an organ loaned by Ivan Howard, G2DUS.
The Hon Sec Bill Stedman, G3XWS, and his band of willing helpers were warmly congratulated, and those who had braved the elements to come considerable distances on a very wintry evening agreed that it had been really worthwhile.

Region 6 RR L W. Lewis, G8ML

Cheltenham (RSGB Group)—First Thursday, 8pm, Great Western Hotel, Clarence Street, Cheltenham.
Chiltern (CARC)—Last Thursday in every month, 29 January (Extraordinary general meetings), 8pm. Please note temporary venue: Carrington Arms, Oxford Road, High Wycombe. Attendances are rising so keep it up. Obtain more details from club net: Sundays, 1,945kHz, from 1200bst, and on Wednesdays, 1,920kHz, from 2000bst.
Gloucester (GRS)—Second and fourth Thursdays, 7.30pm, RAFA Club, 6 Spa Road, Gloucester.
North Buckinghamshire ARS—Meetings fortnightly, (9, 23 January), 8pm, "The Crown", Stony Stratford. Slow Morse at 7.30pm. More details from David Coxhill, G8CXT, 2 Blenheim Avenue, Stony Stratford, Bucks.
South Bucks VHF Club—6 January ("Home brew" display), 8pm, Bassetbury Manor, High Wycombe.

Region 7 RR P. A. Thorogood, G4KD

INTO '70—Can you make our hobby better? First we need more money to meet rising costs, particularly of *our* journal—you and your club can see that all non-members of our Society sign membership forms and I will see which club or group should lead this column in future in its reports to me. The form is usually in *Radio Communication* each month. Edgware signed one up today. Sign "*Into 70*" on right hand corner of form.

Acton, Brentford & Chiswick (ABCRC)—20 January (AGM). All are urged to attend for the future of the club will be under discussion. 7.30pm, Chiswick Trades & Social Club, 66 High Rd, Chiswick.

Addiscombe (AARC)—7.30pm, second and fourth Tuesdays, Toc H Hall, 158 Lower Addiscombe Rd.

Ashford, Echelford (ARS)—Last Thursday of month. 12 January (Surplus sale), 29 January, not fixed (DF?), 7.30pm, St Martins Court, Kingston Crescent, Ashford, Middlesex.

Barking (B & DREC)—Tuesdays and Thursdays, 7.30pm, Gascoigne Recreation Centre, Gascoigne School, Morley Rd, Barking.

Bexleyheath (NKRS)—Second and fourth Thursdays, 8 January ("Modern trends in single sideband design," by G3FRB), 22 January ("Modern transistors," by C. A. Jones of Mullard Ltd), 7.30pm, Congregational Church Hall, Chapel Rd, Bexleyheath.

26 RSGB members at last meeting and nine non-members. The uhf group in the club gave a talk on the latest vhf/uhf developments and used the medium of amateur television to present their talk. The studio was provided by G6AEE/T who gave a brief technical rundown on the gear being used. G8AXA gave details of a proposed 23cm beacon station. G8AZM described his latest cavity type pa for 420MHz and G8AYN described the converter trends for 4 and 2 metres.

The picture quality received in the clubroom on a large screen tv was excellent and in spite of sound difficulties, which were later traced to a coax feeder short, the whole effort was a first class job. Our G8s are to be congratulated on their achievements.

Cheshunt (CDRC)—First Friday of month, 7.30pm, Methodist Church Hall, opp Theobalds Station, Cheshunt.

Chingford (RSGB Group)—Fridays, telephone 01-524 0308.

Chingford (SRC)—Fridays, 8pm, Friday Hill House, Simmons Lane, Chingford, E4.

Civil Service (CSRS)—First and third Tuesdays, 6.30pm, Civil Service Recreation Centre, Monck St, Westminster.

Croydon (SRCC)—Third Tuesdays (January meeting will be on "Aerials" by R. L. Glaisher, G6LX). February ("Mobile operation," by N. A. Fitch, G3FPK), 7.30pm, Swan & Sugarloaf, South Croydon.

Crystal Palace (CP & DRC)—17 January (VHF evening by G3OOU/G3FZL, 8pm, Emmanuel Church Hall, Barry Rd, SE22.

Dorking (DR & DRS)—Second and fourth Tuesdays, second Tuesday "Wheatshaft".

Ealing (E & DARS)—Tuesdays, 7.30pm, Northfields Community Centre, Northcroft Rd, W13.

East London—18 January (1970 programme and action), 2.30 for 3pm.

Edgware & Hendon (E & DRS)—12 January (AGM), St George's Hall, 51 Flower Lane, Mill Hill, NW7.

Farnham, Bucks (Burnham Beeches RC)—Fortnightly, Mondays, Farnham Common, Village Hall, Victoria Rd.

Gravesend (GRS)—Wednesdays, 8pm, Community Centre, Cedar Avenue, Kings Farm Estate, Gravesend.

Guildford (G & DRS)—Second and fourth Fridays, Guildford Engineering Society, Stoke Park.

Hampton Court (TVARTS)—First Wednesday, 7.30pm, The Three Pigeons, Portsmouth Rd, Surbiton.

