RSGB BULLETIN

MARCH 1966
VOL. 42, No. 3

G3RKK RECEIVER Mk. 2

(see page 148)

G3SBA TRANSISTOR TOPBAND TRANSMITTER

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JOURNAL OF THE RADIO SOCIETY OF GREAT BRITAIN

Volume 42 No. 3

March 1966

4/- Monthly

R S G B BULLETIN

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The RSGB Bulletin is published on the first Wednesday in each month by the Radio Society of Great Britain as its official journal and sent to all members.

The closing date for copy for the April issue is 7 March.

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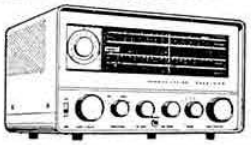

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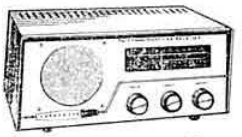

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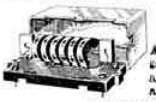

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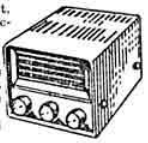
DE-LUXE V.F.O.



5 bands covering 80-10 metres. Employs high 'Q' series tuned Clapp Osc. High output 10-20 volts to drive any TX. Large slide rule dial. Dual impedance O/P. 230V. A.C. operation. Size 6¼" × 5¼" × 7¼". Supplied complete with all instructions. **16 GNS.** Carr. 7/6.

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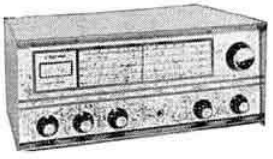

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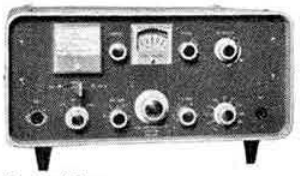

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20mA	22/6	50V. DC	22/6
50mA	22/6	100V. DC ..	22/6
100mA	22/6	150V. DC ..	22/6
150mA	22/6	300V. DC ..	22/6
200mA	22/6	500V. DC ..	22/6
300mA	22/6		
500mA	22/6	15V. AC	22/6
750mA	22/6	50V. AC	22/6
1-0-1mA ..	22/6	150V. AC ..	22/6
1A.DC	22/6	300V. AC ..	22/6
2A.DC	22/6	500V. AC ..	22/6
5A.DC	22/6	"S" Meter 1mA ..	29/6
"S" Meter ..	29/6		
50μA	32/6		
100μA	29/6		
200μA	27/6		
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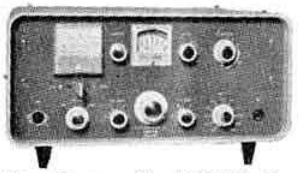

10 to 160 metres. 90w. P.E.P. SSB, 75w. CW, 65w. AM. Transmitter **£110** P.S.U. **£25.**

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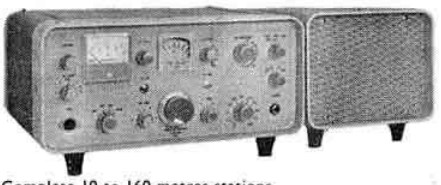

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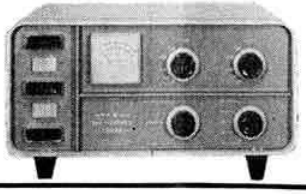

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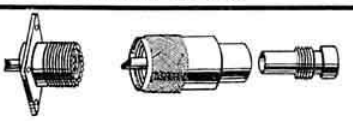

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1926

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

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Region 9.—South Western.	R. E. Griffin, G5UH, 13 Alexandra Road, Uplands, Bristol 3.
Region 10.—South Wales.	C. H. Parsons, GW8NP, 90 Maesycoed Road, Heath, Cardiff, Glam.
Region 11.—North Wales.	Office vacant.
Region 12.—North-East Scotland.	J. MacIntosh, GM3IAA, Broom Park, Cradlehall, Inverness.
Region 13.—South-East Scotland.	G. P. Millar, GM3UM, 8 Plewlands Gardens, Edinburgh 10.
Region 14.—West Scotland.	Office vacant.
Region 15.—Northern Ireland.	L. M. Lyske, GI3CDF, 63 Church Street, Portadown, Co Armagh.
Region 16.—East Anglia.	P. J. Naish, G3EIX, 6 Mildmays, Danbury, Chelmsford, Essex.
Region 17.—Southern.	L. Southwell, G3JLS, 15 Hollybank Road, Hythe, Southampton, Hants.

QSL BUREAU MANAGER

A. O. Milne, G2MI, 29 Kechill Gardens, Bromley, Kent

News from Headquarters

Second 70 Mc/s Contest 1965

It is very much regretted that, owing to a clerical error at Headquarters, the entries from Mr G. N. Roberts, G3ENY/P, and the Ariel Radio Group (Evesham), G3PPG, were not put forward for consideration by the V.H.F. Contests Committee when the Second 70 Mc/s Contest 1965 was being adjudicated.

Mr Roberts' score of 9828 points would have given him second place in the contest.

RSGB Amateur Radio Call Book

The following are corrections to the 1966 Edition of the RSGB Amateur Radio Call Book.

G3REA, C. F. Peers, 21 Abbotsbury Gardens, Eastcote, Pinner, Middlesex.

G3TZO, P. J. Holland, Field House, 19 Kingsley Road, Boughton Heath, Chester, Cheshire.

G3DVQ, R. H. Pounder, " Fair Wind," 44 Hartley Hill, Purley, Surrey.

G3TEV, M. J. Mills, The Bungalow, Randall's Green, Chalford Hill, Stroud, Gloucester.

G8WN, A. E. Reeve, 20 Bartley Avenue, Rushington Estate, Totton, Hants.

Area Representative

A correction to list of Area Representatives published in the December, 1965 issue of the BULLETIN:

Wirral: J. K. Birch, G2FOS, 19 Lloyd Drive, Greasby, Upton, Wirral, Cheshire and not Mr A. Seed as published.

Amateur Appointed Fellow of the Royal Veterinary College

Dr W. Kerr, GI2KR, deputy director of the Ministry of Agriculture has been made a Fellow of the Royal Veterinary College.

This award is in recognition of his work in connection with veterinary science and especially his studies on brucellosis. Dr Kerr is also the holder of the British Veterinary Dalrymple-Champneys award for outstanding contribution to the advancement of veterinary science in the field of brucellosis. Five years ago he was awarded one of the highest awards in British Veterinary Science, the Henry Steele gold medal by the Royal College of Veterinary Science.

G3ML/G4MH

The GPO has approved Mr J. H. Fish, G3JML, changing his call-sign to G4MH. This was the call-sign used by his Grandfather for many years.

LONDON LECTURE MEETING

WEDNESDAY, 9 MARCH, 1966 — 7 P.M.

AERIAL FARMING IN A MONASTERY

By the Rev Paul Sollom, G3BGL

Royal Society of Arts, John Adam Street, London, W.C.2. Buffet tea before lecture

Reciprocal Licensing

Just before this issue of the BULLETIN went to press, the Post Office started to issue licences (Amateur (Sound) Licence C) to foreign amateurs. Such amateurs are allocated call-signs in the G5 + three letters series, followed by the licensee's home call-sign; for example G5AAA/K0JBA.

Up to 22 February 1966, the Post Office had issued 26 Amateur (Sound) Licences C and five Amateur (Sound Mobile) Licences C.

RSGB QSL Bureau Sub-Managers

The following is a list of the RSGB QSL Bureau Sub-Managers showing the call-sign groups for which they are responsible:

G2:	J. W. Russell, G2ZR, 45 Shakespeare Avenue, Bath.
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G6 and G8:	A. J. Mathews, G6QM, 62 Ashlands Road, Hesters Way Estate, Cheltenham.
G3AAA-BZZ:	C. C. Olley, G3AIZ, 157 Wanstead Park Road, Ilford, Essex.
G3CAA-DZZ:	C. A. Bradbury, BRS1066, 13 Salisbury Avenue, Cheltenham.
G3EAA-HZZ:	W. J. Green, G3FBA, " Meadway," Links Avenue, Brundall, Norfolk, NOR86Z.
G3IAA-KZZ, BRS and A numbers:	G. L. V. Butler, G2BUL, 995 London Road, Thornton Heath, Surrey.
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GD:	T. R. Moore, GD3ENK, " Glyn Moar," St. John's, Isle of Man.
GI:	R. R. Parsons, GI3HXV, 45 Erinvale Avenue, Finaghy, Belfast.
GM:	D. Macadie, GM6MD, 154 Kingsacre Road, Glasgow, S.4.
GW:	J. L. Reid, GW3ANU, 28 Waterston Road, Gabalfa, Cardiff.
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The G3SBA Top Band Transmitter

By R. C. MARSHALL, M.A., A.M.I.E.E., G3SBA *

ALTHOUGH transistor modulators and transistor d.c.-to-d.c. inverters are commonly used for mobile work, fully transistorized transmitters of reasonable power output are still quite rare. This article describes in detail a design for a 10 watt rig for fixed or mobile use on Top Band. It is contained entirely in a small diecast box and operates from a 12 volt d.c. supply.

The transistor transmitter is obviously suited to mobile use as it is rugged and can operate directly from the car battery. Although the writer's personal opinion is that mobile operation on the crowded roads of today is near-madness—the transmitter described here is in fact designed for fixed operation—only the addition of a stage of l.f. filtering to the battery input should be needed for mobile use. At home, batteries still seem the best source of power as they provide good voltage stability and avoid hum problems. At G3SBA, two 12 volt 35 Ah nickel-iron batteries are installed, connected in series with the positive earthed. The present transmitter operates at −12 volts, and the −24 volt supply is intended for ex-government motors, domestic hi-fi and future high power transmitters. The batteries are charged in parallel by an ordinary 12 volt charger.

The choice of voltage for the transmitter is easy. At high voltages efficiency is high, but as the peak collector voltage in a collector modulated p.a. is four times the supply voltage, exactly as in the corresponding valve circuit, and transistors rated at more than 60 volts are hard to come by, 12 volts is used.

Silicon *n-p-n* transistors are used in the r.f. stages and germanium *p-n-p* types in the modulator. As both types of transistor are used here on a negative supply the r.f. transistors are "upside down" with their collectors at earth potential, and the modulator is the right way up.

P.A. Stage

To most readers the p.a. is the most interesting stage, and so this will be described first. Germanium r.f. power transistors such as the 2N1907 have been available for some years. Last year, an RCA *n-p-n* silicon planar transistor appeared, priced at less than £1 retail with 5 watt dissipation and an f_T of 100 Mc/s (this is the frequency at which the common emitter current gain is 1, and is several times higher than the maximum useful frequency). Two of these transistors in parallel will handle 10 watts c.w., but cannot provide the higher current peaks required in a modulated p.a., and therefore three are used. The Mullard BFY51, which is now available, claims superior characteristics to the 2N3053, and two of these would probably suffice even for a.m.

Two electrical arrangements are possible: common base and common emitter, corresponding to grounded grid and grounded cathode valve circuits. Common base operation gives slightly more output, but common emitter is used here because its power amplification is much higher, saving one driver stage.

The p.a. transistors are cooled by attaching them to the diecast box, which acts as a heat sink. As their collectors are internally connected to the cases, this is possible only if the positive side of the battery is earthed, which it is, and the tank circuit is connected in the emitter lead. The resulting circuit, which has no valve equivalent because it would require impossibly good heater-cathode insulation, is shown in Fig. 1. It uses a double wound driver transformer T4 to drive the p.a. transistors TR8, TR9, and TR10, whose emitters are tapped into the tank coil T5. Without bias the transistors draw no current, so that all the bias required for class C operation can be provided by auto-bias resistors in the emitter leads, which also help to equalize the currents through the three transistors.

With 10 watts input at 11 volts (the remaining volt or so is lost in the modulation transformer and r.f. chokes) the mean p.a. input is 0·9A. The instantaneous peak current when fully modulated is six times this, divided between the three transistors. The current gain of the transistors falls rapidly with increasing current in this region, and initial experiments showed considerable flattening of modulation peaks ('downward modulation'). At the suggestion of G3KPF the driver amplifier was also modulated, which almost completely eliminated the trouble. This rather startling arrangement has since appeared in several commercial designs.

Another consequence of high currents and low voltages is that decoupling capacitors must have very low impedances. The bias resistors are each decoupled by two parallel 0·1μF metallized plastic capacitors, and the p.a. supply decoupling, through which the whole p.a. r.f. current must flow, comprises a 1μF metallized plastic capacitor C28 in parallel

* 30 Ox Lane, Harpenden, Herts.

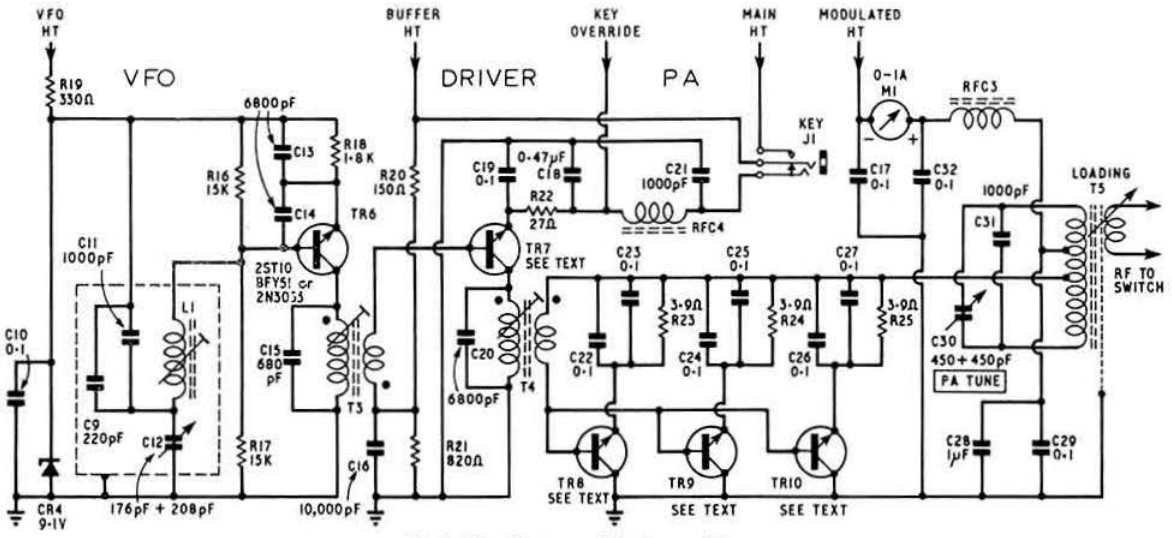

Fig. 1. The r.f. stages of the transmitter.

with a 0·1μF foil and plastic unit, C29. Metallized capacitors are only just good enough for use at this frequency as the resistance of the metallizing film which appears in series with the capacitor is comparable with the reactance.

The p.a. tank circuit must match the output transistors to their load, and have a *Q* of about 10 or 20 to attenuate harmonics without introducing excessive losses due to high circulating currents in the tank circuit. The output impedance of this p.a., calculated exactly as for a class C valve p.a., is about 6 ohms, and the load may vary from 75 ohms for a fixed installation with a separate a.t.u. to about 1 ohm when mobile. A pi-network for these impedances would need capacitors of about 200,000 pF, and so a parallel tuned circuit is used instead, with the aerial link-coupled. This would still need a 120,000 pF tuning capacitor if the p.a. were not tapped down the tank coil so that the coil acts as an impedance transformer. In this design the p.a. is tapped to the middle turn of the tank coil to give the tightest possible coupling. The tank circuit comprises nine turns of thick wire wound on a ferroxcube rod (T5 in Fig. 1) tuned by a 900 pF variable capacitor C30 with a 1000 pF fixed capacitor, C31, in parallel. This combination covers the 160m band with some margin for tuning out reactive loads. The aerial is coupled by a four turn link that can be slid over the end of the ferroxcube rod.

Driver and V.F.O. Stages

The driver stage must supply about 100 mW drive to the p.a., the input impedance of which is 50 ohms. This is supplied via a tuned step-down transformer wound on an adjustable ferrite pot core. Both this core and that on the driver input are set to the middle of the band and do not require further adjustment. The driver transistor TR7, another 2N3053, operates in class A at 40 mA collector current. At this lower current a small push-on heatsink is adequate, allowing the output circuit to be in its usual place in the collector lead. On c.w., the driver is keyed, and on NET it is switched on as otherwise the v.f.o. is not audible. As the driver is modulated and keyed, it could be used " barefoot " as a QRP transmitter.

The oscillator TR6 is designed so that either a series tuned circuit or a crystal may be used, although a crystal may oscillate only if C13 and C14 are reduced to about 1500 pF. Initially some trouble was experienced with frequency modulation owing to feedback to the v.f.o. from the p.a. This also produced frequency shift between NET and SEND. G3RRQ built a similar transmitter with a v.f.o. covering 0·9 to 1 Mc/s and doubling in the collector circuit. This, together with careful screening and decoupling, completely solved the problem, and the author's transmitter has been modified accordingly. The oscillator circuit is connected between base and emitter, and the second harmonic is extracted from a tuned transformer in the collector circuit, thus providing a considerable degree of isolation. If a crystal is used, it may be either fundamental or sub-harmonic. The h.t. is stabilized by a Zener diode. At 1·9 Mc/s the change in frequency between NET and SEND is about 70 c/s and the frequency drift during the first ten minutes after switching on from absolute " cold " is just under 200 c/s.

A g.d.o. or p.t.o. is essential for checking the r.f. coils before assembly. If ferrite cores other than those specified are used, the number of turns may need to be altered to obtain the required resonant frequency, keeping the same turns ratios and the same tuning capacitors.

Modulator

As the modulator and the p.a. share the same h.t. supply and have the same impedances, an autotransformer or tapped choke is used to couple the push-pull modulator output transistors TR4 and TR5 to the p.a., as shown in Fig. 2. This minimizes the bulk of a transformer, although it is still the biggest component in the transmitter. A mains transformer with about 15 watts output is suitable, and this is easily rewound by hand. The wire should be split on to two reels so that the two halves of the winding can be wound together. Wind 180 turns of the double wire and then connect the start of one wire to the finish of the other. As there is considerable d.c. unbalance in the windings, to avoid saturation the laminations are gapped by simply not interleaving them. The same technique is used in the driver transformer T1.

The modulator operates in class AB1 and can deliver 6 watts. The standing currents in TR4 and TR5 are adjusted by selecting Ry and Rx until there is 30 mA flowing in each collector with no audio input. The two resistors must be adjusted repeatedly until both are correct, as they interact. On modulation peaks the total collector current will rise to 900 mA.

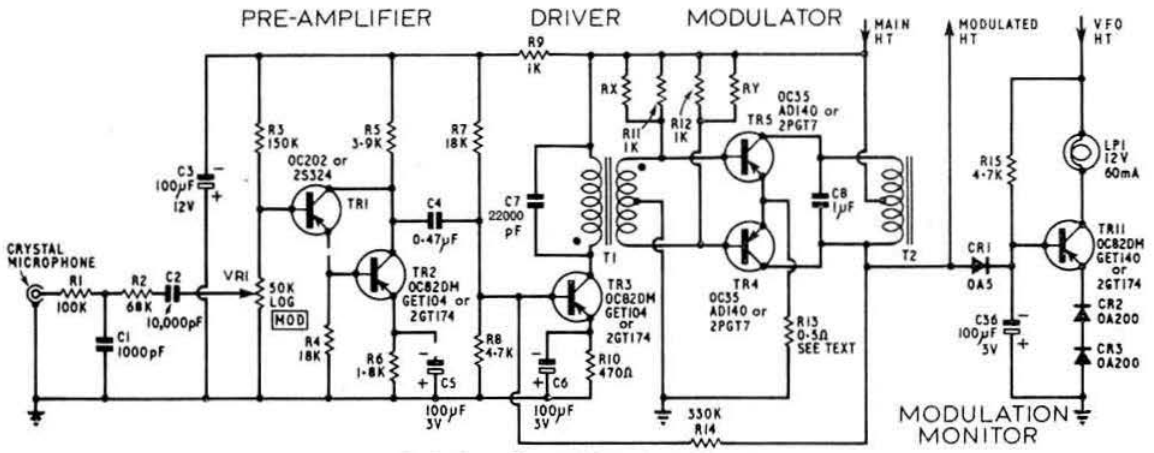

Fig. 2. The audio amplifier and modulator.

The driver stage, TR3, uses a GET104 transistor and there is overall feedback from the output to its base to reduce distortion. If the sense of the connections to T1 is not as shown on the circuit, the amplifier will oscillate. C7 and C8 ensure stability and restrict the high-frequency response to eliminate unnecessary sidebands. The pre-amplifier is designed for use with a crystal microphone, and to obtain the required high current gain an emitter follower, TR1, precedes the amplifier, TR2. The curious arrangement of the MODULATION control VR1 avoids disturbance of the d.c. voltage on TR1 base as the control is adjusted. As a crystal microphone behaves as a voltage in series with a 2000 pF capacitor, a degree of bass cut suitable for communication purposes is obtained with a load of 200K ohms. This load consists of R1 and R2 in series with the r.f. bypass capacitor C1 connected at their junction. Oscillation of the modulator is possible if the earth connections are not grouped as shown on the circuit diagram.

A simple modulation monitor is included, using a transistor, TR11, connected in series with the indicator lamp. TR11 is normally bottomed by current flowing through R15 from its base to h.t., but if a downward modulation peak is sufficient to make CR1 conduct, TR11 base is driven positive, turning off the lamp for a period dependent on C36. The diodes CR2 and CR3 are used in their forward direction as a low voltage Zener diode to bias the emitter of TR11 about 1·5 volts positive, so that the indicator lamp is extinguished if the h.t. to the p.a. falls below 1·5 volts on modulation peaks.

Switching and Keying

The send-receive switching is achieved by a triple push button unit. No standby position is required as there is nothing to warm up. In the RECEIVE position the whole transmitter is turned off and the aerial is connected through to the receiver. On NET, h.t. is connected to the oscillator and buffer, and the key is shorted out —see Fig. 3. The aerial circuit is not connected to earth on SEND, so that it may be earthed remotely at the a.t.u. As the SEND button is pressed the receiver is muted and its aerial terminals shorted out, while the aerial is connected to the p.a. link coil. Slightly later, when the interlocking bar releases the NET button, the h.t. supply to the p.a. is connected and the transmitter is on the air. When either the NET or OFF buttons are pushed in, the action of the link bar again ensures that h.t. is removed just before the receiver is reconnected, avoiding any possibility of transmitter power blocking the receiver. If it is desired to tune up the transmitter off load, the SEND button is partly depressed to release the other button and then itself released, so that all three are out. This puts power on to the transmitter without changing over the aerial or muting the receiver.

The key is connected in the emitter of the buffer stage via a key click filter RFC4 which gives rise and fall times of about a tenth of a millisecond. An additional contact on the key jack short-circuits the modulation transformer on c.w. to prevent the generation of voltage transients in the modulator and to avoid the voltage drop owing to the resistance of the transformer winding.

Interference Suppression

The thorough supply-filtering and screening of the design are the result of trouble owing to pick-up in a nearby high-fidelity amplifier. A prototype of the p.a. had shown that it tended to produce some tenth harmonic, and the Faraday screen on the aerial link was intended to remove

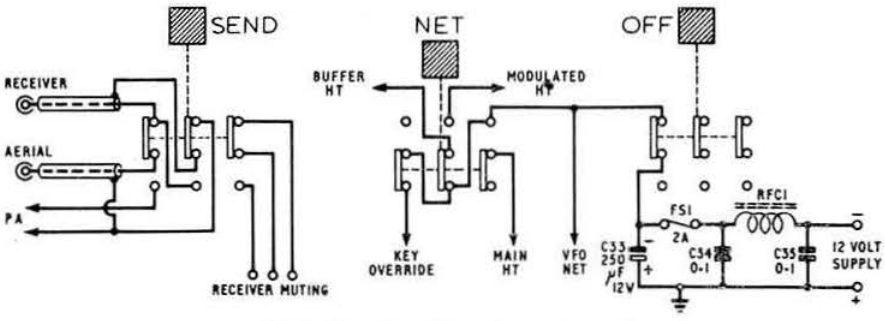

Fig. 3. The wiring of the switch and power input.

this. In the final design the 1 Mc/s component in the output is 56db down, and all harmonics are at least 60db down. The aerial tuner will further improve these figures. RFC3 and C32 also ensure that r.f. cannot cause M1 to read incorrectly.

Components

C1, 11, 21, 31	1,000 pF mica or polystyrene.
C2, 16	10,000 pF 30 V metallized plastic.
C3	100 μF 12 V electrolytic.
C4, 18	0·47 μF metallized plastic.
C5, 6, 36	100 μF 3V electrolytic.
C7	22,000 pF 30 V metallized plastic.
C8, 28	1 μF metallized plastic.
C9	220 pF ceramic, −750 p.p.m./°C.
C10, 17, 19, 22-27, 32, 34, 35	0·1 μF 30 V metallized plastic.
C11, 15	680 pF polystyrene.
C12	176 pF + 208 pF in parallel, airspaced variable, with 6 : 1 epicyclic drive.
C13, 14, 20	6,800 pF mica or polystyrene.
C29	0·1 μF plastic and foil.
C30	450 pF + 450 pF in parallel, airspaced variable.
C33	250 μF 12 V electrolytic (in insulating sleeve).
CR1	OA5 or similar germanium diode.
CR2, 3	OA200 or similar silicon diode.
CR4	9·1 V, 200 mW Zener diode.
FS1	2 A fuse.
J1	Igranic Miniature Jack socket with short-circuiting contact and additional normally open contact.
L1	Osmor QO4 with windings in series aiding, in $\frac{3}{4}$ in. square i.f.t. can.
LP1	Thorn miniature lamp, 12 V, 60 mA.
M1	Japanese moving coil meter, 0-1 A d.c., $1\frac{3}{16}$ in. sq.
R1	100 K ohms.
R2	68 K ohms.
R3	150 K ohms.
R4, 7	18 K ohms.
R5	3·9 K ohms.
R6, 18	1·8 K ohms.
R8, 15	4·7 K ohms.
R9, 11, 12	1 K ohms.
R10	470 ohms.
R13	0·5 ohms (see text).
R14	330 K ohms.
R16, 17	15 K ohms.
R19	330 ohms.
R20	150 ohms.
R21	820 ohms.
R22	27 ohms.
R23, 24, 25	3·9 ohms, $1\frac{1}{2}$ watt wirewound.
Rx, Ry	see text.
VR1	50 K ohms log. potentiometer

All resistors $\frac{1}{2}$ watt, 10% unless otherwise stated.

RFC1, 2, 3	40 turns 28 s.w.g. on $\frac{1}{4}$ in. o.d. ferrite tube, $1\frac{1}{4}$ in. long, or Henry's Radio type RFC8, 5 μH.
RFC4	1·5 mH, Henry's Radio type RFC.
Switch	Plessey push-button assembly, 3 interlocking buttons, each with 3 changeover contacts.
T1	$\frac{1}{4}$ in. stack No. 450 0·015 in. Radiometal laminations butted (Coded grey, 1 in. × $\frac{3}{4}$ in. overall, $\frac{1}{4}$ in. centre limb). *Primary:* 1,120 turns 43 s.w.g. *Secondary:* 200 + 200 turns 38 s.w.g., bifilar wound, *or* Ardente D3052.
T2	$\frac{3}{8}$ in. stack No. 187 0·018 in. silicon iron laminations butted ($2\frac{1}{4}$ in. × $2\frac{3}{4}$ in. overall, 1 in. centre limb). 180 + 180 turns, 23 s.w.g., bifilar wound.
T3	11 mm. ferrite pot core, adjustable. *Primary:* 20 turns, 30 s.w.g. *Secondary:* 10 turns, 30 s.w.g.
T4	11 mm. ferrite pot core, adjustable. *Primary:* 6 turns, 30 s.w.g. *Secondary:* 3 turns, 24 s.w.g.
T5	Ferrite rod, $\frac{1}{2}$ in. diam., $1\frac{1}{2}$ in. long. *Primary:* 9 turns, 19 s.w.g., starting $\frac{5}{16}$ in. from one end, tapped at $3\frac{1}{2}$ turns and $4\frac{1}{2}$ turns. *Secondary:* 4 turns, 22 s.w.g., on former sliding along finish end of core.
TR1	OC202 or 2S324.
TR2, 3, 11	OC82DM, GET104 or 2GT174.
TR4, 5	OC35, AD140 or 2PGT7.
TR6	2N706, BFY51 or 2N3053.
TR7-10	BFY51, 2N3053 (see text).

Construction

The complete transmitter is constructed inside a deep Eddystone die-cast box $7\frac{1}{2}$ in. × $4\frac{3}{4}$ in. × $3\frac{1}{4}$ in. The box is used upside down, so that its lid forms the bottom cover. The positions of the principal components are shown in Figs. 4 to 6. The modulation transformer is fixed along the shorter side of its laminations by brackets tapped for the fixing screws, and is placed in the centre of the box so that it separates the p.a. from the low level r.f. circuits and the modulator.

The v.f.o., driver and modulation monitor are assembled on a piece of Lektrokit board bolted to the side of the box on spacers, so that the cores of L1, T3 and T4 may be adjusted through access holes in the side of the box. The v.f.o. is earthed directly to the tuning capacitor, whose frame is bolted to the box, and the r.f. driver stage is separately earthed to the box via one of the board fixing screws. An epicyclic drive is used for the v.f.o. tuning, with a round Perspex dial and an unskirted knob to match the skirted p.a. knob. The driver transistor TR7 has a small push-on heatsink. A twisted pair of wires takes the r.f. output from T4 to the p.a. stage.

The modulator output transistors are bolted to the rear of the box, which acts as a heatsink. They must be insulated from the box with bushes and mica washers smeared with silicone grease. Their emitter resistor R13 is a length of resistance wire. The r.f. filter on the microphone input and the gain control are behind the front panel, and all remaining modulator components, including the driver transformer, are on a second Lektrokit board between the v.f.o. and the modulation transformer.

As the p.a. transistors have their collectors earthed they may be fitted in the type of heatsink having a single bolt fixing, or merely pressed into holes drilled in the box (these holes must be exactly the right size). They are grouped in the rear corner of the p.a. compartment. The small components in the p.a. stage are fixed on miniature stand-off insulators, with the earth connections taken to a star tag.

The p.a. tank coil is wound on a short piece of $\frac{1}{2}$ in. ferrite rod. The writer has found no better method of cutting this than putting it in a vice whose jaws are lined with cardboard, and hitting it with a mallet. Starting with a 12 in. length this produced two usable pieces and a lot of debris. The $\frac{1}{4}$ in. thick support (see Fig. 5) has a hole filed in it to just fit over the winding, and the rear end of the coil and the core are fixed into their hole with Araldite. The rear connection goes directly to the frame of the tuning capacitor, and small holes bring leads from the tapping points through the paxolin support. The front end of the winding goes directly to the fixed vanes of the capacitor (it is particularly important to keep leads short in the p.a. stage). About $\frac{5}{8}$ in. of the core is left exposed at the front for the aerial coupling link, which is mounted on a carrier of $\frac{1}{16}$ in. thick printed circuit board which can be moved along the axis of the coil by a 2BA threaded rod rotated by the LOADING knob. A nut to accept the studding is soldered to the panel side of the circuit board. The carrier has copper foil feet which slide along the side of the box, earthing the copper surface and preventing it from rotating. The aerial link is wound on a former of copper foil that is soldered to the carrier, acting as a Faraday screen. The foil must have a gap in it to avoid a short-circuited turn, and at this point the carrier surface must also be slotted. The tank coil support and link carrier are both shaped to clear the tuning capacitor frame. The frame of C30 is insulated from the box by a Perspex spacer and nylon mounting screws; the voltage is low, therefore the spindle can pass through a $\frac{1}{2}$ in. clearance hole and the knob be fitted in the usual way.

Every effort should be made to keep losses low: one serious

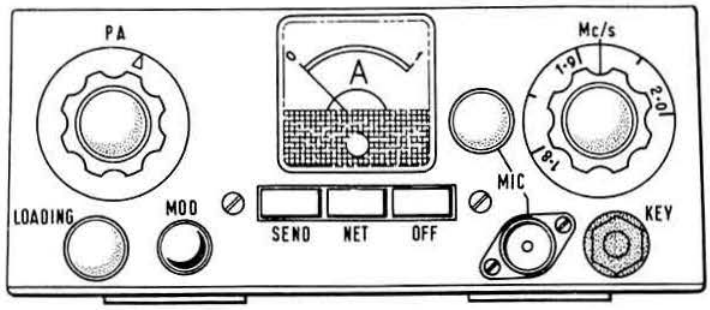

Fig. 4. The grouping of the controls, sockets and meter on the side of the Eddystone die-cast box. The edges are deliberately shown converging, for the aperture of the box is slightly larger than the base (the top in the case of this unit).

loss not anticipated was due to eddy currents in the underside cover plate. This was overcome by cutting a 2 in. × 2½ in. hole in the plate and covering it with a piece of Veroboard (perforated paxolin with copper strips on it). These strips touch the lid on one edge only so that they act as a screen without allowing eddy currents to circulate. The Veroboard is covered by a piece of $\frac{1}{16}$ in. sheet rubber, and at the other end of the lid is a matching ¼ in. thick strip of rubber, forming non-slip, non-scratch feet.

To fit the push-button switch in the centre of the panel it is necessary to remove part of the strengthening rib of the die-cast box. This can best be done with a Surform drum cutter in an electric drill.

The components on the modulator and v.f.o. Lektrokit boards should be arranged as though on a printed board with the absolute minimum of crossed leads, and then wired up as far as possible with the component leads themselves or tinned copper wire. The essential crossing wires are then fitted with sleeving. Loops of tinned copper wire at the board edges may be used as terminals.

If the plug and socket system used for the 12 volt supply leaves any possibility of plugging in the wrong way round, wire a 2A silicon diode in series with the fuse.

Alignment and Testing

When switched to NET the current consumption should be about 100mA. Adjust the core of L1 so that the v.f.o. tunes from 0·9 to 1 Mc/s, and scale it 1·8 to 2 Mc/s. Press the SEND button, and check that the current rises to about 1·1A. The panel meter will indicate about 0·6A. Set the

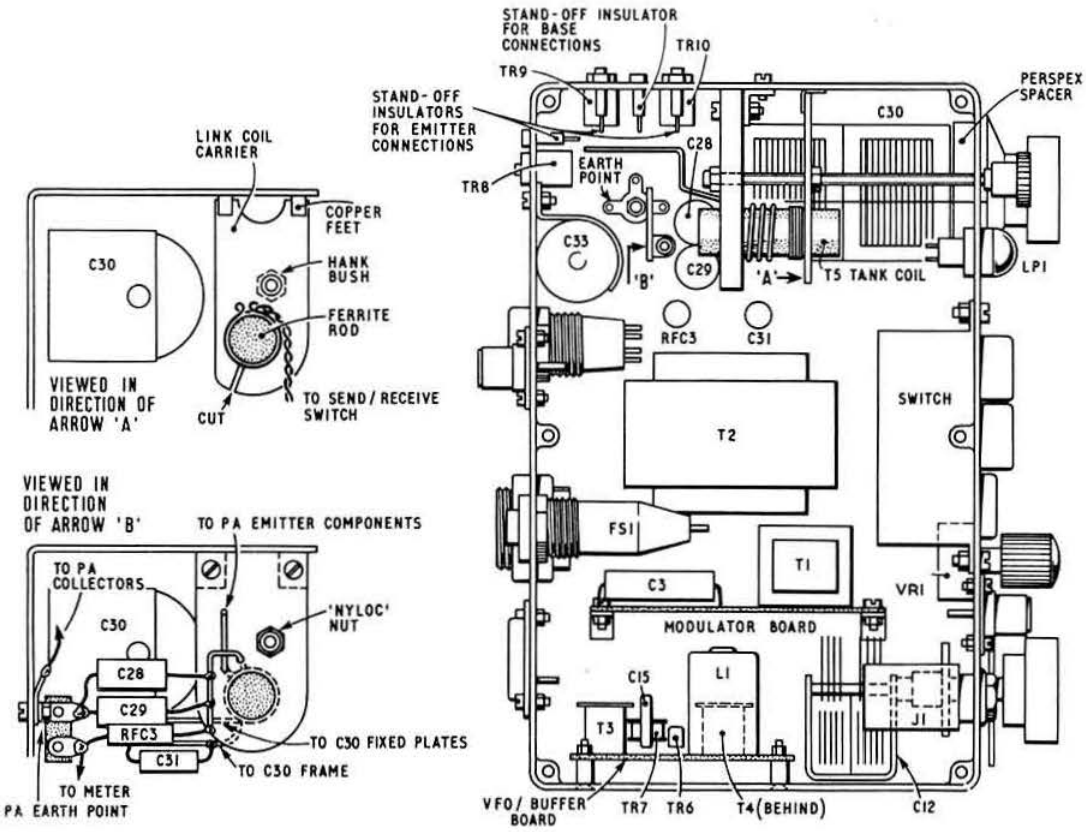

Fig. 5. The underside view and details of the p.a. assembly.

cores of T3 and T4 to give maximum meter current at 1·9 Mc/s, and tune the p.a. for minimum current. Connect a 12 volt, 12 watt lamp as a load and adjust the LOADING knob to give maximum brightness. The modulation may be checked through the output on a receiver, or, if possible, on an oscilloscope. Check the operation of the modulation monitor.

When everything seems satisfactory, try it on the air. You will be one of a very select group of high power transistor operators, with a new talking point and a justified feeling of achievement.

• • •

Since this article was prepared, the author has tried BFY51s with the expected improvement. With 13 volts d.c. mains supply (11·2 volts actual p.a. input, the remainder being lost in emitter resistors, modulation transformer and r.f. chokes) a single BFY51 absorbed 0·43A, two used 0·69A, and three absorbed 0·85A. Three 2N3053s had required a 14 volt supply to obtain 10 watts input, and then gave about 20 per cent less r.f. output.

There is some remaining downward modulation: the p.a. current falls about 30 mA on speech at full modulation with three transistors of either type. The effect is worse when only one or two transistors are used.

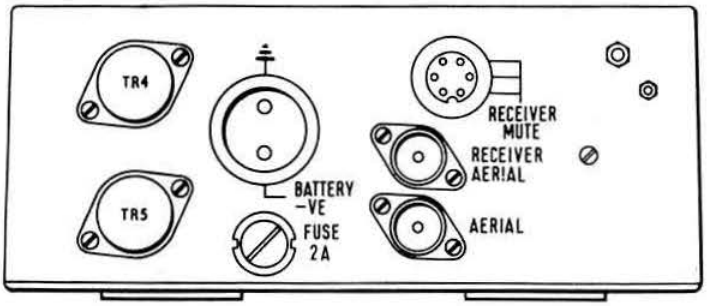

Fig. 6. The rear view of the transmitter. The modulator transistors TR4 and TR5 must be insulated from the box, but the p.a. transistors, TR8, TR9 and TR10, may be mounted directly on the metal, the top right hand nut in this illustration holding the mounting bolt for TR8.

The transmitter has now been duplicated successfully by G3OQV, G3RRQ, and G3TXP. GM3RKO has the v.f.o. and driver working. The author acknowledges with thanks the comments of these constructors, which have helped considerably in the preparation of this article.

Fitting Belling Lee Sockets to the 7026 Coaxial Relay

By E. SHACKLETON, G6SN*

NOW that supplies of the Londex co-axial relay type 7026 are available on the surplus market many will have been purchased to replace the very noisy, wartime relay type 78A. Unfortunately, supplies of the correct plugs are not always available, and so many amateurs will wish to use Belling and Lee plugs.

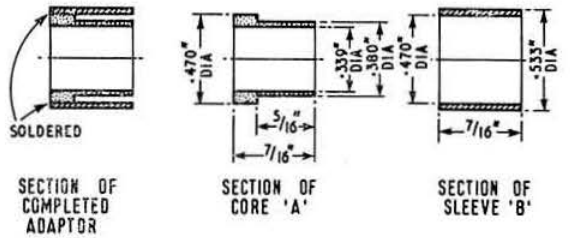

Fig. 1. The cross section of the adapter in various stages of completion.

The adapters shown in Fig. 1 are a press fit into the existing sockets of the relay and will take one end of the Belling and Lee co-axial line coupling type L616. The adapter parts are turned from brass rod, $\frac{1}{2}$ in. diam rod being used for *A* and $\frac{9}{16}$ in. diam for *B*, the two parts being then sweated together. The dimensions in decimals should be adhered to as closely as possible but a tolerance of $\frac{1}{64}$ in. is permissible in the fractional figures. Since the core *A* has to be sweated into the sleeve *B* this fit should be snug but not tight.

Having machined a set (or sets), smear a thin film of soldering paste into the larger diameter of the core *A* before inserting it onto the sleeve. Place the adapter on a small piece of sheet aluminium, drop a ring of 22 s.w.g. resin cored solder into the gap and heat on a gas ring. When cold face both ends and file or turn a slight " lead " for entry into the relay socket. Remove the rubber ring at the bottom of the relay socket, insert the adapter, base first into the relay and squeeze home in the vice. Finally press the Belling and Lee coupling into the adapter again with the vice.

The dimensions given have been selected to give a tight grip between the adapter and the coupling.

It is advisable to machine the sleeve *B* first. Chuck a length of $\frac{5}{8}$ in. diam brass rod and centre the free end to take the tailstock centre. Turn the outer diameter to size for a length of 2 in. (for one set of adapters), drill the bore with the largest drill available but not exceeding $\frac{7}{16}$ in. diam and part off the three sleeves. Chuck each sleeve and bore to size. The $\frac{9}{16}$ in. diam brass rod for the cores *A* should also be held in the chuck and supported by the tailstock for turning. The bore can be finished with a letter R drill *provided* the drill has been correctly ground, otherwise it may drill oversize. Part off and solder.

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THE G3RKK RECEIVER MK.2

By A. J. SHEPHERD, G3RKK*

AFTER the receiver described in the July 1963 RSGB BULLETIN [1] had been in service some 18 months, the writer decided that it was time to rebuild it. Experience had suggested that several improvements could be made, and the large amount of experimental work that had already been done had left it in rather an unsatisfactory state mechanically. These mechanical shortcomings will not as a rule have been carried over by those who built receivers to the original design.

Nevertheless, as a complete rebuild was planned, it seemed prudent to make a critical reappraisal of the receiver's performance and to determine how it could be improved. The results of this project are described in this article, which shows how the Mk.2 design evolved from the Mk.1. It was felt that this approach would be of more interest to those who do not wish to copy the design exactly, while providing no less information for those who do, than a formal circuit description.

Readers will remember that the original design used an Electroniques front end, and the writer decided to experiment with this in conjunction with the Mk.2 project. The results of these experiments are included for the benefit of those who are interested in getting the best possible performance from these units; but this is not intended to imply that the QP166 as supplied by Electroniques is unsatisfactory. Many of the modifications and adjustments described here could not be carried out on a commercial scale without considerably increasing the cost.