Harlow (DRS)—Tuesdays (General), Thursdays (CW practice), Fridays (Junior), 7.30pm, Mark Hall, Barn, First Avenue.

Harrow (RSH)—Every Friday, 8pm, Roxeth Manor School, Eastcote Lane, Harrow.

Havering (H & DARC)—Fortnightly, 8pm, British Legion House, Western Rd, Romford.

Hemel Hempstead (HH & DARS)—First and third Fridays, 7.30 pm, "Addmult" Sports Club, Hemel Hempstead.

Holloway (GRS)—Mondays (RAE), 7pm, Wednesdays (Morse), 7.30pm. Fridays (Club), 7.30pm, Montem School, Hornsey Rd.

Ilford—Every Thursday, 8pm, 50 Mortlake Rd, (off Ilford Lane), Ilford.

Kingston (K & DARS)—Second Wednesday. 14 January ("Chassis construction and fabrication," by M. Disprose. Receivers discussion), 11 February (Radio building and construction techniques). A 4m net is currently being organized on 70·11MHz. 8pm, Penguin Lounge, 37 Brighton Rd, Surbiton.

Leyton & Walthamstow—Tuesdays, 7.30pm, Leyton Senior Institute, Essex Rd, E10.

London (UHF Group)—First Thursday, 7.30pm, Whitehall Hotel, Bloomsbury Sq, Holborn, WC1.

Loughton—Fortnightly, Fridays, Loughton Hall, Rectory Lane (nr Debden Station).

Maidenhead (N & DARC)—Third Tuesday of month, 7.30pm, Victoria Hall, Cox Green, Maidenhead.

New Cross—Wednesdays and Fridays, 8pm, 225 New Cross Rd, SE14.

Paddington (P & DARS)—Thursdays, 7.30pm, Beauchamp Lodge, 2 Warwick Crescent, W2.

Purley (P & DRS)—First and third Fridays, 8pm, Railwaymen's Hall, side entrance, 58 Whytecliffe Rd, Purley.

Reigate (RATS)—First Wednesday, 7.45pm, George and Dragon, Cromwell Rd, Redhill.

Romford (R & DRS)—Tuesdays, 8.15pm, RAFTA House, 18 Carlton Rd.

Scouts (ARS)—Third Thursday of month, 7.30pm, Baden Powell House, Queensgate, South Kensington, SW7.

Sidcup (CVRS)—First and third Thursdays, 15 January (Surplus sale), All Saints Church Hall, Bercta Rd, New Eltham.

Slough (SDR Group)—First Wednesday, 7.30pm, United Services Club, Wellington St.

Southgate (SRC)—Second Thursday of month, 7.30pm, Civil Defence Hut, Bowes Rd, N11.

St Albans (Verulam ARC)—21 January (special meeting open to members of all neighbouring clubs. Mr B. Priestley, G3JGO, of the RSGB Clinic on "TVI—the complete treatment"). 7.30 for 8pm, Town Hall, St Peters St, St Albans.

Sutton & Cheam (SCRS)—Third Tuesday, 8pm, The Harrow Inn, High Street, Cheam.

Welwyn (Mid-Herts ARS)—Second Thursday of month, 8pm, Welwyn Civic Centre, Welwyn.

Wimbledon (W & DRS)—Second and last Fridays, 8pm, St John Hall, 124 Kingston Rd, South Wimbledon, SW19.

Wembley (GECARS)—Thursdays, 7pm, Sports Club, St Augustin Avenue, North Wembley. (This Club is open to non-GEC employees by invitation. Telephone ARN 1262 for details).

Region 8 RR D.N.T. Williams, G3MDO

Canterbury (EKRS)—Information of future meetings from the hon sec: D. N. T. Williams, *G3MDO*.

Dover (SEK YMCA RC)—Thursdays, 7.30pm, YMCA Leybourne Road, Dover.

Eastbourne (SARS)—Meetings held at 8pm, Victoria Hotel, Latimer Road, Eastbourne.

Maidstone (M YMCA ARS)—Tuesdays and Fridays, 8pm, "Y" Sports Centre, Melrose Close, Loose, Maidstone.

Mid-Sussex (MSARS)—All meetings and club station at Marle Place, Leylands Road, Burgess Hill.

Thanet (TRS)—Fridays, 8pm, Hilderstone House, St Peters, Broadstairs.

Worthing (W & DARC)—Meetings held every Tuesday, 6, 13 January (Two lectures on first aid), 20 January (Ragchew evening), 27 January (Mullard film), 8pm, the clubroom, "Rose Wilmot Youth Centre", Littlehampton Road, Worthing.

Region 9 RR J. Thorn, G3PQE

A happy New Year to all. It is hoped to hold a regional meeting in the South West either early May, or end September. Views of clubs and members would be appreciated on what programme they would enjoy.

Barnstable, Bideford, North Devon area. Another meeting will be held to further the formation of a club in Barnstaple on Tuesday, 13 January, 7.30pm, "Grinnis", High Wall, Old Sticklepath Hill, Barnstaple. *G4CG*.

Bristol (BARC)—Every Monday and Thursday, 7.30pm, Club HQ (G3TAD), University Settlement, 41 Ducie Road, Barton Hill, Bristol 5. *G3SXY*.

(City & County of Bristol RSGB Group)—26 January ("The radio amateur and the public", by Sylvia Margolis, public relations officer, RSGB), 7.30pm, Becket Hall, St Thomas Street, off Victoria Street, Bristol 1. *G3ULJ*.

(Shirehampton Radio Club)—Every Friday, 7.30pm, Twyford House, Shirehampton. Morse and RAE classes in progress. *G3YIQ*.

(University of Bristol ARC)—Meetings Saturdays, 2.30pm, Dept of Physics, Royal Fort, Woodland Road. Club stations G3KAC and G8CXH.

Burnham on Sea (BOSARS)—Contact *G3GIW*.
Cornish (CRAC)—1 January (A demonstration of a station inspection, and films), 7.30pm, SWEB Clubroom, Pool, Camborne. *G3UCQ*.
(VHF Group)—Third Thursday in each month, 7.30pm, The Peoples Palace, Pydor Street, Truro. *G3XC*.
(Falmouth Group)—6 and 20 January, Laburnham Drive Mission Hall, *G3OJN*.
(Newquay Group)—7 and 21 January, Treviglas School. *G3THT*.
Exeter (EARS)—6 January, YMCA, St Davids Hill, Exeter. *G3HMY*.
Plymouth (PRC)—6 January ("Holiday among the Continental amateurs", by G3SCW), Club HQ (G3PRC), Virginia House, Bretonside, Plymouth. *G3YDU*.
Saltash (S & DARC)—2 January (Talk on semiconductors by G3VVP) 16 January ("Radioactivity", by F. Hurley), Burraton Toc H Hall, Warraton Road, Future meetings will be fixed on the first and third Fridays in each month, not fortnightly. Slight changes at the recent agm: Ken Price, G3WJ, now chairman; secretary and Treasurer as before. *G3XWA*.
South Dorset (SDARS)—2 January, Labour Rooms, West Walk, Dorchester. *G3RZG*.
Taunton (T & DARC)—Every Friday, 7.30pm, SEVO HQ, Taunton Barracks, The Mount. RAE and Morse classes commence again. Warm welcome to visitors. *G3WPJ*.
Torbay (TARS)—Every Tuesday and Friday, Club HQ (G3NJA), Bath Lane, rear of 94 Belgrave Road, Torquay. *G3NQD*.
Wells (WARS)— Contact *G3MQQ*.
Weston Super-Mare-(WSMRS)—2 January ("Digital read out frequency meter for the amateur", by John Crowther, G3KMM), 7.30pm, Westhaven School, Ellesmere Road, Uphill, WSM. Vic Newport, G3CHW, visited the club last month and gave a bright and breezy talk in his usual manner on the hazards of ssb. New faces are flocking to the meetings, so why not join them at this month's. *G3GNS*.
Yeovil (YARS)—Wednesdays, 7.30pm, Park Lodge, The Park, Yeovil. *G3NOF*.

Region 10 RR C. H. Parsons, GW8NP

Blackwood (ARC)—Fridays, 7pm, Blanche Cottage, off High Street, Blackwood, Mon. *G6BK*.
Barry College of Further Education (ARS)—Meets during term on Thursdays, 7pm, College of Further Education, Calcot Road, Barry, Glam.
Cardiff (RSGB) Group—Monday 12 January ("Home-made transistor transmitter", by M. Williams, GW3VXC), 7.30pm, T A Centre, Park Street, Cardiff.
East Glamorgan Raynet Group—Tuesday 6 January (AGM), 7.30pm, Cardiff Emergency Services HQ, Womanby Street, Cardiff.
Hoover (ARC)—Mondays, 7.30pm, Hoover Social Club, Hoover Factory, nr Merthyr, Glam.
Port Talbot (ARC)—Second Tuesday of each month. Morse classes are being held and it is hoped to start rae classes in the near future. 7.15pm, Trefelin Club and Institute, Port Talbot. *GW5VX*.
Pontypool (ARC)—Tuesdays, 7pm, Educational Settlement, Rockhill Road, Pontypool, Glam. *GW3JBH*.
Pembroke (ARC)—Last Friday of each month, Defensible Barracks, Pembroke Dock. *GW3LXI*.
Rhondda (ARS)—Meets at the Rhondda Transport Employees Club & Institute. Porth, Rhondda, Glam. Full details are available from the secretary, *GW3PHH*.
Sully & District Short-wave Club—Tuesdays, 7pm, Annexe, Sully Bowls & Social Club, 59 South Road, Sully, Glam. *GW3SLA*.
Swansea Telephone Area (ARS)—Fridays. Regular activities include Morse practice, preparation for the rae, and construction. 7.30pm, Telephone Engineering Centre, Gors Road, Townhill, Swansea. Secretary, M. D. E. Connor, 54 Talley Road, Penlan, Swansea, Glam.
University College, Cardiff (ARS)—Tuesdays, 8pm, Geology Dept, New College. Shack located behind computer centre. Further details from the secretary, c/o Students Union, Dumfries Place, Cardiff.
University College, Swansea (ARS)—Monday 19 January ("Pilot tone, stereo multiplex fm radio transmission", by John Howells), 7.30pm, Applied Science Building, Swansea University, Singleton Park. *GW3TSH*.