The front-end modifications are treated separately from the rest of the circuit, as they are equally applicable to any receiver using this front-end. Conversely, a standard unmodified front-end can be used quite satisfactorily in the Mk.2 design.

These modifications fall into three categories: first, those that can be carried out simply with a minimum of test equipment; second, those that are simple to carry out, but necessitate a complete realignment; and third, those requiring drastic mechanical alterations to the front end. They are dealt with in that order.

Simple Modifications

One thing that was very noticeable on the Mk.1 design was the large variation in gain from band to band. It is desirable that the gain of the r.f. stage should be just sufficient to over-ride the first mixer noise but no more, or cross-modulation is liable to occur. Similarly, the input to the r.f. stage should be just enough to enable the aerial noise to over-ride that generated internally. Whilst these conditions are attained on the h.f. bands, on the l.f. bands the aerial noise is higher, the r.f. stage gain is higher and the mixer gain is higher, so the S-meter reads incorrectly, and cross-modulation and possibly instability are very likely to occur. Adjustment of the r.f. gain control can effect a partial cure, but in the writer's case the range of adjustment was insufficient and in any case it is more convenient if the gain on all bands is at least of the same order. The best way of accomplishing this would be to fit suitably redesigned coils on 160m and 80m; but not many will want to do this, so a simpler solution may be of interest. The input to the first mixer was reduced to the required level by fitting 1·5 Kohm resistors in series with the untuned windings of the 160m and 80m mixer coils (i.e., in series with one of the leads not connected to the ceramic trimmer). A modification of this type cannot be expected to do the front end selectivity any good, but in fact the effect was very slight. Also, the input from the aerial on these bands was reduced by fitting 50pF capacitors in series with the primary (untuned) windings of the appropriate aerial coils. In both cases the actual component values to use will be a matter for individual experiment, bearing in mind the considerations at the beginning of the paragraph. Some readers may like to try a similar modification on 40m where the gain is also a little higher than necessary, but in this case the r.f. gain control is fully effective. The alterations described above will ensure that the gain is of the same order on all bands. Rather more work would be required to make it exactly the same, but it is quite easy to mark the r.f. gain control with the settings that give correct S-meter readings in each case. When these modifications have been carried out, the value of R1 (on the original Mk.1 circuit) may be reduced to 82 ohms, giving improved sensitivity on 10m without instability on 80m and 160m.

The EF183 has acquired a very bad reputation as an r.f. amplifier in some quarters, and although it is not the best valve to use when there is another amateur or a broadcast transmitter just down the road, the writer does not consider that this reputation is altogether justified. The main complaints that have been made concern instability and cross-modulation. Now cross-modulation occurs when a signal outside the i.f. passband has sufficient amplitude to drive a

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stage into non-linearity before the i.f. selectivity has eliminated it. The unwanted signal will then modulate the wanted one, and nothing can be done to remove this spurious modulation once it has occurred.

In normal circumstances, it is unlikely that any signal will induce sufficient voltage at the aerial terminal to drive the r.f. stage into non-linearity. After several stages of amplification in the front end, however, its amplitude will have increased many times, and cross-modulation may well occur. (If this signal is only 20-30 kc/s off tune, the front end circuits will have negligible attenuation.) Thus it can be seen that cross-modulation may be reduced by choosing valves for the front end that can handle a larger input before they are overloaded, and by reducing the gain before the selective circuits.

Often an EF183 is used to replace an existing r.f. amplifier. If this is adjusted for optimum performance on the h.f. bands, the increase in gain will help to over-ride the mixer noise, and a welcome improvement in sensitivity will result. On the l.f. bands, however, where losses are lower, and aerial noise higher, the gain is probably already more than adequate, and the increase is bound to aggravate the cross-modulation situation, and may even result in instability. This effect has been the main cause of the EF183's bad name, and can be much reduced by the precautions described above.

With pentagrid mixers, the full gain of an EF183 is needed to overcome mixer noise on the h.f. bands.* With pentode mixers, a 6BZ6 would suffice (see below), and with triodes and beam deflection valves it is not strictly necessary to use an r.f. stage at all [11]. Furthermore these latter types allow the pre-i.f. gain to be reduced, and are thus likely to give better cross-modulation characteristics. Sensibly used, however, the EF183 will be satisfactory under normal conditions, and any attempt to replace it by a lower slope valve without changing the mixer as well will result in a degradation of the signal to noise ratio on 10m.

Oscillator Stability

This next series of adjustments does not require drastic mechanical alterations to the front end, but will involve the constructor in a realignment of the oscillator coverage. Those without the necessary equipment and experience are advised to leave well alone—it is almost hopeless to try and align a receiver of this type without some sort of signal generator.

The greatest sacrifice that has been made in this design from considerations of cost, is probably in respect of oscillator stability. This is no reflection on Electroniques, but with the h.f. oscillator switched to 32 Mc/s the stability is almost bound to be six times worse than that of a single range oscillator at 5 Mc/s or so (as is used in receivers with a crystal controlled front-end). The writer did consider building a front-end of this type, but it would have been much more expensive, and with an s.s.b. transceiver also under construction, it was not felt to be justified. In any case, it is possible to bring about a considerable improvement by alteration of the h.f. oscillator after it has been fitted into the receiver. Obviously, Electroniques could not give their units this sort of attention on the production line, as they had no idea of the exact conditions under which they were to be used. However, when the receiver is working, sudden changes in frequency can be prevented by attention to the mechanical rigidity and possibly the oscillator working conditions; and thermal drift may be reduced to quite a low figure by attention to the temperature compensation. A suitable figure to aim for on 15m is 100 c/s in any ten minute period and 400 c/s within any period of an hour, after say 30 minutes warm up. Warm up drift should be less than 1·5 kc/s total. Some units will be nearer these figures than others when initially installed.

Drift curves were plotted on each band under normal operating conditions (i.e. with the receiver upright in its cabinet) and with the evidence so gathered, the temperature compensation adjusted for minimum long term drift. Full details of this procedure are not given as there is no denying that it is a tricky job that should not be attempted by a beginner. The adjustment was achieved by varying the proportion of ceramic to silver mica capacitance; the values used by the writer are given in Table 1, and may be used as a basis for experiment. It is not suggested that they are by any means optimum, but the changes made are simple, and in the writer's case give a worthwhile improvement particularly in warm-up drift. In fact, this part of the circuit would benefit from a much more thorough investigation as regards

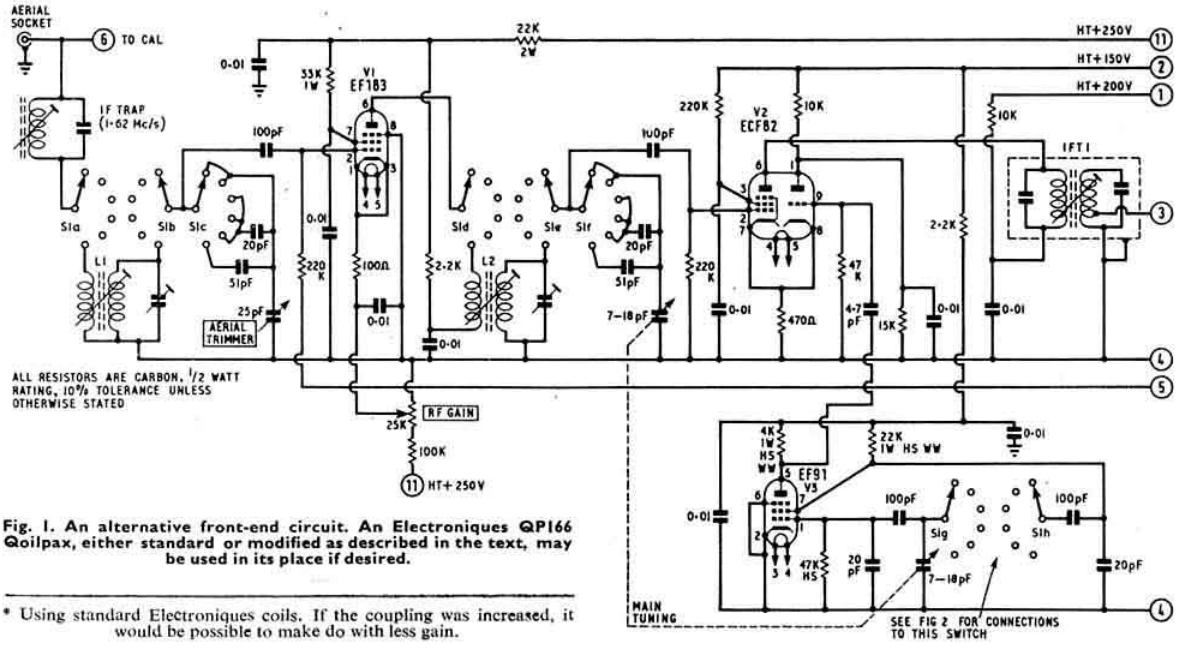


Fig. 1. An alternative front-end circuit. An Electroniques QP166 Qoilpax, either standard or modified as described in the text, may be used in its place if desired.

* Using standard Electroniques coils. If the coupling was increased, it would be possible to make do with less gain.

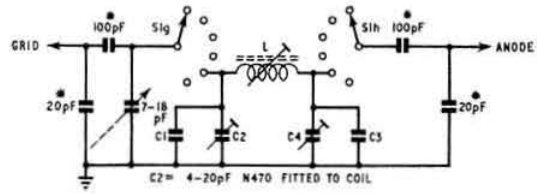


Fig. 2. Oscillator tuned circuit modifications.

TABLE I

Oscillator Capacitor Values

Band	C1	C3	C4
160m	—	150pF†	47pF N750
80m	—	120pF†	82pF N750
40m	20pF†	*†	10-40pF N750
20m	47pF†	47pF†	10-40pF N750*
15m	47pF†	20pF†	10-40pF N750*
10m	10pF†	—	10-40pF N750*

* As fitted to Qoilpax QP166.
† Silver mica.

operating conditions as well as temperature compensation.

It should be pointed out that the settings of the various trimmers will have a considerable effect upon the operation and temperature compensation, particularly on the higher bands. Incidentally, although the dial calibration is not linear, a reasonable approximation can be obtained over any portion of 100 kc/s (e.g. the c.w. end). It is thus quite plausible to align the receiver so that two adjacent calibration pips appear at (say) 0 and 100 on the Eddystone dial. The logging scale is then direct reading to within a few kilocycles over this part of the band.

Mixer/Oscillator Modifications

The changes described above define just about the limit of the improvements that can be made to the front end without disturbing the basic circuitry. Those described below are more drastic, and are aimed at improving the signal-to-noise ratio, cross-modulation performance, and oscillator stability. Modification is not perhaps quite the right word here, as although the writer did fit the new circuitry into his QP166, it would be better to build from scratch if this circuit is going to be used.

The ECH81 mixer/oscillator valve has been replaced by a separate ECF82 mixer and EF91 oscillator (Figs. 1 and 2). The ECF82 is much quieter than the ECH81, and so the gain of the EF183 may be reduced by increasing the value of the unbypassed cathode resistor and eliminating the bypassed one altogether. If building from scratch, it would be worth trying one of the low cross-modulation types like the 6BZ6 or 6CD6 in the r.f. stage. Some readers might like to go

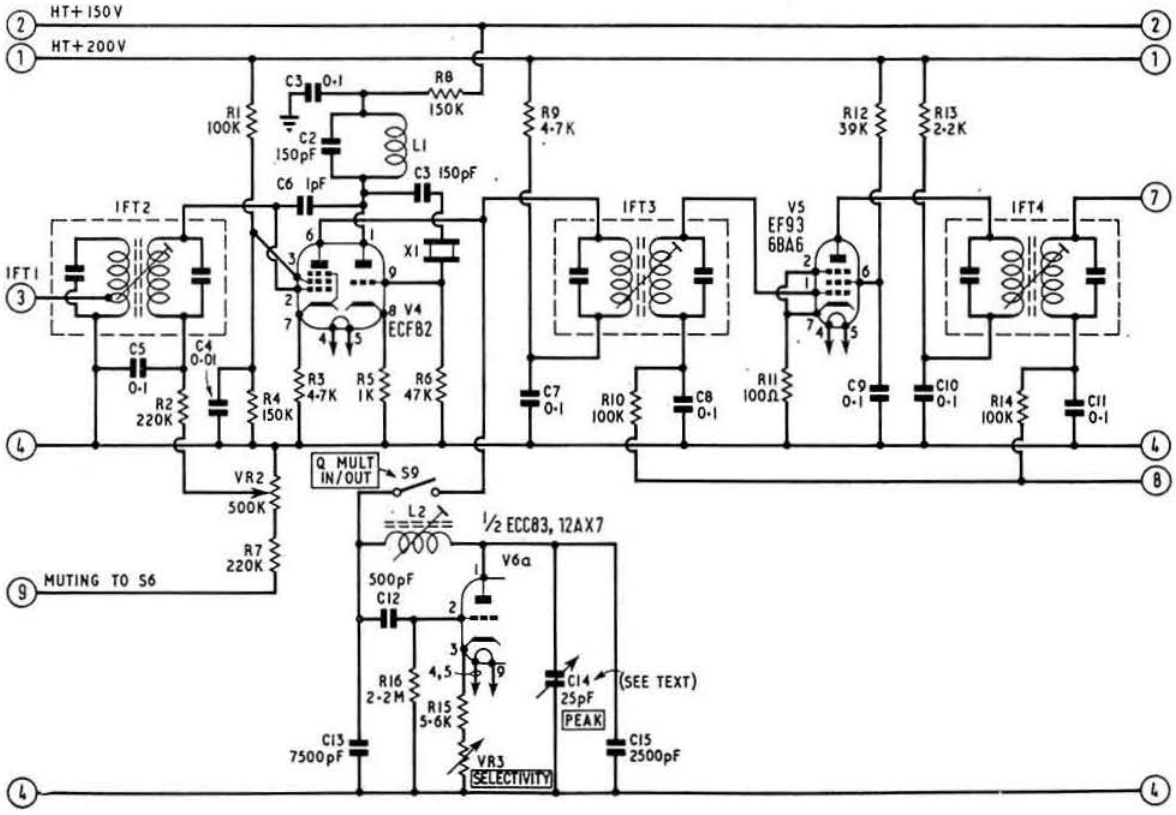
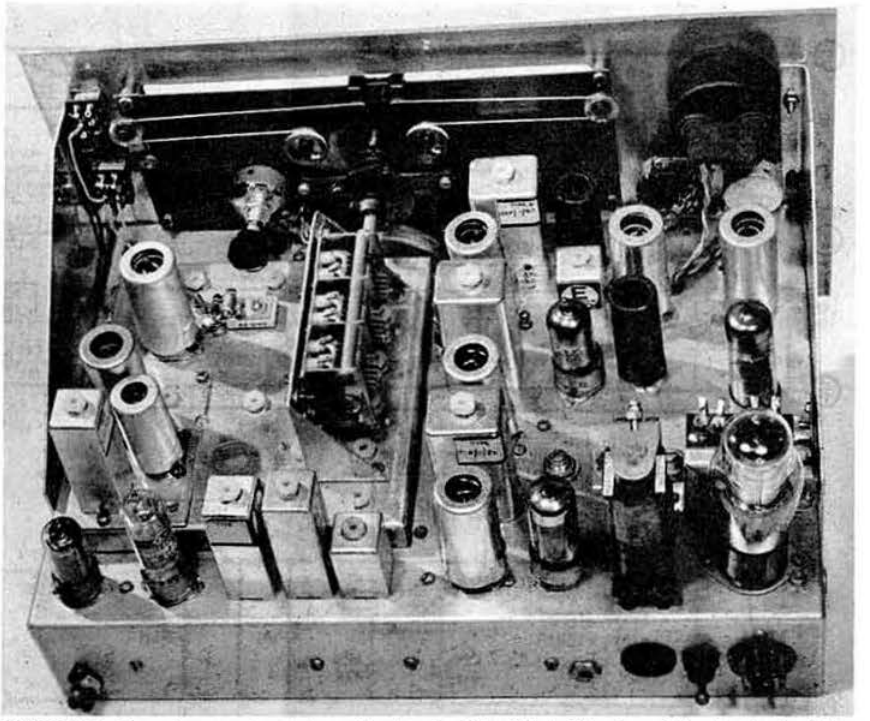


Fig. 3. The second mixer, first i.f. and Q multiplier stages. A standard peak/notch type Q multiplier may be substituted if required.

even further and use a double triode mixer which will permit the gain of the r.f. stage to be reduced still further, and the arrangement would then be similar to that proposed by G2DAF in the June 1964 RSGB BULLETIN [2] with the crystal oscillator replaced by the EF91 v.f.o. It is recommended that the same type of valve be used for both mixers whichever arrangement is adopted. This will ensure that there is no degradation of the signal to noise ratio due to insufficient output from the first mixer. However, the ECF82 second mixer shown here will be quite satisfactory following a standard Electroniques front end.

The EF91 first conversion oscillator uses the same circuit as the original triode, with the screen grid acting as the anode of the oscillator circuit, but the electron coupled output and cathode follower ensure that pulling and similar forms of instability are eliminated. It would probably be worth redesigning the oscillator circuit completely, but that would be a major undertaking.



G3RKK's Mk. 2 receiver, constructed on the chassis of the Mk. 1. The size of the chassis should be increased from 13¾ in. × 9 in. to 13¾ in. × 11 in. if a power supply is to be incorporated.

Image Rejection

Two stages of preselection at signal frequency are included in the QP166, tuned by sections of the main tuning capacitor, one of which may be shunted by an aerial trimmer. The writer has disconnected the front section of the main tuning capacitor, and increased the value of the aerial trimmer to 25pF, which thus has complete control of the tuning of the aerial circuits. This was done so that experiments in neutralisation could be carried out, but if building from scratch it would enable a two gang rather than a three gang to be used for the main tuning. Incidentally, neutralisation was not thought to be sufficiently beneficial to the noise factor to merit the trouble involved.

This arrangement gives an image rejection of better than 60db on all bands except 15m and 10m where it is of the order 45-50db. This is quite satisfactory under present conditions but might prove less so when the sunspot count begins to rise significantly. An extra tuned circuit on 10m, 15m and possibly 20m would solve the problem but requires some re-arrangement of the coil compartments. For mechanical reasons it would probably be necessary to include the extra tuned circuit between the aerial coil and r.f. stage with top capacity coupling. An extra switch bank could be fitted to the front of the bandswitch for the purpose and the extra coils placed between this and the front panel. Under present conditions, the writer does not consider this modification to be worth the trouble.

Mixer and I.F. Breakthrough

The output from the first mixer is co-ax coupled to the first i.f. section (Fig. 3) using low impedance taps on the i.f. transformers. This places four lightly coupled tuned circuits between the mixers, giving improved rejection of the second image response and also providing some protection against cross modulation at the second mixer. The oscillator injection capacitor C6 may conveniently consist of a short piece of insulated twin cable. Its length should be adjusted to give reasonable conversion efficiency without generation of excessive spurious products.

The crystal calibrator which uses the modified circuit suggested by G2NH [3] is installed behind the front end by the aerial socket which is mounted on the chassis backdrop. It is doubtful whether this was a very wise move, as it does bring the aerial and the first i.f. rather close together. However, with a small screen fitted under the chassis and co-ax output from the front end taken straight from the i.f.t. (not the leadthrough provided, which should be disconnected), no trouble has been experienced with i.f. breakthrough from this cause. On 160m however, the front end circuits offer very little discrimination against the first i.f. and it is necessary to rely upon the 30-40db rejection offered by the trap. If 160m is a favourite band, it might pay to alter the first i.f. slightly to clear any persistent interference on 1620 kc/s.

The cathode resistors and other components in the second mixer and i.f. stages have been chosen to allow correct operation of the a.g.c. under all conditions. For this reason, there is no conventional i.f. gain control and the a.g.c. is permanently connected.

A.G.C. and I.F. Gain Control

The a.g.c. rectifier uses a pair of silicon diodes in a voltage doubler arrangement. This is either fed from a separate a.g.c. amplifier (Fig. 4a) or else capacitively tapped down the primary of IFT5 (Fig. 4b).

On s.s.b. and c.w. there is no noticeable difference between the two arrangements, but on a.m. slight distortion results from the leading of the diodes on IFT3 when they are

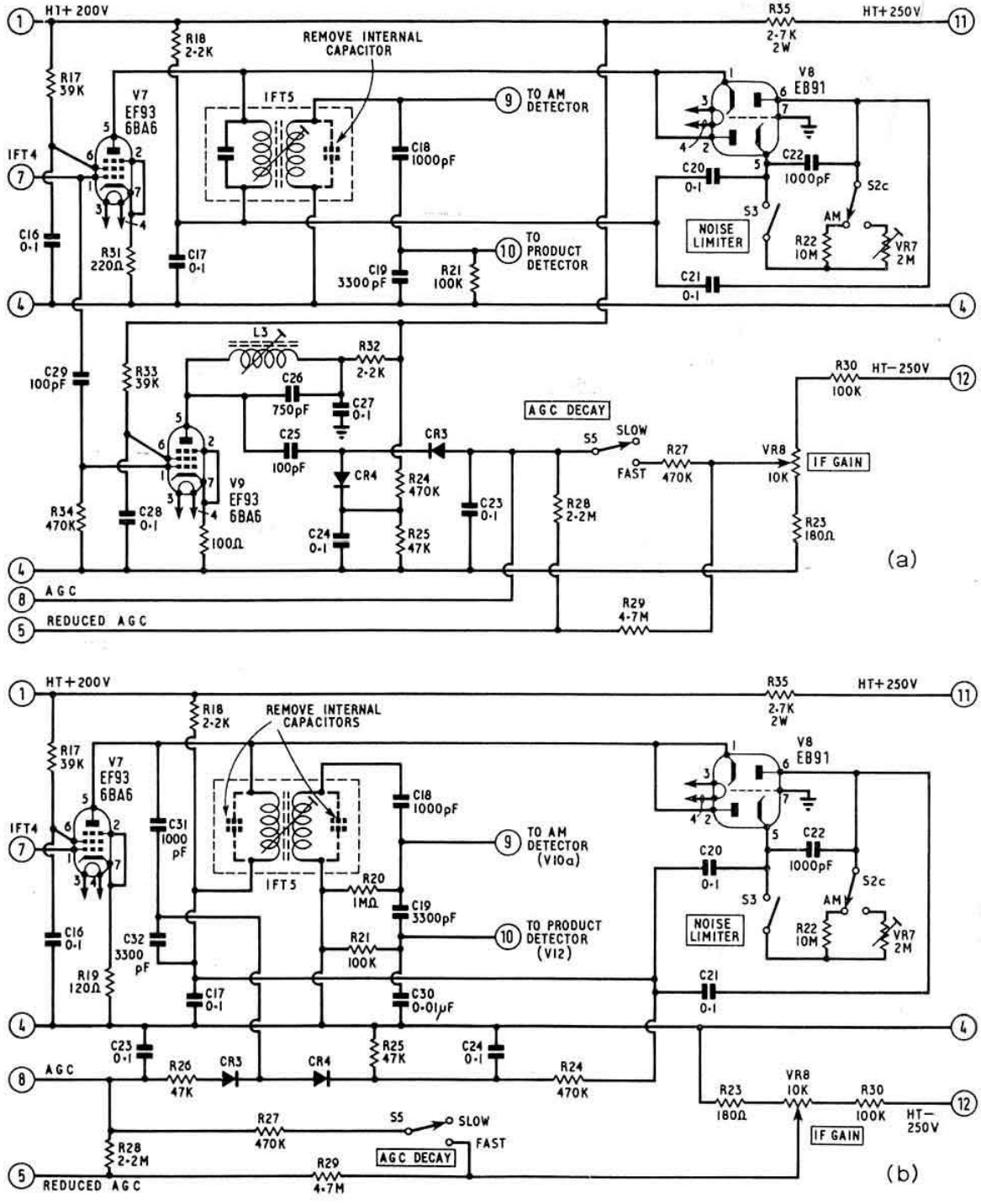


Fig. 4. (*a*) **The second i.f., noise limiter and a.g.c. circuits. This arrangement uses a separate amplifier V9 to drive the a.g.c. detector.** (*b*) **The second i.f., noise limiter and simplified a.g.c. circuit. In this arrangement, the a.g.c. detector is fed direct from the second i.f. amplifier V7.**

conducting. Normally this would not be noticeable, but the bandwidth of the i.f. strip (2 kc/s at −6db) is really too narrow for a.m. and degradation of quality from other sources must be kept as low as possible. Thus some constructors may think it worth while to include the separate a.g.c. amplifier. There is no problem from b.f.o. breakthrough, as the product detector gives good isolation provided that care is taken with the layout. Those whose main interest lies in a.m. can obtain a wider i.f. bandwidth by using the /D type of transformer for one or both of IFT3, 4. For c.w. and s.s.b. the curve can still be peaked up with the *Q* multiplier, but the skirt selectivity will not be as good as with the standard transformers. The a.g.c. circuit is of the fast attack, slow decay variety, CR2 serving as a gate diode as well as being part of the detector. Two decay time constants for a.m. and s.s.b./c.w. may be selected by S5. This was originally ganged to the a.m./c.w./s.s.b. switch, but some trouble was experienced in very noisy conditions when high amplitude transients could cut off the receiver for several seconds with the a.g.c. recovery set to SLOW. The noise limiter minimized this effect, but it was felt desirable to be able to use fast decay a.g.c. for s.s.b. and c.w. under some conditions.

A delay potentiometer R24/R25 is fitted to prevent a.g.c. action on receiver noise. The ratio may have to be adjusted experimentally for best results.

The writer's receiver has an i.f. gain control of the threshold variety [5]. This is used to set the maximum gain of the receiver when no signal is being received, and in normal use will have no effect when a station is tuned in. When transmission stops, the receiver gain only returns to the level set by the control. If turned right up, it over-rides the a.g.c. completely, and functions as a normal manual gain control. This feature is useful for net operation, but is by no means essential, and has the disadvantage of requiring a negative bias supply. This supply does also enable a quieter muting system to be used, but if one does not want the additional complication the i.f. gain control can be omitted and muting carried out in the cathodes [1].

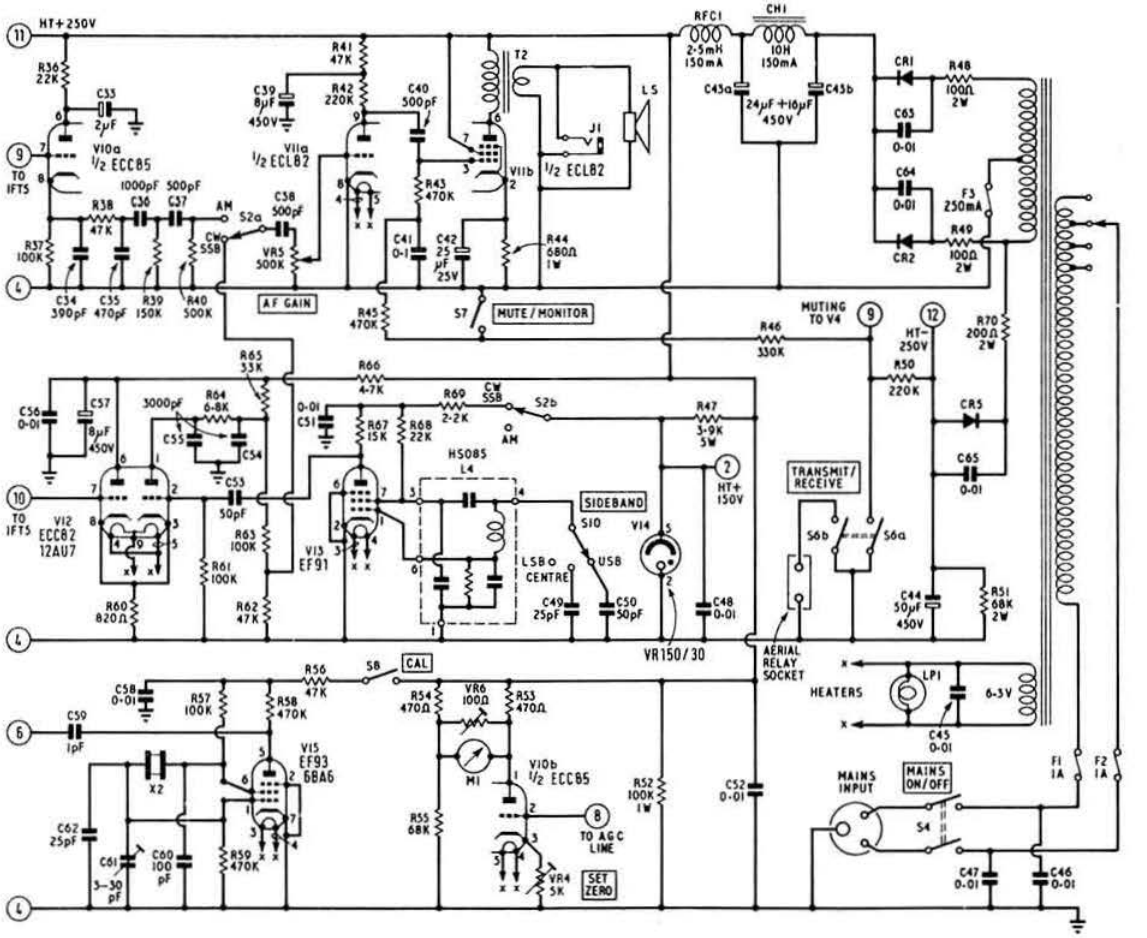


Fig. 5. The detector, b.f.o., audio, power supply, crystal calibrator and S meter circuits. The power supply may be fitted either on the main chassis, or built as a separate unit. The choke RFC should be mounted on the main chassis. R55 should be 2 watts rating.

The r.f. gain control is normally turned full up (and only backed off if cross-modulation is experienced), the S meter being calibrated to read correctly with this setting. As a.g.c. is only applied to the r.f. amplifier to aid the reduction of cross-modulation on strong signals, and excessive control would degrade the signal-to-noise ratio, the a.g.c. voltage to this stage is reduced. The cathode potentiometer VR1 is available to control signals that cannot be handled by the reduced a.g.c.

The noise limiter is of the Bishop type [6] connected across IFT5. It is most effective on s.s.b. and c.w.; for those modes the clipping level is set by the preset control VR7. The degree of clipping used for c.w. and s.s.b. would introduce bad distortion on a.m. and R22 provides a more suitable level for this mode, on which an audio limiter is really more effective. A thermionic valve is used in preference to semiconductors. The OA81 type is definitely not suitable, but the silicon variety may be better. Incidentally, those using the audio limiter described in the Mk.1 article will find that it works much better with silicon diodes of the OA202 type, rather than the OA81's specified. Sub-standard OA202's are currently obtainable very cheaply on the surplus market.

The writer is not seriously troubled by impulse noise and has found these precautions to be quite adequate except during thunderstorms, when it is safer to ground the aerials and forget about Amateur Radio anyway. However, those living in industrial areas may want to try one of the noise blanking circuits. The type with an input before the i.f. stages are generally best, and information on the various possible arrangements is given in references [6, 7, and 8].

Selectivity

Three double tuned i.f. transformers at 85 kc/s are used, as in the Mk.1 design. This gives a bandwidth of about 2 kc/s at −6db and 5-6 kc/s at −60db and is about the best compromise that can be obtained for the price. Crystal or mechanical filters will give a better shape factor for s.s.b. but they are much more expensive. It would be useful to provide variable selectivity, and one way in which this can be done, is to use pairs of i.f. transformers with variable bottom capacity coupling. Details of this system are given in reference [4].

The Mk.1 receiver had an external *Q* multiplier at 1·6 Mc/s. This frequency was used because it was hoped that the *Q* multiplier would be able to assist in the prevention of cross-modulation at the second mixer. In practice it was rarely needed for this purpose, and with the two transformers now fitted it would be needed even less.

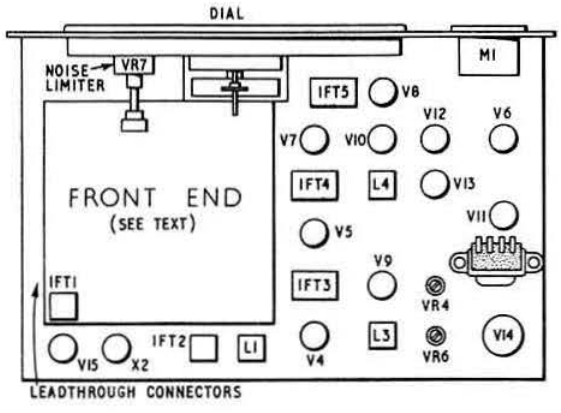


Fig. 6. Above chassis layout of the receiver.

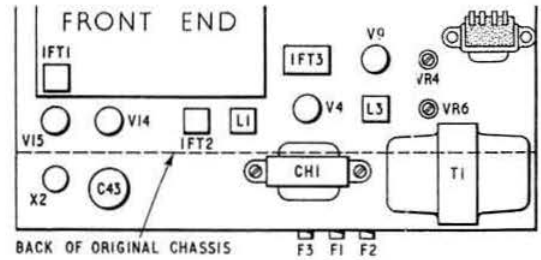


Fig. 7. Alternative above chassis layout to include power supply. The part not shown is identical to Fig. 6.

It should be possible to get a much better peak at 85 kc/s, but early experiments proved disappointing. A re-examination of the *Handbook* circuit suggested that, whilst a 2·5mH choke was fine for 465 kc/s and above, the value for 85 kc/s should be very much higher. 10mH seems to be satisfactory, although some writers [9] have specified as much as 100mH for this component.

An alternative arrangement used by the writer (Fig. 3), which only provides the peak function, eliminates the choke altogether, and when " cranked up " provides a very sharp peak for c.w. work. The other half of the valve was used as a relay amplifier, but many constructors will doubtless wish to include the " notch " function. They can use the standard *Handbook* circuit with a 10mH choke and a tuning capacitor connected from the anode of the valve to earth. The 25pF capacitor specified for the peak only circuit just moves the peak a few hundred cycles as an aid to tuning, and if full coverage of the passband is required, as for the notch filter, the value must be increased to 150pF.

Readers who are content with the peak function only could use the spare half of the valve for the S meter, a diode detector for a.m. and eliminate V10 altogether. Alternatively, V7 could be modified to include the G2DAF S meter circuit [3].

Detectors

The voltage available at the secondary of IFT5 is too high for correct operation of the detectors, as it has purposely been

Components Information

CR1, 2, 5, 1000 p.i.v. 300mA silicon diodes.
CR3, 4, OA202 or similar small silicon diodes.
Metalwork, (Philpotts Metalworks Ltd.).
With power supply
Chassis 13⅜ in. × 11 in. × 2½ in. 16 s.w.g. aluminium.
Cabinet 14¾ in. × 11¼ in. × 7½ in.
Without internal power supply
Chassis 13⅜ in. × 9 in. × 2½ in. 16 s.w.g. aluminium.
Cabinet 14¾ in. × 9¼ in. × 7½ in.
Front Panel 14¾ in. × 7½ in. ⅛ in. thick aluminium.
Dial and drive, Eddystone type 898.
Knobs, Eddystone.
Front End, QP166 Amateur Bands Qoilpax (Electroniques (Felixstowe) Ltd.) or see text.
IFT1, 2, Electroniques 1·6 Mc/s Series 1 type DIF4.
IFT3, 4, Electroniques 85 kc/s Series 2 type DIF1.
IFT5, Electroniques 85 kc/s Series 2 type DIF1/D.
M1, 0-1mA moving coil meter.
T1, 250-0-250V, 150mA, 6·3V, 5½A mains transformer, with 200/250V primary.
T2, Output transformer. 9000/3 ohms, 2 watt type.
L1, 50-75μH, DLM14, Electroniques Ltd.
L2, 85 kc/s *Q* multiplier coil type QL9, Electroniques Ltd.
L3, 3·2-5mH type DLM26, Electroniques Ltd.
X1, 1537 kc/s (see text of Mk. I article July, 1963).
X2, 100 kc/s bar. (QCC etc.).
PL1, 6·3V 150mA pilot lamp.

increased to provide better a.g.c. characteristics. The detector inputs are thus tapped down a capacitive potential divider which replaces the internal capacitor across the transformer secondary.

The a.m. detector, which is of the infinite impedance type receives more input than the product detector as it is less easily overloaded, and also a very lossy filtering network is fitted in its output to provide some compensation for the severe top cut produced on a.m. signals in the i.f. strip.

The product detector again uses a twin triode, but the values have been changed to give improved performance.

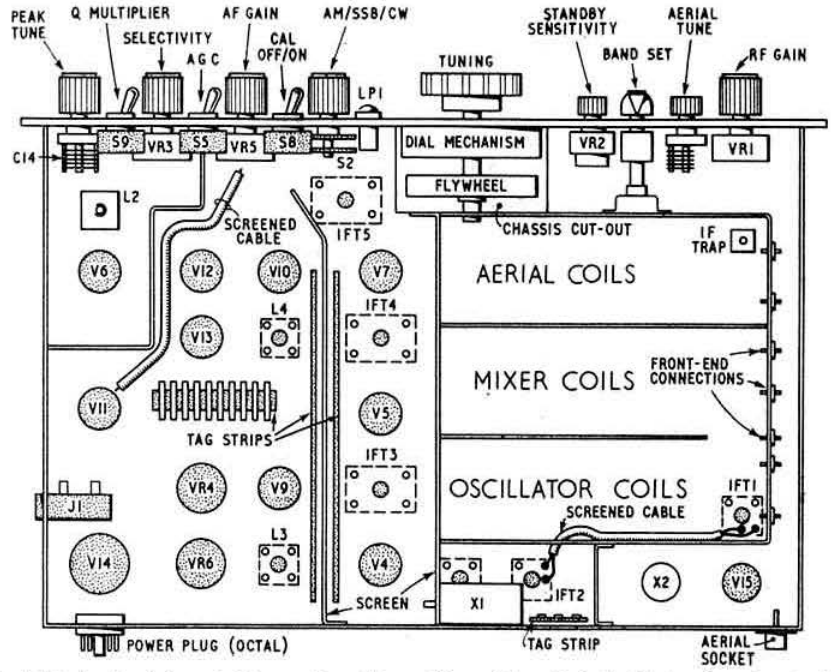


Fig. 8. Under chassis layout of the receiver. The positions of the coils in the Electroniques front end were given in the Mk.I article.

S Meter

Several readers had trouble with the S meter circuit used in the Mk.I, and further experiments showed that the adjustment was very much more critical than had first been thought. Correctly adjusted, the linearity was excellent, but a change of valves was often enough to throw the whole thing off balance. A rather more conventional circuit, which nevertheless gives excellent results and thus been included in the new version. The other half of the ECC85 used for the a.m. detector is connected in a simple bridge circuit, in which VR6 is adjusted so that the meter can never hit the stop, and VR4 is used to set zero. A 12AU7 would be equally suitable, but would give a slightly different calibration. The writer used a 6db step TV attenuator at the aerial input for calibration purposes, and the scale so obtained was nearly linear, and accurate enough for normal purposes.

B.F.O.

The b.f.o. circuit (Fig. 5) is the same as that used before, except that it is switch tuned. In the writer's receiver three positions are provided—u.s.b., l.s.b. and centre (for netting). Some readers may prefer to provide u.s.b./l.s.b. on the mode switch with automatic selection of the usual pitch control for c.w.

No provision is made for switching sidebands on an s.s.b. signal for sideband suppression measurements, etc. The best way of doing it on this receiver would be to provide a second conversion crystal $85 \times 2 = 170$ kc/s above the one already fitted, and to interchange these for switching sidebands. The same effect can be obtained by using a v.f.o. instead of the crystals and switching a preset capacitor across the tuned circuit to give the 170 kc/s shift. With either method a long extension shaft on the mode switch would be necessary.

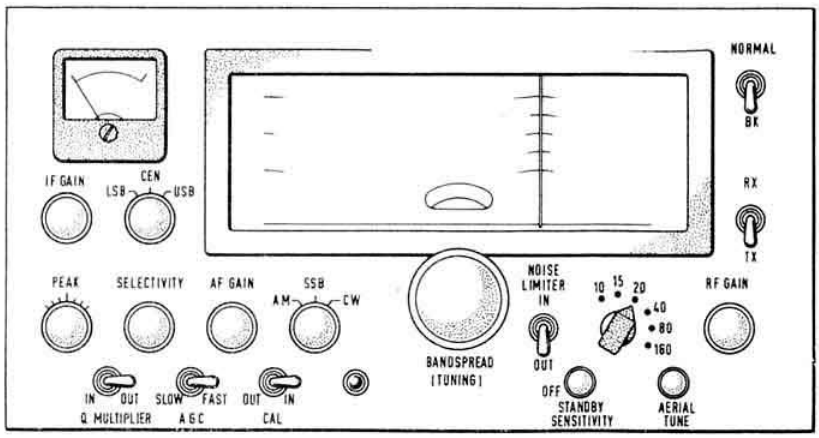


Fig. 9. Front panel layout, showing the positions and functions of the controls.

Audio Stages

An ECL82 is used as a.f. amplifier and output stage. The coupling capacitors are selected to give fairly drastic bass cut, to balance the treble cut in the i.f. stages, and an extra filter is included in the output of the a.m. detector as the sideband clipping effect is more noticeable in this mode.

The writer uses low impedance phones and connects them across the secondary of the output transformer; but if high impedance phones are used, the arrangement suggested for the Mk.I is more satisfactory. Of course, the best system is to use an output transformer with a 500 ohm tapping, but these seem to be rather hard to come by at reasonable prices.

Muting and Control Circuits

The prototype includes a relay amplifier and differential keyer which the reader is unlikely to want to duplicate. The writer originally hoped to include full break-in, but found that this would either be very noisy, very complicated or involve a loss of performance in the receiver, and was thus abandoned in favour of automatic changeover breaking between letters.

One or two muting systems may be used. The simpler breaks the cathode circuit of the r.f. and i.f. amplifiers, and this will provide either listen through or complete cut-off, but tends to be a little noisy. The other (Fig. 5) requires a negative bias supply which is fed to the second mixer grid, and gives sufficient reduction in gain for the transmitted signal to be monitored on the receiver. If this system is used, the second mixer must, of course, be disconnected from the a.g.c. line, but the effect upon the a.g.c. characteristics is small. If complete muting is required, the a.f. output stage is also biased off via S7 which is part of the stand-by sensitivity control. Thus the station transmitter may be automatically monitored at any desired level or cut off completely.

Muting via the a.g.c. line did not prove practicable, as the recovery time was too long when the a.g.c. was set to SLOW.

Details of the cathode muting system were given in the Mk.1 article.

Mechanical

Most of the comments made in the Mk.1 article still apply. The prototype chassis is 13¾ in. × 9 in. × 2½ in., but the depth should be increased to 11 in. if the power supply is to be included. The material used is 16 s.w.g. aluminium; the corners are welded and there is a ½ in. flange around the bottom. The front panel is made from ⅛ in. thick aluminium, and the side brackets were bent up from 16 s.w.g. sheet.

Much of the wiring is carried on two tag strips mounted either side of the central screen. The main cable harness distributing the power supplies (not heaters), a.g.c. control circuitry, etc., also runs along the top of the screen, allowing a reasonably neat layout and good accessibility for servicing and modification. It should be emphasised that, as a rule the tag strips should only be used for d.c. feeds—h.t., a.g.c. and so on. Components carrying r.f. or a.f. should be connected straight to the appropriate valveholder or transformer tag using the shortest possible leads. The leads from the a.f. gain control to V11, and from IFT1 to IFT2 should be screened. Ordinary TV type co-axial cable is suitable but rather bulky, and good quality screened microphone cable should be satisfactory.

In general the capacitors should be polystyrene or silver mica below 7000pF, disc ceramic 7000-15,000pF, plastic covered paper or polyester 15,000pF-0·5μF and electrolytic above 0·5μF. In particular the 0·1μF decoupling capacitors are 400V working Mullard polyester, Hunts Dipseal, TCC Plastiseal, etc., and the 0·01μF components are 500V disc ceramics. All capacitors associated with the variable oscillator or *Q* multiplier tuned circuits should be silver mica unless otherwise stated, but the polystyrene type is quite suitable for interstage coupling, etc.

Twisted pair was used for the heater wiring but it proved possible to earth one side without increasing the hum level. The writer has tried this on several pieces of equipment, and it is usually satisfactory, but occasionally a worthwhile reduction in hum may be had by using balanced wiring. Some difficulty might be experienced in fitting the front end chassis into its cut-out on the main assembly. The writer cut the bandswitch spindle short, and then fitted an extension spindle from the outside, once the sub-chassis was in place!

In order to keep the size and weight down, it was convenient to use an external power supply, but there is no reason why it should not be included on the main chassis if its depth is increased by about 2 in. and the components at the rear are suitably rearranged. In fact there is quite a bit of spare space there, where the writer fitted the keying and changeover circuitry. Details of a suggested layout are given in Fig. 9.

Alignment

The alignment of the i.f. strip is more or less as for the Mk.1 and it is not proposed to give details for the front end. Anyone who is not familiar with the procedure is well advised to leave it alone and refrain from making modifications any more drastic than the fitting of an aerial trimmer.

This receiver has been in use at the writer's QTH for the last nine months and has worked extremely well. The overall improvement on the original model is considerable and the project has been most worthwhile. Many of the ideas here could easily be applied to an existing Mk.1 receiver, and, of course, there is ample scope for the reader to incorporate his own pet gadgets and modifications. Variable selectivity [4] would be particularly worthwhile.

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[3] "Some Notes on the Construction and Alignment of the G2DAF-type Receiver." George C. Monkhouse, BRS25729. BULLETIN, June 1964.

[4] The DCS-500 Receiver. ARRL *Handbook*, 41st Edition, 1964, p.133.

[5] *Communication Receivers*, p.19. G. R. B. Thornley, G2DAF. RSGB Publications.

[6, 10] "Added versatility for the HBR16." William E. McKay, W7QBR. *QST*, January 1963.

[7] "An Effective Noise Silencer." G. T. Sassoon, G3JZK. *Short Wave Magazine*, August 1962.

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TECHNICAL TOPICS By PAT HAWKER, G3VA

Pressure on Frequencies . Transistorized Bridge Oscillator . Japanese Receivers . 73 Magazine Constant Output Amplifier . Simple Automatic Level Control . Single-loop Quad Diodes for Relay Control . Recharging Dry Batteries . Voltage-controlled Amplifier Regenerative Detector

A RECENT *Technical Topics* referred to the ever increasing demands by communications services for more frequencies. That this situation applies not only on h.f. but also on v.h.f. and u.h.f. was brought home strongly at a recent IEE/IERE conference on mobile communications where many speakers described the acute pressure on the bands of frequencies allotted to " land mobile " services.

Over the years, mobile communication has grown until it now includes far more transmitters than for any other services, including amateurs and the rapidly growing Citizen's Band of the United States and some other countries. In the UK there are now some 70,000 mobiles for the public services (police, fire, etc.) and the number is doubling roughly every three years. In the USA such transmitters are now numbered in millions.

Some idea of the resulting pressure—and the possible effects on amateur allocations—can be gathered from a speech made by Mr J. R. Brinkley, one of the leading figures in the British commercial mobile field, in the United States and referred to by him at the London conference:

" Land mobile radio users . . . would be wrong to eschew the value of international co-operation. . . . The world's radio amateurs have been most successful in obtaining substantial frequencies. . . . In Britain 10,000 amateurs have 32 Mc/s of the v.h.f./u.h.f. spectrum compared with land mobile's 30 Mc/s . . . land mobile radio has many more equipments in operation than all other communication services put together . . . yet frequency space is totally inadequate. . . . I believe that the aim should be to clear 136-178 Mc/s for land mobile leaving existing maritime and amateur allocations undisturbed. The 450 Mc/s aim should be to extend the band downwards to 420 Mc/s . . . a suitable interstice should be left for amateur operation . . . 420-470 Mc/s will then yield 1,000 (mobile) channels."

These extracts indicate the danger in which both 144 and 432 Mc/s amateur bands may be placed before long—particularly since some commercial users may be far less concerned to take note of amateur needs than Mr Brinkley who is managing director of Pye Telecommunications, the major British manufacturer of mobile equipment.

The London conference yielded rather less information of practical value to amateurs than might perhaps have been expected (and what a pity it was that no papers describing amateur work were presented at either this conference or the one on h.f. communications held in 1963). Improved stability, largely resulting from the recent miniature glass-encapsulated crystals, now allows mobile channels only 12½ kc/s wide (original commercial allocations were of 100 and 200 kc/s per channel). There was also some interesting information on v.h.f. and u.h.f. propagation and on the miniature transceivers which have been developed for use around 90, 160 and 460 Mc/s by a number of firms for such applications as police personal radio.

For instance, a paper by D. A. S. Drybrough (GEC) showed that with outputs of 350 mW, 250 mW and 100 mW respectively the ranges from a higher power base station on these frequencies could be expected to be 2·2, 2·2 and 1·4 miles in 90 per cent of locations. Much longer ranges could be expected even with this power in favourable conditions.

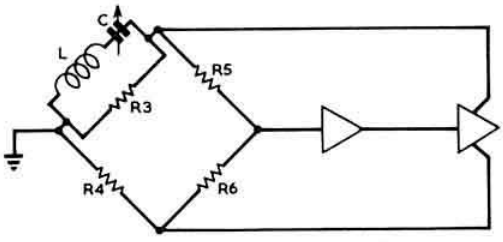


Fig. 1. Basic principle of a bridge oscillator.

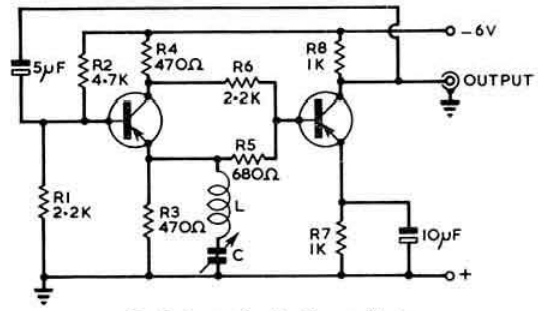


Fig. 2. A practical bridge oscillator.

Transistorized Bridge Oscillator

ZL4LI in *Break-In* (October, 1965) directs attention to the transistorized version of a Wien bridge oscillator for use as an h.f. oscillator which he finds more stable and less critical of adjustment than Clapp or Franklin transistor circuits. The circuit was earlier described in the *Journal of Scientific Instruments* (1962, 39, p. 646) for use at around 100 kc/s.

A simplified block diagram (Fig. 1) shows the principle of operation. R3, together with the tuned circuit, and R4, R6 and R5 form a bridge circuit connected between input and output of a two-stage amplifier. At resonance the series-tuned circuit forms virtually a short-circuit across R3 causing the bridge to change from the negative feedback condition to positive feedback, and hence it oscillates at this frequency.

The attraction of this type of circuit is that ideally the external circuit conditions do not affect the resonant frequency. It is claimed that by carefully balancing the bridge the effects of temperature and voltage changes on the transistors can be reduced to the point where it is the effect of temperature on the tuned circuit itself which becomes the most important factor contributing to drift. The tuned circuit, incidentally, can be directly replaced by a crystal to form a frequency standard.

ZL4LI reports that at 3·5 Mc/s a recognizable one-to-one Lissajous figure remained on the oscilloscope for a minute or more, when the variable oscillator was compared with a crystal reference oscillator. He suggests that the circuit will work well with most r.f. transistors, though some difficulty

was experienced using OC44 types at 3·5 Mc/s. Other types (2N274, 2SA93, AF117, etc.) worked without complaint throughout the h.f. range and ZL4LI believes that the circuit would work at lower v.h.f. He points out that if it is necessary to increase the feedback, this may be done by increasing R5 or decreasing R6.

Japanese Amateur Communications Receivers

A review of Japanese receivers for amateurs and short-wave listeners (*Japan Electronics*, November 1965) lists altogether some 11 different models from five manufacturers: Trio Corporation; Mita Musen Laboratory Co. Ltd.; Star Co. Ltd.; Yaesu Musen Co.; and Solar Co. Ltd. The article states that the number of amateurs in Japan has now passed 41,000 although only 14,650 of these are members of the Japanese national society.

The journal makes the criticism that while many of the sets are electrically " fairly superior " it considers that they are " inferior in mechanical characteristics to the overseas products." It cites loosening and backlash of dial mechanisms which it says are used because limited cost does not allow manufacturers to use high-grade gear systems, resulting in the use of cord drives to reduce the backlash which would be obtained with cheap gears. This seems to be rather severe self-criticism since a number of firms (such as Drake) have shown that the cord drive can be an effective mechanism. Many of the receivers would appear from their specifications to be capable of high performance, and many of course are appearing in British stores. Yaesu Musen have developed an associated s.s.b. transmitter (the FL100B). One or two of these transmitters are already in use in the UK.

Probably the most interesting among the current designs are:

Trio JR300S: double conversion with crystal-controlled front-end and mechanical filter, switchable upper and lower sideband b.f.o. crystals, covering seven bands each 500 kc/s wide. This is the basic model of the Lafayette HA350 reviewed by G3EDD in the February BULLETIN.

Star SR600A: triple conversion on higher bands; crystal-controlled front-end; third i.f. 55 kc/s. Five bands each 600 kc/s wide. Tunable section 3·4-4·0 Mc/s. Second i.f. 455 kc/s. Four-stage LC variable selectivity filter at 55 kc/s.

Star SR550: double conversion, i.f. 1·65 Mc/s and 55 kc/s; seven bands 1·8-54 Mc/s.

Yaesu Musen FR100B: this is part of an s.s.b. line with the FL100B transmitter, and provides a v.f.o. output between 4·9-5·5 Mc/s. Crystal-controlled front-end. 5·955-5·355 Mc/s tunable first i.f. and 455 kc/s second i.f. Crystal filter and 2 kc/s and 4 kc/s mechanical filters. Covers five 600 kc/s bands between 3·5-29·1 Mc/s with provision for any three additional bands between 1·8-30 Mc/s.

Solar NT110: This is a conventional four band (3·5-30 Mc/s) double superhet (i.f. 2·18 Mc/s, 150 kc/s) with separate bandspread tuning mechanism for amateur bands. The second oscillator has a 2·33 Mc/s crystal.

At least one of the low-priced Mita Musen as well as Trio and other Japanese receivers is marketed in the US under the Lafayette brand name.

Selections from "73"

Although we try to scan as many overseas journals as possible (limited by the resources of the Patent Office and other libraries) we must admit there are some amateur magazines which we manage to see only at irregular intervals. One of these is *73* but (thanks to G2AHL and RSGB headquarters) we have recently been catching up on a batch of 1965 issues. The publisher, W2NSD, keeps up a no-holds-barred running argument with ARRL and also with those occupying his former editorial chair at *CQ*. But whatever one may think of his outspoken views on current amateur controversies, it is clear that *73* has come up fast during its first five years of existence and today manages to pack in a lot of helpful advice, with the emphasis very much on devices suitable for home-construction.

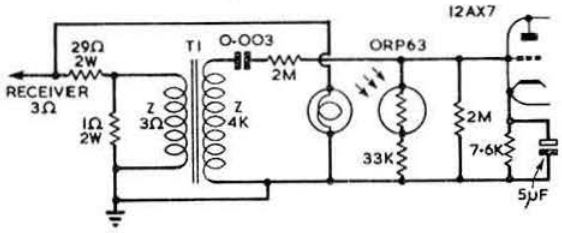


Fig. 3. The control circuit of a constant output amplifier. T1 is an output transformer.

Photoconductive Cells for A.L.C. and Constant Output

Way back in February 1963 (see also *TTfiRA*, page 19) we suggested how the combination of a photoconductive cell and a pilot lamp could be used to remotely control audio gain. A proprietary combined cell and lamp (Rayvistor) was later reported, but at appreciably higher cost than for separate units.

Several useful applications for this type of combination have been spotted in *73*, including a constant output amplifier (May, 1965) and as an easily added automatic level control for such transceivers as the NCX3 (W2KAK, November 1965). This latter article inspired G3WW to try out this idea, and he reports that, after introducing some modifications, the technique has proved most successful.

In the receiver application, the pilot bulb is powered from a low impedance audio output socket (with normal speaker disconnected). A small amount of the audio output is taken from an attenuator network to a three-stage audio amplifier (12AX7, 6AQ5). The gain of the first 12AX7 section is controlled, as in the original 1963 circuit, by a cadmium sulphide cell (listed as an Amperex ORP63 but as this company handles Mullard equipment in the United States, a Mullard cell could almost certainly be substituted). Fig. 3 shows the heart of the unit.

It is claimed that once the gain control in the receiver has been set so that most signals are limited in output by the cell, the speaker volume can be set as required by a gain control in the second 12AX7 stage. Then no matter whether a loud or weak signal is being received the audio output should stay reasonably constant.

Automatic Level Control

While a device such as the above can obviously be an operating convenience for receiving, the W2KAK automatic level control can also be used on transceivers to increase talk power without causing splatter. In this circuit (see Fig. 4) the control pilot bulb is powered from a loop coupled to the r.f. output tank of the transmitter (preferably by means of a swinging link which should be well insulated) and is adjusted

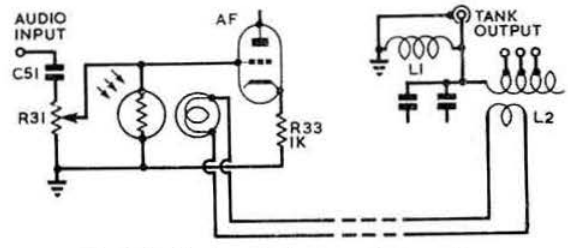


Fig. 4. Application of a.l.c. to s.s.b. transceivers.

so that audio gain increases on low r.f. output. The cell in this case is quoted as a Lafayette No. 99G6309 (and this is the type used by G3WW) but we suspect that an ORP-type cell could be used without difficulty.

W2KAK states that the thermal inertia of the tungsten filament of the pilot bulb in combination with the 100 millisecond delayed action of the photoconductive cell allows the transmitter to approach nearly full power before limiting action occurs. Furthermore as the power to the filament increases, the lamp brightness rises very rapidly, so that the peaks are clipped in a rounded manner rather than sharply, and thus should not cause spurious signals.

G3WW writes: " I have fitted the cell and bulb (6·3 V, 0·1 A) as directed in *73* but found it needed two turns of wire in the p.a. tank coil instead of just one, and even this needs a 5·3 V bulb to reduce the 10 Megohms of the cell down to the 9000 ohms of the arm of my microphone gain potentiometer to earth. One turn even with the 5·3 V bulb would not bring the resistance of the cell down to below 20,000 ohms. Two turns will bring it down to 5000 ohms on full talk. It certainly does give a.l.c. as claimed."

Single-loop Quad Aerial

Another of the *73* articles which attracted my notice was that by W6WAW (*73*, September 1965) on a single-loop quad aerial, with which he has been working DX out of North Fairfax Avenue in Hollywood—a busy street just under the Hollywood Hills which we well recall going along last year, and which is certainly far from an ideal QTH. (G3WW could probably also confirm this since he also made a trip to the land of the Californian kilowatts at around the same time.)

W6WAW built and put up this 14/21 Mc/s aerial " in less than two hours." It is simply a single quad loop which can later be converted to the more conventional two loop quad for greater gain: Fig. 5. Feed impedance is theoretically around 125 ohms but W6WAW has used it with RG59/U coax (75 ohms) quite effectively. He says that 7 Mc/s operation is possible by connecting a 28 ft. 9 in. length of 300 ohm twin lead, shorted at the far end, across the feed point, without affecting 14 and 21 Mc/s working.

The aerial was built using a bamboo framework with a basic spider consisting of a 12 × 12 × ¼ in. square of aluminium with 8 ft. of 1 in. aluminium angle stock—but any of the usual quad constructional techniques could be used.

Tricks with Diodes

A few years back, one of the most popular of the various technical quiz questions was to work out what was in " black boxes " which allowed separate circuits to be con-

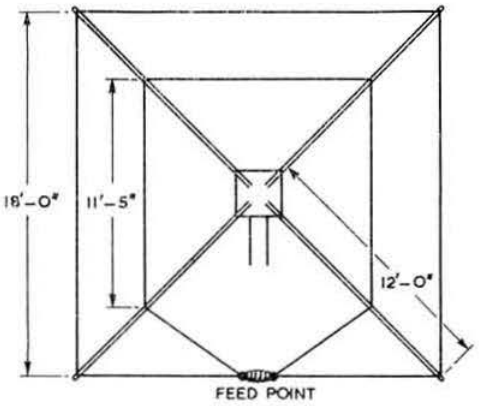


Fig. 5. W6WAW's simple DX aerial using a single quad element.

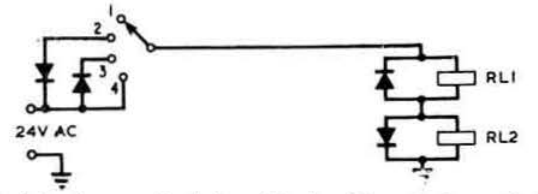


Fig. 6. A relay control unit. In position 1, neither relay is energised; in position 2 RL2 is energised; in position 3 RL1 is energised; while in position 4 both relays operate.

trolled over a single line. The answer consisted of the ingenious use of diodes. Now much the same techniques turn up in a WB2CCM article " The ultimate transmitter control " (*73*, September, 1965) showing how two separate relays can be energized individually or together over a single wire. It is not intended here to attempt to go into any detail of just how WB2CCM uses these and similar tricks in his control unit, but Fig. 6 shows the basis of the device. Low voltage silicon diodes are used in conjunction with a 24 V energizing transformer and relays rated at 12-24 V d.c. Other possible applications will probably occur to readers.

Voltage-controlled Amplifier

The use of a photoconductive cell, as mentioned earlier, is not the only way in which the gain of an amplifier can be controlled remotely by means of a d.c. voltage. An *n-p-n*

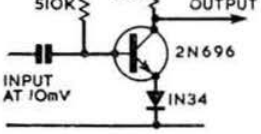


Fig. 7. An amplifier providing voltage-controlled gain.

transistor used as a voltage-controlled amplifier was noted in *Electronic Design*: see Fig. 7. By varying the potential on the base, it is claimed that the gain can be changed over about 40 db with little distortion of signals from 100 c/s to over 100 kc/s.

Recharging Primary Batteries

On various occasions we have pointed out that some degree of recharging of layer batteries can be achieved using charging currents of the order of a few milliamps. In this connection, we noted in an extensive coverage of batteries (*Electronics World*, October 1965) a quotation from the US National Bureau of Standards on the subject of recharging conventional carbon-zinc Leclanché dry cells.

" From time to time attention has been turned to the problem of recharging dry cells. Although the dry cell is normally considered a primary battery it may be recharged for a limited number of cycles under certain conditions. Briefly these are:

(i) The operating voltage on discharge should not be below 1·0 V per cell when the battery is removed from service for charging.

(ii) The battery should be placed on charge very soon after removal from service.

(iii) The ampere-hours of recharge should be 120-180 per cent of the discharge.

(iv) Charging rate should be low enough to distribute recharge.

(v) Cells must be put into service soon after charging as the recharged cells have poor shelf life.

In general, recharging of dry cells may be economically feasible only when quantities of dry cells are used under

controlled conditions with a system of exchange of used cells for new ones already in practice, and with equipment available to provide direct current for charging. Recharging of cells which are not specifically designed for charging can be dangerous since excessive amounts of gassing from too high current may cause a tightly sealed cell to explode."

Regenerative Detector

QST (January 1966) gives an English-language version of a DJ1ZB design (originally published in *DL-QTC*) for a five-band, three-transistor straight receiver (regenerative detector plus two-stage audio amplifier) intended to provide a compact receiver for portable c.w. use, etc. The interesting part of the design is the regenerative collector-detector circuit, which it is claimed gives a superior performance both to regenerative base-emitter transistor detectors and to regenerative valve detectors. Since a slightly different aerial input circuit is used on 3·5 Mc/s to those on other bands, the arrangements for both 3·5 and 7 Mc/s are shown; other bands use a similar circuit to that of 7 Mc/s. It is claimed that although the receiver, like any other straight circuit, is subject to strong-signal overload it otherwise delivers excellent performance and is a welcome addition to portable equipment.

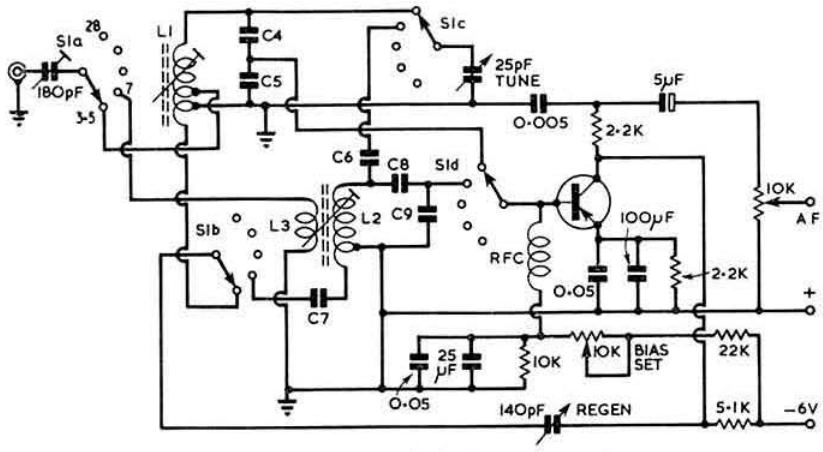


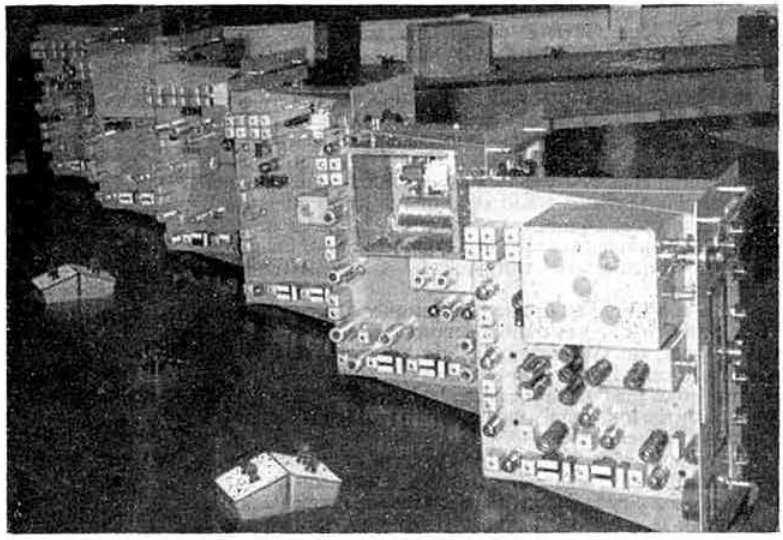
Fig. 8. Detector stage of the DJ1ZB straight receiver.

Mc/s	L1	L2	L3	C4	C5	C6	C7	C8	C9
28	—	13t., tap 2t. from S1b 20 s.w.g. enam.	1t.	—	—	18	47	27	200
21	—	11t., tap 2t. 24 s.w.g. enam.	1t.	—	—	12	33	50	500
14	—	18t., tap 2t. 24 s.w.g. enam.	1t.	—	—	12	50	50	500
7	—	29t., tap 3t. 24 s.w.g. enam.	1t.	—	—	15	80	100	1000
3.5	69t., tap 9t. 28 s.w.g. enam.	—	—	120	1600	—	—	—	—

Coils are wound on ⅜-in. slug-tuned formers.

In the circuit diagram shown, the wave change switching accounts for the complexity, but a simple adaptation could be made either for fewer bands, or for plug-in coils. The transistor in the *QST* version is an RCA 2N1177 but European types such as the OC171 and AF115 could be used.

Wirral Amateur Radio Society Construction Scheme



By NORMAN KENDRICK, G3CSG *

AN article appearing in the *Newsletter* of Wirral ARS prompted a discussion on the merits of commercial equipment and home-built apparatus. Many interesting theories were put forward on either side including cost, reliability, knowledge gained in building, hire purchase systems, etc. The writer, a keen home constructor, was convinced that home-built equipment had many advantages over the commercially built product, but suffered certain disadvantages, as follows:

(i) Finish, i.e. painting, engraving, metalwork
(ii) Initial cost of components
(iii) Lack of confidence that the apparatus would function well when completed
(iv) Time required to construct
(v) Workshop facilities for the individual
(vi) Test equipment required to " line up " the product

If these disadvantages could be overcome then it was felt that first-class equipment could be built with a tremendous saving in cost, since the purchaser would be providing the labour, an item which is considered to be the major factor in determining the price of most goods.

Many members of the society were desirous of building the G2DAF single sideband transmitter, while others were wanting a good a.m. transmitter. If some system could be found of overcoming the difficulties enumerated then there was a distinct possibility of more home-built equipment being produced in the Wirral Amateur Radio Society.

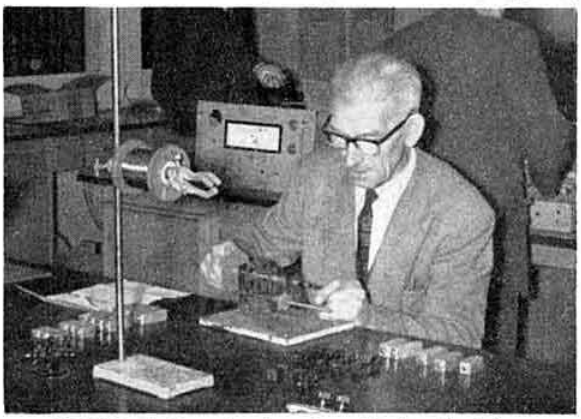
Accordingly, the writer proposed a self-build scheme to club members a few weeks after the original discussion. It was suggested that members wishing to build either an s.s.b. or a.m. transmitter should form a group and pool their knowledge and ability, in a determined effort to build first-class transmitters for themselves, of good appearance and reliability which would rival commercial equipment both in performance and cost. Bulk purchase of components—the best of government surplus or the usual marketed items would further reduce cost. A local sheet metal worker would cut and bend the steel chassis, panels and brackets, leaving only the drilling of holes and cut-outs for various components. Stove enamelling, with a wide variety of finishes, was offered by a local enameller, whilst a firm of engravers offered to produce the various dials and labels. Clearly, finish would be of a high order. The problem of premises on which to build was met by the local evening institute which has an excellent record, particularly with facilities for non-vocational classes. It must be pointed out, however, that the writer has strong connections with the institute, and his own laboratory forms the base at which the group meet.

* 77 Grampian Way, Moreton, Cheshire.

Cost

It was estimated that the cost of the transmitters would be in the region of £40, and since some two dozen members were keen to participate in the scheme, the best part of £1,000 of members' money would be involved. To set the scheme on a sound financial footing, a treasurer with experience of such matters was elected to look after the financial side of the venture. There was no need for a large initial outlay of money on the part of the individual, since all the components would not be required at the outset. Accordingly members paid in a sum of money each week, and when this was pooled a start was made on the purchase of initial components, such as metalwork and hardware.

One of the members, G2FOS, has considerable experience with sideband transmitters, and guaranteed that, by using



G3AKW winding coils using a home-made coil winder.

pooled test equipment and the layout suggested, coupled with a modified G2DAF circuit, the transmitter would function well. The writer offered a similar guarantee to the builders of a.m. transmitters. Test equipment in the group consisted of inductance bridges, multi-range test meters, valve voltmeters, wobbulators, oscilloscopes, signal generators, frequency meters, etc.—more than sufficient for the group's needs.

The initial stages of the venture consisted of discussions to determine the layout and style of the transmitters, and though the basic circuitry and layout is identical in each transmitter, each individual had an opportunity of including his own particular minor modifications to suit his own requirements.

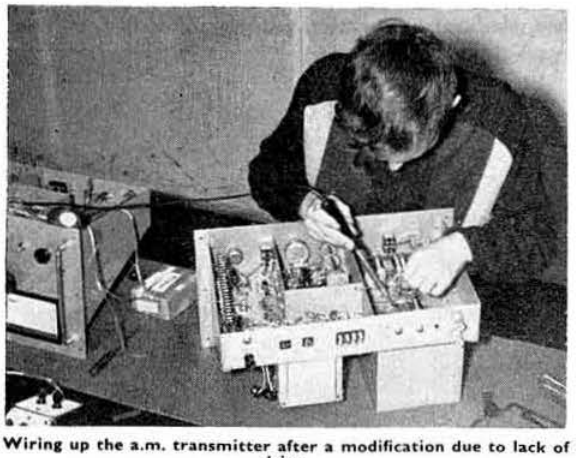
It was considered advisable to meet only one evening per week, and this time was mainly devoted to advice on layout, marking out, etc. Workshop facilities were provided by the metalwork centre, where power tools were available to ease the burden of the " metal bashing." Further work was done at home by the individuals, such work requiring the minimum of tools and facilities.

The completed metalwork was then sent to a professional enameller for stove enamelling; chassis, brackets and screens being painted grey and front panels to the requirements of the individual. Most chose hammer silver grey, though some chose other colours. One conservative gentleman stuck resolutely to black crackle in order to match the remainder of his equipment!

By this time there was sufficient money in the pool to purchase capacitors, resistors, etc., and the wiring up commenced. At the time of writing, some transmitters are finished and were on display at the RSGB Exhibition 1965. Others are still being lined up; some are still being wired, whilst others have just returned from the enamellers.

This was found to be one of the snags in the scheme, the different speeds at which people work. Some work on their equipment most evenings of the week, whilst others leave them from one week to another. It has been found necessary to put a time limit on this venture, so that the scheme will finish by Easter this year. It is hoped by this method that the slower members will be encouraged to put in extra time at home, and so all transmitters will be completed by the spring.

To date few snags have arisen over the sideband transmitter, indeed those that are at present in use are giving a very good account of themselves. Strangely enough there was a snag over the a.m. transmitter—lack of drive. This has been rectified by a valve change, and it is expected that by the time this article appears in print these transmitters will be completed.



Wiring up the a.m. transmitter after a modification due to lack of drive.

Lining up a crystal filter in one of the s.s.b. transmitters.

For those interested in data on the transmitters the following information is given:

G2DAF Type s.s.b. Transmitter

This circuit follows closely the circuit published by G2DAF in the RSGB BULLETIN. The p.a. has been modified slightly, however, most constructors using a pair of 5B/254M valves in parallel. The p.a. stage in most transmitters has been boxed in, as has the v.f.o., which was built in an Eddystone die-cast box.

100 Watt A.M. Transmitter

This transmitter was based on the Geloso principle using three v.f.o. circuits, followed by buffer or doubler stages. The p.a. again is a pair of 5B/254M valves in parallel, and the buffer/doubler stages uses Z759 valves. More than sufficient drive is available on all bands, 160m-10m. For 160m working, one of the 5B/254M valves is switched out of circuit with an extra wafer on the wavechange switch. H.t. is also reduced from 450 V to 300 V. The modulator line up consists of 12AX7, 12AU7 and 5B/254M's in push-pull, giving more than 50 watts of audio to anode and screen modulate the p.a. Circuitry is quite conventional, though facilities have been included for sequential keying on c.w. and t.r. electronic switching.

The success of the venture largely depends upon the willingness of those with experience and knowledge to help others without. In the case of the Wirral Society we are fortunate in having several such members, and they have given their services willingly. To many amateurs, the possession of a six-band s.s.b. or a.m. transmitter costing less than £40 may well be sufficient to mark the venture an outstanding success, particularly when in appearance, robustness and performance it rivals its commercial counterpart, which costs much more. The writer is rewarded, however, by the fact that many members in the Group have learned a great deal about amateur radio in the process of building this equipment. As an educationalist he is convinced that " to do is to know." When a person pays out a sum of money to build a piece of equipment, there is a positive incentive to make the thing work.

There have already been suggestions that the group follows up its success by tackling other projects—a modern communications receiver perhaps!

Broad Band Balun

A 1 : 1 balun for use on all bands from 3·5 to 30 Mc/s and capable of handling up to 1kW has been introduced by K.W. Electronics Ltd. of Dartford, Kent. It is claimed that there is virtually no insertion loss.

The unit is designed for 50-70 ohm co-axial cable and as it weighs less than 4 oz. it is suitable for installation at the feedpoint of dipole aerials or beam arrays requiring a balanced input. The price is 35/-.

FACTS AND FIGURES ON FIELD DAY

By P. J. A. GOWEN, G3IOR*

FOR many years Norwich has taken part in National Field Day, and has always managed to put two stations on the air for the contest, despite the difficulty of finding sufficient staff for the weekend. Also, for many years, Norwich has been sufficiently lacking in points to make the thought of winning the competition a remote dream; this area of the British Isles appearing to have most of the disadvantages and none of the advantages, i.e., geographical separation from the main bulk of activity, no extra points allowed despite this, no high hills for ideal sites, and no

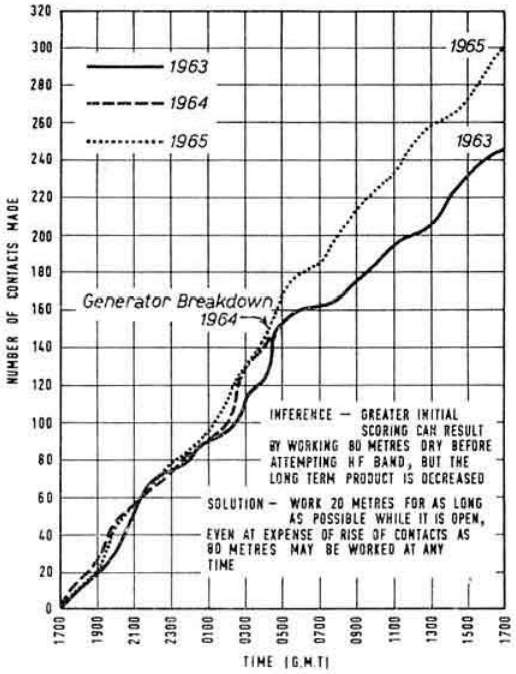


Fig. 1. Comparison of the rate of contacts made by G3IOR/P (Norwich " B " station) during NFD 1963, 1964 and 1965.

rare call-sign prefix to attract the distant stations. The only hope of winning, or even coming within sight of this, obviously lies in an improvement in station efficiency.

The results of a time and motion study, and the sifting of vast amounts of cause and effect data, have resulted in a number of quite interesting facts, and it is felt that these may be of use to the average group attempting to improve its score. Most of the evidence is produced here in graphical form, as this is by far the most digestable method of assimilating the information and then relating it to one's own station and score.

Fig. 1 shows the number of contacts made plotted against time, over the past three years. (The curve for 1964 ceases at 04.00 GMT. This was the time when the piston's conrod shot out of the side of the generator.) The most interesting points to note here are that the nulls and peaks all occur at about the same time each year, and that the higher the initial score from the first two hours working, then the lower the score of contacts towards the end of the contest. This was found to be due to early working on the low frequency bands, at the expense of the higher frequencies, as it was found that the lower frequencies were far more productive. The group has since learned that one can work the lower frequencies at almost any time, provided one does operate for one period during the small hours for long skip contacts, and one period during the day to catch the short skip. The high bands are only open for the DX beyond Europe for very limited periods, and this must be caught while it is available. Also, the lower bands can soon become exhausted, while there is a constantly changing and almost limitless supply on such bands as 20m. It can be seen that the bulk of early operation has been on the 20m band at G3IOR/P during the last two occasions, resulting in a much improved overall score, although with a lower place in the 80m listings.

Studying Fig. 2, the graph of contacts and points against time for 1963's NFD, the lower curve represents contacts average per hour at the time of the base figure, whilst the upper line indicates the number of points average per hour at the same time. These graphs were made from correlated information from the Norwich " B " station, G3IOR/P, which takes 3·5 Mc/s, 14 Mc/s and 28 Mc/s, and the " A " counterpart, G2YU/P, on the 1·8 Mc/s, 7 Mc/s, and 21 Mc/s bands. The dotted line indicates 14 Mc/s operation, the continuous line shows 3·5 Mc/s operation, and the letters along the time base indicate the operator who took over at that time. Note how, in most cases, a change of operator causes an initial drop in the rate of score, followed by a rise once he has settled in.

From this it was learned that an operator must be left to it while he is doing well, and only keep a tentative rota of

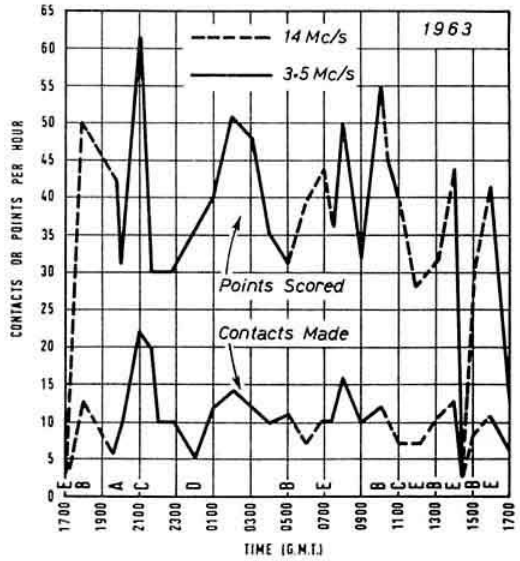


Fig. 2. The number of contacts and points scored by G3IOR/P during NFD 1963 plotted against time.

* 17 Heath Crescent, Hellesdon, Norwich, Norfolk.

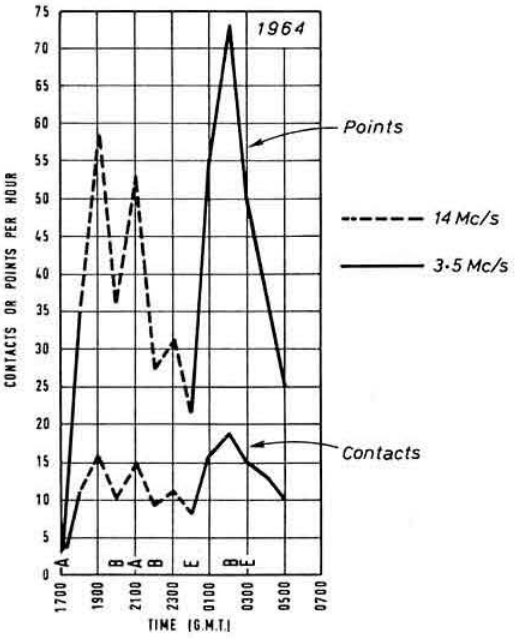


Fig. 3. G3IOR/P's scores and contacts plotted against time for NFD 1964.

operators. It was also discovered that if the incoming operator is logging for at least half an hour before he takes over, then the initial drop is not so deep nor so long lived, as by then he has had sufficient time to familiarize himself with the prevailing circumstances. You may also notice that at 05.00 in 1963, operator " B " went on to 20m. Operator " E " took over and immediately changed to 80m, probably having noticed that the number of contacts during a given period had diminished by the change. The number of contacts in time increased, but note that the actual points per unit of time on 20m were much higher than those from the 80m operation. It follows that he obviously should have stuck to 20m despite the apparent loss. Sure enough, it was found that Norfolk had put up a very good showing on 80m that year, but the 20m score was very poor indeed; lower than the average " B " station.

The 1964 graph, Fig. 3, shows that the club learned its lesson to some extent, and, apart from a short period at the beginning on 80m, due entirely to the fact that the 20m aerial had not by then been re-erected, the operators stuck to 20m until the band was dead. When operator " E " took over, he went straight on to 80m and had plenty of stations to work who by then were hunting under the layers of strong signals for stations that they had not worked. The following year, 1964, would have been a good year, but for the aforementioned generator breakdown at 04.00. Up till the time of closing down, the station was doing 21 per cent better on contacts, and 34 per cent better on points, with a big short skip day-reserve to come on both bands, which would mean that any blank periods of fruitless searching would have been very unlikely. It was generally agreed that the transmitter had been switched to 80m at the right time that year, and that the following year the 20m aerial must be put up first to ensure commencement on that band from the start. A reliable generator would also have to be found! The rate of change of operators was still too frequent, and so a longer period per person was agreed.

This was done the following year, 1965 (Fig. 4), but the initial operation was again on 80m, the reason being the same: for the third year in succession, the annual cult of quad breaking was performed! So NFD was under way with no 20m aerial to radiate but within 20 minutes a modified G5RV was erected that worked surprisingly well in the circumstances. Once on the band, the station continued to work it until it was dead, leaving a fresh band for a fresh operator at 00.01 GMT. From then onward, there was a dive in contacts and points each time 20m was tried, until 11.00 on the Sunday, but efforts of being prepared for a 10m opening every year paid off at last. The circled lines indicate the contacts and points deviations for this band. The greatest mistake in 1965 was the opposite of previous years, i.e., operator " E " was left with the rig for far too long, and he virtually had to be carried out of the operating tent at 07.00 after seven hours of continuous effort and no sleep. Note how the change of operator using the same band produced a rapid increase in the rate of score.

Other factors, not apparent from the graphs provided, have also influenced the efficiency of the station. One is the realization that an operator requires absolute silence in order to concentrate upon the job in hand. For this reason, no talking is permitted in the operating tent, and quite separate tents are provided for sleeping, cooking and storage. Visitors are entertained in the cooking tent, where the desired cup of tea is available, and from there they are conducted to the operating tent by one of the staff who explains the station. This prevents any intrusion into the operator's concentration. The only communication other than the contest that takes place within the station tent is between the operator and his logger, who gives indication as to whether to call a written down call-sign or not by a thumbs-up for go-ahead, or a thumbs down for worked. If any important communication must be given to the operator, then this is written down

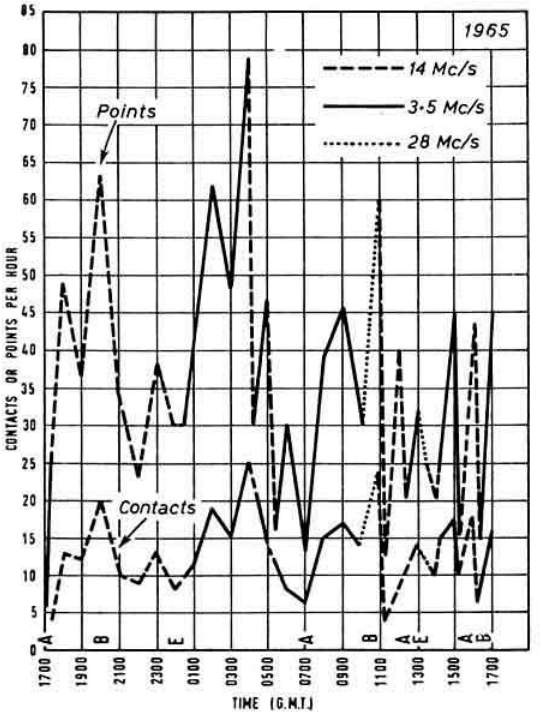


Fig. 4. G3IOR/P's scores and contacts plotted against time for NFD 1965.