Region 11 RR M. Williams, GW3LCQ

Members interested in forming a radio club in the county of Meirioneth please contact GW3GKZ at "Ty Gwyn," Abergwynant, Dolgellan, N. Wales.
Bangor (UCNWARS)—Meetings on alternate Thursdays. 15 January ("VHF/UHF techniques", by J. Lawrence, GW3JGA), 29 January (to be arranged), club active on all bands "top to two". Electronics Dept, Dean St, Bangor.
Conway Valley Amateur Radio Club—Next meeting 15 January at the Parade Hotel, Church Walk, Llandudno. Frank Wiseman, GW3GRY, has organized a radio quiz to help the unlicensed amateur. Frank Burke, GW3YLZ, will also give a talk and demonstrate the KW2000A. On 20 November G. Barnes, G3AOS, gave such an interesting talk and demonstration on vhf/uhf equipment that it was midnight before he got away from the members of the club. The junk sale and raffle held on 4 December last was a great success and generously augmented the clubs funds. And on 12 December our annual dinner was once again a success, over 40 members and their wives attended and partook of a first-class meal, which was followed by "Moods and moments", a travelogue given by the Rev Francis Dorken, GW3GCZ.
Rhyl and District Amateur Radio Club—The next meeting will be on 13 January at the usual QTH, Mona Hotel, Market St, Rhyl. The lecturer will be that well-known figure, John E. T. Lawrence, who will discuss and demonstrate a transistorized receiver. The meeting held on 9 December covered constructional hints and was well received by the members. There are quite a few new events in the pipeline and these will be announced as and when confirmed. The present secretary is Alan Cobb, *GW3YIH*, "Mon Reve", Towyn.

Region 12 RR A. W. Smith, GM3AEL

Aberdeen (AARS)—Fridays, 7.45pm. 6 Blenheim Lane, Aberdeen. *GM3HGA*. Aberdeen 33838.
Lhanbryde (MFARS)—Mondays, 7.30pm, St Andrews School, Lhanbryde by Elgin, Morayshire, *GM3UKG*, Tel Clochan 225.
Dundee (RSGB Group)—Thursdays, 8pm, 3 Magdalen Place (off Roseangle), Dundee, *GM3KYI*.
Lerwick Radio Club (Shetland)—Tuesdays and Thursdays, Annsbrae House, Lerwick, *GM3XPQ*. Tel Bixter 249.

Region 13 RR V. W. Stewart, GM3OWU

Lothians Radio Society—8 January ("23cms", by Brian Flynn, GM8BJF), 22 January ("West side story", a tale from our Glasgow friends), 7.30 pm, in the clubroom, YMCA, St Andrew St, Edinburgh.

Region 14 RR N. G. Cox, GM3MUY

Ayrshire (Ardeer Recreation Club ARC)—6, 8, 13, 15, 20, 22, 27, 29 January, 7.30pm, Ardeer Recreation Club, Amateur Radio Section, Stevenston, Ayrshire. Details from J. F. McCreight, GM3DJS, 10 Auchenharvie Road, Saltcoats, Ayrshire.
Ayrshire (AARG)—11, 25 January, 7.30pm, ATC HQ, Kilmarnock.
Glasgow University (GURC)—9 January ("Contest working," by GM3WOJ), 23 January (RAEN Glasgow Group), 7.30pm, George Service House, 11 University Gardens, Glasgow W2.
Greenock (G & DARC)—9, 16, 23, 30 January, 7.30pm, Watt Library, Union Street, Greenock.
Mid-Lanark (RSGB Group)—16 January, 7.30pm, YMCA, Brandon Street, Motherwell.

Region 16 RR W. J. Green, G3FBA

Basildon (VARS)—Every Thursday. 7 January (Demonstration to Billericay Scouts), 7.30pm, Scouts Hall, Fairview Road, Vange, Basildon. Slow Morse net on Mondays commencing at 8pm 1,910kHz, G3XOI G3XQA etc. The top band/2m tx-rx project is progressing and a number of the rx sections are working. *G3VOP*.
Chelmsford (CARS)—First Tuesday in every month, 7.30pm, Marconi College, Arbour Lane, Chelmsford. *G3OZF*.
Colchester (CARS)—Every Wednesday, 7pm, Room 41, NE Essex Technical College, Colchester. R. C. Greenleaf, 27 Ernest Road, Wivenhoe, Essex.

Gt Yarmouth (GYR & ES)—Fortnightly, 7.30pm, 98 South Market Road, Gt Yarmouth. G3HPR.

Ipswich (IRC)—28 January (Radio miscellany) 7.30pm, Red Cross HQ, Gippeswyk Hall, Gippeswyk Avenue, Ipswich. *G3UJR*.

Maldon, Essex (MYCRG)—Meetings every Thursday, 7.30pm, The Friary, Chequers Lane, Maldon, Essex. *G3VOJ*.

Norwich (NARC)—5 January ("Printed circuits", G8AWS), 12 January (Informal meeting), 19 January (AGM), 26 January (Chassis bashing), 7.30pm, The Brickmakers Arms, Sprowston Road, Norwich. *G3PTB*.

Southend (SDRC)—Meetings on 2 and 16 January, 8pm, in the canteen of EKCO Electronics. Details from *G8BSB*.

Region 17 RR C. Sharpe, G2HIF

Basingstoke (BARC)—3 January (Club project evening), 17 January ("Transistors in receivers", by Colin Desborough, G3NNG), 7 pm, Chineham House, Popley Way, Basingstoke. *G3CBU*.

Chippenham (C & DARC)—27 January (junk sale), 7.30 pm, Boys High School, Hardenhuish Lane, Chippenham. *G3UTO*.

N. Berks (AERE, Harwell, ARC)—Meetings on the third Tuesday in each month, 7.30 pm, Social Club, AERE, Harwell, Berks. All local amateurs welcome. *G2HIF*.

Portsmouth (PDRS)—14 January (AGM), meetings each Wednesday, 7.30 pm, Room 5, Community Centre, Twyford Avenue, Portsmouth. *G3CNO*.

Royal Naval Amateur Radio Society—Commander John Pegler, G3ENI, who is a founder member and who has been on the committee of the RNARS for the last nine years, is standing down as chairman due to his retirement from the Royal Navy next year. The position of chairman will be taken by CRS Mick Puttick, G3LIK. The RNARS now has members in 10 countries in addition to a thriving membership at home. The main event in 1970 will be the tenth anniversary rally in HMS *Mercury* on 14 June. G3ENI would like to thank all those, both inside and outside the Society, who have supported him during his period in office.

Southampton (So'ton Gp)—10 January (Rtty demonstration by G3HKT) 7 pm, Lanchester Buildings, Southampton University. The Southampton Radio Club also meets every Wednesday and Friday at the clubroom, 14 Nightingale Grove, Southampton. *G3GOY*.

Channel Islands Postage

Following the changeover of the British GPO from a Government department to a public corporation, the Channel Islands now have their own Post Office departments.

As a result UK stamps are no longer valid on correspondence from the Channel Islands, which now issue their own stamps. Consequently, stamped addressed envelopes, carrying UK stamps should no longer be sent for posting in the Channel Islands. (Any which are will be surcharged at double the rate and this will have to be paid by the recipient.) Such envelopes should be accompanied by a Commonwealth or International Reply Coupon to the value of 4d in the Channel Islands.

MEMBERS' ADS

These advertisements are free to members. The number of words is limited to 32, not including your name (or call-sign) and address. All ads must be clearly written or typed on the Order Form or on a postcard. Each ad must be accompanied by a recent *Radio Communication* wrapper, the address of which must agree with the address on the ad. No trade or business ads can be accepted. The RSGB cannot accept responsibility for errors, for the quality of equipment offered, or guarantee inclusion. Ads must reach RSGB HQ during the first seven days of each month for the next month's issue. Ads which are not printed will *not* be held over, they must be resubmitted. We advise members to enclose a stamped addressed envelope when replying to ads. For further details of these ads see the current Order Form. No correspondence concerning non-appearance, etc, can be entered into.

Comps by weight. Most used, all tested, no valves. 1lb 6s, 3lb 10s, 10lb £1. All post free. M. Mann, G8ABR, 45 School Lane, Milton, Cambs.

SX117, HT44, PS150-120, HA1, HA10, HA 14, HP24, HO13E, HO1OE, HN31, HAM-M, 10/15/20 fibreglass quad. All vgc, orig boxes, mans, spares. Vibroplex DM51, ant tuner, operating consol, 30ft tower, £450 lot. Buyer coll. G3FPD, QTHR.

Gen bargains, computer pcbs packed with comps, var types avail from 5s 6d ea, sae for full detls. G. Baraclough, 2 High View, Higham, Rochester, Kent. Tel Shorne 2297.

Trio 9R59DE, Aug '68 immac, £28. F. Munslow, 1 Lonsdale Place, Derby. Tel Derby 43056.

Vanguard Mk 1, vgc, 5 bands, £30, ono. Also Cornishman, 90% finished comp valves, filt, six xtals, solid state psu, two transfmrs 300V exciter 800V pa, offers. GM3BRF, QTHR.

Beam—Mosley A203C optimum spaced monobdr for 20m, varnished, absol as new, half price. Also Selsyn indicators master and slave, £4. G3SEL, Wits End, Lower Odcome, Yeovil, Somerset. Tel W. Coker 712.

SWM binders vols 17, 18, 19, 20. 6ft gpo rack, black crackle cases 19×10×10, hinged lids. R208 psu, 6V dc and 100V 250V ac. 1950 ARRL hdbk. Offers with sae, why. G3REP, 94 Canterbury Walk, Cheltenham, GL51 5HF.