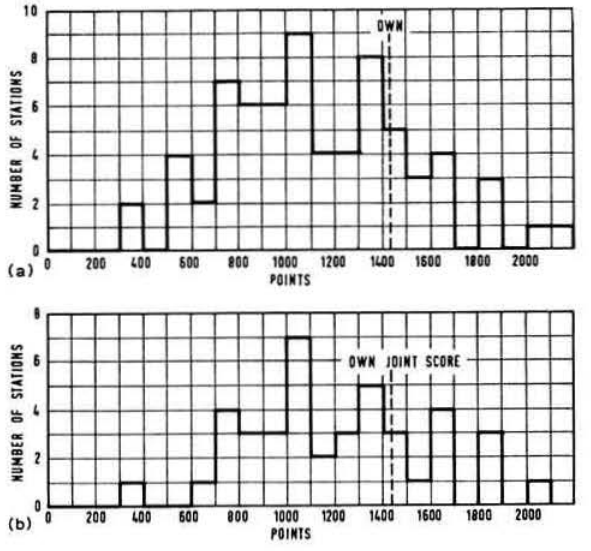


Fig. 5. (a) Points distribution graph for all group entries, irrespective of method of band sharing. (b) Points distribution for all groups using alternate band sharing system.

as a note, and placed in front of the operator who reads it at a time convenient to himself.

Station planning is started the week after the finish of NFD, i.e., one year ahead, by passing to each operator, logger and helper a circular letter, and requesting each recipient to write in his comments, criticisms, and his suggestions while the event is fresh in his mind. These are thrashed out at a meeting about three months before the next field day, and a rota of jobs and site visits ensues. Each person is delegated to a task, for which he is entirely responsible. One will undertake to provide station equipment, one the tents and furniture, one to arrange food, and so on. Therefore nothing is left behind, and little is duplicated. Every year someone suggests a dummy run but this has yet to become a reality! So much for Norwich's own planning. Let us now look at the results generally, and compare some facts and figures.

An Overall Survey

The results of NFD 1965 recently published† show 70 group entries, of which six were excluded owing to non-conformity with the rules. The single station entries brought the total number of entries to 144. If we divide the joint entry ("A" plus "B") stations into three groups, for instance the top, middle and lower thirds, it will be found that of the 70 competing groups, 42 used their "A" stations on 1·8, 7, and 21 Mc/s, and consequently their "B" stations on 3·5, 14, and 28 Mc/s. Only the winners and about six others showed any intentional deviation from this method, and they used their "A" stations on 1·8, 14 and 21 Mc/s, with their "B" stations utilizing 3·5, 7, and 28 Mc/s. Other stations using this method were eleventh, twentieth and thirty-seventh respectively out of 64. Of the top third, fifteen groups used the alternate band sharing system, of the middle third, sixteen, and of the last third, only eleven. From this we can deduce that the alternate band sharing system is better, as an approximately equal number of points may be attained by both the "A" and "B" stations, and each have at least one active band at any time during the contest. There are, however, certain provisions, and these are:

(i) Both stations are evenly matched, as regards siting, availability of operators, equipment, and efficiency.
(ii) No station has a rarer call (bearing WPX in mind) or a county position that gives preference by its existence on 1·8, 14 or 21 Mc/s.
(iii) Aerial space and availability are such that common aerials such as may be used on 80m and 40m, or on 20m and 15m are not a necessary factor to consider.
(iv) Each station is in a position to operate effectively on each of the bands available to it. Note that many stations did not use the 15m band, and many more did not utilize the opening available on 10m. This year's winners ignored the 10m band, but then they were not using the station grouping to which we are referring!

Norwich's own group station had an unfortunate transmitter failure on 21 Mc/s, the band for which the aerials had been designed, thus lowering the total score. Even so, if we add the average 21 Mc/s score of 103 points to the combined total, the group would then have only obtained ninth position.

TABLE 1

Band Mc/s	Average Score	Maximum Score	Minimum Score	Norwich's Score	Norwich's Percentage of Average Score
1·8	255·8	500	0	211	82·4 % of average
3·5	349·2	493	87	491	40·6 % above average
7·0	238·6	500	40	287	20·5 % above average
14	229	596	0	398	73·7 % above average
21	103	277	0	0	0 % of average
28	15·7	74	0	48	205·7 % above average
All Bands "A" and "B"	1191	2094	397	1435	20·48 % above average
All "A"	597·5	1096	134	498	67·6 % of average
All "B"	593·5	998	172	937	58·0 % above average

Obviously, we must look farther than this if the group is to stand a chance of winning. It is interesting to compare one's band, group, and total score with Table 1, and calculate the percentage of or above the average score for that band or similar group. The table has been worked out considering

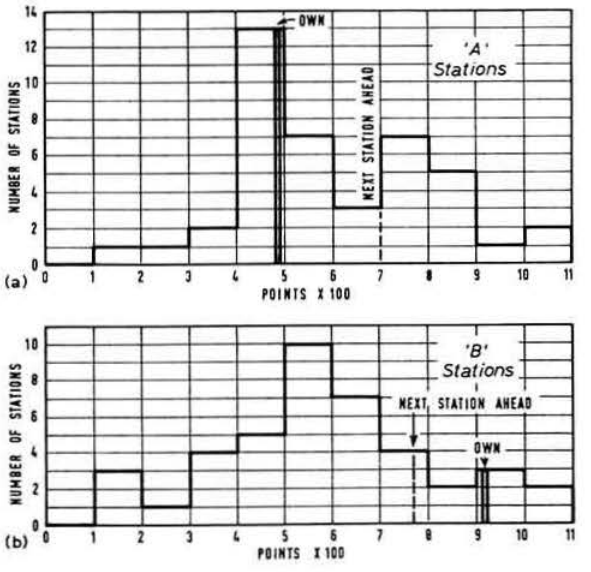


Fig. 6. (a) Points distribution for all "A" stations of groups using alternate band sharing. (b) Points distribution for all "B" stations, of the same groups as (a).

† RSGB Bulletin, February 1966, page 106.

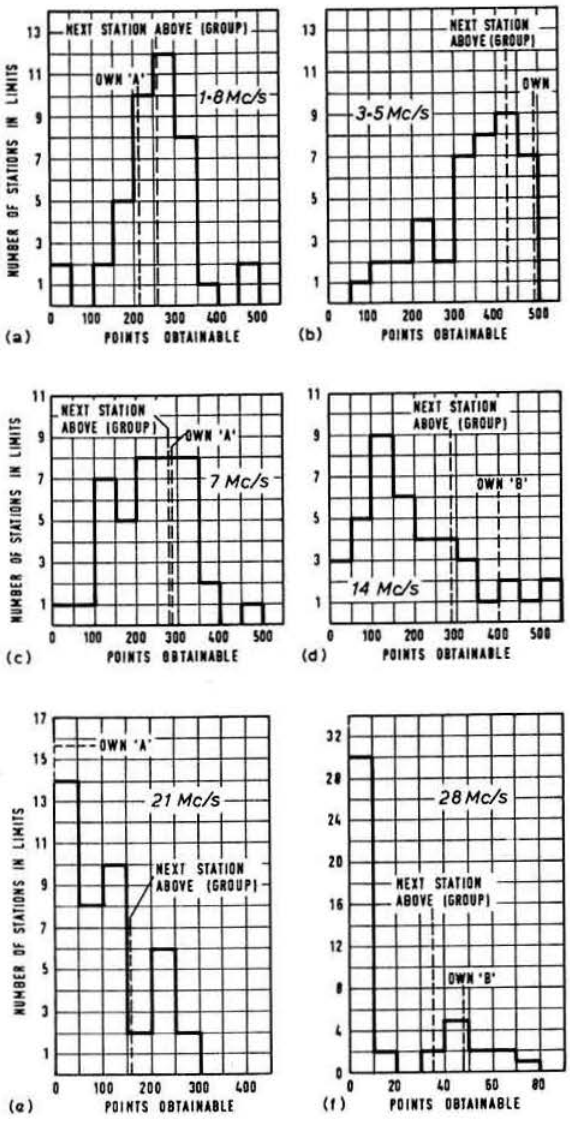


Fig. 7. Points distribution for the individual bands.

the alternative band sharing stations only, as only they are relative to the group system. Norwich's " B " station was very fortunate this year, as it acquired a reliable generator, and passed the ill-luck to the " A " station. As it was, the " A " station made up what points it could by working 7 Mc/s, and, as far as this is possible from a geographically separate location, 1·8 Mc/s. If an average " A " score had been achieved, the result would have been a joint tenth position. To stand a reasonable chance of winning, the combined score will have to increase by at least 400 points, which is an overall increase of 22 per cent! The final sets of graphs (Figs. 5, 6 and 7) are hysteresis graphs, which show the distribution curve of points. A very good idea of the relative efficiency of your own station on any particular band, group of bands, or its relative placing among the competitors may be obtained by studying these. Place a line on the points base where your score is, and compare this with the position of the next station above or below using the alternate bands sharing system. This will soon give you an idea to which band you must pay more attention, and on which band (if any) you can afford to rest a little more.

The only other factor calculated was the average " S " point of the group's transmitted signals, and this was related to the average signal strengths recorded by the stations, allowing for the vast number of S7's that are exchanged. It was found that the average report to other G stations on the l.f. bands, all with the same power limitations as the group, was 1·18 times as great as that received, the group using a full sized dipole at the maximum height permitted.

Acknowledgment

The writer wishes to thank the members of his local field day stations who have supplied information and provided assistance in evaluating the event, enabling this article to be compiled.

" Space "

Space is a monthly publication of some 50 pages produced by the Cockatrice Press Limited, of 90 Mortimer Street, London, W.1, from whom it is available on *subscription only* at a yearly cost of £2. The articles deal with such varied subjects as " *The Cambridge 1-mile Telescope*," " *Space Age Astronomy* " and " *The Moon Programme*," together with a number of other features all dealing with space activities.

Space, which contains many photographs, is attractively produced in a 7 in. × 7¾ in. format.

Radio Amateur Old Timers' Association

The ninth reunion of the Radio Amateur Old Timers, Association will be held at The Horse Shoe Hotel, Tottenham Court Road, London, W.1, on Friday, 6 May, 1966. Membership of the Association is open to all who have held a full transmitting licence issued by the United Kingdom Postmaster General for an unbroken period of at least 25 years, including the war years. Details of RAOTA can be obtained from the Founder-Secretary, John Clarricoats, O.B.E., G6CL, 16 Ashridge Gardens, London, N.13.

SAID LONG AGO

" As designers and makers of radio equipment we had the idea of doing something to encourage not only the radio amateur of this country but also the Amateur Radio movement itself.

" Amateurs having pioneered, they must maintain their lead.

" As a Society you should do a bit of boosting with the gear we have given you, remembering all the time that not all the advances in radio technique have come from the other side of the Atlantic."

Three points made by Sir Ernest Fisk, Managing Director, Electric and Musical Industries Ltd., when presenting a specially designed transmitter and other equipment to the Society on December 4, 1946. The equipment later went on the air from RSGB Headquarters as a frequency marker station using the call GB1RS.

J. C.

The Butler Oscillator

By B. PRIESTLEY, G3JGO*

THE advantages of overtone operation of crystal oscillators are well known but unfortunately a reputation for unreliability discourages some amateurs from using them. The following notes on the design and practical results are intended to show what the circuit can, and cannot be expected to do.

A quartz crystal, near its resonant frequencies, fundamental or overtone, has the equivalent circuit of Fig. 1 where R, the equivalent series resistance (e.s.r.) is about 50 to 100 ohms for an h.f. overtone unit. Ignoring the effect of the holder capacitance C_h, we know that if the crystal were

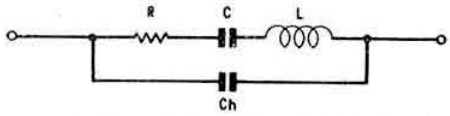


Fig. 1. Equivalent circuit of a quartz crystal near resonance.

connected across the output of a signal generator, the r.f. current flowing would show a sharp peak at the resonant frequency, where only R limits the current. However, if a 20K ohms resistor is connected in series with the crystal, the rise in current at resonance would be much less spectacular, and in practice could be completely masked by the current through the holder capacitance. As this series resonant

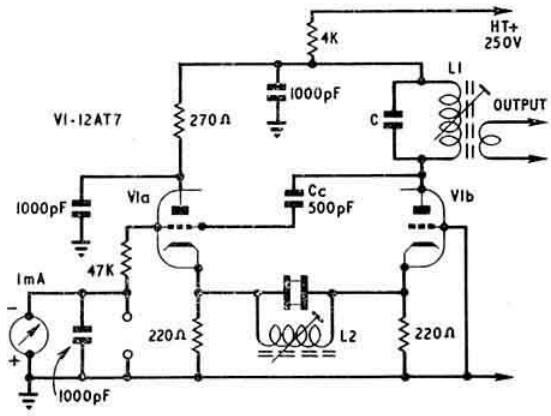


Fig. 2. Standard Butler Oscillator circuit.

mode is almost universal in overtone operation, to give the crystal control it is most important to work between a low resistance source and load, and to bear in mind and possibly neutralize the holder capacitance.

The Butler Oscillator

In the circuit of Fig. 2, the low source impedance is provided by a cathode follower $V1_a$ and the low load impedance by an earthed grid amplifier $V1_b$. Cross coupling is provided by C_c to maintain oscillation. L1 and C are resonant at the overtone frequency, but should provide only sufficient selectivity to guarantee the correct overtone, so that the crystal alone determines the working frequency. For this reason it is desirable that C should be simply the stray capacities. When extreme stability is required, a damping resistor across the tuned circuit is recommended.

L2 tunes out the holder capacitance, typical values for the latter being 40pF for a 10X unit, 15pF for FT243 and 7pF for HC-6/U. This component may not be essential with modern overtone units, but is necessary with non-overtone units of high capacitance and high e.s.r. Again, for extreme stability, it should be shunted by a resistor of 500-1000 ohms.

Practical Results

Using the circuit shown, it was found quite straightforward to persuade surplus FT243 units to take off on their fifth overtone around 35-36 Mc/s, provided L2 was used and adjusted to prevent self-excited operation. (If this seems remarkable, a report prepared by Philco for the US army reports successful ninth overtone operation with careful circuit design. A 14 Mc/s crystal was used!) The output

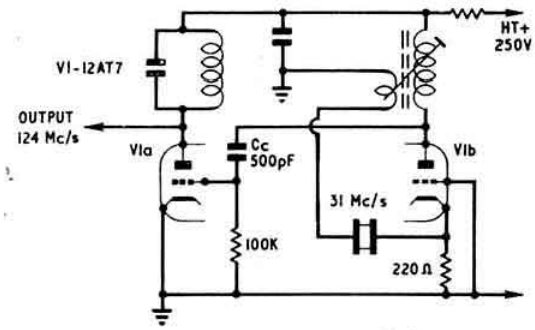


Fig. 3. Squier oscillator and multiplier.

was not very great, but was perfectly adequate to drive an EF91 or similar valve.

A modification to the circuit was the inclusion of a circuit tuned to a harmonic of the overtone in the cathode follower anode circuit. This was tried, with a view to reducing the number of stages of multiplication in a 145 Mc/s converter. During setting up it was found that the frequency tended to jump, and it was realized that the crystal dissipation was excessive, for if the e.s.r. is 50 ohms, the maximum (r.f.) current is 6mA for the dissipation to be kept within the typical 2mW limit, and so the h.t. was reduced to about 200V which eliminated the instability. However, this also reduced the harmonic output to very low proportions, because the cathode follower is operating under class AB2 conditions. Thus it seems desirable to generate harmonics in a following stage if frequency stability is at all critical, even with crystal units capable of greater dissipation.

As the writer had insufficient space in a prototype unit for additional valves, one half of the 12AT7 was re-wired as a Squier oscillator working on the same principles, leaving the other half free for use as a quadrupler (Fig. 3). This gave much more output at 124 Mc/s and a stability adequate for G3MED's s.s.b.! though possibly not good enough for moonbounce!

(Continued on Page 174)

* Member, RSGB Technical Committee. 43 Raymond Road, Langley, Slough, Bucks.

Using Surplus Crystals

By G. R. STEELE, G3SIY *

A GLANCE through the magazines and periodicals concerned with Amateur Radio shows that there are still large numbers of surplus crystals on the market. When a crystal of a specific frequency is needed, however, almost invariably the frequencies available are never those which are required. Whilst it is true that modern crystals are better and have a higher activity, most amateurs would hesitate to purchase new crystals for a trial circuit in view of the expense involved. The normal approach therefore appears to be to use a surplus crystal and then, if the results are sufficiently promising, a new crystal can be justified.

A recent constructional project involved the use of many crystals of specific frequencies, and in order to cut down cost various methods of crystal frequency adjustment were tried. The techniques involved in processing crystals are reasonably straightforward, but the writer soon found that he was considerably hampered through lack of certain useful information, for instance, what frequency change could be obtained, and by how much was it possible to change the frequency. A thorough investigation of the problems was conducted, and the information gleaned proved so useful that it was considered worthwhile to prepare an article for the benefit of other amateurs.

Processing Crystals

Information published on this topic gives three possible ways of going about it:

(i) Edge grinding.
(ii) Etching.
(iii) Plating methods.

The first two involve the actual removal of quartz from the crystal and the frequency is raised, while the third method involves the plating of a conducting metal layer on the surface of the crystal and the frequency is lowered. It is obvious, of course, that one chooses a surplus crystal whole initial frequency is nearest to the desired frequency in order to cut out unnecessary effort.

All the three methods were tried. The plating was carried out by electroplating and chemical plating with copper and silver. It was found difficult to get good adhesion of the plated layer and the frequency of the final crystal tended to alter slightly with time. It was soon decided that this method was too difficult and unreliable.

Edge Grinding The quartz is removed from the crystal edge by *gently* wiping the edge on a sheet of fine carborundum paper, the finer the grade the better. After grinding, the crystal must be well washed in liquid detergent or alcohol, then water to remove any dirt and grease before the frequency is checked. The method was found to be quite successful, but the actual frequency shift is proportional to the grade of carborundum paper used, the heavy handedness of the operator and the initial frequency of the crystal. It is not possible to make large frequency changes by this method. Tests on an 8·5 Mc/s crystal showed that the frequency can be raised by about 10 kc/s with a considerable expenditure of effort and patience. A quartz crystal is very fragile, especially for the higher frequencies, and it is advisable to practice on an old crystal first.

Crystal Etching The quartz is removed from the crystal by actually dissolving the surface layers away. After several trial runs it became obvious that this method could easily be controlled and the frequency shifts calculated. All subsequent crystal frequency adjustments were therefore carried out using this method.

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Etching Method—Preparing the Solution

Quartz can be dissolved by several reagents, the most vigorous being hydrofluoric acid. Unfortunately this acid is a very unpleasant chemical to handle; the vapour is harmful and attacks most things within range, while the liquid itself can cause serious burns on the skin—in other words not the sort of chemical to have in the shack or the kitchen sink. A much better reagent to use is ammonium bifluoride, NH_4HF_2, also known as ammonium acid fluoride and ammonium hydrogen fluoride. It is a white crystalline solid, very soluble in water, and is usually stored in glass bottles, the insides of which have been previously coated with a layer of paraffin wax. The solid itself is fairly cheap, costing about 9s. for 250 grams. In solution it is hydrolysed and any splashes must be quickly wiped away. As the solution will dissolve quartz, glass utensils cannot be used and all bottles, beakers, etc., should be of polythene or plastic. The cut-off bottom section of plastic " washing-up " liquid containers make ideal beakers for the etching. It is preferable to make up a reasonable volume of the solution and once this has been standardized it can be used over and over again on different crystals. The solution used in the following trials was made by making up a saturated solution and adding 5 per cent more water in order to prevent any crystallization taking place. Ammonium bifluoride, like hypo, gets very cold when dissolved and if a saturated solution is to be made, allowance must be made that more

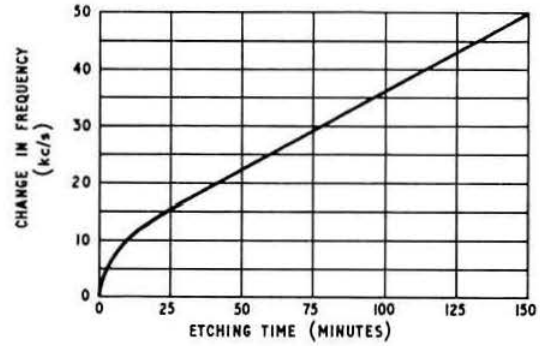


Fig. 1. Plot of change of frequency with time, using a saturated ammonium bifluoride solution at a temperature of 18°C. The initial crystal frequency is 8790 kc/s.

AMMONIUM BIFLUORIDE

is extremely dangerous and great care must be taken when handling it. Any spilt on to the skin can inflict a wound that will not heal for several months. Immediate hospital treatment is essential.

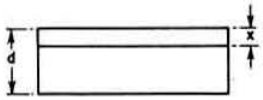
solid will be dissolved as the solution warms up to room temperature. The rate of solution of quartz, like other chemical reactions, is greatly influenced by temperature and so a suitable temperature should be decided upon and all subsequent runs can be carried out under the same conditions. If the thermometer is used remember it will dissolve like the quartz necessitating rapid removal and washing after use.

Rate and Degree of Change in Frequency

The etching process itself merely consists of placing the crystal in the solution, gently swirling to remove any air bubbles and noting the time. After the calculated period the crystal is removed, washed, dried on filter paper and the frequency checked. When washing a quartz crystal remember it is very light and fragile and is easily washed down the drain.

Fig. 1 shows the change in frequency with time of an 8790 kc/s crystal.

Looking at the process mathematically:



Dissolving a thickness x from a crystal of initial thickness d. The relationship between frequency and thickness of a crystal is given by

$$f = \frac{c}{d}$$

where c = the frequency constant (more about this later). Therefore original frequency

$$f_1 = \frac{c}{d_1}$$

and the new frequency

$$f_2 = \frac{c}{d_1 - x}$$

where x is the thickness dissolved

Change in frequency

$$f_2 - f_1 = \frac{c}{d_1 - x} - \frac{c}{d_1}$$

$$f_2 - f_1 = \frac{cx}{d_1^2 - d_1 x}$$

As x is small compared with d, dx will be small compared to d_1^2

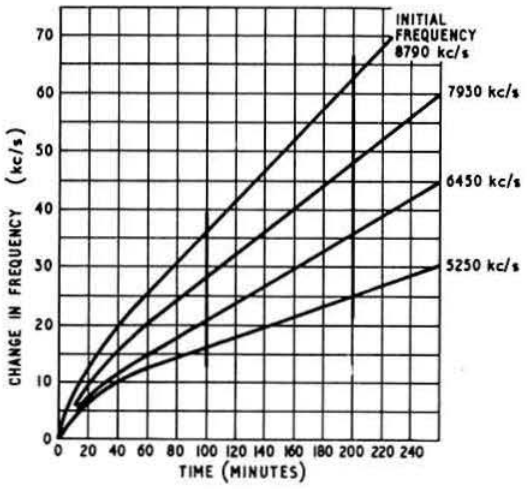


Fig. 2. The change of frequency experienced with crystals of different initial frequencies, under the same conditions as for Fig. 1.

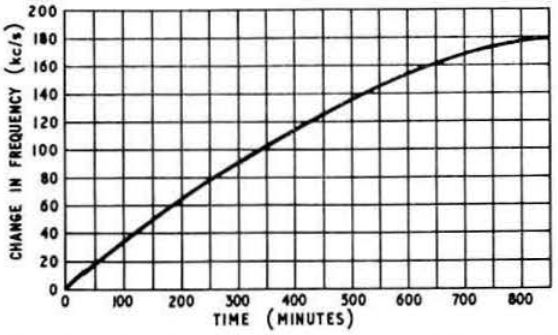


Fig. 3. The effect of prolonged etching on an 8790 kc/s crystal. Conditions as for Fig. 1.

So $f_2 - f_1 = \frac{cx}{d_1^2}$ to a close approximation

If we now take another crystal of different initial frequency but the same frequency constant in the solution for the same time as the first (c and x are the same)

$$f_4 - f_3 = \frac{cx}{d_2^2}$$

Comparing the changes in frequency

$$\frac{f_2 - f_1}{f_4 - f_3} = \frac{\frac{cx}{d_1^2}}{\frac{cx}{d_2^2}} = \frac{d_2^2}{d_1^2} = \frac{\frac{c^2}{f_4^2}}{\frac{c^2}{f_1^2}} = \frac{f_1^2}{f_4^2}$$

Therefore for the same etching time, the change in frequency of two crystals of different initial frequencies but having the same frequency constant, will be proportional to the squares of their initial frequencies to a close approximation. Using this relationship we can calculate the frequency shift of any crystal once one crystal has been measured, provided that the frequency constants are the same. Fig. 2 shows the plot of change in frequency with time for several crystals of different frequencies, all having the same frequency constant. The snag, of course, is knowing if the frequency constants are the same.

The frequency constant of a crystal is dependent on the type of cut used for the crystal. The table below gives the frequency constants of several common crystal cuts and an approximate idea of the frequency range normally associated with that particular cut. Actual size considerations often govern what type of cut is to be used.

Cut	Frequency Constant	Approximate Range
AT	1670 kc/s/mm	Up to 3 Mc/s
BT	2560 kc/s/mm	3-10 Mc/s
CT	3070 kc/s/mm	10 Mc/s up

Fig. 2 shows that within limits our square law is roughly correct, and that originally there is a rather rapid change of frequency, but this soon decreases and the graph becomes linear. The next problem is how much can any crystal be changed in frequency. Fig. 3 shows the effect of prolonged etching: the rate of frequency change gradually falls off with increasing time. In practice, however, the process cannot be continued indefinitely, for a close examination of the crystal shows that the edges tend to become curved, the activity falls off and eventually the crystal stops oscillating. Several different trials were carried out and a personal opinion is that it is not advisable to attempt to move the frequency more than say 2 per cent of the initial frequency.

(Continued on page 173)

A Mounting Arrangement for Rotatable Aerials

By A. C. WADSWORTH, Grad. IERE, G3NPF*

THE writer recently moved into a new house and this, coupled with a desire to erect an outside aerial for 2m and 70cm, led to the design of the rotary beam mounting to be described. The requirements were that it should be simple, safe, neat, cheap, and easy to construct. This design goes a long way to fulfilling all these objects and should not be beyond the average amateur.

In the writer's case a CDR Rotator is used as the actual rotating mechanism but there seems to be no reason why any sort of rotator, whether home constructed or not, should not be used. The aerial installation at G3NPF

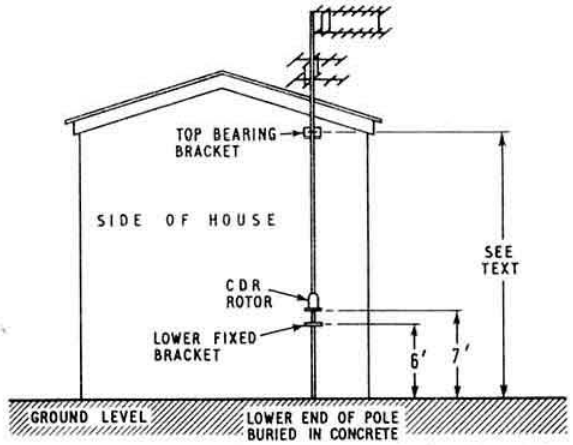


Fig. 1. The mast in relationship to the house, showing the positions of mounting bracket, aerials and rotator.

consists of a J-Beam 8-over-8 for 70cm at 30 ft. and a J-Beam 4-over-4 for 2m at 22 ft. both mounted on the same pole. The general layout is as shown in Fig. 1. As can be seen the rotor unit carries only the dead weight of the aerial, most of the lateral strain caused by windage and off balance aerial weight being taken by the top bearing to be described.

Rotating Bearing Assembly

This constitutes the major "engineering" part of the system and comprehensive notes will be devoted to it.

Basically, it consists of three small ball races, spaced 120° apart, which form the actual bearing surfaces. These are mounted, as shown in Fig. 2, between two parallel metal plates, each plate being split into two parts to facilitate erection of the mast. Detailed drawings of the various parts are shown in Fig. 3. The ball races are 1 in. in diameter with a $\frac{3}{8}$ in. hole in the centre, but any similar type could be used with suitable modifications to the dimensions of the plates. Two of each plate are required, together with one back plate, two angle mountings, and two angle brackets. The dimensions shown are to accommodate a $1\frac{3}{4}$ in. pole. The slotted hole for the bearing marked D is to make it possible to adjust for the correct running fit after the mast has been erected. The necessary spacers are shown in Fig. 4. A plan view of the complete assembly is shown in Fig. 6.

As can be seen the two large plates and the two small plates form sub-assemblies on their own. They are fixed to each other by two $\frac{3}{8}$ in. diam. BSF bolts. One of these is not tightened up but forms a bearing to enable the complete assembly to be opened up for erection of the mast. The nut used on this bolt should be of the captive, shakeproof type having a nylon insert. Failing this, the nut should be prevented from coming loose by means of a split pin through the bolt. The other bolt is inserted into position after the mast has been erected and the nut held captive in a similar manner.

The bearing plates are made from $\frac{1}{8}$ in. aluminium alloy sheet and may be cut using a fret saw or tension file. The backing plate is made from $\frac{1}{4}$ in. aluminium alloy plate and the angle mounting brackets from 1 in. × 1 in. × $\frac{1}{8}$ in. alloy angle. The bearing plates are fixed to the backing plates by means of the angle mounting brackets which are secured by 0 BA or $\frac{1}{4}$ in. BSF stainless steel nuts and bolts as shown. The angle brackets used for fixing the pulley during erection of the mast are fixed to the backing plate by means of four 2 BA nuts and bolts.

Fixed Bracket

This is made from $1\frac{1}{2}$ in. × $1\frac{1}{2}$ in. × $\frac{1}{8}$ in. alloy angle bent and cut as shown in Fig. 5. The completed assembly is shown in Fig. 5(d). All nuts and bolts are 2 BA and are stainless steel. The mast is secured by an ordinary "U" bolt as shown. Care must be taken when bending the angle for if too sharp an angle is attempted the metal will almost certainly fracture.

Bottom Fixing

In the writer's case, no bracket is used. The lower end of the fixed pole is merely dropped into a shallow hole cut in

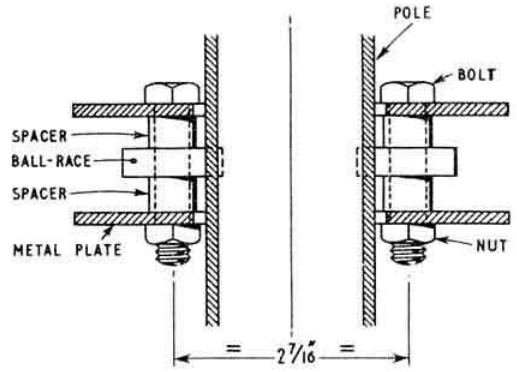


Fig. 2. Mounting arrangements of bearing for the top bracket.

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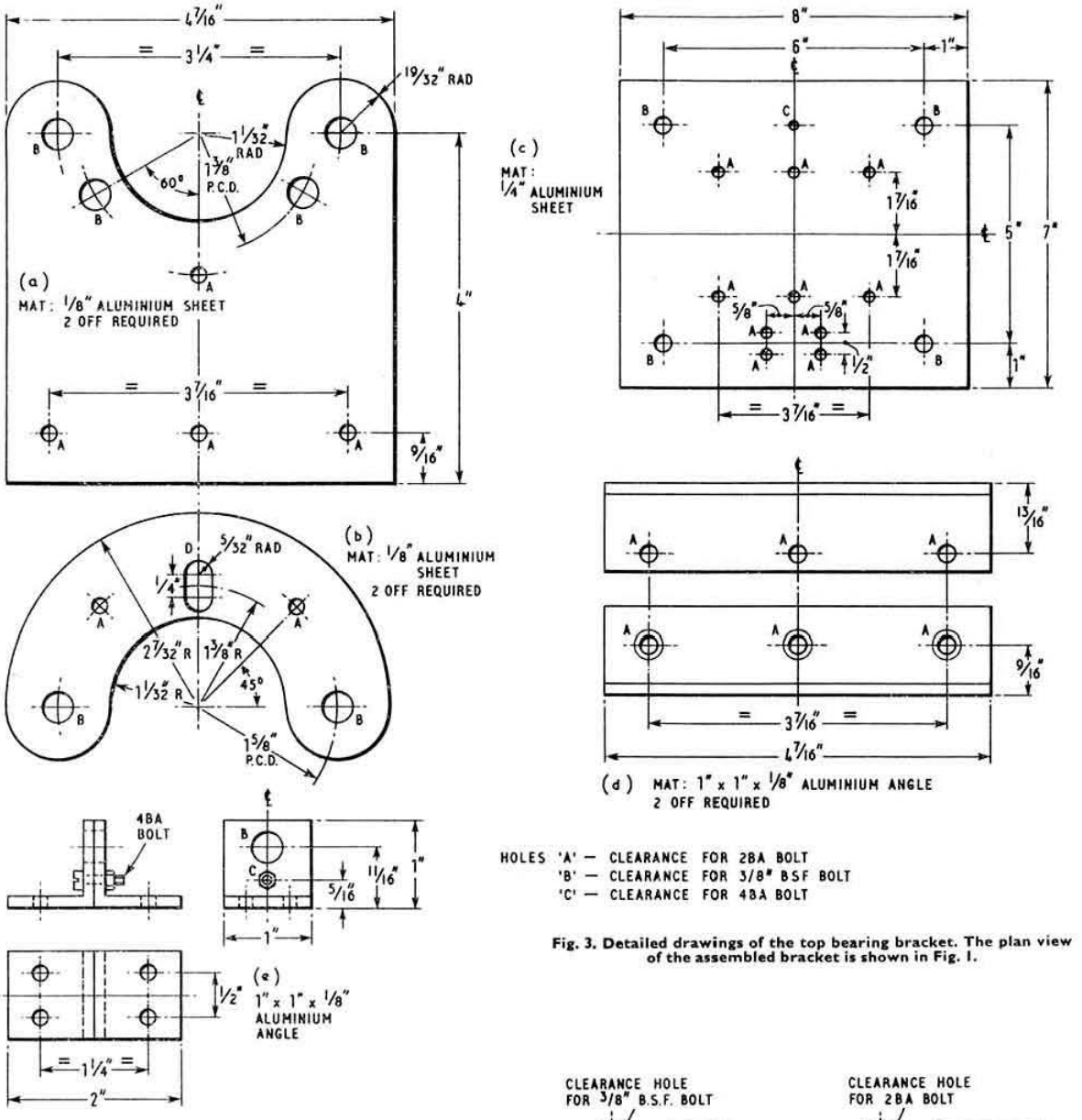


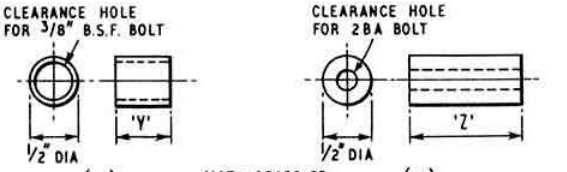
HOLES 'A' — CLEARANCE FOR 2BA BOLT
'B' — CLEARANCE FOR 3/8" BSF BOLT
'C' — CLEARANCE FOR 4BA BOLT

Fig. 3. Detailed drawings of the top bearing bracket. The plan view of the assembled bracket is shown in Fig. 1.

the concrete path and cemented in place. If the mast is over soft earth, then some method must be found to prevent it from sinking in.

Mounting the Brackets

The rotating bearing assembly should be mounted as high as possible to leave a minimum of unsupported mast above it. In the writer's case this was as shown in Fig. 1. The back plate is fixed to the wall by four ⅜ in. diam. " Rawbolts", although ordinary rag-bolts may be used if desired. The use of " Rawplugs " and woodscrews, however large, is not recommended as the result could be quite devastating if the



DIMN. 'Y'	NO OFF REQUIRED
3/8" *	4
9/16" *	2

DIMN. 'Z'	NO OFF REQUIRED
1"	1
1 3/16"	2

* THESE DIMENSIONS ASSUME THAT THE BALL-RACE IS 1/4" THICK

Fig. 4. Drawings of spacers for the top bracket, dimensioned to allow the bearing to rotate freely.

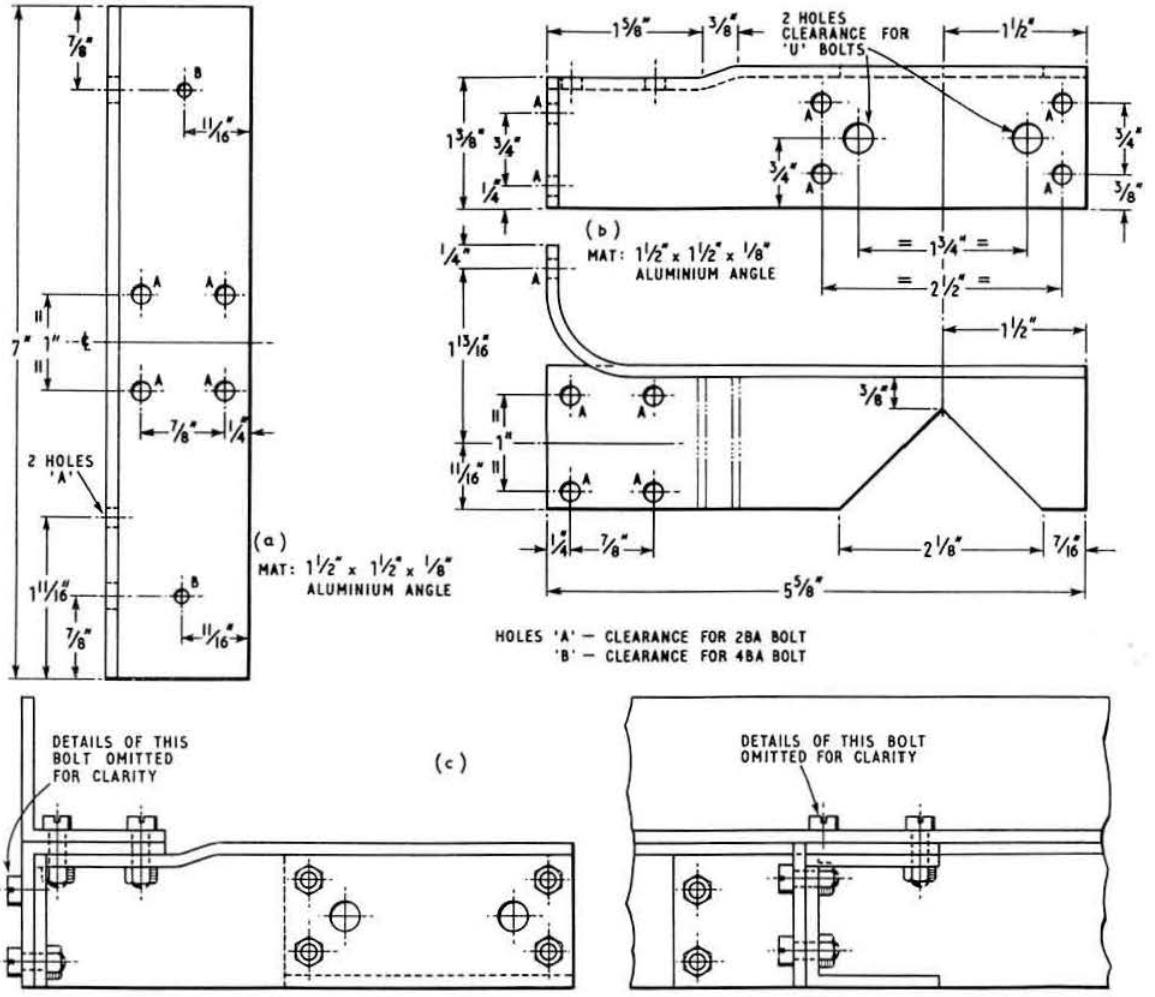


Fig. 5. (*a*) **The fixed bracket, of which two are required. One should be formed exactly according to the drawing, while the second bracket must be folded in the opposite direction.** (*b*) **Plan and side views of the mast support angle.** (*c*) **Method of assembling the complete fixed bracket.**

back plate came away from the wall during a gale. The lower bracket may be fixed by large screws and Rawlplugs if desired, as the strain on this assembly is relatively slight.

Erecting the Mast

Erection was accomplished with the assistance of only one helper, and was found to be a remarkably simple operation.

First make sure that the top bearing is securely fixed to the wall and is in the open position. Also be sure that a ladder is in such a position that the top bracket may be easily reached so that the assembly may be closed when the mast is in position.

Attach a pulley to the bracket provided and thread a stout rope through it. For G3NPF's mast, the XYL's clothes line and pulley were pressed into service. Assemble the aerial, mast, rotator assembly, etc., on the ground, making sure that all bolts are secure and that when erected, the aerial elements will clear the roof and chimneys. Lay the assembled mast at right angles to the wall and fix its bottom end in some way such that it will not slip or lift. Attach the rope to a point

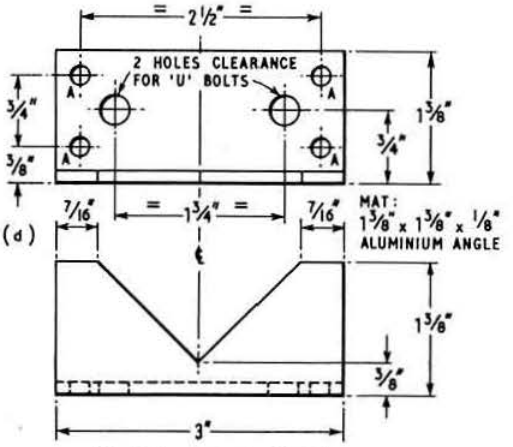


Fig. 5 (*d*). **Mast retaining clamp.**

on the mast as high as possible, but not so high that it will foul the top bearing when the mast is raised into the upright position. Then, while the helper pulls on the rope, " walk " the pole up as far as possible to avoid undue strain on the rotor, rope, mast and nerves. When the mast is vertical close the top bearing over it and bolt up. Finally adjust the ball race marked D until the mast is free to turn easily but is completely free of lateral movement. The " U " bolt on the fixed lower bracket should also be tightened up.