KW Viceroy Mk 3A, extra filt, 6146Bs, no mods, vg cond, £90. G3RWQ, QTHR.

Practical Electronics from first to May 1969, offers. C. Railton, 4 Northease Drive, Hove, Sussex. Tel Brighton 735694.

Electronic flash, Braun 100J, extra head, £5. Furzehill xtal calib 10kHz, 100kHz, 1MHz, batt valved, £3. D. Wilson, G8APS, 177 Dower Rd, Four Oaks, Sutton Coldfield. Tel 021 308 3044.

11 transistor vhf/mw car radio and spkr, 5 pushbutton rf stage, 5W output, 7/12V pos/neg chassis, unused, cost £37, acc £26 ono. BRS28484, 7 Harrow Drive, Brooklands Sale, Cheshire. Tel 061 962 6634.

Clean AR88D with hdbk, case, illumin tuning meter, £35 ono. Rejector unit 1·2-10MHz, £1. 250V 60mA 6·3V 2A psu in case, £11 10s. Joystick +3A tuner, £6. A. Haines, 2 Hampton Dene Road, Tupsley, Hereford. Tel Hereford 3964.

AR88D + Panda PR120V with relay unit for single knob "turnto-talk" operation. Mic, leads and mans, all exc appearance and perform, buyer coll, £75 comp. G3UQP, QTHR. Tel St Neots 2236.

SB101 + psu HP23E, KW E-zee match, and swr KW match, loudspkr and multiband ant, Shure mic etc, £200. G3DWI, The Martins, Chipping Campden, Glos. Tel Campden 439.

Codar CR-70A gc rx, as new, £12. Want 1MHz xtal, B7G pref. A. Thorburn, 27 Banklands, Workington.

Advance 1kW constant voltage trans 190V-260V input 240V 500W and 70V 7A output, £10 ono. G3TCG, QTHR.

Advance E2 sig gen 100kHz to 300MHz vgc, accurate, £5. C/R bridge, 10pf-10mf, 10 Ω-10M Ω, 50s. Audio beat freq no. 8 oscill, 0 to 200kHz, as new, metered, all 250ac. G3PDT, QTHR. Tel 021 454 1825.

Avo valve tester, rec valve data. £4. RSGB mon osc, £3. TU5B, £1. SCR522 tx less 832s, £1. AR88D, 10s. ¼in elect drill 240V, £1 sae carr pse. G2HCV, QTHR.

HRO 5T, 4 bs 1 gc coil, psu, hdbk, £20. G3HTA rx, £20, both mint AR88LF with spares, vgc, £20. G3WPI, QTHR. Tel 01 303 6681.

Top band stn: 10W tx, matching rx, atu, swr indic, mic, attractive appearance, £10. G3TWI, QHTR. Tel 01-542 0609.

HRO, psu and bs coils, £20. RCA xtal calib wavemeter TE149, £10. Audio power meter, £4. Test set 1-56-D (valve tester multimeter), £3. 2m convtr, £6. 70cm convtr, £10. G8AUZ, 47 Cottenham Rd, London, E17.

Trnsfmr 250V ac input, 12V output at 5A. New cond, £1, 5s pp. I. Hazelton, 7 Dorset Rd, Burnham-on-Crouch, Essex.

Low band Pye base stn, tx has seen service but comp and unmod, £8 ono, buyer insp and coll. G8BXI, QTHR.

WS12 tx wkg, £12. WS62 transcvr wkg, £10. Xtals HC6U 34·542, £2 ea. Chiltmead invertor as bought, £1. Fm tuner, £4. Fsm, £1. AR88D wkg in case, £25. G8ATK, QTHR. Tel Farnham 5765.

Heathkit 14 MHz transcvr, neat mains psu, spkr unit, Shure ceramic mic, lpf, perf cond, £65. M. Batt, G3SJI, QTHR. Tel Bristol 623321.

HA14 Lin, new 572Bs, £50, or swop perf SB610. Silicon metered supply, £25, will demonstrate. G3GYE, QTHR.

2m 5ele beam, £3. 30ft mast, £3. 500mw tx/rx 145·8MHz with mic, meter etc, ideal as transistor scrap use, £15 ono. Detls/offers, sae pse. GW8BXN, QTHR.

Marconi BD627A pic and waveform mon, stabilized psu 250V at 500mA, would suit mon, offers. 200W mod. pair TZ40s, £5. TW 2m convtr with psu, 24-26MHz if. £5. G300 wavemeter 160-220MHz, 30s. G8AYN, QTHR. Tel Lodge Hill 4671.

12S67 (12), 12A6(11). 12SJ7(6), 12C8(2), 12H6(4), 12SR7(2), 12K8(4), 12SH7(4), 12SK7(4), 12SA7(2), 12SF7(1), 12A7(1), 12SO7(1), £4 the lot. Mostly unused, buyer coils. W. Scott, G3IFG, "Dudley", Anstey Lane, Alton, Hants. Tel Alton 3610.

Bliley 1000kHz xtal, octal base for BC221, new cond, 40s. 2pin 1000kHz, 15s. TCC hpf, 12s. 813, 21s. Wanted, Heathkit ref power meter type HM-11U. G2UZ, QTHR.

62 set, little wk needed, £8. One B44 Mk 3, sim, £5 ono. Wanted, vhf and/or uhf convtr. C. Garcia, 68 Grand Ave, Worthing, Sussex. Tel Worthing 45010.

KW2000A dc psu, as new, £25. KW EZ match atu, new, £6. Webster big K whip with bumper mount and coils for 160, 20, 15, cost £30, acc £17. G3TLV, QTHR.

Rxs, Codar T28, £12: R1475 +psu, 2-20MHz highly stable, £10 ono, gd cond, buyer coll or by arrange. G3TXG, QTHR. Tel Exeter 67963.

Stereo/mono headphones, 8-16 Ω, US manufctr, with chamois earmuffs, mint, £1 19s 6d. Small cab spkr, 5 in unit, suit comm rx, 19/6d. Grundig stereo amp, £10 10s 6d. CR300 rx with hdbk and spkr, £5 19s 6d. G3KPO, Jersey Hse, Hodney, Eye, Peterboro, Hunts. Tel Eye 351.

Villiers 2½hp 2-stroke petrol engine, ideal for running alternator for /P or a compressor, offers. 1½hp capacitor start motor, single phase, 1in shaft, 2800rpm £12. Geloso G212 tx, gd cond, £25 ono. G3WFU, QTHR. Tel Chellaston 2265.

HROmx, 7 coils bandspread 10m. psu, spkr, spares. Bfo not wkg, gd cond + atu, £23. C. Lamb, 70 Dudsbury Road, Ferndown, Dorset. BH22 8RG.

KW trap dipole, new, £10. Shibaden vtr and uhf rx mon, £125. 6 months old requ check. Service assis available. Tv cameras and mon also available tel for prices and detls. G3CXI, QTHR. Tel Bishops Cleeve 3834.

YAESU FTDX400 as new, perf, £185. G3CKO, The Forge House, Church Enstone, Oxford, Tel Enstone 357.

Heathkit HW30 2m transcvr, £18. Power pack for HW30, 12v dc, £6. Pye Ranger less psu, £5. G8BDY, QTHR. Tel 0255 82 610.

RAE correspondence course (BNRS), £2. Orig service mans Pye tvs V200, V700D. 368 chassis, 15s ea. Wanted 2m beam. G8CDP, QTHR.

U150/1100(4), DET12s(10), 813(2), TZ40(6). Mostly unused, offers. G3MU, QTHR.

G2DAF rx, new xtals, £25. HRO gc coils, homemade psu, £8. 6LQ6s, 100 of other valves, transfmrs, sae. GW2BFD, The Candle, Ewenny Rd, Wick. Nr Cowbridge, Glam. S Wales. Tel Wick 286.

Solartron 577 scope, £25, pref buyer coll. G3JVJ, QTHR. Tel 021 705 6584.

Unfinished 6JP Lin, no TT21s, £7. Unfinished cw tx 20, 80, 160, £5 BC348, double convsn, £15. Two 4CX250B with bases + chimneys, £10. Furzehill valve voltmtr, £3. Selsyns 30s pr. Bush radio mw sw rf b/s etc in walnut cab, 10w hi fi, gd cond, £15. G3LCS, QTHR. Tel Wolverton 3379.

Woden UM3 mod and DT1 driver transfmrs, £3 10s pr. Cambridge unipivot 100mA meter, £1 10s, pref buyer coll. G3QC, QTHR.

Pvc sleeving, 1mm blue or black, 25 yds 2s pp. Capacitors; 0·012 µF 350V sufflex 9d ea. 0·1µF 500V 9d ea post extra. G8CCE, QTHR. Tel, Iver 1409.

Pair mod steel cases, blue hammer stoved finish 21 × 11.5 × 6.5 in rubber feet, unused, £2 5s ea or £4 pr. Buyer coll or carr extra. G3VSZ, QTHR.

DX100U tx, factory built, exc cond, no mods, £45. KW dc psu, 12V pos earth for 2000A or Atlanta etc, unused. £25. "Hdbk" type Qmult with high Q coils, 465kHz if, £4 10s buyer coll. G3XZB, QTHR. Tel Southampton 74352.

DX100, £40. SB10U, £20. Both, £50, wkg, mans, buyer coll. G2DTO, QTHR. Tel 01 653 7315.

3ft diam met balloons, 10s ea. 275ft reels of aluminium wire 10s ea, ideal for erection of balloon supp aerials. G3XKV, 15 Avenue Rd, Brentford, Middx. Tel 01 560 8671.

SR550 rx, 80-10m, fb cond, buyer coll or will del 30 mile radius, £35. G3UDA, QTHR. Tel Shrewsbury 51733.

CR100, £15. S750 £35. Both exc. 160/80m 10/20W tx. Dual HT, vfo, pp mod + rx control, £12. G3OGR, QTHR. Tel Upton on Severn 2244.

Heathkit RA1 rx gd cond but needs aligning, £30 ono Inc spkr + headphones. 8P6CB, Manor House, Northfield, Birmingham 31.