Cables

The two co-axial feed lines are taped to the pole to prevent movement in wind. They are twisted round the pole twice before being fixed to the back plate by means of a cable cleat screwed to the plate in the hole provided. Care should be taken to ensure that when the mast rotates it tends to unwind the cables. If this is not the case the characteristic impedance of the cable will be somewhat affected! It is obvious that this type of arrangement can only be used with rotators whose angular rotation is limited to 360°.

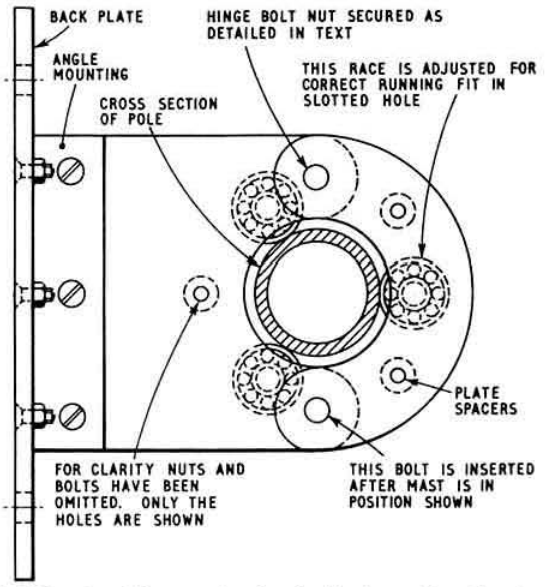


Fig. 6. Top view of the upper bracket showing the position of bearings and plate spacers.

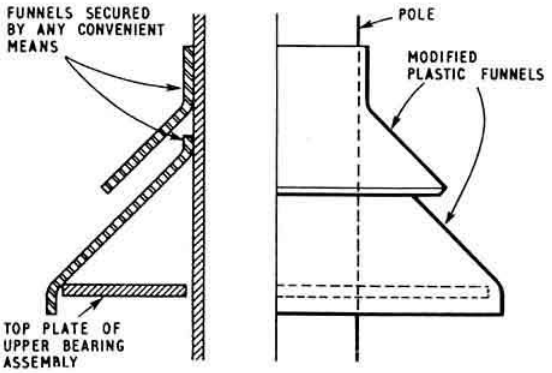


Fig. 7. The weather proofing arrangements adopted by the writer for the upper mounting brackets.

Water Proofing

As can be seen the bearings are open to the weather and some method must be found to prevent rain from rusting the ball races. A suitable method is shown in Fig. 7. It consists of two modified plastic funnels of the type sold by all ironmongers, arranged as shown. Fixing can be by any convenient means. The ball races are well packed with thick grease before assembly. Both the bracket assemblies are well painted before installation.

The system described above has been in use at G3NPF for several months and has given faultless service. The resulting mast is not too unsightly and should not annoy the most fussy neighbour.

The design given here is intended as a guide and not as the only possible arrangement. It is recommended that if this system is to be used for supporting large arrays such as h.f. beams, then the brackets should be constructed of thicker metal and the various nuts and bolts increased in size.

International Radio Amateur Meeting in Denmark

The Danish Radio Amateur Union EDR invites British radio amateurs to an International Radio Amateur Meeting at the Hotel Nyborg Strand (near Nyborg, at the east end of the island Funen) during the Whitsun holiday, 28-30 May, 1966, inclusive.

EDR is hoping for a large gathering of radio amateurs from many different countries. The informal meeting will consist of lectures and demonstrations, and there will also be many outdoor activities including "fox-hunting" (D/F hunts), a mobile competition on 3·5 and 144 Mc/s, and balloons carrying v.h.f. transmitters. There will be an exhibition of radio equipment. For XYLs, YLs and children special excursions will be arranged, and there will also be several films and tours of the scenery near Nyborg. Further details may be obtained by writing to Svend Aage Olsen, Folkvarsvej 9, Copenhagen F, Denmark.

Using Surplus Crystals

(Continued from page 169)

A Typical Example

A crystal of frequency 6000 kc/s is required, and the nearest useful surplus frequency would be 5950 kc/s. This crystal is placed in the etching solution for about one hour, and in this time the rapid change in frequency with time period will be passed and we should be on the linear part of the graph. The crystal is then removed, washed, dried and its frequency measured. The frequency may now, for instance, be 5980 kc/s.

Frequency shift required = 6000−5980 = 20 kc/s.

Comparing with the 7930 kc/s crystal of Fig. 2.

$$\frac{\text{Change in freq. of A}}{\text{Change in freq. of B}} = \frac{(\text{initial freq. of A})^2}{(\text{initial freq. of B})^2} \text{ for same etching time.}$$

Where A is the crystal described in this article, and B is the crystal to be etched.

Now, at 60 minutes, frequency of 7930 kc/s crystal = 7950 kc/s

$$\text{Therefore, } \frac{\text{Change in frequency of 7950 kc/s crystal}}{20} = \frac{7950^2}{5980^2} = 1{\cdot}767$$

Therefore the change in frequency of a 7950 kc/s crystal = 20 × 1·767 = 35·34 kc/s.

From Fig. 2 to move a crystal from 7950 kc/s to 7985 kc/s would take 235 − 60 = 175 minutes. Therefore, if the 5980 kc/s crystal is etched in the solution for a further 175 minutes the resulting frequency should be 6000 kc/s.

The Effective use of Low Pass Filters for Reducing TVI

By G. P. ANDERSON, AMIEE, G2QY*

A FEW years ago the writer was involved in some investigations into the reduction of TVI from high power transmitters, and some of his experiences may be of interest to other amateurs faced with similar (but lower power) problems. Although much has been written about TVI and how to overcome it, several features the writer has not seen in print came to light during the work.

Despite care in design, some harmonic energy will be produced in a transmitter, and surprisingly little is needed to spoil a picture, especially in areas of low TV signal strength. The principal step, which cannot be over-emphasized, is complete screening of the transmitter, so that the only outlet for r.f. of any frequency is through the aerial connection. Therefore, screen and filter all supplies as well as the transmitter itself—and this includes power, key, microphone and meter leads. Information on these points is given elsewhere, and naturally the extent of the filtering needed will depend upon the strength of the TV signal.

The transmitter in the case under review was already well screened and filtered, and as a first trial tuned traps had been inserted in the output leads to the aerial. These certainly reduced the interference, but being essentially single frequency devices, they had to be retuned each time the transmitter frequency was changed. The obvious solution was a low pass filter—no novelty to the amateur, but as far as the writer was concerned the novelty lay in the kW instead of watts.

A suitable filter was designed and fitted inside a copper box with terminals on either end; it was to work into 600 ohm open wire line, and laboratory measurements showed attenuation of more than 60 db at frequencies above 40 Mc/s.

Owing to the particular position of the transmitter used for the tests, it was convenient to mount the filter horizontally on the top of the cabinet, and to make the connections to the output terminals of the transmitter through about 18 in. of wire. As already mentioned, the transmitter was very well screened, and the filter box was firmly bonded to it, and consequently to earth. The output of the filter was connected through 600 ohm feeder line to a correctly terminated rhombic aerial, and measurements were made to see if any harmonics were getting through. They were; in fact, as a result of tests at a number of locations up to two or three miles away it soon became apparent that in some places the harmonic level was increased by the introduction of the filter—not at all " according to the book." It was also observed that the effectiveness of the filter on various harmonics was different at different sites.

To cut a rather long story short, further tests showed that this effect was due to direct radiation from the transmitter and associated wiring, plus radiation from the aerial system, of harmonics that had bypassed the filter. The variation in effectiveness (or lack of it) of the filter in different places was due to the " interference pattern " of the signals arriving by different routes and with phase conditions disturbed by the introduction of the filter.

The cure was obtained by eliminating the few inches of open wire line between the transmitter output terminals and the filter by mounting the filter so that it became essentially part of the transmitter cabinet, and the output terminals of the filter became the output terminals of the transmitter. It was then impossible to detect any harmonic energy even quite close to the transmitter itself.

The lesson learned was that, having satisfied oneself that the filter is producing the desired attenuation by means of measurements on the bench, should its effectiveness at the television receiver be in doubt, a check should be made into the thoroughness of the bonding into the transmitter. Even an inch or two of exposed line between the transmitter and the filter, or r.f. on power feeds, key or microphone leads, can allow harmonic energy to get on to the aerial, or house wiring, and so ruin the performance of the filter.

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Claims for RSGB Certificates

Members are reminded that claims for RSGB Certificates should be sent direct to Headquarters. Claims are acknowledged on arrival and passed to the Honorary Certificates Manager for attention.

The Butler Oscillator

(continued from page 167)

Possible Developments

The Butler circuit can also be used to generate the fundamental frequency, in which case the tuned circuit can be replaced by a choke or resistor. It is particularly useful for sluggish, low frequency units.

The conventional double triode may be replaced by a triode pentode, using the pentode as an electron-coupled amplifier to obtain a greater output.

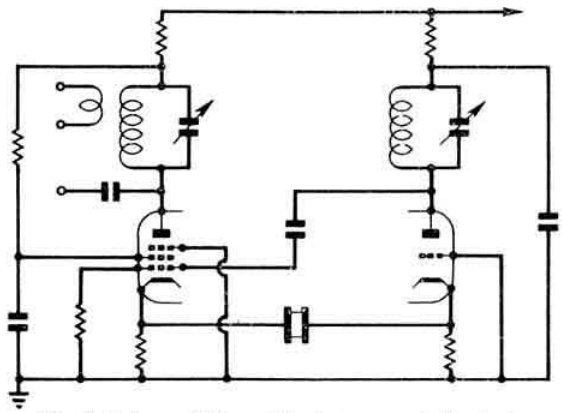


Fig. 4. Butler oscillator with electron coupled output.

Conclusion

Experiments have shown that the Butler is a reliable overtone oscillator, even with surplus crystals, and is capable of good stability. It is simpler than the Squier, needing no adjustment of transformer ratios, but at the expense of another triode. In common with all precision oscillators it is not intended to deliver high power output.

THE MONTH ON THE AIR

By JOHN ALLAWAY G3FKM

WHEN checking a batch of QSL cards received from the Bureau recently your scribe was surprised to discover how many there were confirming contacts *in the latter part of 1966*! A closer scrutiny revealed a quite alarming number of small but possibly important inaccuracies. In these days of the keen certificate hunter details can be of great importance, and it seems a great pity that a much sought QSL should prove to be worthless because its sender did not take sufficient care in filling it in. The details which are absolutely necessary are: (1) The call-sign of the station contacted, written clearly and *without alteration*. (2) Date and time, in GMT, of QSO. (3) Frequency used. (4) Mode of contact—in the case of an all s.s.b. QSO saying "Two way s.s.b." (5) Report. (6) It is also highly desirable that the fact of a *contact having taken place* should be mentioned. The writer has recently seen cards from a well known DXpedition which could be s.w.l. reports. For the sake of completeness the full QTH of the sender should be given, including the county.

It is suggested that those who would like to help in a piece of research into propagation which is currently being carried out by the International Amateur Radio Club (4U1ITU) could have a small panel printed on their cards showing the ITU Zones of both stations in the QSO, and the date, time and signal reports exchanged. The layout suggested is as below:

Calling stn.	ITU Zone	Called stn.	ITU Zone	Date	Time (GMT)	Report

Information entered thus can be fed into a computer at Geneva, and will ultimately be of great assistance in forecasting propagation. The British Isles is in Zone 27.

Those who have general coverage receivers may be interested to know that there is a broadcast of "**DX Club**" by Serge, UB5UN, from Radio Kiev, in English between 19.00 to 19.30 and 22.30 to 23.00 GMT on the last Thursday in each month. Frequencies used are 9640 and 6020 kc/s for the earlier broadcast, and 1240 kc/s for the later one.

News from Overseas

Regular readers of this feature will be delighted to hear that Mike Dransfield, **5N2AAF**, is quite safe and still on the air in spite of the recent troubles in Nigeria. It does appear however that apart from 5N2FEL, who is also well away from a capital town, he is the only 5N2 still active. Mike says that new regulations came in recently which make the conditions required to obtain a licence in Nigeria identical with those in the UK. 150 watts will be permitted on all bands. G3HZG has just arrived out there and has applied for permission to operate on the basis of his G licence, but is still awaiting a reply. Mike has been doing well on Top Band, having worked ten G stations, as well as DL1FF, DL9KRA and 9L1HX. His activities on 160m have meant that he has not been on the other l.f. bands, but he will be back on 40m and 80m in time for BERU. However, as there is now no power available to him from dawn to dusk on Sundays he thinks that 5N2AAF will be at a distinct disadvantage during that contest! At the other end of the spectrum 10m has been very poor indeed, 15m has been patchy, and only 20m has really produced anything of note. Those who complain that stations in the tropical zones have better DX propagation than ourselves should note that Mike has just worked his first ZL for six years . . .

Another letter from Al, **VK4SS**, contains a great deal of interesting information. He keeps a regular sked with Stan, **VS9MP**, who will continue to be active until July on 80m, 40m, and 20m c.w. Al finds that there is an opening between VK4 and Europe every day between 19.00 and 20.00 on 40m. He uses 7007 kc/s, but has great difficulty in reading signals through the three layers of Europeans calling "CQ DX" and working their next-door neighbours! Obviously DX could be very good on this band at this time if only more people would listen. Recent activity from **VK9WE** and **VK9CJ** has been noted, and **VR4CR** appears to be on almost nightly at about 07.00 GMT around 14,085 kc/s. **ZL4CH** has been worked on 14,045 from Campbell Island, and **VK0MI** (Macquarie Island?) on 14,054 at 07.30 has been heard but not worked.

Top Band News

Conditions on this band seem to have been somewhat variable during the last few weeks, and unfortunately the much awaited **CQ 160m DX Contest** coincided with one of the poorer spells. Contest Manager W1WY, in a letter to the writer says that conditions were well down DX-wise, and he was only able to work four non W/VE stations. This view is shared by VO1FB who only managed 17 European

The new Commonwealth DX Certificate which is now being issued. The Certificate replaces the former Empire DX Certificate. A leaflet giving full details of CDXC may be obtained from Headquarters on request.

* 10 Knightlow Road, Birmingham 17. Please send all reports for the April issue to arrive by 16 March.

QSO's compared with 64 last year. He says that there was apparently some one-way skip, as he was being heard very well at times in Europe, but has never heard the sector between 1825 kc/s and 1830 kc/s so devoid of signals. Some very excellent DX was heard on this side during the test, and is listed under the *Band Reports* section.

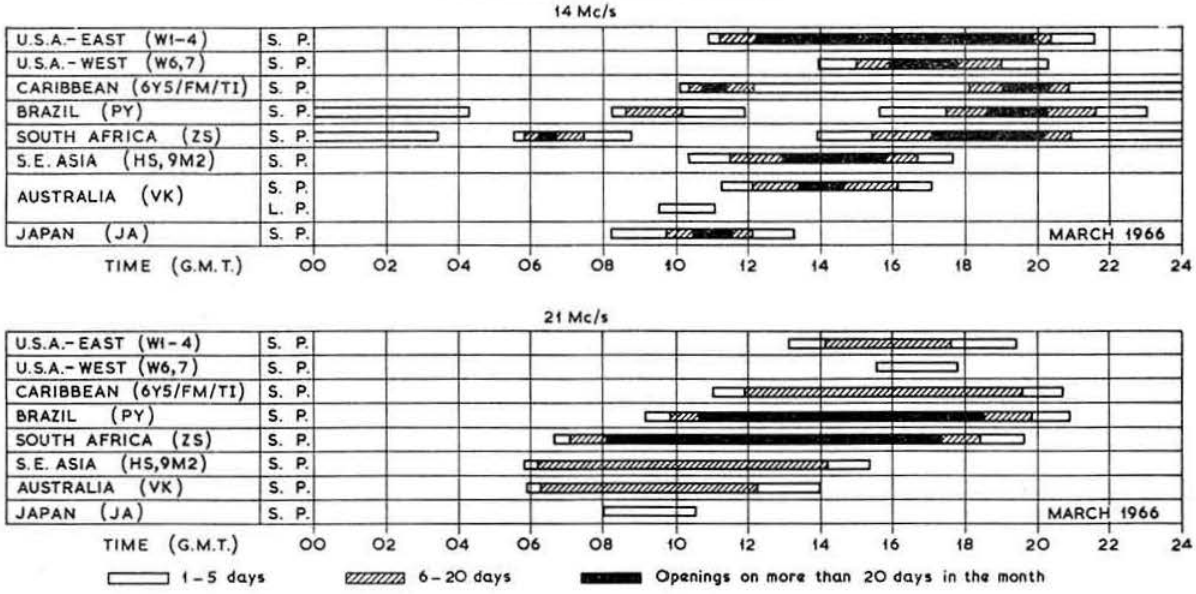
News from the Singapore area comes from Bob, now known as **9V1LP**. He did manage to contact DL1FF, G3RPB, and G3OQT during the contest, also several W6's and W7's. The week previous to the contest he managed to contact G3NYQ, G3RFS, 9M6BM, G3LIQ, DL9KRA, G3OQT, and heard G3UQD, G3IGW, G3RRJ, and G3PQA. He says that the band is open to Europe for two hours some days.

Quite a few lucky G's have managed to contact Nigeria. **5N2AAF** has been on on a number of occasions, and has had a good signal. He reports working quite a number of other European as well as at least a dozen UK stations.

The Japanese spot frequency of 1880 kc/s is no longer applicable; there is at present no operation from JA. A new spot frequency of 1910 kc/s will be authorized shortly.

An aerial view of Honiara on the north coast of Guadalcanal, Solomon Isles, showing VR4CR's QTH in the top left-hand corner, $\frac{3}{8}$ in. from the edges of the photograph.

Propagation Predictions



At the times of the equinoxes (day and night of equal duration: March and September) there is an approximately symmetrical distribution of the m.u.f.'s about the equator. For this reason, the propagation conditions in the northern and southern hemispheres are nearly the same. Traffic within the southern hemisphere (South Africa, South America and Australia) will therefore in general show an improvement over the winter months. Sunspot activity is still relatively low, even though we are on the increasing slope of the eleven year sunspot cycle. 28 Mc/s will still be of little practical value for DX working. At present on days with extremely high F2 m.u.f's (that is, in exceptional cases) the possibility does exist for contacts to be made with Central and South America from about 12.00 to 17.00 GMT, Africa from 08.00 to 17.00 and South East Asia from 08.00 to 12.30. With the approach of the summer season 28 Mc/s will show a certain amount of life with the appearance of short skip conditions over distances of 500 to 1,100 miles. With the falling off in the daytime F2 m.u.f.'s owing to the continued approach of the summer season, conditions on 21 Mc/s will probably be worse than in the previous month. This will be particularly the case for contacts with, among others, stations in North America. Eastern USA will therefore only be workable on days with above average F2 m.u.f.'s. Thus the prospects for the forthcoming second part of the ARRL DX Contest are, unfortunately, not good. Traffic to South America and Africa will, however, not be affected by this general deterioration. 14 Mc/s will show an improvement in propagation conditions compared with the previous months. As the days lengthen the band will remain open for some hours after sunset. Most people will then have the opportunity to work DX in the evenings on this band, and all continents should be workable. Chances of working DX on 14 Mc/s via the long path will rapidly diminish during the present season (equal day and night). On days with noticeably above average F2 m.u.f.'s it should be possible to work Hawaii on this band from about 16.30 to 18.30 GMT and Alaska from about 08.30 to 12.00 and 15.30 to 18.30. On 7 Mc/s there will still be opportunities for DX working, when the greater part of the transmission path lies in darkness. Traffic conditions to South America, Australia and South Africa will experience a seasonal improvement. Contacts with the USA in the latter half of the night may be occasionally interrupted by a drop in the m.u.f. The daytime F2 m.u.f.'s are at the present time mostly below 7 Mc/s so that during the day on this band local traffic may be frequently interrupted outside the ground wave area by the dead zone. On 3·5 Mc/s DX traffic will worsen as the atmospheric noise level increases slowly during this month. This increase will continue with the approach of the summer season. In the latter half of the night (sometimes earlier) one must be prepared for frequent interruptions to local traffic by the dead zone.

The provisional sunspot number for January 1966 was 26·7 with the period of greatest activity lying in the second half of the month when a number of 28 was recorded on the 19th. The predicted smoothed sunspot numbers for May, June and July are 28, 30 and 32 respectively.

The special " **First Timers** " tests seem to have gone down well, and according to W1BB there has been excellent co-operation from the regulars. The last one for this winter will take place between **05.00 and 07.30 GMT on 6 March.** This one will be for W/VE first timers, and they will call " CQ " during the first, third, etc., five-minute periods of each hour. DX stations should reply to them preferably between 1823 and 1827 kc/s, and will themselves call CQ during the second, fourth, etc. five minute-periods, listening at the low end of the band for replies.

DXpeditions

At the time that this is being written Chuck, K7LMU and Ted, ZL2AWJ are still missing " somewhere in the South Pacific." Nothing has been heard of their boat the *Marinero* since they sailed from Wallis Island on 27 January. Shortly after their departure the area was struck by a hurricane. It is to be hoped that they will soon turn up, but in the meanwhile there is very great concern for their safety. Don, W9WNV, who had returned to the US temporarily, is now said to be in the search area. Previous to this turn of affairs it had been announced that Don and Chuck would activate Minerva Reef, using the call 1M7LMU or 1M9WNV, and Maria Teresa Reef under the call FO8M.

Confirmation from VS9ARV that the expedition to the **Kamaran Islands** is definitely being undertaken has been received by your scribe. It will be run by the Royal Signals, and VS9ADF and VS9AFR will also be amongst those present. Operation will commence on 4 March and continue until 14 March. The call-sign will be VS9KRV. The one and a half tons of equipment will include one KW2000A, two KW2000's, and a 45 watt homebuilt transmitter. It is hoped to operate on all bands 3·5 Mc/s to 21 Mc/s. On 14 Mc/s frequencies most likely to be used are 14,009 kc/s c.w., and 14,160 kc/s s.s.b. QSL's should be sent via RSGB.

During the phone weekend of the ARRL contest **ZF1BF** will be joined by K4IIF and VE2BK. At other times during his stay in the Cayman Islands (which will end about 15 March) VE3CJ will try to operate as ZF2 and ZF3BF, to help the prefix hunters. It is believed that W0NWX will be on from the same spot during the c.w. part of the contest.

DXpedition of the Month announces that it is hoped that all QSL's for Gus's African trip will be mailed by the end of February. W2GHK also asks all who are interested to send him a 3 in. by 5 in. file card listing their most needed DX, in order that he may plan future expeditions. At present there are possibilities of operations from Annobon Island,

G3KZM, from Portland, in Dorset, operates under the call 9M8KZ while he is in Sarawak. His station in this photograph is located at Kuching Airport.

The owner of one of the outstanding signals from the Falkland Islands. Dave, VP8HJ, whose excellent c.w. signal may be heard on most bands, particularly at contest time. It is interesting to note that equipment sometimes functions best when on its side, even in the far south.

Iraq, and Tunisia, as well as a round trip of the VP8 area with s.s.b. gear.

At present Iris and Lloyd Colvin are operating from the Gilbert and Ellice Islands with the call VR1Z. There are several current suggestions concerning their future itinerary, but most agree that Nauru will be visited. A side trip to the other VR1 area, British Phoenix Islands, is a possibility.

Harold, ZD8HL, together with CR6GF, will be making a trip around the FR7 area during the latter half of March. It is not known precisely which islands will be visited, but they may include Tromelin, Juan de Nova, or Glorioso.

PY2PE reports that there is a possibility of activity from PY0 (Peter and Paul Rocks) during May. There is also a chance that the long awaited operation by the RAFARS from Rockall Island may come off in late May.

DXCC News

In a letter to Les Hill, G8KS, W1WPO says that with effect from 10 November 1965 the **Farquhar** and **Desroches** Island groups will each assume separate country status for DXCC purposes. Seychelles, Aldabra, and Chagos will continue as at present. No date is given yet for submission of QSL's.

At 16.30 on 31 January, the prefix for Singapore became 9V1, instead of 9M4.

Awards

The Radio Club of Budapest announces the **BP Award** I, II and III. A special ten-day activity period from 00.01 GMT on 10 May to 24.00 on 20 May will take place for those interested in obtaining the BP-A II and III. QSO's at any time since 1 January 1959 are valid for the I award. Leaflets giving full details of the requirements for this certificate may be obtained from G3FKM.

The **Worked Danube River** Award may be obtained by European stations who can produce evidence of having contacted the following prefixes since 1 January 1958: DL/DJ-15; OE-7 (including OE1); OK-2; HA-5; YU-3; YO-3; LZ-1; UO5-1. Contacts may have been on any mode, and on any band 3·5 to 28 Mc/s. Applicants should send GCR list plus 10 IRC's to: Ernst Reisenauer, OE1IU, A-1171 Vienna, P.O. Box 23. This award is available to s.w.l.'s.

The **WPX—Zone 15** Award is also handled by Ernst

Gerald, G3OOH at the key of 4U5ITU. *(WIBB print)*

Reisenauer, and is issued in five classes, the class depending on the number of countries and prefixes in Zone 15 confirmed. Class 1 requires 15 countries and 50 prefixes; Class 2, 12 countries and 40 prefixes; Class 3, 8 countries and 30 prefixes; Class T (Top Band), 3 countries and 8 prefixes, and Class U (u.h.f.), 4 countries and 10 prefixes. Zone 15 contains OH, UA2, UR2, UP2, UQ2, SP, OK, YU, HA, ZA, 9H1, FC, HV, IS, IT, I, M, and OE. Starting date, fee, etc., as for the previous award.

The **Diploma Calabria** is awarded to those who can produce evidence of having contacted or heard seven stations in the three Calabrian provinces, at least one in each, since 1 January 1965. QSL's must show date, time and frequency of the QSO, and also the signal reports, and must be sent together with $1 (or equivalent) to: Sezione ARI, P.O. Box 88, Cosenza, Italy.

The **Naples Award** is given for contacts with 20 stations in the Naples area during any calendar year.

The **Diploma Leonessa D'Italia** requires proof of seven stations located in the province of Brescia having been contacted since 1 January 1963. A list of stations contacted, plus two IRC's should be sent to: ARI, Casella Postale 230, Brescia, Italy. Leaflets describing more fully these three Italian certificates can be supplied by your scribe.

In future, applicants for the **" Ex G Radio Club "** Certificate will need to submit a total of 14 QSL's—eight from US members (not more than two from any one call area) plus six from members outside the USA.

The **Bornholm Island Award** is available to European stations in two classes. Class **I** requires proof of two-way communication with three different stations on Bornholm. Class II requires eight " points "—contact with any Bornholm station counts as one point, with the club stations OZ4EDR and OZ4HAM five points. (Stations outside Europe need two QSL's for the former, and five points for the latter award.) Contacts must have been since 1 January 1960 and may have been on any or all modes. QSL's and 10 IRC's should be sent to: OZ4FF, K. Tranberg, 22 Margrethevej, Roenne, Bornholm, Denmark.

QTH Corner

F9QV	Raoul Movalles, 1 rue de Cannet, Lorgues, Var, France.
FO8M	via W4ECI.
FW8ZZ	via W4ECI.
KC6CE	Donald S. Tucker, 9216 S.W. Fir Grove Lane, Portland 25, Oregon.
KG4BD	Box 74, FPO, New York, NY, USA. 09593.
KG6IF	Larry K. Miller, 344 Calle Miramar, Redondo Beach, Calif.
M1N	Operation by W6JFJ—Bruce Henke, 27531 Santa Clarita Road, Saugus, Calif.
OD5EG	Correction from January MOTA—Box 2309, Beirut, Lebanon.
OY6M	via W2VCZ, Bob Stankus, 30 Pitcairn Avenue, Hohokus, NJ.
TR8AD	Box 1025, Libreville, Gabon.
UA1KED	Ernst Krenkel, Chapligin St. 1-A, Moscow, USSR.
VP2DA, VP2VI	Thomas W. Winternitz, Yardley Road, Mendham, NJ 07945.
VP2ME	via D.O.T.M.
VP6AK	via W2CTN.
VR1Z	via YASME.
VS9 Kamaran Expedition	via G2MI.
ZF1RV	VE7RV, Dudley Meakin, 6807 Angus Drive, Vancouver 14, BC, Canada.
1M7LMU/ 1M9WNV	via W4ECI.
4M5H, W2GHK/4M5	via D.O.T.M.
606BW	via W4HKJ, Wm. E. Ethier, 990 S.W. 63rd Avenue, Miami 44, Fla.
7Q7BN	P.O.B. 51, Blantyre, Malawi.
HZ3TYQ/8Z4	via W1RAN, 207 Thames Street, New London, Conn., 06320.
9L1BC	via W2CTN.
9L1TL	via G3USF.
9V1LP	via W2CTN.

QSL Managers

D.O.T.M.	W2GHK, P.O. Box 7388, Newark, NJ, 07107.
W2CTN	156 Ketcham Avenue, Amityville, NY, 11701.
W4ECI	3101 Fourth Avenue South, Birmingham, Ala., USA, 53233.
YASME	Box 2025, Castro Valley, Calif., USA.

RSGB QSL Bureau, G2M1, Bromley, Kent.

Contests

The annual contest run by the Radio Sport Federation of the USSR will take place this year between 21.00 on 7 May and 21.00 on 8 May. Any 12-hour period during the contest may be submitted for entry, but the whole log of contest QSO's should be sent in, including the contacts which took place outside the chosen 12 hours. All bands 3·5 Mc/s to 28 Mc/s c.w. may be used. Only one contact per station per band is permitted, and contacts between stations in the same country do not count. USSR stations send RST followed by their Oblast number. Others send RST plus serial number of QSO, starting from 001. For scoring purposes each complete QSO counts one point. The total number of QSO points is multiplied by the number of countries worked to obtain a score on any particular band. A multi-band score is obtained by adding all the individual band totals. Logs should be posted to Box 88, Moscow, USSR, before 1 June.

Ginny and Kirk, PJ5BC/BD, during their recent DXpedition to Bonaire.

The 1966 H-22 Contest will take place between 15.00 on 30 April and 17.00 on 1 May. This contest covers all bands 1·8 to 28 Mc/s, c.w. and phone. Serial numbers consist of report plus contact number. Swiss stations send the number plus two letters signifying which Canton they are located in. Each QSO counts three points, and each station can be worked once per band, either on c.w. or phone. Final score is obtained by multiplying total QSO points by the total of Cantons worked on each band. Certificates will be awarded to the highest scorer in each country, and W/VE call area. Logs must be postmarked no later than 30 May, and sent to USKA, 6233 Buron, Lu, Switzerland. This contest is an excellent means of obtaining one of the most attractive certificates your scribe has ever seen—the H-22 Award. QSL's from all 22 Cantons should be sent to the address above, together with a list and return postage.

DX Briefs

Reg Tibbetts, **FS7RT** has been active again. So far only reported on 21 Mc/s. From Campbell Island good signals have been heard from **ZL4CH**, both on c.w. and s.s.b. He operates mostly on 3·5 and 14 Mc/s. There is a second station—**ZL4JF**, Warwick, who is at present confined to 3·5 Mc/s. **ZL5AA**, Scott Base, Antarctica, is our old friend Ian, well known for his Kermadec and other operations. There is at present no activity from Chatham or Kermadec Islands.

F9QV/FC will be back on the air in March. His new QTH is in QTH Corner, and Raoul asks those who still need his QSL for a contact between 1949 and 1963 to write to him at this address.

VP8HY, South Georgia, is reported to have been worked from the US on 14,220 kc/s. s.s.b.

Various rumours are circulating about activity from MacQuarie Island. **VK0FO** is supposed to be VK0TO's replacement, and has been reported heard around 09.00. According to OD5EE, **VK0MI** is due to appear on s.s.b. at any time now.

W0YKD/KS4 now has s.s.b. equipment and has been contacted on that mode on 14,338 kc/s.

ARRL have announced that FCC permission has been given for the W's to contact Bill, **K1YPE/XV5**. It seems that **HS2US** is a US Army MARS station, and as such is permitted to contact the US. This means of course that QSL's from this station are OK for DXCC credit.

TR8AD has been on the low end of 14 Mc/s on s.s.b. recently. Unfortunately he operates transceive and does not speak English; in view of the scarcity of signals from Gabon he rapidly becomes submerged in callers and closes down.

There are rumours that an expedition to **Rio do Oro** is to be carried out by EA2CA and EA4CR between 2 and 10 April. Let us hope that this one materializes.

Band Reports

Before going into details of activity around the bands your scribe would like to quote the following, received from DJ2BC, Dr Lange-Hesse, of the Max Planck Ionospheric Institute, to whom the Society owes so much. "No pronounced improvement in propagation is expected during 1966 as compared with 1965. The last sunspot minimum took place in August/September 1964, and the yearly mean of the sunspot number for 1964 is 9·6, and for 1965 15·3. This slow increase shows that the coming sunspot maximum (about 1969/70) will probably be much lower than the last one in 1957/8. Therefore no pronounced improvement can be expected." Dr Lange-Hesse provides the monthly propagation forecast for *MOTA*, and I am sure that all will wish to join me in thanking him on behalf of the Society, for his kind assistance.

Some of the most surprising DX this month is reported on 160m, with reports of signals from the West Coast of the US, Singapore, and Africa. Eighty metres has produced an interesting crop of signals from all continents, and those who are strong enough to fight their way through the intruders on 40 have been duly rewarded. One promising sign of spring has been evident on 20m, where on some nights the band has been open until the early hours to South America. Ken, G4MJ, reports breaking in on a QSO between two CE8's at 01.00, and greatly surprising them! Fifteen metres has been disappointing and is well summed up by G3SML who says that it shows only slight improvement over last year, with odd days of very good conditions but little activity. There appears to have been little of note on 10m, the only signal reported being a solitary W.

Many thanks to all who have sent in reports and news items, and especially to the following: G2BOZ, G2LB, G3DO, G3HCT, G3HDA, G3JVJ, G3KSH, G3NMH, G3SML, G3SVD, G3URK, G3URX, GW3AX, G4MJ, G8JM, BRS20317, BRS25605, BRS26676, A3560, A4038, A4242, A4489, A4641, A4955.

1·8 Mc/s C.W.: DL1FF (16.47), EP2BK/MM (off 8Z4, 23.42), F5AV (22.15), HK4EB (06.00), IS1FR (07.23), "JA6AK" (1821 kc/s—too good to be good!), KV4CI (04.30), LZ1ARN (23.00), OH9NV (22.00), OH0NI (01.10), VE1ZZ (05.10), VE2UQ (06.47), VE3AGK (05.52), VE3BWY (07.00), VE3QU (08.00), VO1HN (01.58), W1ANY (05.05), W1HGT (07.16), W2EIS (06.05), W2GGL (06.29), W3EIS (04.15), W4WHK, W4ZCM, W4OOE (05.00-08.00), W6JTB (06.30-08.13), W6RW (06.50-08.10), W7VGQ (07.00), K8CRJ (07.10), W8HGW, W8ANO, W8TJQ, K8TKG, etc. (05.00-08.00), W9EWC, WA9GUO, W9PNE, K9YWO, W9YYG (05.00-08.00), W0VXO (08.15), ZB2A (07.00, 23.00), ZB2AJ (06.00), 5N2AAF (05.00, 23.00), 6Y5XG (06.15), 9L1HX (00.30), 9M4LP (23.19).

3·5 Mc/s C.W.: CR7IZ (23.30), F9UC/FC (21.05), KV4CI (23.15), OX3LP (22.45), PY1BTX (23.30), UA0KAD (19.43), UW0AF (19.47), UA9's, KHA, KOG, KVN, OH, UG, VB—all Zone 18 (19.00-02.30), UD6AI, UF6AC, UF6AS, UG6DL, UH8AA, UI8LB, UJ8KAA (all 19.00-02.30), VK5KO (20.05), VS9MP (20.15, 22.15), ZD7IP (23.35), 9F3USA (01.00).

3·5 Mc/s S.S.B.: All between 22.00 and 23.00 unless otherwise stated. CN8AW (20.00), HC2RK (23.10), IT1GAI, IS1DMN, HS1WL, LX1DB (22.35), MP4TBO, OX2LP (23.55), PX1YR (00.13), SM6CKU/MM (off the Philippines), TF3EA (22.35), UH8AY, VE1IE, many VE2's and VE3's, VK4FJ, VO1FB/FG/DB/MX, VO2AI, W1WO (08.13), W2ZPL (08.14), W3PMF (08.07), K4TMN (08.48), W5KU (08.22), WA8GXQ (08.19), W9JLH (08.23), ZB2AJ/AM/AO, ZC4MO, ZL2AW (08.15), ZL2OJ (08.15), 7X5MB.

7 Mc/s C.W.: CO6AH (22.45), CR4AE (02.05), EL2D (22.36), FG7XF (23.37), HK3AVK (08.10), HV1CN (15.20), JA1IBX (13.40), JA6AK (14.00), JA5ADR (22.00), K1RNA/KG4 (21.30), KP4BJM (22.07), KV4AA (23.00), UA0KAE (12.22), UA0JA (Zone 19, 14, 11), VP6AK (08.00), VP7NQ (22.40), VS6FF (17.10), VS9MP (17.20-23.45), VU2LE (02.10), W6DFY, PZ, ULS (14.15-15.45 L.P.), W6WX (09.20), WA7ECT (09.37), YV1AB (10.08), ZL1AIR (13.15), ZL4GA (13.45), HZ3TYQ/8Z4 (23.45), 9M6BM (22.54).

7 Mc/s S.S.B.: HK1KU (08.18), PY4ND (21.00), PY7APS (20.45), TF3EA (21.00), VP6KL (21.00), ZB2AJ (21.55), ZS1JA (20.45), 5A3IT (19.00), 4X4HW (19.05), 7X2AH (21.00), 9Y4LQ (21.00).

14 Mc/s C.W.: CP5EZ (23.04), CR8BI (12.05), CT2BO (20.11), FL8RA (08.10), FW8ZZ (08.40, 07.15), HI8XAL (12.00), HK0AI (14.17), SU1IM (07.10), TN8AF (06.50), VP2SJ (10.55), VR1Z (08.30), YN1AA (11.35), ZD8BC (07.50), 6W8DD (08.00), HZ3TYQ/8Z4 (08.40).

14 Mc/s S.S.B.: CE8CG/CM (01.10), CP1DV (20.01), CX9AAK (11.00), DU1BSP (Boy Scout Station—14.00), EP3AM (11.51), FB8XX (16.30), FG7XX (13.50), FK8BB/P

(09.15), FK8BG (09.10), FR7ZD (17.15), FW8ZZ (08.10), HI3DAC (18.33), HK0AI (14.56), HM5BF (08.50), HR2ABC (19.00), KC6BA (07.48), KG6IF (08.20), KG6NAC (08.41), KW6EJ (08.20), KX6DC (08.15), KX6EA (08.30), KZ5PW (21.30), LU7AW (01.10), M1B (08.45), OA1W (11.27), OX4FR (18.10), OY6M (20.15), PJ2CH (18.45), TG8CJ (20.00), TI4JP (12.37), TI6EC (19.41), TL8SW (16.50), TR8AD (09.30), TU2AS (17.25), TY3ATB (09.18), UA1KED (F. J. Land, 09.30), UA0AI (09.57), UA0WH (09.00), UA0YP (Zone 23, 08.10), VE8AA (17.40), VK8AV (12.50), VK9AG (09.10), VK0GW (18.33), VP1BE (21.45), VP2AA (11.00), VP2ME (18.54), VP2VE (12.06), VR2EK (07.30), VU2RA (15.19), XW8AX (14.30), YA1AW (08.00), YK1AA (14.35), YN1AW (12.50), YS1HUKE (19.10), YV9AF (11.37), ZB2SS (Sea Scouts—16.00), ZD7RH (08.28), ZD8WZ (21.00), ZL4CH (Campbell Is.—08.55), ZS2MI (18.27), 7Q7LA (16.55), 9L1HX (08.40), 9M2GF (16.22), 9U5KU (19.42), 9Y4VT (19.30).

21 Mc/s C.W.: CR6DX (16.00), OD5LX (10.50), VK4EL (08.30), ZC4GB (14.30), ZL3IS (10.10), 9H1AF (11.00), 9J2JC (10.18).

21 Mc/s A.M.: CR6AN (15.04), CR7AX (15.39), CR7BS (15.50), EA8DV (15.55), HI3AGS (16.10), KP4DV (16.00), LU5DZ (11.00), MP4BFL (12.10), OD5CS (13.00), PY7VA (16.20), VK6DR (13.00), VS9OC (10.34), XE1PY (15.00), ZC4LK (10.40), ZE1BR (14.45), 5A1TK (13.25), 5N2AAF (14.40), 9G1SC (11.23).

21 Mc/s S.S.B.: CR6EC (12.40), ET3USA (11.05), HC1SM (15.25), KP4BFF (14.05), KV4CX (12.45), KZ5JW (14.10), MP4TBO (12.15), OD5BZ (14.25), SV0WF (10.22), VK3WM (11.20), VK5GM (11.20), VK5GN (12.06), VK6SM (09.25), VS6AJ (10.00), VS9AWR (11.55), XW8AX (09.25), ZD8WZ (10.43), ZE1AC (11.15), ZL1AGO (10.00), ZS6BEJ (12.35), 5N2AAF (15.40), 9J2DT (10.33), 9M2DQ (11.25).

28 Mc/s A.M.: W3PTP (15.02).

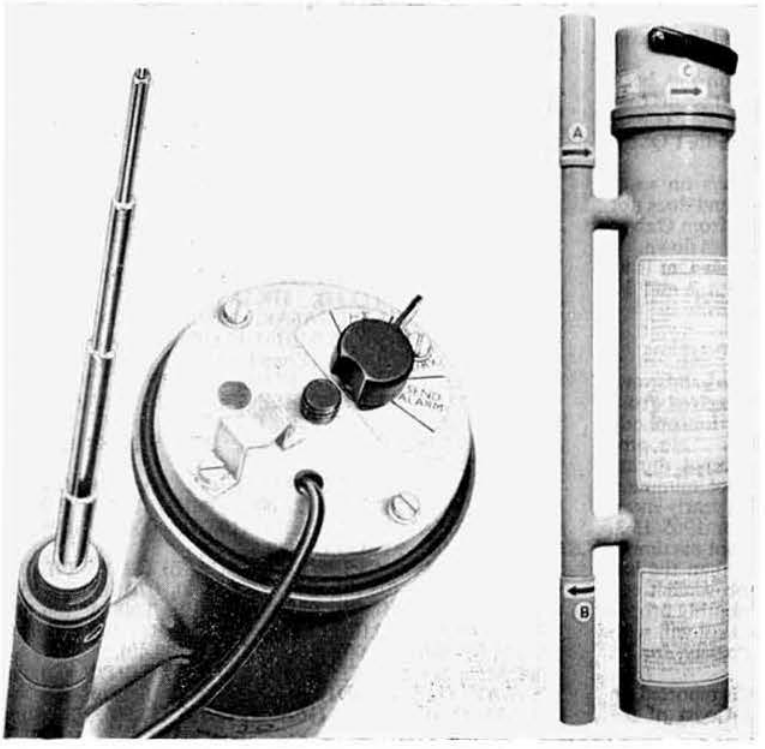
QRP News

Another supporter of the use of low power is G3URX. He lives in Cambridge, which is a notoriously bad area—TVI—and says that running just 25 watts to a dipole enables him to operate at any time without arousing the ire of the neighbours. In rather less than a month he has QSO'ed all round Europe, including ZB2AM, and also UF6KPA, W1FCV, WB2HXD, W8AZD, and K1TZZ, who expressed surprise when told about John's power. Your scribe often thinks what a good idea it would be to revert to the former requirement whereby all new licensees were restricted to 25 watts of c.w. during the first year after getting their licences. It can be a very interesting and revealing experience to gradually reduce power during a QSO—it is surprising just how much this can be done before the man at the other end notices any change.