R107T, fb cond hdbk, all connct, headset etc, pref buyer coll, £12. G3KPP, QTHR. Tel Shrewsbury 3545 (after 6).

Eagle RX-60N rx, gd cond with circ covers 500kHz-30MHz, 240V supply, £15 ono. S. Redfern, 5 Pinfold Rd, Worsley Manchester M28 5DZ. Tel 061 790 2662.

52 set rx/tx comp gd cond in carrier, atu, cables, phones, orig hdbk, vry hvy. £30 ono. R. Bovingdon, 6 Roberts Lane, Chalfont St Peter, Bucks.

B28 (CR100) recent overhaul exc perf, £18. Eddystone bug key, £2. G3GGK, QTHR. Tel Madingley 374.

Collins 30L1 lin amp. Also Gonset communicator Mk 5, 2m tx/rx 115/12V psu rx tuneable. Both in new cond. E19V, QTHR.

Lafayette HE-73 preselec convtr, cost £22, imac cond, £10 ono. G3XZT, QTHR.

Moving up. Sommerkamp FRDX500 and FLDX500, as new, £200 the pair. G3BJQ, 91 Hocombe Rd, Chandlers Ford, Eastleigh, Hants.

Heathkit RA1, gd cond with hdbk and spkr. See Heathkit adv spec, no mods, £28 ono. Murphy WS38 Mk 3, gd cond with batts, £3. Pye vibrator unit, £1 ono. R. Watts, 74 Belevedere Road, Taunton, Somerset.

KW 2000A + ac psu exchanged for Eddystone EC 10 rx and £130 cash adjustment. G3PZF, QTHR.

Avometer 7 Mk2, £10. Heathkit gdo GD1U with man, £8. G8ANU, QTHR. Tel Stafford 62533.

Harrow transistor 4 chan mic mixer. Hardly used—cond as new, £2 + 1/6 pp. D. Shirley, 60 New Century Road, Laindon, Essex.

Mixed new resistors and capacitos, 2/6 per 100. Send strong sae. M. Bucknall, G8CYF, 3 The Avenue, Betchworth, Surrey. Tel Betchworth 2225.

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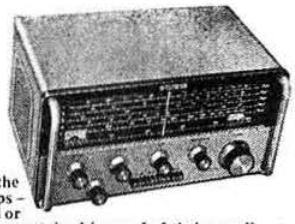

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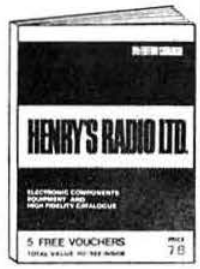

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Please print in block letters

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or Name and Address

Telephone number

(To reach HQ during first seven days of each month)

DATE ..... *SIGNED*.....*CALL-SIGN, BRS or A on.* .....

The number of members ads sent to HQ each month is increasing at such a rate that some form of limiting on an individual ad would be most desirable. Four pages are at present allocated to Members ads each month. We hardly like to cut down the number of words allowed per ad. Thus we ask all **licensed amateurs** to simply give their **call-sign** and state **QTHR**, instead of giving their address in full. (**QTHR** *means—my address is correct in the current call-book*) In this way we should be able to meet the increasing demand for space. By giving QTHR you will be helping other members to have their ads published. Please also make sure that you print your ad clearly, we just cannot read some ads! Also *clearly* describe the equipment that you have for sale or require without using abbreviations (we put in the abbreviations to our own set style). Of course use abbreviations like W for Watts, V for Volts and so on. Please make your ad as brief as possible, in this way you will be helping us and other members. *Thank you.*

POST TO MEMBERS' ADS, RADIO COMMUNICATION, 35 DOUGHTY STREET, LONDON, WC1

INDEX TO ADVERTISERS

Radio Society of Great Britain

FOUNDED 1913
INCORPORATED 1926

PATRON H.R.H. THE PRINCE PHILIP,
DUKE OF EDINBURGH, KG

APPLICATION FOR CORPORATE* OR ASSOCIATE* MEMBERSHIP

RADIO SOCIETY OF GREAT BRITAIN,
35 DOUGHTY STREET,
LONDON, WC1.
01-837 8688

* I hereby apply for election as a Corporate Member of the Society and enclose a remittance for £2/10/- being the amount of my first annual subscription.

* Being under 21 years of age and not holding a current Amateur Radio Transmitting Licence I hereby apply for election as a Non-Corporate (Associate) Member of the Society and enclose herewith a remittance of £1/5/- 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 to 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.

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The first subscription of 50/- or 25/- should be enclosed with this application to avoid delay.

FOR OFFICE USE ONLY

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RADIO COMMUNICATION

Index to Volume 45

January to December 1969

Journal of the
Radio Society of
Great Britain

Abbreviations

MOTA—Month on the Air
FMD—Four Metres and Down
TT—Technical Topics

Current comment (editorials)

DF events and equipment

DX

HF receiving

HF transmitting

Lectures and exhibitions

Licences

Miscellany (general)

Miscellany (technical)

Propagation

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73

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