1966 Countries Table

	1·8 Mc/s	3·5 Mc/s	7 Mc/s	14 Mc/s	21 Mc/s	28 Mc/s	Total
G3JVJ ..	14	5	14	6	2	—	41
	17		12		—		29
G3KSH ..	6	1	4	4	4	—	19
G8JM ..	—	—	—	31	8	—	39
A4489 ..	19	41	45	91	—	—	136
BRS25605	8	32	29	51	10	1	131

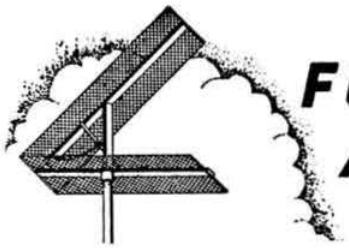
Once again correspondents are thanked for their co-operation, and acknowledgement is made to the West Gulf *DX Bulletin* (W5IEJ), the *LIDXA Bulletin* (W2FGD/W2MES), *DX'press* (PA0FX), *The DX'er* (Northern California DX Club), *Florida DX Report* (Florida DX Club), and the W1BB 160m *DX Bulletin*. Please send all items to arrive not later than **16 March** for the **April** issue, and **13 April** for the **May** issue.



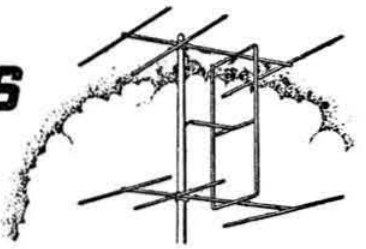
Marine Safety Equipment

From 26 May, 1966 all sea-going fishing vessels over 60 ft. in length will, under a new Board of Trade ruling, have to carry portable radio telephone equipment incorporating a two-tone alarm signal. The ruling arises from recommendations adopted at a Safety of Life at Sea Conference.

KW Electronics Ltd. of Dartford, Kent, is generally thought of as a leading manufacturer of Amateur Radio gear but an increasingly important part of the company's activities is devoted to the production of marine equipment. A particularly interesting example is the KW SAFCOM emergency RT beacon which is type-approved by the GPO. It is powered by Mallory mercury cells and operates on 2182 kc/s. The beacon is contained in a fibre-glass tube measuring 2 ft. by 4 in. in diameter and will withstand temperatures ranging from —10°C to 70°C. The completely encapsulated solid-state transceiver weighs only 9½ lb. Two views of the unit are shown in the accompanying photograph.



FOUR METRES AND DOWN



By F. G. LAMBETH, G2AIW *

THERE has been a great upsurge recently (coinciding with a very large hiatus in conventional operation) in Meteor Scatter operation, especially on the continent. France has recorded much success, with F8DO breaking records, and other countries which are fairly regularly in the Meteor Scatter news include the Soviet Union (UA1, UP and UR), Finland, Hungary, Bulgaria, Poland, Czechoslovakia, Greece, Holland and Austria. The UK is also always very active in this sphere, with G3LTF, G5YV, G3CCH regularly pioneering and maintaining what can really be described as pre-eminence in the mode. Regular schedules are common between many stations in the above (and other) countries, and it is now almost a certainty that an important meteor shower will bring news of a new break-through in QSOs. There follows a report from SV1AB which gives additional interest to this absorbing subject.

SV1AB (Athens) has had fine successes recently in this mode. The first contact was with UP2ON during the November Leonids, bursts varying from S3 to 8, and the second was in December (Geminids) with UA1DZ. On this occasion, the signals were not too strong, but were satisfactory. The distance between Leningrad and Athens (2515 km) appears great enough to capture the 2m m.s. European record so recently taken by F8DO with the same Russian station. The January Quadrantids brought a QSO with OE6AP, which had bursts up to S4 to 7. This brings SV1AB's m.s. total to six countries on 2m since August. The other January skeds with LX1SI, F8DO and G3LTF brought no results. The frequency in use at SV1AB from 1 January, 1966 will be 144·154 Mc/s ± 1 kc/s.

V.H.F./U.H.F. Firsts and Records

The writer hopes to try and establish, for international purposes, a list of historical v.h.f./u.h.f. records. This has been tried before, without much success, for it does depend on the co-operation of the various people involved. Anyone who has been involved in a " first " contact, and who has at any time held a record on a v.h.f., u.h.f. or s.h.f. band is invited to drop your scribe a line, giving a brief note of relevant details, not forgetting dates, and modes of propagation. If enough data is assembled, something of value to all may emerge.

QSL Cards

G2WS (Coventry) is glad that the unsatisfactory QSL situation is receiving attention. He feels that the G8 --- licensees appear to be meeting the bleak selfishness of certain seasoned u.h.f. operators to whom most contacts with G8 --- are, it seems, of limited interest. Although not a QSL hunter himself, G2WS makes a point of sending a card to anyone he thinks may value it—although he has also found that only a small proportion of the recipients send cards back, even when requested. Perhaps the most chilling experience is to receive one's own card back, rubber stamped that the recipient doesn't QSL! Unless such a person genuinely cannot afford the cost of printing and postage, this would seem to be a splendid example of the " non-amateur spirit." Two suggestions are offered: first, that all active operators who wish neither to send nor receive cards should be invited to notify the Society and that an asterisk be placed against their names in the RSGB *Amateur Radio Call Book*; and secondly, would it not be possible to inaugurate what G2WS calls a " QSLL " card—a rough sample of which is shown, and which could be printed cheaply and in bulk.

CONFIRMATION OF QSO

From..... **To**.....

I confirm that our stations made contact on the ..... **Mc/s band on** ..... **19...**

at ..... **GMT.**

Your signals were received here Q... S.../RST.....

Signature .....

The station wanting confirmation of a contact stamps the card, puts his own address on the back, fills in the call of the station and then his own call, together with the frequency band, but leaves the date and time blank. He then puts the card in an envelope addressed to the other station and posts it. Any operator receiving such a card has merely to refer to his own log, fill in the date and time and put the card in the nearest letter-box. This could be expensive for the certificate hunter but possibly the (stamped) QSLL could be sent out through the QSL Bureau.

Beacon Station DL0SO

A new beacon station heard on 28 January for the first time was DL0SO on 145·750 Mc/s. Information about this beacon gleaned from DL6CU is that it radiates during evenings only and is a club station located in the vicinity of Cologne (from G2JF).

ARTOB

It has apparently proved necessary to accept frequency partitioning, as follows, in forthcoming experiments: 144·08 to 144·10 Mc/s c.w. and 144·10 to 144·12 Mc/s, s.s.b. Operators are asked to follow this system whenever they attempt to use the balloons. Powerful stations are requested to give a chance to the weaker stations which may appear from time to time, for DX stations play a vital part in these tests. Long CQs are not desirable, all that is

* 21 Bridge Way, Whitton, Twickenham, Middlesex. Please send all reports to arrive not later than 11 March for the April issue, and 8 April for the May issue.

TWELFTH INTERNATIONAL V.H.F.-U.H.F. CONVENTION

SATURDAY, 2 APRIL, 1966

Guest of Honour: Mr G. G. Gouriet, Head of Research Dept., BBC.

MORNING

An exhibition of commercial and home-constructed equipment will open at 11 a.m. Colour slides of the launching of *OSCAR III* will be shown.

AFTERNOON LECTURES

Members of the GB2GC Expedition Group, winners of the 1965 V.H.F. NFD, will be describing the organization put into the expedition, and Mr A. L. Mynett, G3HBW, will give a talk on the equipment used on the trip.

The second lecture, entitled "Radio Aurorae at V.H.F.," will be conducted by Mr C. E. Newton, G2FKZ. He will discuss the results of the data obtained during the IQSY, and will also mention possible plans for future research.

EVENING

The dinner, and presentation of prizes.

KINGSLEY HOTEL BLOOMSBURY WAY LONDON, W.C.1.

UNDERGROUND: HOLBORN (KINGSWAY) or TOTTENHAM COURT ROAD

BUSES: 7, 8, 19, 22, 24, 25, 29, 32, 38, 73, 127, 134, 156, 176.

TICKETS may be obtained from Mr F. E. A. Green, G3GMY, 48 Borough Way, Potters Bar, Herts.

Convention, 4/6. Convention and Dinner, 32/-

Organized by the V.H.F. Committee.

required of contacts being call-signs, RST reports and QTH. The Institute for Stratosphere Physics, Lindan (Harz), has asked if the DJ4ZC equipment can be fitted to one of the Institute's balloons. This balloon will be released in April/May, 1966, in the Aachen area, travelling west to east at a height of over 30 km. It will be airborne for 8 to 10 hours. DJ4ZC has agreed in principle. To allow for service announcements, there should be complete silence at every full hour after ascent for five minutes.

Four Metres

A4242 (London N.21) listens regularly on the band with an RF27 feeding an R109 with a 4-element Yagi on a 21 ft. mast. Although local activity is nil at present, several operators have now obtained 4m transmitters.

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

Call-sign	Location	Nominal Frequency	Emission	Aerial Direction
GB3ANG	Craigowl Hill, Dundee	145·985 Mc/s	A1	
GB3CTC	Redruth, Cornwall	144·10 Mc/s	A1	North-East
GB3GEC	Hammersmith, London	431·5 Mc/s	A1	
GB3GI *	Strabane, N.I.	145·990 Mc/s	A1	
GB3LER	Lerwick	145·996 Mc/s	A1	S
GB3LER	Lerwick	70·305 Mc/s	A1	N/S
GB3LER	Lerwick	29·005 Mc/s	A1	N/S
GB3VHF	Wrotham, Kent	144·50 Mc/s	A1	North-West

*Not yet in operation.

RSGB V.H.F. BEACON STATION GB3VHF

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

Date	Time	Error
19 January	10.00 GMT	24 c/s high
25 January	11.30 GMT	500 c/s low
1 February	10.50 GMT	230 c/s low
8 February	10.00 GMT	150 c/s low

Seventy Centimetres

G2WS (Coventry) comments that locals have set up a 432 Mc/s "activity hour" between Birmingham and Coventry stations, on Mondays between 7 and 8 p.m.

A4242 (London N.21) is building a 70cm TV converter and has already acquired a 6-element Yagi.

Two Metres

During the First 144 Mc/s Contest (C.W.) held on 30 January there was a welcome upsurge in operation. QSOs were possible up to 150 miles, although conditions were not particularly good. GW3RUF/P (Brecknockshire) was a good signal in the home counties, as were G6GN (Bristol) and GC2FZC. Some Lancashire and Yorkshire stations were also well in evidence. The practice of incomplete signing, which, apart from being irregular, is very misleading to less experienced operators, was evident during the contest. Please remember to use both call-signs when calling or replying to another station and use them in the correct order.

G3JON (Sheffield) gives further details of his 2m QSOs on 6 January. The stations worked were PA0RLS, PA0GG, OZ3JD and OZ5AB. G3JON has been operating exclusively on 2m since July, 1965 and has found the band most interesting. During the ensuing period 107 G, three DJ, two F, one LA, one ON, eight OZ and 15 PAs have been worked.

The rig is home-made, and runs 90 watts to a QQV06-40A. The p.a. is driven by a 15W transmitter using a QQV03-10 in the final stage. The aerial is a J-Beam 8-over-8 slot at 25 ft. at a QTH 800 ft. a.s.l. with a good take off to east and south. The receiver is an RSGB design Nuvistor con-

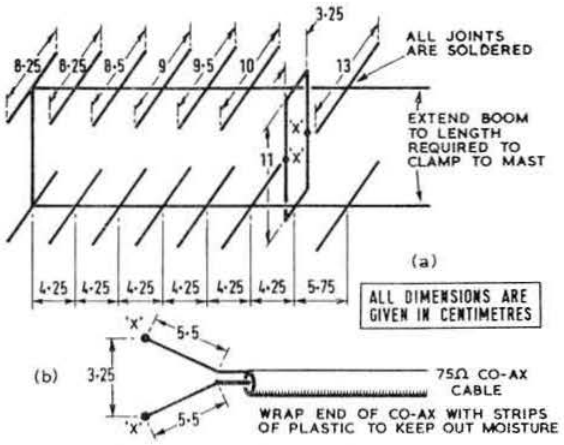


Fig. 1. G8AEJ's 1296 Mc/s slot-fed beam.

verter into an old AR77 tuning 28-30 Mc/s. G3JON is on most evenings from 23.00 GMT working the home counties. A little more late night activity would help, considering the fact that he has never known a time when he could not receive the Wrotham beacon GB3VHF.

During the period 5-7 January already mentioned, **G2JF** reports that the extent of the opening, generally speaking, was 250-300 miles east and south with some very good signals coming from the north of the UK.

DL9DL, DL6CU and DL6PI were good signals in the south, in addition to QSOs previously noted with OZ and F9NL. There was also good tropospheric propagation on 28 January which, unfortunately, collapsed after 24 hours resulting in normal tropo for the RSGB contest. GW3RUF/P Brecknockshire was a strong signal, though accompanied by a trace of key click. He had worked 76 stations by 19.30 GMT on Sunday. Other GW stations who worked into south-east UK were GW5BI, GW3MFY, GW3LEW, GW3PWH and GW3FSP (all in Glamorganshire). An outstanding signal from the north was G3US, while G2FO was heard from Stockton-on-Tees.

SCOTTISH V.H.F. CONVENTION

30 APRIL, 1966

Mill Hotel, Rutherglen

TALKS - DISCUSSIONS - DINNER

The exhibition will be open from 2 p.m., and the convention will start at 3 p.m. The evening dinner is at 7.15 p.m.

Tickets may be obtained from W. B. Miller, GM3PMB, 14 Clamps Wood, East Kilbride, Lanarkshire, or J. Hunter, GM6ZV, 63 Beechlands Drive, Clarkston, Glasgow.

Convention, dinner and tea: 27s. 6d.
Dinner only: 22s. 6d.
Convention and tea: 5s.
Convention only: 2s. 6d.

ORGANIZED BY W. B. MILLER, GM3PMB

MIDLANDS V.H.F.

CONVENTION AND DINNER

WOLVERHAMPTON

1 p.m., Saturday, 14 May, 1966

Tickets, price 30s. which includes dinner and light tea, are available on receipt of an s.a.e. from F. T. Smith, 5, Pinfold Crescent, Penn, Wolverhampton.

Enclosed car park available

Twenty-three Centimetres

G8AEJ (G6TDG/T, Penge) has sent notes of a new piece of equipment for this band. The accompanying diagram shows details of an easily constructed 8-over-8 slot-fed aerial which is very light, and which has very low wind resistance, enabling it to be placed high on even the lightest of masts. This aerial was designed and constructed by G5DT, who then passed it on to G8AAA and G8AEJ who have used it with great success. G3LTF received an S4 carrier from it during the 1296 Mc/s tests in July, 1965. The power at that time was 8 watts to a CV90 tripler in a G3FP cavity.

Only readily available materials are used. The method of construction used at G8AEJ is as follows. The main booms are $\frac{7}{32}$ in. o.d. brass tube, while the elements and slot are $\frac{1}{8}$ in. brass brazing rod. All joints can be soldered, and the 75 ohm co-ax cable is also soldered direct to the Delta Match. Nothing can rust—it can be erected and forgotten.

The President, Mr R. F. Stevens, G2BVN, presenting the CHC-500 Award to Mr C. R. Emary, G5GH. Mr Emary is the first UK recipient of the award. Also in the picture is G2AHL (centre).
(Photo by G3NMR)

NEWS . . .

Collated by John Clarricoats, O.B.E., G6CL

Radio Astronomy. In an interesting survey of The Unquiet Universe, Christopher Sheriden, Associate Editor of *Popular Electronics*, pays tribute in the January issue to the " forgotten man " in the discovery of solar radio emissions—Denis Heightman, G6DH, of Clacton, Essex—who he recalls long before World War II had co-related solar hiss with sunspot activity and had reported his findings to Prof (later Sir) Edward Appleton. Sheriden says there are now 350 radio observatories throughout the world, actively carrying out advanced research.

Mullard Electronic Centre, opened recently by the Minister of Aviation (Rt. Hon. Roy Jenkins, MP), has, in its 5000 ft. of floor space at Mullard House, London, many new ideas which will enable the Centre to be used for all kinds of conferences and exhibitions concerned with the electronics industry. Feature is a new sculpture in steel—" Nuclus "—which revolves in a changing pattern of lighting to the accompaniment of electronic music. There is also a 50 ft. mural with a spoken commentary which visitors may listen to through hand-held earphones working in conjunction with an induction loop.

Ultrasonics and the Blind. The use of ultrasonics as an aid for the blind has been reported to Parliament by the National Research Development Corporation who, in conjunction with Ultra Electronics Ltd., have made 150 prototype instruments and distributed them to blind people. Results are now being assessed. A photo-electric blind aid which may be complementary to the ultrasonic aid is being investigated by the Corporation.

Korean Amateur Radio League has 75 licensed radio amateurs among its 400 members. Call-signs in the series HM1-7 are issued systematically in areas (HM1 is assigned to Seoul City), but those in the series HM8-0 are assigned regardless of call areas. HM8 calls go to Third Class operators, HM9 calls are used to identify portable or mobile stations and HM0 calls are issued to club stations.

Amateur TV in France is now permitted, using monochrome, on 405 or 625 lines on specified frequencies in the 430-440 Mc/s band and vertical polarization. Full details of the new facility, achieved after four years of negotiation by REF, are given in *Radio REF* for December 1965.

Guard your Beams. Don't be too sure your equipment is safe from theft just because it is anchored to the ground. W3LRS had a fully-assembled three-element beam stolen out of his yard in full view of the State Barracks, two drive-in theatres and a busy main road! All of this, according to *QST*, happened in less than two hours while W3LRS was out at lunch.

Mullard Film Lectures will be held at the following places during March: 2nd, Peterborough (Town Hall); 3rd, London (Caxton Hall); 3rd, Newport, Isle of Wight (Technical College); 10th, Bournemouth (Hawthorns Hotel); 15th, Jersey (Pomme d'Or Hotel); 16th, Guernsey (Hermitage Hotel); 22nd, Redruth (Cornwall Technical College); 23rd, Plymouth (Continental Hotel); 24th, Middlesbrough (Cleveland Scientific Institution). Members who wish to attend any of these meetings should notify Mr Ian Nicholson, Films and Lectures Organization, Mullard House, Torrington Place, London, WC1, who will send an invitation. Meetings commence at 7.45 p.m. and at each the talk will be " Transistor Topics." The films to be shown are entitled " *Thin-film Microcircuits* " and " *Electro-Magnetic Waves—Part II.*"

QST's 50th Anniversary was marked by the publication, in the December 1965 issue, of ten pages of miscellaneous items from very early issues printed on the quality of paper used in those days. *QST* first appeared in December 1915—a point in time when the Great War in Europe was well into its second year.

Going to Israel? If so and you want to operate your own or any licensed Israeli station apply direct to the Ministry of Posts, 37 Yehuda Hayamit Street, Jaffa. No charge is made for a temporary licence but the application must be accompanied by a photostat copy of the home licence and a statement relating to length of stay and intended QTH. (Source: 4X4FV in *CQ*, December 1965.)

27 Mc/s Walkie Talkies. Replying to Sir Ian Orr-Ewing (G5OG) in the Commons on 15 December, 1965, the PMG again explained that no walkie-talkies have been licensed in the UK for operation in the 27 Mc/s band because they are liable to interfere with authorized services in this and other bands. The PMG told Sir Ian there had been several recent prosecutions for the unlicensed use of Japanese walkie-talkies. Dealers who advertise these sets are advised that licenses to use them in this country are not available. On the same day, also in the House, the Minister of State, Board of Trade (Mr George Darling) described in detail the difficulties of banning the import of 27 Mc/s walkie-talkies. The report of the exchanges occupied more than three pages of *Hansard*!

National Bureau of Standards frequency standard station WWV is due to move from Greenbelt, Maryland, to Fort Collins, Colorado, on 1 July next. The new station will be equipped with four 5 kW and four 20 kW transmitters and the building in which the equipment is to be installed is being constructed in the side of a hill to minimize effects on radiation patterns. The new station will be close to the NBS Radio Laboratories at Boulder, Colorado.

First IEE Appleton Lecture was given by Mr J. A. Ratcliffe, Director of Radio Research at the Radio and Space Research Station, DSIR, Slough, who described how his friend and fellow research worker, the late Sir Edward Appleton, carried out the important experiments on 11 December, 1924, which confirmed the existence of what we now call the E and F layers.

BATC Growth. Founded in 1949 to co-ordinate the activities of Amateur Radio enthusiasts experimenting with television. transmission, and to liaise with other enthusiasts engaged on similar work overseas, the British Amateur Television Club now has a membership of 800, one-third of whom live abroad. The Honorary Secretary is D. Mann, G6OUO/T, 67 West Hill, Wembley Park, Middlesex. Membership costs 10s. a year.

GBR QRT. The time signal service provided by GBR, Rugby, on 16 kc/s has been withdrawn for six months to enable the transmitters to be modernized for frequency-shift keying. The service has been transferred temporarily to GBZ, Criggion, on 19·6 kc/s.

ITU Centenary was commemorated by REF on 4-5 December, 1965, when a special station using the call F8ITU was active from somewhere in France. (Source: *Radio REF*, December 1965.)

US Colour TV. The US television industry is predicting that with the 3,000,000 mark now passed, at least 5,000,000 colour receivers will be operating in the United States by the end of 1966.

Public Address Exhibition, arranged by the Association of Public Address Engineers, will be held a the King's Head Hotel, Harrow-on-the-Hill from 15 to 17 March, 1966.

Electrical Engineers' Exhibition, organized by P. A. Thorogood, G4KD, on behalf of the Association of Supervisory Electrical Engineers, will be held at Earls Court, London, from 23-30 March, 1966.

Physics Exhibition will take place at the Alexandra Palace in North London from 28-31 March, 1966.

QUA Associates

conducted by "JIX"

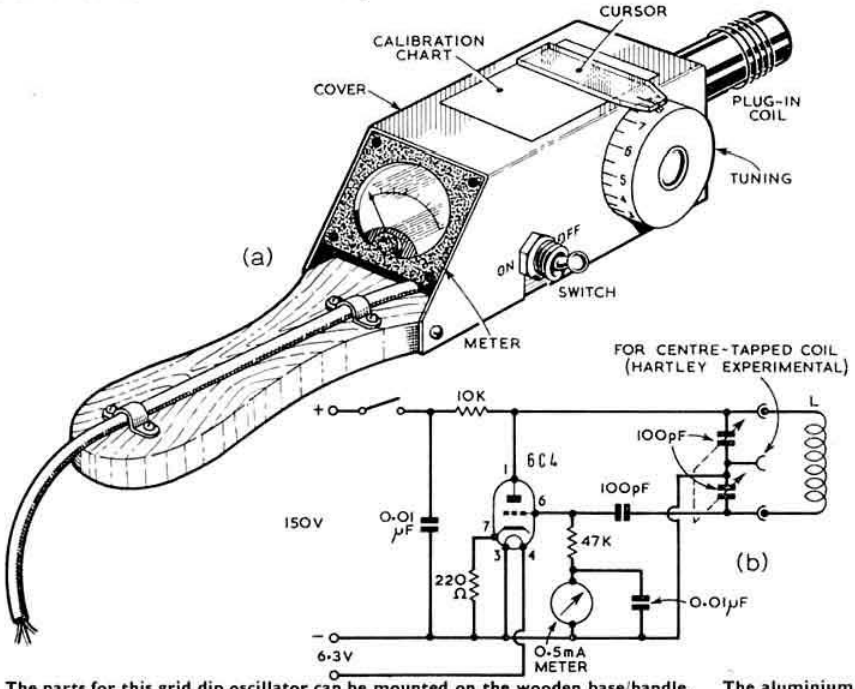
I AM sure that the Ollerton meeting was one of the best events of last year which, I must admit, was quite an eventful period. Unfortunately, this applies in both senses; it has been quite successful, but has also shown up, more than at other times, a tendency towards apathy amongst a fair proportion of radio-inclined lads when it comes to taking part in meetings, visits, exhibitions and camps.

However, Ollerton brought to light the keen enthusiasm that can exist, and plenty of praise is still due to the organizers of this get-together. I met the keenest bunch of boys for a long time there, the Mount school radio club members. Then there was the London Federation of Boys' Clubs Hindleap Warren project where the Roding Boys' Society managed to put Youth Amateur Radio on the map. Also in connection with the Boys' Clubs was the feature on Amateur Radio in the Royal Festival Hall show "Clubs are Trumps." Pretty good. I hope Frankie Vaughan and the other "Show-Biz." personalities could see what a great activity Amateur Radio would be in Youth Clubs, and come up with one or two ideas for support! The one trouble is that it is the same old bunch of lads who get into all these projects, and in fact because of them "QUA . . . ." started at all. Organizations like the YHA or Scouts form groups to go abroad, have adventure camps, put on shows etc. etc. But there is no sign yet of a Youth Radio Scheme here in the country of birth of radio. I have been in contact regularly with the Australian Youth Radio Scheme Organizer, Mr R. C. Black. Many hundreds of boys are involved on projects and activities there.

What of the future? First is the proposed Easter Camp invitation from the Mount Radio Club to the members of the RBS. This is the first inter-Youth Group co-operation project to materialise. We are very grateful for this invitation from the Mount lads. There is a possibility that the London Fed. Amateur Radio project will be launched this year. If so, this will mean groups of young enthusiasts visiting Hindleap Warren and building a log cabin radio shack etc. throughout the summer at weekends. Finally, at the very beginning of 1966, the Society put on a stand at the *Daily Mail* Schoolboys and Girls Exhibition in London. I visited this Show, and was pleased to see a little Amateur Radio. Again, where were the "A" Members and boys who should be the backbone of the Youth Radio Movement? No, I saw mainly the adult officers of the Society. But the show of simple home built gear saved the day.

Grid Dip Oscillator

This piece of test equipment is of great value, and if you have not experimented with the simple circuitry involved, then let me encourage you to start here and now. A g.d.o. enables you to check the resonance of tuned circuits even before power is ever supplied to the unit. The tuning of aerials can then be checked in a moment. It acts as a simple signal generator, with the circuitry no more complex than the simple one valve receivers most boys make.



The parts for this grid dip oscillator can be mounted on the wooden base/handle. The aluminium cover carries the pointer and calibration chart. Plug-in coils are used, and the number of turns required should be found experimentally by winding the coils and finding the frequency of oscillation on a receiver.

The Colpitts oscillator circuit shown in the diagram can be built up on a small piece of wood as suggested, or mounted in any way you think best. When the circuit is oscillating, hold the coil near to a resonant network, tune the g.d.o. and watch for a dip on the meter. When this is observed, the frequencies are equal, and the unknown resonant circuit tuning can be read off the g.d.o., if it is calibrated. (By checking against a receiver, for instance.)

* K. L. Smith, 82 Granville Road, Walthamstow, London, E.17.

Society Affairs

A Brief Report on the January, 1966 meeting of the Council

THE meeting was held on 6 January, 1966, and was attended by Messrs R. F. Stevens (President), N. Caws, J. Etherington, J. C. Foster, J. C. Graham, E. G. Ingram, L. E. Newnham, F. K. Parker, A. D. Patterson, W. A. Roberts, J. F. Shepherd, G. M. C. Stone, J. W. Swinnerton, Louis Varney, E. W. Yeomanson (Members of Council), John A. Rouse (General Manager and Secretary) and P. C. M. Smee (Assistant Secretary).

Apologies for absence were submitted on behalf of Mr L. N. Goldsbrough.

Welcome to New Members

The President opened the meeting by welcoming Mr J. Etherington, G5UG, and Mr W. A. Roberts, G2RO. Mr Stevens also welcomed Mr G. M. C. Stone, G3FZL, who had been re-elected to serve on the Council.

Election of Executive Vice-President

In accordance with Article 11 of the Articles of Association, Mr F. K. Parker, G3FUR, was elected Executive Vice-President for 1966 (Mr Parker's election was reported on page 77 of the February issue of the RSGB BULLETIN. EDITOR).

Recommendations of Committees

The Council accepted recommendations relating to RSGB policy on h.f. band contests for the guidance of the Society's delegates to the Region I IARU Conference in Opatija, Yugoslavia, in May, 1966 (*H.F. Contests*), the results of the 1296 Mc/s Tests 1965 (*V.H.F. Contests*) and the results of the 1965 RAEN Rally (*RAEN*).

Membership and Affiliation

The Council approved 64 applications for membership (57 Corporate, 7 Associate) and 6 applications for transfer from Associate to Corporate grade.

The subscriptions of three members were waived on the grounds of blindness.

The Council granted affiliation to the University of East Anglia Radio and Electronics Club.

Resignation of Mr R. H. James, GW3BFH

The Council considered the position arising from the resignation of Mr R. H. James from the office of Council Member for Zone E with effect from 1 January, 1966.

It was agreed to hold a ballot to elect a member to fill the vacancy and to call for nominations in the February issue of the RSGB BULLETIN.

Council Member for Zone D

It was agreed under Articles 28 and 54 of the Society's Articles of Association to hold a ballot to fill the casual vacancy. (A notice calling for nominations was published on page 77 of the February issue of the RSGB BULLETIN. EDITOR.)

Cheque Signatures

The Council formally authorized the President, Executive Vice-President, Honorary Treasurer and General Manager to sign cheques drawn on the Society's Banking Accounts. (Cheques require two signatures.)

Committees of Council for 1966

The Council agreed on the names of members to be invited to serve on Committees during 1966. (A list of Committee members was published on page 77 of the February issue of the RSGB BULLETIN. EDITOR.)

Honorary Managers for 1966

The Council appointed the QSL Manager, V.H.F. Manager, Certificates Manager, and Slow Morse Organizer for 1966. (Announcements were published on pages 77 and 78 of the February issue of the RSGB BULLETIN. EDITOR.)

Minutes of the AGM and EGM

The Minutes of the AGM and EGM held on 17 December, 1965 were approved for publication in the February issue of the RSGB BULLETIN.

IARC Convention, 1966

It was agreed to submit a paper to the 1966 Convention of the International Amateur Radio Club.

A member of the Council suggested that the Defence of the Amateur Bands would be a suitable—and most important—subject.

New Headquarters

The Council noted that, although many properties had been inspected during the last 12 months, none had proved suitable. However, the Headquarters ad hoc Committee is continuing its efforts to find new Society offices. The requirements are kept constantly under review and the possibility of a Headquarters outside the London area has not been overlooked.

Minutes of Committees

The Council received as reports the minutes of the following Committee meetings: H.F. Contests (18.11.65), Technical (26.11.65), V.H.F. Contests (1.12.65), RAEN (4.12.65), V.H.F. (6.12.65), Education (18.12.65), Scientific Studies (20.12.65), and IARU Working Group (15.12.65).

Lambda Investment Co. Ltd.

It was reported that the Headquarters Fund had been invested with the Lambda Investment Co. Ltd. in the form of a loan to the company.

Region 14 Meeting

After discussion, Mr J. F. Shepherd, GM3EGW, was asked to call a meeting of members in Region 14 on 13 February to consider the vacant office of Regional Representative.

The Council was in session for 4½ hours.

Writing to Headquarters?

When writing to Headquarters please use separate sheets of paper for:

- Changes of Address (return a wrapper from the *Bulletin* if possible)
- Orders for Publications
- Queries
- *Bulletin* items
- Committee items

When paying your subscription please return the reminder card sent to you by Headquarters or quote the date on which your subscription falls due.

Whenever you write to Headquarters please write your name in block letters and quote your call-sign, BRS or A number.

Obituaries

Charles E. Biggs, G2TZ

It is with deep regret that we report the passing of Charles E. Biggs, G2TZ, of Dorchester, on 12 January, 1966, after an illness of some three months. Charles, as he was known to his friends, was, in the early days of radio, a seagoing operator in the Merchant Service and had for a number of years been active mainly on c.w. on the 14 Mc/s band.

His retirement from business coincided with the formation of the South Dorset Radio Society, and at its inaugural meeting he was elected Secretary, a post he held until his death. It was mainly through his efforts that the Society has grown to its present strength. Charles was a keen NFD enthusiast and was present throughout the V.H.F. Field Day less than a month before his illness. He will be sadly missed by his many friends in the RSGB and the South Dorset Society. To his widow we extend our deepest sympathy.

F. A. Boyes, G2HDV

Those amateurs in the Stockport area who were active in the immediate pre-war years, and again in the years following hostilities, will learn with sorrow of the sudden death of "Freddie" Boyes, G2HDV. He died suddenly during work at the age of 64, just when he was beginning to look forward to a well-earned retirement.

A keen DX man on "Ten" and "Twenty," Fred was always ready to give advice and a helping hand (to say nothing of gifts from the junk-box!) to younger enthusiasts taking up the hobby. In recent years he had not been active, his interest having been diverted at first to photography and then to cruising. His enthusiasm in these fields matched that which he had devoted to Amateur Radio, and his friends in the North Cheshire Cruising Club, of which he was a member, this year expressed their appreciation of his work by appointing him their Commodore.

To his widow and two sons, his old "ham" friends extend their deepest sympathy.

F.E.W.

Paul Verner Rasmussen, OZ1PR

It is with sadness that we learn of the passing, on 18 January, of Paul Verner Rasmussen, OZ1PR.

Paul had a handicap which made him extremely shy to meet people personally, but once the ice was broken a firm friendship would grow. He was a radio man through and through. He began as an apprentice and during his time of 33 years with the same firm became well known in the trade, achieving the position of chief technical designer and constructor of B.C. radio. His hobby was simply a means to further his interest, by experimentation. Since his death it has been said he was a technical genius.

All equipment at the station was Paul's own design and construction, and he was most proud when his wife worked DX and got good reports on phone. He was a c.w. man, though not so active during the last four years of his life.

He acquired his licence and call in spring of 1939 and made many friends throughout Great Britain and other parts of the world. His wife was only one of the many people he helped and encouraged to obtain a licence in Denmark. Both in the trade and in Amateur Circles, OZ1PR will be sadly missed.

He leaves a widow, L. Margaret Rasmussen, to whom we offer our deepest sympathy.

L. H. Shersby, G2GZ

The death occurred on 17 January, 1966, after a short illnesss of Laurie Shersby, G2GZ of Raynes Park, London, at the age of 63 years.

Licensed in 1930 and a member of RAOTA, he has been continuously active throughout the years, a diehard low power man who never hankered after "bigger and better." Nevertheless he extracted the maximum pleasure from the hobby and his enthusiasm knew no bounds.

As an active member of the Wimbledon Amateur Radio Society he was ever willing to assist newcomers. During the 1939-1945 World War he served in the Army as a Gunner with wireless training duties.

His cheerful and lively personality will be greatly missed by his many friends and our deepest sympathy is extended to his widow, Dolly, in her sudden loss.

J.H.P.

Cyril Smith, G4LP

It is with regret that we have to record the death, on 10 December, 1965, of Cyril Smith, G4LP, at the comparatively early age of 53.

Cyril had been an active amateur since being licensed. His interests covered all bands up to 2m, but in latter years he concentrated more on Top Band mobile operation. His pleasant and charming personality and keen sense of humour were always evident over the air and a personal contact with him was indeed a pleasure.

His friends in the greater Manchester area deeply regret his passing and extend to his widow and daughter their heart-felt sympathy.

D.B.

Anthony Stimson, G3RKY

On 17 January the death occurred of Anthony (Bill) Stimson, G3RKY, from a coronary thrombosis following a successful glaucoma operation.

Bill had only recently become interested in Amateur Radio following a highly successful career in engineering. It is through this work that he became known for his inventive ingenuity. His main recreation was choral music, in which he was intensely interested. For several years in the post-war period he was a member of the Harrogate Operatic Players and at various times he sang in Christchurch Choir and with the Harrogate Guild of Singers under the late Eric Godley.

He leaves a widow and two daughters, to whom we convey our deep sympathy.

J. N. Walker, G5JU

We learn with deep regret of passing of James Norman Walker, "Jerry," on 30 January, 1966.

He was educated at Swansea Municipal Secondary School, matriculating with honours. When he was commissioned in 1940 in the Technical Branch of the Royal Air Force, his appointments included Squadron Signals Officer, special duties in "Y" service, involvement in the development and operation of "Oboe," service with the Pathfinder Force, Station Signals Officer and service at the Air Ministry. With over 500 hours operational flying and twice mentioned in Despatches, he was demobilized with the rank of Squadron Leader. He was employed by Eddystone Radio Ltd., Birmingham, from 1946 as technical sales engineer.

He leaves a widow, one daughter and three sons to whom we offer our sympathy at their great loss.

Silent Keys

We record with much sorrow the passing of the following amateurs:

H. N. Livings, G3BVV, Herne, Kent.

N. E. Jones, G3JVI, Bishop's Stortford, Hertfordshire.

TV Reception in Fringe Areas

The GPO Liaison and TVI Committee wishes to compile a list of television receivers known to be satisfactory—from an Amateur Radio point of view—in fringe areas. Members are invited to co-operate in compiling the list; details should be sent to the Committee at Headquarters.

What is an Amateur?

Do we ever stop to think of the subtlety and power represented by the magic word amateur? From a single word, it means as much an experimental stage than a professional realization; but on the other hand, we always come back to the word amateur to mean this entity without borders which is Amateur Radio.

A sportsman, a golfer or a hockey player, when he has overlapped the amateur stage becomes a professional, this latter definitely framing him so; while with our fraternity often vibrating to the caption from the motion picture by Christian-Jacque, entitled: "Si tous les gars du monde" (If all the guys of the world), then the amateur means the professional consecration of a hobby, full of unexpected things and also full of hope because the word amateur touches a sensible string of human nature.—VE2NK

Letters to the Editor

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

National Field Day Rules

Rule 12 for NFD (RSGB BULLETIN, January 1966) simply states that power for any part of the station must not be derived directly from supply mains. In the same issue, Mr McNicol, GM3UU deprecates the use of p.e. generators producing outputs of up to 4kW to operate a station requiring only 100 watts. Mr McNicol also states that the primary object of NFD is to set up, under emergency conditions, a station which will establish contact with as many other stations as possible to prove its efficiency. Should local authorities ever require the assistance of amateurs to establish communications in an emergency, it is hardly likely that they will impose any restrictions on the use of p.e. generators. In NFD, as in an emergency, it must remain the prerogative of individual groups to use generators or batteries, whichever they find better suited to their needs or more readily available. For contest purposes, station efficiency is rightly measured in terms of points obtained for contacts rather than in terms of station input divided by generator *rated* output. The actual generator output will only be the power consumed by the station, and not the maximum figure stamped on the generator nameplate, so the problem of getting rid of the surplus 3900 watts hardly arises.

A more serious aspect of Rule 12 is that it leaves the way open for battery users to bring a mains power supply into the operating area for charging purposes. It may even be construed that lighting heating and cooking appliances do not form part of the station proper, and may therefore be operated directly from the mains. I hasten to add that I have no knowledge of any group which has interpreted Rule 12 in this fashion, but I would suggest that some classification is necessary.

WM. M. HAMILTON, GM3GDX

Motherwell.

In recent years many of the letters which have appeared in the BULLETIN concerning National Field Day have expressed extreme dissatisfaction with the rules of the contest. Surely this is sufficient justification for the Society to completely revise NFD.

The 10 watt limitation and other initiative destroying rules in these days of modern and efficient amateur radio equipment are responsible for the widespread discontent. If the original idea of NFD has to be maintained, i.e. operation in an emergency, then readily available equipment running for example, 100 watts, will be just as acceptable as 10 watts.

Why not give us a contest with various classes for the different power inputs and no aerial limitations, where points can be claimed for all manner of contacts including countries or zones Then we can really enjoy NFD by applying unrestricted initative to the event.

J. D. FORWARD, G3HTA

Exeter, Devon.

Contests

It would appear that the members of the RSGB Contests Committee do not apparently, read the BULLETIN. For a long while correspondents, have been bemoaning the fact that contests occupy the whole of the bands on most weekends during the summer months. A golden opportunity to increase the prestige of the RSGB is being overlooked. If we put our own house in order and regulated RSGB sponsored contests in the way Lieut. Colonel Sir Evan Y. Nepean, Bt. (September issue, 1965) suggests, then we would be doing ourselves, and the rest of the world, a big favour indeed. Who knows, some other countries might just see the good sense in it and follow suit.

In recent months, requests for skeds with 27 radio amateur friends all over the world have been declined because " there's another bloomin' contest on and I'm going to dig my garden."

What does one have to do short of pole squatting outside New Ruskin House to make the Contests Committee pay attention to the majority of radio amateurs?

Please, please, let's do something about this now. I'm sure a vote among RSGB members would be greatly in favour of regulating contests.

D. DAVIES, 9H1AD, G3SJQ

Malta G.C.

Being interested in v.h.f. contests and also in operating c.w. on 144 Mc/s, I have just read through the rules of the First 144 Mc/s Contest (c.w.) 1966 and must express my utter disgust at the method of scoring applied to this event. It certainly does not encourage stations in the northern counties to take part in such an event.

Take, for instance, a station in Yorkshire; the adjacent counties are Lancashire, Lincolnshire, Nottinghamshire, Durham, Westmorland and Derbyshire, and in order to obtain 20 points for a contact I have to work stations in the following counties.

	Nearest Point
Lancashire	60 miles
Staffs.	75 miles
Cheshire	75 miles
Huntingdonshire	85 miles
Cumberland	105 miles
Northumberland	105 miles

How these figures compare with stations in the home counties I do not propose to show as I am sure that the chance of such stations having to work similar distances in order to obtain 20 points is remote, and furthermore, owing to the high concentration of stations, it is far easier to knock up a good score with only locals.

I do not think that there is any need to comment on the chances of northern stations collecting a good clutch of 30 pointers.

It is about time this system of scoring was scrapped for v.h.f. contests and points per mile or km substituted.

C. S. NORMAN, G3FCY

Hull, Yorkshire.

V.H.F. Contests

I see the Contests Committee is up to its tricks again. Rule 6(*b*) for the Second 144 Mc/s Contest (Open) 1966 says, " To satisfy Amateur (Sound) Licence A requirements frequencies in use should be recorded on the reverse side of the cover sheet." Under which section does the licence require this? It is significant that the rules for NFD on the next page do not include the same requirements, yet I am not aware that the licence makes any distinction of this nature between the various bands. Why then has the Committee cooked up this particular imposition for 2m operators?

In the absence of a reference to a specific licence regulation, I assume that licence Section 6(1)(c) is relevant. If one reads this pedantically it could be concluded, since the plural word, frequencies, is used, that one should record both the incoming and outgoing frequencies. Is this the intention of the new rule?

Does the Committee intend the operators to measure their frequency every time they change, and thus waste valuable time, or will it be sufficient to quote the frequency within the limits of tolerance of the table appended to the licence: i.e. within 0·5 Mc/s at the centres of both parts of the band and 100 kc/s at the edges. Some clarificaton of this point is desired.

Furthermore, the licence regulations have now been in force for some time. Why the belated discovery of this supposed requirement?

I suspect the real reason for this new rule is to keep tabs on the observance or breaches of the quite voluntary band plan. If this is the case let the Committee be honest in their intentions and not dress them up with specious reference to licence regulations.

S. F. BROWN, G4LU

Oswestry, Salop.

(The V.H.F. Contests Committee states that Mr Brown has correctly interpreted their intention. The Committee is not empowered to enforce the Band Plan but does try to protect some kind of voluntary order.—EDITOR.)

A Simple Two-way Telephone System

While to some readers the article in last September's BULLETIN on a simple two-way telephone system may not be connected with Amateur Radio, it was nevertheless very enlightening for those of us who sit in our shacks, yards away from our XYLs, and wish from time to time to ask for liquid refreshment or embrocation for stiff key-bashing muscles. From time to time I have tried various combinations of relays, power supplies, etc., in connection with two ex-GPO telephones with varying success. but I built up Mr Christian's circuit and had immediate success. I would add that my 'phones were fitted with dials for automatic exchange use but this does not seem to affect the performance of the system.

I write this letter surrounded by tea-cups and embrocation oil.

ALAN G. WHEELER, G3RHF

Ashford, Middlesex.

ATC Instructors Required

Throughout the ATC in the UK I am trying to encourage greater use of the 5 Mc/s ATC W/T network.

The usual cry from the squadrons is " we have no experts to man, repair, and build the gear." There must, however, be many ex-signals types who could assist these squadrons, and so a plea is made to anyone with a knowledge of radio, radar and W/T procedure to offer their services as instructors. An interest in amateur Radio can, of course, be fostered among the cadets.

The following ATC Squadrons, all in the Staffordshire wing, are known to require assistance, and have specifically asked for the help of radio amateurs: 240, Darlaston; 481, West Bromwich; 1047, Wolverhampton; and 2156, Rowley Regis.

Flying Officer V. J. REYNOLDS, G3COY
Signals Officer, 238 Squadron, ATC.

25 Yoxall Avenue,
Hartshill,
Stoke-on-Trent.

Spark

Quite recently, a friend of mine lent me a book, called *500 Wireless Questions Answered*. This book was printed in 1924 by Radio Press Limited and I have found one particularly interesting question in it, which might fit your " Said Long Ago " section, in these days of s.s.b. and other modern rigs, using very narrow channels.

" *Question: 498.*

Is it likely that the " spark " system will be superseded by continuous waves for maritime communication?

Answer: Not at all likely. The traffic problems which would arise if c.w. were employed are almost insuperable. When stations have to be constantly picking up and working with numbers of others at short notice, it is necessary to employ rather broad tuning."

My friends and I already had some very broadly tuned smiles as we read it; perhaps others would like to have some as well.

THOMAS E. J. TOTH, BRS26680

London S.E.18.

Procedure and QSL's

It would appear that Amateur Radio is in urgent need of four new procedure signs to clear up some of the misunderstandings that often occur in connection with QSL cards. I believe that the following would be suitable.

1. I am sending you a card—please do not send yours.
2. I am sending you a card—please send yours (at present known as QSLL).
3. I am not sending you a card—please do not send yours.
4. I am not sending you a card—please send yours.

These may well be sent as QSL 1, 2, 3, or 4, with the assumption that business is to be via the QSL Bureau in respect of Nos. 1, 2 and 4. In the event that direct action is being undertaken, the latter could be supplemented by a suffix " /D."

In the case of number 4, it is assumed that the other station is either very generous, or that he already holds the sending stations' card and that a reciprocal card has either not yet been sent, or if it has, it has gone astray. There may be other reasons for using this signal of course.

It is not thought that the material length of a QSO would be adversely affected by use of this or a similar procedure, for these same signs could, as well as conveying the intelligence shown, also incorporate all that intelligence which is at present rather an extraneous appendage to a QSO, and sometimes somewhat greater in length than one! For example, BCNU, 73, CUL, BEST DX, TNX QSO OM, PSE QSL, MNI TNX, is sometimes found, usually sent in triplicate. As a concession we might allow 73, which is suitable for posterity, and justifiably so, but both this and the QSL procedure sign should only be sent once at the end of a QSO.

There is no doubt that the adoption of proper procedure, and its intelligent use, will save the QSL Bureaux a vast amount of unnecessary work, and they will be able to cope better with the more important traffic. The same benefits will accrue to the operators themselves of course.

It will be appreciated that the more important card handling by the Bureaux is already colossal, and will increase still further in the future. It may be possible to achieve a satisfactory balance, but because the proportion of people who QSL ad lib and ad infinitum are in direct proportion to the number of licensees, it becomes doubtful, to say the least, that this will happen.

Perhaps, in view of the need for more financial support, it could be foreseen that QSL action may well become related to direct revenue to the organizers of the QSL Bureaux, i.e., the more you use it, the more you pay. Indiscriminate QSLers will then either learn to be more selective or foot the bill. This may well be upsetting to them, but it will ensure that those who deem it an honour to do otherwise, will never be able to get *more* than their money's-worth.

These are the sentiments of an outsider. The QSL Bureaux organizers and those to whom they are directly responsible may well be satisfied with their lot, for they certainly never complain. Even so, on and off the air comments seem to indicate that in the matter of the QSL card, there is room for improvement.

E. G. KENDALL, G3APA

Coundon,
Coventry,
Warwickshire.

QSL Managers

I feel strongly the injustice of Mr Milne's statement in the January BULLETIN apparently admitting a case for only two or three amateurs in this world. A Manager, in offering his services, shows his interest in the problem besetting many who have a high QSO rate. They are sincere, dedicated people and far from being " mugs," provide the means of obtaining a QSL which probably would not otherwise be forthcoming.

The case for a G lies with American QSOs, where a G is DX to many. I find that a potential quarter-million on call, given the choice, will choose via a QSL Manager; it is cheaper for them and a card more certain. An American QSL Manager will usually only handle W cards for a G and no Bureau is involved whatsoever in QSL transactions. The main accusation that a Manager would issue a card without reference to a check log holds little water, as an overburdened amateur is more likely to do just this.

Mr Milne runs an impeccable service; his concern that re-directing to a Third Party by him should become widespread is worthy of attention. However, times change and for outgoing QSLs a means should be found to cater for the situation. For QSLs coming to a G, responsibility should lie with the individual to redirect his own; his envelopes are at the Bureau and the address can be c/o Timbuctoo. There are only two people allegedly involved as yet.

The QSL Manager has his place in Amateur Radio and the picture painted of him by Mr Milne is so utterly wrong.

F. PARDY, GW3DZJ
QSL Manager W3HAK (W's only)

Flintshire.

I read Mr A. O. Milne's letter with interest and agreement with his sentiments. The main point in his letter is " that something should be done " so let us proceed to frame some rules, written or unwritten:

(1) What sort of station reasonably qualifies for the help of a QSL Manager?

(*a*) Invalid operators who cannot cope.
(*b*) Lone operator stations with a card rate of over *100 per week*.

(2) What qualifications should we all require of a QSL Manager and how should he be appointed? In my view he should:

(*a*) be a volunteer already holding DXCC himself.
(*b*) be a member of a recognized club, and in the USA preferably a member of a DXCC club.
(*c*) be sponsored by the local president or secretary of the club as being a person who will conduct the business with integrity.
(*d*) have his appointment endorsed by the society of his country, e.g., ARRL, RSGB.

(3) How should QSL Managers operate and how should they co-operate with Bureau managers?

(*a*) The arrangement—subject to the satisfaction of the conditions above—should be one entirely between the DX station and the QSL Manager. Bureau managers should not need to be involved at all.
(*b*) QSLs should be sent direct to the QSL manager, or if

" To Bureau " then the card should be in an envelope with only the call of the QSL manager appearing thereon.

(*c*) If cards are routed to " Bureau," *not* enveloped as in (*b*), the Bureau manager should not be required to translate from the call appearing on the card to some other call, and he would forward the card on in accordance with normal bureau practice. If the DX station receives a large quantity of cards he wants his QSL manager to handle, he will have to forward them on himself or be more explicit on the air and tell would-be QSLers how to route their cards as in (*b*) above.

I find that the main QSL load comes from the USA demand. Here, although all call areas have been worked countless times, skeds are still put on to give the operators a chance to work a new one. This results in a QSL load of an average of 150 per week, with many peaks well in excess of *200 a week* (e.g., 97 worked in 2 hours, 8 minutes, one day when 21 Mc/s opened). There have been many offers to act as QSL manager but, although I would like to have one for the USA traffic, I have so far resisted this because of the uneasiness expressed by G2MI. I hope that the result of his letter will be a set of " Agreed Terms " expressed by RSGB and ARRL as to the acceptance of QSL Managers, to which we can work.

R. H. TAYLOR, GC8HT

St. Saviours,
Guernsey, C.I.

Trees as Aerial Supports

I was interested to read of the method used by G3DGN in his article " *Trees as Aerial Supports* " in the November BULLETIN. Perhaps he in turn might be interested in a method I used to overcome the same obstacles. I also used this to get a line over my house. The method employed a Trout Spinning rod with fixed spool reel and nylon thread line. If a small two or three ounce lead weight is attached to the line end, then a " cast " can be made over the roof or tree quite easily. A string can then be tied to the nylon line, the line being wound back on to the reel bringing the string with it. After that one just needs a rope to complete the job.

WALTER H. FERGUSON, G3KMH

Northumberland.

Why Mobile on Grandad's Band

The comments on Top Band working by G. R. J. in " Current Comment " in the October BULLETIN were interesting, in as much as they contain more than an element of truth. In addition, however, I would like to point out that there are at least 24 spot frequencies which we are told to avoid when using this band. Why mobile members use this band so slavishly is quite a mystery to me. A loaded whip aerial for 160m mobile is technically ridiculous.

J. C. ELSDEN, G3DXN

Birmingham.

New Books

ESSAYS IN ELECTRONICS. By M. G. Scroggie, B.Sc., M.I.E.E. Published by Iliffe Books Ltd. 8¾ in. × 5¾ in., 301 pages. Price 42s.

As its title suggests, this book is not an electronics textbook. Nevertheless, anyone interested in learning about electronics (rather than just passing exams) can expect to find both information and interest here. Twenty two articles from *Wireless World* each discuss a subject in a helpful and accurate but never long-haired way, giving the reader the feeling of a friendly discussion with a teacher who can remember his own difficulties.

Unfortunately, little of the subject matter is directly related to Amateur Radio; if anything there is a bias toward audio. Even so, this book could well form part of a course of study for membership of an Institute of Advanced Amateurs!

B.P.

ELECTRONIC EQUIPMENT IN INDUSTRY. By W. D Gilmour, B.A., A.M.I.E.E. Published by Iliffe Books Ltd. 265 pages with 101 diagrams and 6 plates. 50s. net.

There is surely a demand for a book of this kind now that electronic control equipment has permeated the whole area of industry and science. This volume is more than a guide book; it is a conducted tour through the literature of the subject with an easy to read, clearly expressed commentary. The work is in two sections—means, which include measurement, telemetry, servo and tele control, computers, data logging, etc. and design, which covers requirements, organization of development, installation, maintenance, testing etc.

Being mainly a descriptive and practical work, mathematics is absent—the author has much encouragement for the " non math " type—" Nobody should hesitate to apply electronics to a problem because he fears that his mathematics may not be up to the task."

The amateur transmitter comes in for favourable mention. In dealing with radio transmission for example we read—" for preliminary experimental work the services of a licensed amateur transmitter can often be very helpful." And again in discussing the problem of maintenance of equipment on the spot, " possible sources of local talent that should not be overlooked are radio amateurs and those interested in radio control of models."

The feature of this book is without doubt the excellent bibliographies and references. For example, on measurements there are 199 references and on computers 130 and these have all been very carefully selected by the author.

This most useful work should certainly be read by anyone who is concerned with electronic control techniques and their applications.

L.E.N.

ELECTRICAL & ELECTRONIC TRADER YEAR BOOK 1966: Radio, Television and Electrical Appliances—37th edition. Published by Iliffe Books Ltd. Price 35s. net (postage 1s. 3d.). Size: 8¾ in. × 5½ in. 480 pages.

Electrical & Electronic Trader Year Book is an important reference book in the radio and electrical industries and is of great assistance in seeking sources of supply.

The 1966 edition has been brought up to date and includes technical information giving radio valve and c.r.t. connections with base diagrams; transistor types and connections; specifications and valve line-up of radio and television receivers; specifications of radiograms, tape recorders, record players, storage heaters, refrigerators, spin dryers and washing machines; receiver i.f. values and a BBC and ITA station guide with field strength contour maps covering 55 transmitters. Technical literature is covered by brief reviews of approximately 300 books on radio, television and electronics. A surprising omission is any mention of RSGB publications.

General information deals with trade organizations; licensing; legal guide; index of gramophone records and tapes; overseas main voltages, electricity boards, etc.

Buyer's guides name manufacturers and suppliers of domestic electrical and radio and television goods. A proprietary names section identifies makers of branded articles.

RSGB 21/28 Mc/s Telephony Contest 1965

THE 1965 contest held on 25–26 September encountered the worst conditions yet, with scores generally considerably below those of previous years.

The overall winner was D. R. Taylor, 9J2DT who, with 100 watts a.m. and s.s.b. into a 1,650 ft. rhombic, made 170 contacts in all the Home Counties. This total includes 28 QSOs on 28 Mc/s, more than all the other entrants combined.

In second place was C. K. Harrison, OD5EG with 1319 points made from 146 contacts including three on 28 Mc/s. In third place overall and leading British Isles entrant was A. H. Trigell, G3JAF, who will be awarded the Whitworth Trophy. His total of 88 contacts, made entirely on 21 Mc/s, included 43 which attracted bonus points and gave him an 83 point lead over A. E. White, G3HCU, in second place.

Entrants' Comments

"An ideal way to spend a wet weekend," (G3JAF). "A real marathon indeed in the shocking conditions," (G3CAZ). "Too early in the year for me, no east-west path," (G3KFT). "Had time in between QSOs to go into town shopping with XYL" (G3KHU). "Guess I will have to get some s.s.b. gear going next year" (G3LHJ). "Worked quite a few DLs on 28 Mc/s but no Gs" (9J2FK). "Conditions better both before and after the contest weekend' (G3SSO).

Committee's Comments

The transmitting logs were generally very good with few mistakes, but please note UB5, UT5, UV5 are all the same country, the Ukraine. Several stations seem to have invented

RESULTS

Call-sign	Points	Placings Home	Placings Overseas
9J2DT*	1888		1
OD5EG*	1319		2
G3JAF*	1290	1	
G3HCU*	1207	2	
G3UML	1160	3	
G2QT	1155	4	
G3CAZ	1112	5	
G6RJ	1051	6	
UB5FG*	1040		3
OD5BZ	1025		4
G2DC	965	7	
G3KFT	875	8	
G3KHU	870	9	
4X4JU*	869		5
G3TKK	795	10	
GW3AHN*	760	11	
G2JB	705	12	
G3LHJ	687	13	
ZE1AC*	665		6
CR7FR*	657		7

Call-sign	Points	Placings Home	Placings Overseas
G3JRL/M	647	14	
9J2FK	635		8
G3BXS	592	15	
ZC4JU*	570		9
G3PMX	455	16	
4W2AA*	442		10
GW2HFR	435	17	
G3KSH	415	18	
LZ1UF*	407		11
G3PZO	398	19	
G3BCC	370	20	
G2AJB	365	21	
EA4HD	315		12
G8KU	285	22	
CR6DX	250		13
G3TMN	245	23	
G3MWZ	245		
G3AKY	242	25	
9H1AB	234		14
GM3SKX	230	26	

Call-sign	Points	Placings Home	Placings Overseas
9J2GJ	227		15
G3SMM	200	27	
YO4CT	180		16
4X4SK	165		17
VK6QL	140		18

MULTI-OPERATOR SECTION

Call-sign	Points	Placings Home	Placings Overseas
ZC4MO*	1605		1
G3SSO*	1170	1	
G3CIO	807	2	
ZC4PC	659		2
G3TCH	627	3	
G3GJL	570	4	
UB5KBR	512		3
G8KL	480	5	
YO3KAA	237		4

This position he has now occupied in four of the last five contests and it would not be out of place to wish him better luck next time.

L. S. Margolis, G3UML, did well to be the third placed G station as he lost some eight hours' possible operating time on the Saturday. A number of South African and South American stations not worked by other entrants enabled him to make up a lot of lost ground.

The Multi-operator Section was this year much better supported, the winner being the RAF Troodos ARC station, ZC4MO, with 160 contacts on 21 Mc/s and one on 28 Mc/s. The Government Communications Headquarters ARC station, G3SSO, had 79 contacts, all on 21 Mc/s, to give them second place in this section.

Conditions

The contest date was brought forward from December in the hopes of providing rather better DX conditions, particularly for VK and ZL, but this idea rather misfired, only three Far East stations and one W. being recorded in the logs. Entrants generally described the conditions as being between fair and—awful! However, this view is not shared by G2DC, who believes the absence of European and W signals made it more of a DX contest. Many overseas stations complained of the clash with the SAC contest making things difficult for them. By the time this situation revealed itself it was too late to alter the dates but, from the British point of view, this may well have helped to produce the increased activity from Africa without which the contest would have been a total flop.

001 as a number from PY2BZD/0. When working a station not participating in the contest it is not necessary to obtain a serial number in order to claim the points.

In this contest, it has become almost essential to be able to work on both a.m. and s.s.b. in order to have a chance of winning. It is a great pity that more stations do not accept that both methods are telephony and use them accordingly without prejudice.

Finally our thanks to all stations who sent in an entry, no matter how small, and to G3HDA and DE-15143 for their check logs.

NATIONAL FIELD DAY 1966

FINAL DATE FOR ENTRY—

Members responsible for stations participating in this year's NFD, to be held on 4-5 June, are reminded that details of call-signs and frequencies to be used, together with the name of the group, club or affiliated society concerned, must reach the Contests Committee at RSGB Headquarters not later than Wednesday, 27 April, 1966. The information should be set out as shown in Rule 6. on page 51 of the January 1966 issue of the RSGB BULLETIN.

Results of the V.H.F. National Field Day Questionnaire

PROMPTED by suggestions to modify certain rules of V.H.F. National Field Day, the V.H.F. Contests Committee decided that the best way to sound the views of the entrants as a whole would be by means of a questionnaire. A questionnaire was duly compiled and circulated to clubs and other past entrants in this contest, at the end of July 1965, and it is pleasing to note that 80 groups completed the questionnaire. The results shown in the table are the percentages based on the 80 replies received.

A quick look through the table will show that, in general, the entrants accept the present rules and do not wish them to be changed. This is confirmed by the answer to question 18. The table is basically self explanatory, but some answers require elaboration.

Taking questions 4, 5 and 6 together, many groups felt that aerial gain and height were not important factors to be taken into consideration in view of the excellent locations used by most groups. Those whose locations were not quite so good would be penalized by such restrictions.

The answer to question 9 shows the majority in favour of one receiver per band. The rules for the 1966 event have been modified to allow only one receiver per band.

Question 19 asked for alternative scoring systems. Only three groups supplied detailed alternative scoring systems. One suggested that the total score for any contact should be a function of the distance worked, power input and height above sea level, and went on to supply the formulae linking these terms. While the merit of the system is debatable, the mathematics involved in calculating the score is tremendous. The other two systems involved county and country multipliers based on the number of contacts made, contact distance not being taken into account! Several other groups suggested modifications to the present rules involving Zone multipliers and other bonuses. However, it is considered that all known bonus systems will favour one or more geographical areas more than others. One group from a densely populated (radio-wise) part of the country said that the " distance worked " system discriminated against it, while another group from a rather isolated part of the country said the same! Obviously there are arguments on both sides, but if a group feels that its geographical location is unfavourable it is at liberty to select a better location. Future entrants can judge the relative advantages for these two groups by studying past results. In general, most groups were happy with the present scoring system as being fair and straightforward.

There were many general comments connected with question 20. The enforcement or non-enforcement of band plans divided opinion fairly evenly. This has been discussed by the V.H.F. Contests Committee, but as yet no final decision has been made.

There was a widely held view that the QRA locator system for location and kilometres for distance measurement should be used. These systems are gradually being introduced into all v.h.f. contests. There was also a large number of individual comments and suggestions, all of which will be considered.

The V.H.F. Contests Committee would like to thank all the clubs and groups who contributed towards this survey and hopes that they will continue to support the event.

TABLE OF RESULTS

1	Which is the best month for this event?	September 80%; July or August 11%; May or June 9%
2	Suggest starting and finishing times.	Both 18.00 GMT 59%; both 16.00 or 17.00 GMT 30%; contest less than 24 hours 11%
3	Suggest erection period.	6 hours, 62%; less than 6, 21%; more than 6, 10%; no fixed period, 7%
4	Should there be a limit to the number of aerials?	No limit 54%; Limit 46%
5	Should there be a limit to aerial height?	No Limit 65%; Limit 35%
6	If " Limit " in Question 5, what should the limit be?	Over 25 ft. 75%; Under 25 ft. 25%
7	What should be the maximum input to the final stage of the transmitter?	25 W. 64%; 10 W. 16%; Other limits 12%; No limit 8%
8	How many transmitters should be allowed per band?	One per band 84%; More than one 16%
9	How many receivers should be allowed per band?	One per band 71%; More than one 29%
10	Should there be an overall weight limit for equipment?	No 90%; Yes 10%
11	If yes in Question 10 suggest limit.	Limits ranged from 20 lb. to 10 cwt.!
12	Should there be any restrictions on modes of modulation?	No 92%; Yes 8%
13	Should the number of operators be restricted?	No 85%; Yes 15%
14	Should single operator entries be accepted?	Yes 90%; No 10%
15	Should any particular power source be prohibited?	Public Supplies 76%; No limitations 16%; P.E. Sets 8%
16	Should accommodation be restricted to tents?	No 60%; Yes 40%
17	If " No " in Question 16, suggest alternatives.	All accommodation except fixed buildings 85%; Allow cars, etc. 15%
18	Is the present scoring system satisfactory?	Yes 64%; No 36%
19	If " No " in 18, suggest modifications or alternatives.	See text.
20	Comment on any other aspect of V.H.F. NFD	See text.

D/F Qualifying Event

The following are details of the Rugby D/F Qualifying Event:

Sunday, 24 April, 1966.

Organizer: R. A. Burdett, 8 Fenwick Drive, Rugby, Warwickshire.
Frequencies and Call-signs: To be announced at the start.
Map: Ordnance Survey, New Popular Edition, Sheet 132.
Assembly Point: Ref. 582751, a track leading SW from Yelvertoft, three miles from M1/A428 Junction.
Assembly Time: 13.00 BST for 13.20 BST start.
Entries and Tea: Intending competitors should notify the organizer as soon as possible stating the number of people in their party who will require tea.

Beacon Station GB3GI

The Northern Ireland Beacon station GB3GI has been in operation on 145·990 Mc/s since early February 1966, beaming south-east using a 5 element Yagi temporarily at 35 feet above ground. Tne power input is 10 watts, it is hoped to switch the transmissions alternately north and south-east shortly. Reports will be welcome.

Rules for V.H.F. National Field Day 1966

The Rules for this event are essentially the same as for 1965. Changes in the rules in paragraphs 2 and 6 are in accordance with the replies received to the questionnaire.

Entrants are strongly recommended to operate within their local frequency zones in the 144-146 Mc/s, 432-434 Mc/s and 1296-1298 Mc/s bands.

Cover sheets will be forwarded to all 1965 entrants: other groups should write to RSGB Headquarters as soon as possible.

Rules

1. **Duration.** From 18.00 GMT 3 September, to 18.00 GMT 4 September, 1966.

2. **Eligible Entrants.** Any RSGB member or group of members within the British Isles may enter. The group may be any group of RSGB members, a club or an Affiliated Society.

3. **Operators.** Operators of portable stations competing in the contest must each hold a current British Isles Amateur (Sound) Licence and must be **fully paid up** Corporate Members of the RSGB at the time of the contest.

4. **Power Supplies.** Power for any part of the station shall not be derived directly from supply mains.

5. **Stations.** Each competing group will be permitted to put one or two stations in operation; these two stations must use different call-signs. There is no restriction on the combination of bands allocated to each call, but only one station may be operated on each band and only one transmitter on any band at a time under one call-sign. Stations may operate from the same site or from different sites. It will be permissible for two groups from a single region or from adjacent regions to amalgamate for the purpose of scoring; if this is done frequency bands must be allocated between two stations as detailed above. **Only one receiver per band may be used.**

6. **Apparatus.** No apparatus may be erected on the site prior to 12.00 GMT on 3 September, 1966. This rule includes aerials and aerial fittings as well as accommodation for the stations, but does not apply to accommodation to be used for storage purposes.

7. **Contacts** may be made on any mode permitted in the Amateur (Sound) Licence except A2 (m.c.w.), in the bands 70·1 to 70·7 Mc/s, 144 to 146 Mc/s and 427 to 450 Mc/s with an input not exceeding 25 watts to any stage of the transmitter; or in any amateur band above 1215 Mc/s with any power or type of emission permitted under the terms of the Amateur (Sound) Licences.

8. **Scoring.** Points will be scored on the basis of 1 point per kilometre, and crossband contacts will not count for points. The whole score for the band 427-450 Mc/s is to be multiplied by 3 and that for bands over 1215 Mc/s is to be multiplied by 10 (Contestants should *not* multiply the individual contact scores by the band multipliers).

9. **Contest Exchanges.** RST or RS reports followed by the contact number (starting at 001 for each station and continuing in sequence irrespective of band), and location. Location must be specified either as a five character QRA locator or at a place clearly identifiable on the 10 mile to 1 inch Ordnance Survey map or as a distance and bearing from such a place. It is the responsibility of the receiving operator to obtain the information he requires to calculate distances correctly.

All entrants must be prepared to supply QRA Locator details on request.

Contestants are advised when calling to indicate on which band they are operating.

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. Proof of contact may be required.

10. **Logs.** (*a*) Separate logs must be submitted for each band and tabulated in columns headed (in this order): Date/time (GMT); Call-sign of station contacted; Our report on his signal and serial number sent; His report on our signal and serial number received; Location of station contacted as received; Operator's call-sign; Points claimed.

(*b*) The special cover and summary sheets provided for this event must be completed and signed by a member who will be responsible for the entry. These cover sheets are available from RSGB Headquarters on receipt of a large stamped addressed envelope.

11. **Entries.** Must be postmarked not later than **26 September, 1966.**

12. **Awards.** At the discretion of Council, the Surrey Trophy will be awarded to the overall winner and a miniature cup to the runner-up. Certificates of Merit will be awarded on a country and Band basis where there is sufficient activity.

BARTG Spring RTTY Contest 1966

1. **When:** 02.00 GMT **12 March, 1966,** to 02.00 GMT **14 March, 1966.**

2. **Bands.** 3·5, 7, 14, 21 and 28 Mc/s amateur bands.

3. **Stations.** Stations may not be contacted more than once on any one band. Additional contacts may be made with the same station if a different band is used.

4. **Country Status.** As ARRL Countries List—except that KL7, KH6 and VO to be considered as separate countries.

5. **Messages.** Messages exchanged will consist of: (*a*) Message number; (*b*) Report (RST); (*c*) Time in GMT; (*d*) Country.

6. **Points.** (*a*) All two-way RTTY contacts with stations in one's own country will earn two points. (*b*) All two-way RTTY contacts with stations outside one's own country will earn ten points. (*c*) All stations will receive a bonus of 200 points per country, including their own.

7. **Scoring.** (*a*) Two-way exchange points, times total countries worked. (*b*) Total country points, times number of continents worked. (*c*) (*a*) and (*b*) are added together to give the total test score.

Sample Score

(*a*) Exchange points (302) times countries (10)	= 3,020
(*b*) Country points (2,000) times continents (3)	= 6,000
(*c*) Adding item (*a*) and (*b*) above	= 9,020

8. **Operation.** The contest will be divided into two parts for single and multiple operator stations. The transmission of RTTY on more than one frequency at one time will be disallowed.

9. **Logs and Score Sheets.** Logs and score sheets should be received by: Honorary Secretary, BARTG, Alan Walmsley, G2HIO, The Woodlands, Bath Lane, Moira, Nr. Burton-on-Trent, Staffordshire, England, not later than **1 May, 1966,** to qualify.

Amateur Licences

On 31 January, 1966 the number of amateur licences in force in the United Kingdom was as follows:

Amateur (Sound) Licences A: 11,543
Amateur (Sound) Licences B: 323
Amateur (Sound Mobile) Licences A: 1966
Amateur (Sound Mobile) Licences B: 3
Amateur (Television) Licences: 173

Mr E. W. Yeomanson, G3IIR, presenting the V.H.F. Managers' Trophy to a representative of the Midland Contest Club at the Society's AGM last December.

(Photo by G3NMR)

CONTEST NEWS

RESULTS — REPORTS — RULES

Second 1·8 Mc/s Contest 1965

The Second Top Band Contest took place on 20 and 21 November 1965 but was not quite so well supported as the 1964 event with a decrease of seven in the number of entries.

D. G. Alexander, G3KLH, who operated from his home in Berkshire and achieved a fine score of 829 points from 180 contacts, is this event's winner. He was placed third in 1963 and 1964 and has been well rewarded for his perseverance. It is interesting to compare his score with that of GI6TK's 1964 winning score of 825 points from 170 contacts.

In second place is Mike Whitaker, G3IGW, with 715 points from 166 contacts. Mike, who missed the last two contests, operated from near Halifax in Yorkshire.

RESULTS

Position	Call-sign	County	Score
1	G3KLH	BE	829
2	G3IGW	YS	715
3	G3MXJ	KT	712
4	GM3NYY	AY	674
5	G3JXC	MX	656
6	G3OWM (Op. G3RVM)	ND	633
7	G3KOR	LE	625
*	G8NF	YS	625
8	G3PWU	BE	619
9	GW3NJW	MH	608
10	GM3FXM	FE	554
†	G3JGL	WR	547
11	G5RP	BE	541
12	G3TMC	LN	530
13	G3SVW/A	LE	528
14	G3SIA	WE	514
†	GM3KHH	BF	511
15	G3RXQ	BD	492
16	G3TYK	LE	484
17	G3TKF	GR	478
18	G3JSK	SD	471
19	G3RZI	WR	468
20	G6HD	KT	465
21	G3JKY	KT	463
22	G3KZZ/A	DH	457
23	G5HZ	OX	450
24	G3KPU	NM	443
25	G3RGD	WK	431
26	G3SZF	HF	422
27	G3ITF	HE	418
28	G3RSF	EX	417
29	GM3KMR	MN	413
30	G3TZO	CH	408
31	G2DC	HE	404
‡	G3NOP	YS	404
32	G3TAA	LD	401
33	G3MCX	SY	399
34	G3NBN	CH	388
†	G3OXI	SY	383
35	G3NNW	LE	382
36	G3RWF	NM	373
37	G3ULF	NK	372
38	GW3GWX	CV	367
39	G3CXX	LE	354
	G3THP	LD	354
41	G3OVL	SY	346
42	G3AKY	YS	345
43	G3UFY	SY	332
44	G3GOX	MX	307
45	G3GRK	KT	297
*	G3RSD	LN	297
46	G3NQT	EX	279
47	G3UHO	MX	276
48	G3OMU	HE	254
49	G3TPJ	EX	251
50	G8RZ	CD	207
†	G3SGF	LD	203
51	G3SVD	BE	147
52	GM3ORX	DU	107
53	G3TMY	SF	90
54	G6OO	LN	41
55	G2DHV	KT	29

* Multi-op. † Late entry. ‡ No declaration.

Third, and only three points behind, is D. J. Andrews, G3MXJ, who operated from his old QTH in Kent and scored 712 points from 169 contacts. G3MXJ now lives in Sussex but moved back to his old QTH in Kent because his new home has no room for a Top Band aerial. Dennis was second in 1964 when operating from Suffolk; on that occasion he had 819 points from the same number of contacts, 169.

Conditions seem to have been fairly good but there were certainly not the same number of European contacts as there were in 1964 when the contest coincided with the *CQ* World Wide DX Contest.

Equipment

The following notes on the leading stations' gear may be of special interest to future competitors.

Position	*Call-sign*	*P.A.*	*Receiver*	*Aerial*
1	G3KLH	807	home-made	dipole at 50 ft.
2	G3IGW	5763	Eddystone 756	270 ft. end-fed semi-vertical
3	G3MXJ	6146	converter into HRO at 85 kc/s	274 ft. centre fed
4	GM3NYY	807	AR88LF	200 ft. end fed
5	G3JXC	—	—	265 ft. VS1AA
6	G3OWM	CNY1 modified	KW77	half wave 65 ft. high

G3OWM, the club station at Newcastle University, was operated by G3RVM.

Comments

Comments were quite numerous, and everyone seems to agree that it was a most enjoyable contest with a high standard of operating.

G3IGW is pleased to see so many new licensees taking part—a view heartily endorsed by the H.F. Contests Committee. G3SWA, entering for the second time, has no new theories on the scoring system, finding it perfectly satisfactory. G3SIA approves the scoring system, but deplores the length of time between the submission of logs and the publishing of the results. (Last year the results were published in May—this year we have improved on this by two months and only just missed the February BULLETIN. Further, details of the first four placings were given in the News Bulletin on 23 January—Contests Committee.) G3SIA approves of the summer 1·8 Mc/s Contest. For G3TYK, this was his first contest, and he also supports the summer contest. G3JSK congratulates everyone with their fine signals, and in his view the scoring system is quite satisfactory—he lives in Stafford with six adjacent counties! G3KPU, who enjoyed the contest, feels that it is well worth the full night run. G3ITF, who does not normally operate on Top Band, spent all day Saturday putting up two 30 ft. masts and then had difficulty in loading up his transmitter. He was working on his rig until 20.00, and found himself very tired by 06.30 on Sunday when he closed down. His opinion is that 10 hours is rather too long, and proposes to make sure that he has some rest on the day before next year's contest. G3TZO, entering his first contest, found it most enjoyable and looks forward to many more. Old Timer G2DC found the standard of operating good, but the contest rather tough-going with QSOs having to be chased. He stayed on the whole 10 hours! G3NOP (Yorkshire) thinks that the stations in the Midlands have an advantage over the rest. G3TAA (London) heard weak DX W and VE as well as the illegal NS1A. Fish-phone started up at 08.00 hours; perhaps they were waiting for us to finish, he comments. He is considering moving 300 yards down the road into Kent and operating /A next time. This should provide more 5 point QSOs. G3UFA found it a very enjoyable introduction to the bands and well worth the loss of a night's sleep—he feels that tempers might be less frayed if people netted using v.f.o.'s instead of p.a.'s. G3RSD, who sent in a two operator log, feels that 10 hours for one person is too long.

The Committee thanks all entrants for a high standard of operating and in most cases for very good logs; it really does help checking if all logs are laid out in the form specified. Unfortunately there were some offenders in this respect, but the Committee decided not to penalize anyone for not complying with Rule 7(a) in this event.

Four stations have not been placed owing to late posting of entries.

Awards

The Victor Desmond Trophy will be presented to D. G. Alexander, G3KLH, and certificates of merit will be received by M. Whitaker, G3IGW, and D. J. Andrews, G3MXJ.

Check Logs

Check logs were received from A3942, G3FM, G4VF, OK1GA, OK1KHK, OL1AG, OL4ADU and OL6ACY, and are gratefully acknowledged by the H.F. Contests Committee.

Low Power Contest 1966

The rules for the Low Power Contest to be held on 3 April are given below. It should be noted that the event is for one day only.

1. **When:** 07.00 GMT to 19.00 GMT on 3 April, 1966.
2. **Eligible Entrants:** All fully paid-up members of the RSGB resident in Europe.
3. The General Rules relating to RSGB Contests, published in the January, 1966, issue of the RSGB BULLETIN, will apply except as superseded by the rules of this Contest.
4. **Contacts:** Must be made on c.w. (A1) only between 3500 and 3600 kc/s.
5. **Scoring:** Points will be scored on the following basis:

Watts input to p.a. stage	Up to 0·5	To 1	To 2	To 3	To 4	To 5
Points per contact	20	10	5	3	2	1

A bonus of 20 points may be claimed for the first contact with each different county code area listed on page 50 of the January, 1966 issue of the RSGB BULLETIN.

6. **Contest Exchanges:** RST reports followed by the contact number, starting at 001, and the county code letters, e.g. 559061SX or Sussex.
7. **Logs:** (a) Must be tabulated in columns headed (in this order) " Date/Time (GMT)," " Call-sign of station contacted," " My report on his signals and serial number sent," " His report on my signals and serial number received," " His County," " My input power," " Points claimed."
(b) The cover sheet must be made out in accordance with RSGB Contests Rule 4 and the declaration signed.
(c) Entries must be postmarked not later than Monday, **18 April, 1966.**
8. **Awards:** At the discretion of the Council, the 1930 Committee Cup will be awarded to the winner, and certificates of merit to the runner-up and to the non-transmitting member submitting the best check log in the opinion of the Contests Committee.

Third 144 Mc/s Contest (Portable) 1966

Contestants are asked to note that for the two portable contests QRA locators only should be exchanged and that distances for all future v.h.f. contests are to be measured in kilometres. The QRA locator map of Western Europe is recommended for distance measurement, on which the scale is exactly 25 kilometres to the centimetre. A description of the QRA locator system appeared in the BULLETIN for March, 1965.

Check logs from listeners are invited and may be credited towards the V.H.F. Listeners' Championship. Any comments on the rules will be welcome and will be considered when the rules for the next similar contest are made.

1. **When:** 10.00 GMT to 18.00 GMT on **Sunday, 8 May, 1966.**
2. The **General Rules** for RSGB contests published in the January 1966 issue of the RSGB BULLETIN will apply except as superseded by the rules of this contest.
3. **Power Supplies.** Power for any part of the station shall not be derived from supply mains, and the input to any stage of the transmitter shall not exceed 25 watts.
4. **Contacts** may be made on any mode permitted in the Amateur (Sound) Licence except A2 (m.c.w.).
5. **Scoring** will be on the basis of one point per kilometre for contacts with fixed stations and two points per kilometre with portable or mobile stations.
6. **Contest Exchanges.** RST or RS reports followed by the contact number and five-character QRA locator.
7. **Entries.** (a) Logs should be tabulated in columns headed in this order: " Date/Time (GMT) "; " Call-sign of station contacted "; " My report on his signal and serial number sent "; " His report on my signal and serial number received "; " QRA received "; " Call-sign of operator " (Multi-operator entries only); " Distance in kilometres "; " Points claimed."
(b) The cover sheet must be made out in accordance with the General Rules and the declaration signed. Multi-operator entries should be so marked and the operators listed. The QRA as sent, should be recorded.
(c) Entries must be post-marked not later than **Monday, 23 May, 1966.**
8. **Awards.** At the discretion of Council a miniature cup will be awarded to the winner and a Certificate of Merit to the runner-up.

First 432 Mc/s Contest 1966

As stations in this contest can work from more than one location they have the advantage of claiming the score for the best contact with any particular station. This applies equally to static stations who may work them at more than one site. Please note that the section 432 to 434 Mc/s is to be used and that distances are to be measured in kilometres. The contest will terminate at 12.00 GMT, the start of the 1296 Mc/s Contest.

Check logs from listeners are invited and may be credited towards the V.H.F. Listeners' Championship.

1. **When:** 18.00 GMT on **Saturday, 28 May** to 12.00 GMT on **Sunday, 29 May, 1966.**
2. The **General Rules** for RSGB contests published in the January 1966 issue of the RSGB BULLETIN will apply except as superseded by the rules of this contest.
3. **Stations** may operate from more than one site.
4. **Contacts** may be made on any mode permitted in the entrants Amateur (Sound) Licence except A2 (m.c.w.), on frequencies between 432 and 434 Mc/s.
5. **Scoring** will be on the basis of one point per kilometre.
6. **Contest Exchanges.** RST or RS reports followed by the contact number and location (e.g. RST 599001, 4 north Macclesfield, Cheshire). This location must be identifiable without ambiguity on the Ordnance Survey " Ten-mile " map. Alternatively, five-figure QRA locators may be exchanged. It is the responsibility of the receiving operator to obtain the information necessary to calculate his distances correctly.
7. **Entries.** (a) Logs should be tabulated in columns headed in this order: " Date/Time (GMT) "; " Call-sign of station contacted "; " My report on his signal and serial number sent "; " His report on my signal and serial number received "; " Location of station received "; " Call-sign of operator " (Multi-operator entries only); " Points claimed." Logs must show clearly when the location is changed.
(b) The cover sheet must be made out in accordance with the General Rules and the declaration signed. Multi-operator entries should be so marked and the operators listed. The QTH as sent, QRA if used, and the NGR full six-figure reference should be recorded. Stations outside the area of the National Grid should show latitude and longitude.
(c) Entries must be post-marked not later than **Monday, 12 June, 1966.**
8. **Awards.** At the discretion of Council three awards will be made; to the leading fixed station, the leading portable station and the runner-up. The overall winner will receive a miniature cup and the other two stations a Certificate of Merit.

First 1296 Mc/s Contest 1966

As a result of the great success of the first contest held last year, two contests are to be held this year on this band. The contest is timed to start at the end of the 432 Mc/s Contest, and cross-band contacts either way are permitted, scoring half-points. Distances are to be measured in kilometres and the section 1296 to 1298 Mc/s is to be used.

Check logs from listeners are invited and may be credited towards the V.H.F. Listeners' Championship. Any comments on the rules will be welcome and will be considered when the rules for the next similar contest are made.

1. **When:** 12.00 GMT to 18.00 GMT on **Sunday, 29 May, 1966.**
2. The **General Rules** for RSGB contests published in the January 1966 issue of the RSGB BULLETIN will apply except as superseded by the rules of this contest.
3. **Contacts** may be made on any mode permitted in the entrant's Amateur (Sound) Licence on frequencies between 1296 and 1298 Mc/s.
4. **Scoring** will be on the basis of 10 points per kilometre for stations on the 1296 Mc/s band and 5 points per kilometre where one station is in the 432 Mc/s band.
5. **Contest Exchanges.** RST or RS reports followed by the contact number and location (e.g. RST 599001, 4 north Macclesfield, Cheshire). This location must be identifiable without ambiguity on the Ordnance Survey " Ten-mile " map. Alternatively, five-figure QRA locators may be exchanged. It is the responsibility of the receiving operator to obtain the information necessary to calculate his distances correctly.
6. **Entries.** (a) Logs should be tabulated in columns headed in this order: " Date/Time (GMT) "; " Call-sign of station contacted "; " My report on his signal and serial number sent "; " His report on my signal and serial number received "; " Location of station received "; " Call-sign of operator " (Multi-operator entries only): " Points claimed."
(b) The cover sheet must be made out in accordance with the General Rules and the declaration signed. Multi-operator entries should be so marked and the operators listed. The QTH as sent, QRA if used, and the NGR full six-figure reference should be recorded. Stations outside the area of the National Grid should show latitude and longitude.
(c) Entries must be post-marked not later than **Monday, 12 June, 1966.**
7. **Awards.** At the discretion of Council a miniature cup will be awarded to the winner and Certificates of Merit to the runner-up and the non-transmitting member submitting the best check log.

QSL Bureau

The RSGB QSL Manager, Mr A. O. Milne, G2MI, is holding a large quantity of cards for VK9RB and VS9AJR which are awaiting collection. The address of the QSL Bureau is G2MI, Bromley, Kent.

CLUBROOM

A Monthly Survey of Club and Group Activities

For further information on membership or the activities of a particular club, application should be made to the person whose Call-sign is indicated at the end of the item. Full addresses may be obtained from the RSGB Amateur Radio Call Book.

Acton, Brentford and Chiswick RC cleared its AGM in January and is looking forward to a year of progress in 1966. *G3GEH.*

AERE has attained half a century with the January issue of its newsletter, *QAV*. In discussing plans for the coming year, the Chairman, G2HIF, expresses the opinion that in relation to contests, it would seem to be better to concentrate full scale efforts into fewer events rather than to try to manage the whole lot. Alternatively, he observes that it would be nice to see the club with a second string to its contest's bow in the form of another complete team of men and equipment. *G2HIF.*

Ainsdale RC has a new committee and is all set for the coming year. By the time this item appears in print, the outlines of the future programme should have crystalized. *G2CUZ.*

Barnsley and District ARC held its Annual Dinner and Dance at the Queens Hotel late in January, for which they had an attendance of 65 members and friends. This highly successful event was most ably organized by G5KM. *G3GNK.*

Basildon and District ARC was given a most informative and interesting lecture by G3DGN on Communications by Light during the February meeting. On 24 March a Junk Sale is to be held, the first lot of which will be auctioned at 8 p.m. All are welcome. *G8AAO.*

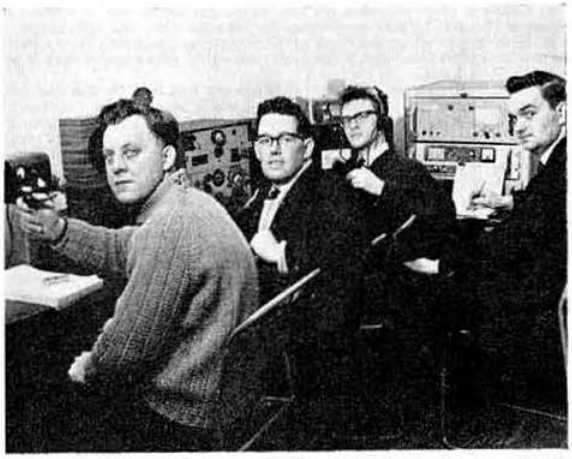
Basingstoke ARC is holding its next meeting on 12 March when G3MED will give a talk on s.s.b.

Bedford and District ARC has elected a vigorous committee, and the club is seeking new headquarters in a more central position. An attractive programme is being arranged. *G3OWQ.*

Bradford RS is meeting on 15 March for a talk " Let's go Mobile" by G3KEP. On 29 March the AGM is to be held. *G3SAO.*

Cambridge and District ARC opened its New Year with a Sale of Surplus equipment conducted by G3PTB. The Annual Dinner was held on 28 January when the Guests of Honour were Mr Roy Stevens, G2BVN, President of the RSGB, and his wife. The Granfield Cup for 1966 was awarded to G2CDX in recognition of his work as Editor of *Cambeam*. *G5BQ.*

Cambridge University WS is again planning one of its ritual annual trips to the Isle of Man at Easter. The Society hopes to be operational on all the h.f. bands, including Top Band, and for a change, will be mainly using s.s.b. Dates provisionally fixed are 15 to 22 March. *G3SGK.*



Committee members of the Ealing and District Amateur Radio Society photographed during a recent visit by the local press to the Community Centre where they meet. The society is fortunate that it has a permanent room which can be locked between meetings.

Chelmsford ARS recently enjoyed a two hour demonstration of over-the-air Amateur TV given by G3NOX/T from Saffron Walden some 25 miles away. The January meeting was the occasion of the Annual Film Show when documentary films on a variety of subjects were screened. *G3EIX.*

Cheltenham Group is still uneasy about the success of the group. The question of amalgamation with CARS was again raised at a recent meeting, but a majority voted against the suggestion. *G3CGD.*

Cheshunt and District RC is now running RAE classes at the East Herts. Technical College on Mondays, Tuesdays, Wednesdays, and Thursdays each week. Practical projects include the construction of a Heathkit receiver and transmitter. It is also hoped to set up an Amateur Radio station at the college. *G3GBL.*

Chester and District ARS which meets every Tuesday, with the exception of the first Tuesday in each month, is another club which has its AGM behind it and which is looking forward to a progressive 1966. *G3TZO.*

Cornish RAC's Chairman passes some very pertinent remarks on Band Usage in the issue of *Cornish Link* under review. Indeed, his closing remarks are well worth repeating here. " Don't forget that the bands are monitored, and one day band usage may be the main factor in arguments for or against the reduction of our frequency allocations." *G3NKE.*

Coventry ARS now meets at the Coventry Civil Defence HQ at Drapers Fields. Old friends and prospective members are assured of a hearty welcome. *G3UOL.*

Crawley ARC's social highlight of the year will be the Annual Dinner and Dance which will take place on 18 March at the Crawley Forest Hotel. Early booking is most strongly advised, tickets being obtainable from G3CTP. At the first meeting of the 1966 Committee, it was decided to re-start a regular Club Net on Top Band. *G3FRV.*

Cray Valley RS reports that the first month of the year proved to be full of activity. A great deal of work has been put into the HQ, largely by G3ANK and G3TAA. The Radio Room which is being set up is beginning to look like a good operating shack. *G3JJC.*

Crystal Palace and District RC is another Club which now has its AGM behind it and is settling down to an interesting and varied programme for the coming year. *G3FZL.*

Derby and District ARS has a slight change of programme in March. The film show has been moved forward to the 16th. On the 23rd a limited number of members will be able to visit the telephone exchange in Colyear Street—it seems that the GPO couldn't get the whole club inside without taking all their equipment out! *G2CVV.*

Dorking ARS reports a full and interesting programme for 1966, following the AGM held in January. It is also envisaged that a junior membership section may shortly be formed. *G3UJU.*

Ealing and District ARS had a very successful tour of London Airport control tower recently. The help and patience afforded by the staff made the visit particularly enjoyable, and was greatly appreciated by the members of the party. Organized Morse classes are now held at 7.30 p.m., half an hour prior to the normal meeting time. *G3SGT.*

East Lancashire ARC held its first meeting on 6 January when a talk and practical demonstration on Loaded Whip Aerials was given by G4CJ. Although a new club, it has currently about 40 members, most of whom are licensed. Despite such a goodly number, the club would be very interested to hear from SWLs or any interested persons, all of whom are assured of a hearty welcome. *G3NCZ.*

East London District spent an interesting afternoon on 16 January listening to G3LTF talking about 70cm equipment. Members were most impressed by the increasing simplicity and miniaturization of equipment, and were particularly fascinated by a Moon-bounce recording. *G2ABC.*

Echelford ARS newsletter under review contains an interesting

design for a crystal controlled variable frequency exciter for 10 metres in which crystals are " rubbered " by capacitors to produce a variable frequency difference that is subsequently hetrodyned to the operating frequency. The society is always pleased to welcome prospective members and visitors. *G3RHF.*

Ex-G Club, whose motto is " For Radio Amateurs born in the UK and domiciled Abroad " meets on the air only on Sundays at 19.00 GMT on 14,346 kc/s. Other frequencies and times are used, and the club would be delighted to send details of membership and these schedules. Application should be made to W8YHO (Secretary), W3HQO (President) or G2FUX.

First Class Operators' Club has held an inquest under the title " DX Marathon Inquest " and does not seem to be at all happy with what came to light. Hard words indeed are contained in the circular letter number 206. Still, straight talking often gets results. *G3JLB.*

Hongkong ARTS has elected its officers for 1966, and the society is in full swing. The society is always pleased to hear from visiting, or newly resident amateurs, and enquiries should be made to VS6BJ directly, or via PO Box 541, Hongkong.

Luton and District ARS reports that its membership is growing steadily, and that the spring programme covers a wide field. Indeed, it is safe to say that whatever a particular member's interest may be, he will find it catered for. *G8ADS.*

Magnus Grammar School RS reports that the club station G3PAW is on the air most lunch times operated by G3UVT, and G3UYU. Arrangements are in hand for a visit to see an industrial computer in action. *G3JNK.*

Mid-Warwickshire ARS is fortunate in that the Borough of Leamington Spa has sponsored 3,000 QSL cards for the use of the Society, and members who live in the Borough. Further support from the Leamington Corporation has taken the form of making available two rooms for meeting purposes, and for this the society is particularly grateful. While meetings are held every Monday evening, a planned programme is only arranged on alternate Mondays, so giving a balance between formality and informality. *G3EHA.*

Newark SWC now has 52 members. They were particularly pleased to welcome to the fold at a recent meeting G3EOV/9M4LX (etc) and ZL2JY who has already been induced into making a promise to give a talk on Amateur Radio in New Zealand. The club net takes place on 28·6 Mc/s at 10.30 clock time on Sunday mornings. *G3UEB.*

Norfolk ARC's publication *Challenge* is really something, and strikes an excellent balance between technical, who-worked-what, and general interest items. This does not mean that they are self-satisfied, for, as is amply illustrated in the issue under review, balanced and constructive criticisms are not dismissed, but published with the same good faith as they are made. Surely a sign of strength, but more important, a real indication of the desire to serve the members. *G3TLC.*

Northern Heights ARS held a very successful sale of surplus equipment which added much to the society's transmitter fund. It is also thought that after a recent talk by L. M. Dougherty on standing waves, signals in the area should be stronger. *G3MDW.*

North Kent RS meets on 10 March for a demonstration of hi-fi. Looking forward to NFD, a committee has been elected to deal with the arrangements for this contest. *G3PUI.*

Oxford University RS caters for all members of the University having an interest in radio, electronics and hi-fi, and operates a station under the call G3OUR. In March, meetings notified are on the 6th and 9th. Full information may be obtained from the Secretary, A. J. Garratt-Reed (BNC).

Peterborough ARC is making arrangements for a demonstration station at the Peterborough Agricultural Show in July. At a recent meeting, much interest was shown in a pocket walkie-talkie for 2m demonstrated by G3TSO. *G3KPO.*

Plymouth RC, in its newsletter, shows interest in certificates and awards. It points out there are some 300 awards ranging from " postage stamp type wall paper to the really magnificent hand drawn masterpiece which would do credit to the ornate of shack walls ". *G3UKI.*

Purley and District RC is holding a Junk Sale on the 18 March, whilst the meetings of the 4 March and 1 April will be " rag-chews " accompanied by a 4m transmitter on the air. Preparations are being made for participation in the various contests which are held throughout the year. The club is always pleased to welcome prospective visitors. *G3FTQ.*

Radio Invalid and Bedfast Club will again be running the s.w.l. Competition for the Silver Cup presented by Dick Holmes of

Roy Stevens, G2BVN, President of RSGB, was a guest at a party on 29 January at the home of G3NMR to celebrate the marriage in London of K6IWG, Niles (" Cal ") Moss. Cal's other call-signs include EL7B, YA11W, HC2IW and HC6IW. The bride comes from Amsterdam, Holland. Left-to-right: G3BXI, G3UML, G3SUS, CE3VU, Anne and Cal Moss, G3OGB, AP2AD, G3KVF, G3BDH, G2BVN, G3NMR. This group shows two father/son teams—G3SUS/G3OGB and G3UML/G3NMR.

Natland, Kendal, but to add variety, there is a change in the rules. Application forms can be obtained from G3LWY.

Reigate ATS held its seventh AGM on 27 January when it was revealed that the society had its most successful year in 1965. Membership stands at 46, of which 30 hold licences. Contest-wise, the club gained a high over-average position in what could be reasonably called the four major club events, and feels that if there was an award for the " Best-All-Rounder " the members would have a strong claim for it to be lodged at Reigate. *G3NKT.*

Royal Signals ARS has established a " Royal Signals Amateur Radio Award" available to its members, and details of which are given in the issue of *Mercury* under review. Under a change in the rules decided at the last AGM, membership of the society is now open to all serving soldiers, and not limited to those in the Signals Corps. Applications from licencees in other branches of the Service will be most welcome. *G3EJF.*

Saltash and District ARC opens the January *Tamar Pegasus* with some pertinent comment entitled New Year Resolutions, of which we like the best: To give accurate reports. It is not an insult to give R4, in fact, if there is any QRM, the report should be R4, for this only means " readable with practically no difficulty." Similarly S6 means " good signals " and is not a confession of a poor receiver, tin ears, or both. Also for the high jump are expressions such as " haitche-eye " (have we really forgotten how to laugh?) " dah-dit-dah," " any possible call " and the like. Talking of laughter, what has happened to G9BO? *G2DFH.*

Southgate, Finchley and District Group is contemplating a change of name to " The Southgate Radio Club " and a revision of the constitution. Details of these changes are to be carried in the Newsletter subject to their confirmation at an Extraordinary General Meeting. *G3TDM.*

Stratford-on-Avon and District RC is meeting on 4 and 8 March, the former being for the W1BB taped lecture, and the latter for a demonstration of Heathkit equipment. On 1 April will be the highlight of the rag chewers' year, namely a " Boasters' Evening " —No comment. *G3OOQ.*

Surrey Radio Contact Club is holding a sale on 8 March for which all members will need either money or surplus equipment for full participation. On 10 May a constructional contest is to be held, so out with the thinking cap and the soldering iron p.d.q. *G3KGA.*

Swindon and District ARC now has a membership hovering around the fifty mark with interests ranging from full blooded DX hunting to tinkering with transistors. With such a wide range of interests, the Secretary feels that the Newsheet gains importance rather than loses it. How true. There can be no doubt but that a lively and informative club circular stitches the whole organization together, and is of particular value to those who, for one reason or another, are unable to attend meetings as regularly as they would wish. Meetings in March are to be held on the 9th and 23rd. *G3LLZ.*

Torbay ARS has a red letter day on the 12 March when the Annual Dinner and Social is to be held at the Templestowe

Hotel, Torquay. If you have not booked for this function, make haste or you may be disappointed. *G3LKJ.*

Thames Valley ARTS held its Annual Dinner and Ladies Festival in mid-December and recorded a total of 93 members and friends. A thoroughly enjoyable time was had by all. *G5LC.*

Thanet RS continues to meet each Friday, and now has a Newsletter produced by G3LMB. At the moment final plans are being laid for the Annual Dinner and Dance to be held on 2 April, and for which early ticket application is strongly advised. *G3BAC.*

Verulam ARC. Recent club activities have included the Trans-atlantic Top-Band Tests during which G3STA, the club station, worked half a dozen W and VE stations during the small hours of the morning. Of particular enjoyment was a description by G3LPX of a 150 watt transmitter for the beginner, and especially appreciated was his description of " gut-buster " hole drilling. *G3PAO.*

West Kent RS is meeting on 11 and 25 March, the former being devoted to a discussion on NFD and the associated arrangements, and the latter to a decision on the proposed constructional project. All members are particularly asked to make a note of the date of the AGM which is 8 April. *G3SSE.*

Worthing ARS has decided to enter for four h.f. and four v.h.f. national events during 1966. Plans are also afoot for a club Top-Band c.w. transmitter-receiver. *G3IWL.*

Bristol RSGB Group's last meeting was held in the new lecture theatre at Bristol University, Royal Fort. Acoustics were excellent and a lecture and demonstration by E. C. Halliday, G3JMY, on " Microwaves" was well received. An interesting programme of lectures and film shows has been arranged for the coming year. Arrangements for NFD are in hand and offers of help are invited, especially from members unable to attend meetings. *G5UH.*

HELP US TO HELP YOU

This feature can materially assist your membership, and when sending contributions the general rule should be to provide too much information rather than too little. In addition, due to pressure on space, as it is not possible to print the full name and address of club secretaries, will you please ensure that a call-sign is included to whom interested persons can apply. Without such a call-sign the club item can lose a great deal of its potential value.

Deadline for the **April** issue will be **11 March.**
Deadline for the **May** issue will be **7 April.**

Grafton Top Band Contest 1966

The rules of the annual G2AAN Top Band Contest, organized by the Grafton Radio Society, are as follows:

When: C.W., 26 March, 1966. Phone: 2 April, 1966. 21.30 GMT until 24.00 GMT.

Procedure and Scoring: Competing stations should call "CQ GRS " on c.w. and " CQ Grafton Contest " on phone. Competitors should exchange RST (or RS) reports followed by a serial number commencing with any number between 001 and 100, increasing by 1 for each contact. Serial numbers for the two sections should continue consecutively. Each contact will count for 1 point, any station being worked once only in each section. RST and serial numbers *must be acknowledged.* First and second place certificates will be awarded to the stations achieving the two highest total scores, and further certificates will be awarded to the individual winners in each section.

Logs, bearing the usual signed declaration, should be sent to G2CJN, 145 Uxendon Hull, Wembley Park, Middlesex, to arrive not later than **12 April, 1966.**

CHANGES OF ADDRESS

Four weeks' notice is required to effect changes of address. When notifying Headquarters, please give the old as well as the new address. Advise changes promptly so that you receive every issue of the BULLETIN without interruption.

CONTESTS DIARY

March 5-6	-Second 144 Mc/s (Open) and 144 Mc/s Listeners' Contests* (see page 48, January, 1966)
March 12-13	-ARRL DX Contest (Phone) (see page 123, February 1966)
March 12-13	-BARTG Spring RTTY Contest (see page 193)
March 19-20	-BERU (see page 609 September 1965)
March 26-27	-ARRL DX Contest (C.W.) (see page 123, February 1966)
April 3	—Low Power Contest (see page 195)
April 16-17	—CQ WW DX S.S.B. Contest
April 16-17	—Second 70 Mc/s (Open) and 70 Mc/s Listeners' Contests* (see page 119)
April 23-24	—PACC Contest
April 24	—D/F Qualifying Event, Rugby * (see page 192)
April 30-May 1	—Helvetia 22 Contest
May 8	—Third 144 Mc/s (Portable) Contest
May 22	—D/F Qualifying Event
May 28-29	—First 420 Mc/s (Open) Contests*
May 29	—1296 Mc/s Contest*
June 4-5	—CHC/FHC/HTH QSO Party
June 4-5	—National Field Day
June 19	—D/F Qualifying Event
July 3	—Fourth 144 Mc/s (Portable) Contest*
July 9-10	—1·8 Mc/s Summer Contest
July 17	—D/F Qualifying Event
July 24	—Third 70 Mc/s (Portable) Contest*
July 31	—D/F Qualifying Event
August 13-14	—WAE Contest (C.W)
September 3-4	—V.H.F. NFD*
September 10-11	—WAE Contest (Phone)
September 11	—80 Metre Field Day
September 18	—D/F Final
October 16	—Second 1296 Mc/s Contest*
October 15-16	—21-28 Mc/s Telephony Contest
October 15-16	—Second 420 Mc/s Contest*
October 29-30	—7Mc/s DX (Phone) Contest
November 12-13	—7 Mc/s DX (C.W.) Contest
November 19-20	—Second Top Band Contest
December 4	—Fourth 70 Mc/s (C.W.) Contest*

* Qualifying contests for V.H.F./U.H.F. Listeners' Championship

Forthcoming Events

Details for inclusion in this feature should be sent to the appropriate Regional Representatives by the first of the month preceding publication. A.R.s and club secretaries are reminded that the information submitted must include the date, time and venue of the meeting and, whenever possible, details of the lecture or other event being arranged. Standing instructions cannot be accepted.

REGION 1

Ainsdale (ARS).—2, 16, 30 March, 8 p.m., 77 Clifton Road, Southport.

Allerton(Liverpool) (SRHS).—Thursdays, 8 p.m., 3rd Allerton Scout Group Headquarters, Church Road, Woolton, Liverpool.

Blackburn (ELARC).—3 March, 7 April, 7.30 p.m., YMCA, Limbrick, Blackburn.

Blackpool (B & FARS).—Mondays, 8 p.m., Pontins Holiday Camp, Squires Gate. Morse tuition from 7.30 p.m.

Bury (B & RRS).—8 March, 8 p.m., Old Boars Head, Crompton Street (private room).

Chester (CDARS).—1 March (Debate—Valves v Transistors), 8 March (net night on 160m and 2m), 15 March (Lecture by Mr K. Gray, GPO), 22 March (surplus equipment sale), 29 March ("2m Quickstarter," by M. A. Rivenall, G3UMV), Tuesdays, except first in month, 8 p.m., YMCA.

Crewe & District.—7 March, 4 April, 8 p.m., Earl of Crewe Hotel, Nantwich Road.

Eccles (E & DAC).—Tuesdays, 8 p.m., Patricroft Congregational Schools, Shakespeare Crescent, Patricroft, Eccles. Every Thursday, Club Top Band net 20.30 GMT.

Liverpool (L & DARS).—Tuesdays, 8 p.m., Conservative Association Rooms, Church Road, Wavertree.

(LARS).—14, 28 March, 7.30 p.m., Students' Union, Bedford Street North, Liverpool 7.

Macclesfield.—1, 15, 29 March, The George Hotel, Jordongate.

Manchester (M & DARS).—Wednesdays, 7.30 p.m., 203 Droylsden Road, Newton Heath, Manchester 10.

(SMRC).— Fridays, 7.45 p.m., Rackhouse Community Centre, Daine Avenue, Northenden.

Morecambe.—2 March, 6 April, 125 Regent Road.

Preston.—8, 22 March (All meetings start with a Morse practice at 7.30 p.m.), St. Paul's School, Pole Street.

Southport (SRS).—Wednesdays, 8.30 p.m., Sea Cadets Camp, The Esplanade.

Stockport.—9, 23 March, 6 April, The Blossoms Hotel, Buxton Road, Stockport.

Wirral.—2, 16 March, 6 April, Harding House, Park Road West, Claughton, Birkenhead.

REGION 2

Barnsley.—11 March ("Stabilised V.F.O.," by H. Eyre, G5KM), 25 March ("Recent Developments in s.s.b.," by B. Lee, G6LZ), 7.30 p.m., King George Hotel, Peel Street.

Bradford.—1 March (Visit to Baird TV Ltd.),. 15 March ("Mobile," by D. M. Pratt, B.Sc. G3KEP), 29 March (AGM), 7.30 p.m., Bradford Technical College, Great Horton Road.

Catterick.—Tuesdays and Thursdays, 7.30 p.m., Club Room, Vimy Road.

Durham.—10 March (Film Show), 8 p.m., Vane Tempest Hall.

Northern Heights.—2 March ("144 Mc/s," by L. L. Cobb, G3UII), 16 March ("On Safari among the Kilowatts," D. Howell), 30 March (Discussion on NFD), 7.30 p.m., Sportsman Inn, Ogden.

Scarborough.—Thursdays, 7.30 p.m., rear of 3 Trinity Road.

Spen Valley.—10 March ("Transistorised Transmitters," by a member of the University of Sheffield), 24 March, Heckmondwike Grammar School.

REGION 3

Bromsgrove (B & DARC).—11 March (RAE Questions and Answers), 8 April (35mm colour slides of Amateur Radio), 8 p.m., the Co-op Rooms, High Street, Bromsgrove.

REGION 4

Burton on Trent (ARS).—14 March, ("Non Destructive Testing," by C. Bailey,) 7.30 p.m., Stapenhill Institute, Stapenhill, Burton-on-Trent.

Derby (D & DARS).—2 March (Surplus Sale), 9 March (Open evening, "The Short Wave Listener," by B. J. C. Brown, and a Committee Meeting), 16 March (Film Show), 23 March (visit to GPO telephone exchange), 30 March, 7.30 p.m., Room 4, 119 Green Lane, Derby.

Heanor (H & DARS).—1 March (Surplus Sale), 8 March (Constructors' exhibition for President's Trophy), 15 March (Film Show), 22 March (DX Working by S. Read, G2ATM), 29 March (Transmitting Evening) Club Room, 7.30 p.m., Heanor Technical College, Ilkeston Road, Heanor, Derbyshire.

Loughborough (LARC).—4 March (Field Day Films), 11 March (Equipment Sale), 18 March (Film Show), 25 March (Night on the Air), 7.30 p.m., Club Room, Bleach Yard, Wards End, Loughborough.

Magnus GS (ARS).—Tuesdays, 3.50 p.m., The Junior Physics Laboratory, Magnus Grammar School, Newark.

Melton Mowbray (ARS).—24 March ("Applications of Transistors" by D. Fisher), 7.30 p.m., St. John Ambulance Hall, Asfordby Hill, Melton Mowbray.

Newark (NSWC).—Mondays, Thursdays, 7.30 p.m., The Hall, Guildhall Street, Newark.

Nottingham (ARCN).—Tuesdays, Thursdays, Room No. 3, Sherwood Community Centre, Woodthorpe House, Mansfield Road, Nottingham.

Worksop (NNARS).—Tuesdays (RAE Class), Thursdays (Lecture Night), 7.30 p.m., Club Room, 13 Gatesford Road, Worksop.

REGION 5

Bedford (B & DARC).—8 March (Construction of Transmitter for NFD), 31 March (Construction of Transmitter for NFD), Westfield School, Queen's Park, Bedford. A Slow Morse session will start at 7.30 p.m.

Cambridge (C & DARC).—4 March (Talk on Interference), 11 March (Informal), 18 March (Frequency Measurement), 25 March (Annual General Meeting), 1 April (Open Night), Fridays, 7.30 p.m., Club Headquarters, Corporation Yard, Victoria Road, Cambridge.

Cambridge University (CUWS).—Tuesdays, 8.15 p.m., Psychology Department, Downing Site, during University Term.

Luton (L & DARS).—1 March ("Construction of D/F Receiver and Miniature Transmitter), 8 March ("S.S.B." by a guest speaker), 16 March (Club visit to Tektronix (UK) Ltd., Harpenden), 22 March ("2 Metre Converter using Surplus Valves"—Shefford Club invited), 29 March (Sale of Surplus Equipment—Messrs. Hannington), Tuesdays, 8 p.m., ATC Headquarters, Crescent Road, Luton, Bedfordshire.

March (M & DRAS).— Tuesdays, 7.30 p.m., rear of Police Headquarters, High Street, March, Cambridgeshire.

Royston (R & DARC).—Wednesdays, 8 p.m., Manor House Social Club, Melbourn Street, Royston, Herts.

Shefford (S & DARC).—3 March ("Command Receiver Modifications," by C. Brown), 10 March ("Crystals," by J. Johnson—other clubs invited), 17 March ("Firestreak Control Systems," by J. Brown), 24 March (Mullard Film Strip Lecture), 31 March (NFD Meeting), Thursdays, 7.45 p.m., Church Hall, High Street, Shefford, Bedfordshire.

REGION 6

Cheltenham.—First Thursday in each month, 8 p.m., Great Western Hotel, Clarence Street, Cheltenham.

Oxford (O & DARS).—Second and fourth Wednesdays in each month, 7.30 p.m., Cherwell Hotel, North Oxford. 26 February (Social), New Inn, Shillingford.

REGION 7

Acton, Brentford & Chiswick (ABCRC).—15 March, 7.30 p.m., AEU Club, 66 High Road, Chiswick.

Ashford (Middx) Echelford (ARS).—9, 23 March, 7.30 p.m., Links Hotel, Ashford.

Bexley Heath (NKRS).—10 March, (Hi-Fi Demonstration by Broadway Radio), 7.30 p.m., Congregational Hall, Chapel Road, Bexley Heath.

Chingford (SRC).—22 March, and alternate Tuesdays, G3RYF, 17 Forest Drive East, Leytonstone, E.11.

Croydon (SRCC).—8 March, 7.30 p.m., Blacksmiths Arms, South End.

Dorking (D & DRS).—8 March, (Informal Meeting), 8 p.m., Wheatsheaf. 22 March ("Aerials & ATUs."), 8 p.m., Star & Garter, Dorking.

East Ham.—Tuesdays fortnightly, 7.30 p.m., 12 Leigh High Road, East Ham.

East Molesey (TVARTS).—2 March (GPO and the Amateur), 6 April ("Mobile Operation" G2ANX). 8 p.m., Carnarvon Castle Hotel, Hampton Court.

Edgware & Hendon (EADRS).—14 March ("Oscilloscopes, Waveform and Measurements," by G3SJE), 28 March (Informal meeting), John Keble Hall, Church Close, Deans Lane, Edgware.

Enfield.—15 March, 8 p.m., George Spicer School, Southbury Road.

Gravesend (GRS).—16 March, 7.30 p.m., RAFTA Club, 17 Overcliffe Road.

Guildford (G & DRS).—11, 25 March, fortnightly 8 p.m., Guildford Model Engineering Society in Stoke Park.

Harlow (DRS).—Tuesdays and Thursdays, 7.30 p.m., Mark Hall Barn, First Avenue.

Harrow (RSH).—4 March (Practical), 11 March, (Junk Sale), 18 March (Practical), 25 March (Film Show), 8 p.m., Roxeth Manor School, Eastcote Lane, South Harrow.

Havering (H & DARC).—9, 23 March, Romford.

Holloway (GRS).—Mondays and Wednesdays, (RAE and Morse), 7.30 p.m. Fridays (Club), 7.30 p.m., Montem School, N.7.

Hounslow (HADRS).—7, 21 March, Canteen, Mogden Main Drainage Department, Mogden Works, Isleworth.

Ilford.—Thursdays, 8 p.m., 579 High Road, Ilford (nr. Seven Kings Station).

Kingston.—17 March (Rag Chew), 31 March (Talk and demonstration by JohnWhitney), fortnightly 8 p.m., YMCA, Eden Street. Fridays (Morse classes), 2 Sunray Avenue, Tolworth.

Leyton & Walthamstow.—8, 22 March, 7.30 p.m., Leyton Senior Institute, Essex Road, London, E.10.

London U.H.F. Group.—3 March, ("V.H.F. Equipment"), 7.30 p.m., Bull & Mouth, Bloomsbury Way, Holborn.

London Members' Luncheon Club.—Third Friday every month, 12.30 p.m., Whitehall Hotel, Bloomsbury Square, Holborn.

Loughton.—11, 25 March, Alternate Fridays, 7.30 p.m., Loughton Hall, (nr. Dedben Station).

New Cross.—Wednesdays and Fridays, 8 p.m. 225 New Cross Road, SE14.

Norwood & South London (CP & DRS).—20 March, CD Centre, Bromley Road, Catford, S.E.6.

Paddington (P & DARS).—16 March ("Crystal Grinding for Crystal Filters" by G3MHQ), 8 p.m., Beauchamp Lodge Settlement, 2 Warwick Crescent, London W.2. Fridays (Club Net 14.2 Mc/s), 11 p.m.

LONDON MEMBERS' LUNCHEON CLUB

will meet at the White Hall Hotel, Bloomsbury Square, London, W.C.1.

at 12.30 p.m. on Fridays, 18 March and 15 April, 1966

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

Purley (P & DRC).—18 March (Junk Sale, Dutch Auction), 8 p.m. Railwaymen's Hall, (Side Entrance), 58 Whytecliffe Road, Purley.

Reigate (RATS).—17 March, (Film Show), 7.30 p.m. George and Dragon, Cromwell Road, Redhill.

Romford (R & DRS).—Tuesdays, 8.15 p.m., RAFA House, 18 Carlton Road.

Scout ARS.—12, 13 March (Indoor weekend camp with Radio. For details contact G3TGS), 17 March, 7.15 p.m., Baden Powell House, Queens Gate, South Kensington.

Science Museum (CSRS).—15 March (Members' slides and films of holiday exploits), 5 April (Lecture and films "The Linear Accelerator" by Mr Atherton of M.E.L. Equipment Ltd.—Mullard), Science Museum, South Kensington.

Sidcup (CVRS).—3 March, 7.30 p.m., Congregational Church Hall, Court Road, Eltham.

Slough (SARS).—First Wednesday in each month, 8 p.m., United Service Club, Wellington Street.

South London Mobile Club.—J. R. Doughty, 17 Hookham Court, S.W.8.

Southgate & District.—10 March, 7.30 p.m., Parkwood Girls School (behind Wood Green Town Hall).

St. Albans (VARC).—16 March ("Direction Finding Contest Techniques" by E. M. Mollart, former National D/F Champion), 8 p.m., Marconi Instruments Service Department, Hedley Road.

Sutton & Cheam (SCRS).—15 March, 8 p.m., The Harrow Inn, High Street, Cheam.

Welwyn Garden City.—10 March (Annual Hamfest; Annual Constructors Competition), 8 p.m., Vineyard Barn, off Digswell Road.

Wimbledon (W & DRS).—11 March, 8 p.m., ("A Blind Person's Approach to Amateur Radio"), Community Centre, St. George's Road, Wimbledon, S.W.19.

Wembley GEC ARS.—11 March, Visitors must telephone ARNold 1262.

REGION 8

Broadstairs (TRS).—2 April (Annual Dinner), 8 May (Mobile Rally), Fridays, 8 p.m., Hilderstone, Broadstairs.

Crawley (CARC).—9 March (Informal), 18 March (Annual Dinner) 23 March (GBQB's mixed bag), 8 p.m., Trinity Congregational Church, Ifield, Crawley.

REGION 9

Bath.—25 March, 7.30 p.m., RNR Training Centre, James Street West, Bath.

Bristol.—Fourth Friday in each month, 7.15 p.m., Royal Fort, Bristol University, Woodland Road, Bristol 8.

Burnham-on-Sea (B-o-SARS).—Second Tuesday in each month, 8 p.m., Crown Hotel, Oxford Street, Burnham-on-Sea.

Camborne (CRAC).—First Thursday in each month, Staff Recreation Hall, SWEB Headquarters, Pool, nr. Camborne.

(CRAC V.H.F. Group).— First Thursday in each month, 7.30 p.m., The Coach and Horses, Rydar Street, Truro.

Exeter.—First Tuesday in each month, 7.30 p.m., George and Dragon Inn, Blackboy Road, Exeter.

Plymouth (PRC).—Tuesdays, 7.30 p.m., Virginia House, Bretonside, Plymouth.

Saltash (S & DARC).—Alternate Fridays, 7.30 p.m., Burraton Toc H Hall, Warraton Road, Saltash.

South Dorset (SDRS).—First Friday in each month, 7.30 p.m., Labour Rooms, West Walks, Dorchester.

Torquay (TARS).—Last Saturday in each month, Club HQ, Belgrave Road, Torquay.

Weston-super-Mare.—First Friday in each month, 7.15 p.m., Victoria Hotel, Weston-super-Mare, Somerset.

Yeovil (YARC).—Wednesdays, 7.30 p.m., Park Lodge, The Park, Yeovil.

REGION 10

Cardiff.—14 March, 7.30 p.m., TA Centre, Park Street, Cardiff.

LOOKING AHEAD

2 April.—International V.H.F/U.H.F. Convention.
24 April.—RSGB National Mobile Rally.
30 April.—Scottish V.H.F. Convention.
12 June.—RSGB National Mobile Rally.
10 July.—South Shields Mobile Rally.
14 August.—Derby Mobile Rally.
11 September.—RSGB National Mobile Rally.
9 December.—RSGB Annual General Meeting.

REGION 11

Llandudno (CUARC).—10 March (NFD Discussion), 7.30 p.m., Cross Keys, Madoc Street, Llandudno.

REGION 14

Auchenharvie (A & DARC).—Tuesdays and Thursdays, 7.30 p.m., Auchenharvie Community Centre, Stevenston, Ayrshire.

Ayrshire.—Third Sunday in each month, 7.30 p.m., Conservative Club, Sturrock Street, Kilmarnock.

Glasgow.—Second and fourth Fridays in each month, 7.30 p.m., in the Christian Institute, Bothwell Street, Glasgow.

REGION 16

Basildon (BDARS).—24 March (Jumble Sale), Mayflower Restaurant, 5 April (Social). Details from G3IJB.

Chelmsford (CARS).—5 April, 7.30 p.m., Marconi College, Arbour Lane, Chelmsford.

Great Yarmouth (GYRC).—Fridays, 7.30 p.m., the Manager's Office, the Old Power Station, South Quay, Swanstons Road, Great Yarmouth.

Ipswich (IRC).—Last Wednesday in each month, 7.30 p.m., Red Cross HQ, Gippeswyk Hall, Ipswich.

Norwich (NARC).—Mondays, 7.30 p.m., the Club Centre, 140 Oak Street, Norwich.

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GB2RS SCHEDULE

RSGB News Bulletins are transmitted on Sundays in accordance with the following schedule:

Frequency	Time	Location of Station
3600 kc/s	9.30 a.m.	South East England
	10 a.m.	Severn Area
	10.15 a.m.	Belfast
	10.30 a.m.	North Midlands
	11 a.m.	North West England
	11.30 a.m.	South West Scotland
	12 noon	North East Scotland
145·10 Mc/s	9.30 a.m.	Beaming north from London
	10.00 a.m.	Beaming west from London
145·8 Mc/s	10.15 a.m.	Beaming south from Belfast
145·30 Mc/s	10.30 a.m.	Beaming north west from Sutton Coldfield
	11.00 a.m.	Beaming south west from Sutton Coldfield
145·50 Mc/s	11.30 a.m.	Beaming north from Leeds
	12 noon	Beaming east from Leeds

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

MORSE MADE EASY FOR THE S.W.L.

Many S.W.L.s miss the thrill of receiving rare D.X. most of which is on c.w. because of a misconception, they think that learning Morse is difficult. Although this was the case in the past by the use of modern methods it is now possible to master the code at 18/20 w.p.m. in about three weeks with only 20 minutes practice daily. This is made possible by the revolutionary teaching method devised by G3HSC some 15 years ago and used in his latest Morse course. By using very carefully timed recordings on disc (played at 33-45-78 r.p.m.) combined with a special spacing technique he is able to teach the student automatically, the *rhythm* of the alphabet as a whole and not the more usual dots and dashes. This completely eliminates translation as the *sound is the letter or word* and is taught as such from the very first day. G3HSC has now issued a new Course specifically for the S.W.L. consisting of a Beginners Course (0-18 w.p.m.) together with an R.S.G.B. R.A.E. Manual covering the technical side of listening and transmitting.

The S.W.L. Course is obtainable either direct from The Morse Centre, 45 Green Lane, Purley, Surrey, or through the Society price 55/- or for full details of all courses send 8d. in stamps to Purley.

RSGB Publications

28 LITTLE RUSSELL STREET, LONDON, W.C.1

RSGB PUBLICATIONS

Amateur Radio Handbook	36/6
Radio Data Reference Book	14/–
Technical Topics for the Radio Amateur	10/8
Amateur Radio Call Book	6/6
Radio Amateurs' Examination Manual	5/9
A Guide to Amateur Radio	5/7
Service Valve Equivalents (Fifth Edition)	3/6
S.S.B. Equipment	3/–
Communications Receivers (Second Edition)	3/–
The Morse Code for Radio Amateurs (Third Edition)	2/–
Log Book (RSGB)	7/–

ARRL PUBLICATIONS

Radio Amateur's Handbook 1966 Edition	42/6
Buckram Bound	50/–
Antenna Book, 10th Edition	18/6
A Course in Radio Fundamentals	10/–
Hints and Kinks, Volume 6	10/–
Mobile Manual for Radio Amateurs	23/6
Radio Amateur's V.H.F. Manual	18/6
Single Sideband for the Amateur (Fourth Edition)	23/6
Understanding Amateur Radio	18/6
USA Licence Manual	5/–

CQ PUBLICATIONS

Antenna Roundup	23/6
CQ Anthology, 1952-59	23/6
CQ Anthology, 1945-52	16/–
CQ Mobile Handbook	23/–
CQ New Sideband Handbook	24/–
RTTY Handbook	30/–
Shop and Shack Shortcuts	29/6

73 MAGAZINE PUBLICATIONS

Care and Feeding of a Ham Club	8/–
Index to Surplus	12/–
Simplified Maths for the Hamshack	4/6
V.H.F. Antenna Handbook	15/–

EDITORS AND ENGINEERS PUBLICATIONS

Radio Handbook (16th Edition)	78/–
Transistor Radio Handbook	42/–

AMERICAN MAGAZINE SUBSCRIPTIONS

CQ (*Cowan*) Monthly (p.a.)	44/–
QST (*ARRL*) Monthly (p.a.)	43/6
Institutions, groups, etc. (p.a.)	50/–
73 Magazine Monthly (p.a.)	30/–

MISCELLANEOUS PUBLICATIONS

Dictionary of Electronics (*Penguin*)	8/2
Guide to Broadcasting Stations (*Iliffe*)	5/6
Foundations of Wireless (*Iliffe*)	22/6
Log Book, 150 pages, opens flat (*Martins*)	21/9
Manual of Transistor Circuits (*Mullard*)	13/6
Radio Amateur Operator's Handbook (*Data*)	5/6
Short Wave Radio and the Ionosphere (*Iliffe*)	12/–
Short Wave Receivers for the Beginner (*Data*)	6/6
Transistor Radios, Circuitry and Servicing (*Mullard*)	5/9
Understanding Television (*Data*)	40/–
Wireless World Radio Valve Data (*Iliffe*)	8/6

MORSE COURSES

G3HSC Rhythm Method of Morse Tuition	
Complete Course with three 3 speed L.P. records + books	84/–
Beginner's Course with two 3 speed L.P. records + books	60/6
Single, Advanced (9-42) or Beginners (0-15 w.p.m.) + books	50/–
Three speed simulated GPO test. 7 in. d.s. E.P. record	11/6
RSGB Morse Instruction Tape (900 ft.)	35/–
RSGB Morse Practice Tape (450 ft.) (both at $3\frac{3}{4}$ i.p.s., up to 14 w.p.m.)	20/–

SHACK AIDS

Easibinders, round backed, gold blocked, for RSGB Bulletin	16/6
Easibind Year Stickers (1964 or 1965)	1/6
QRA Locator, Western Europe	5/6
RSGB Countries List	1/–
Panel Signs, tranfers (*Data*)	
Set 3: White Wording	4/9
Set 4: Black Wording	4/9
Set 5: Dials (Clear Background)	4/9
Set 6: Dials (Black Background)	4/9
Decalet Panel Lettering Transfers (Black or White)	1/–
Blick Dry Print Lettering (Letters and Numerals, Black)	2/6

RSGB MEMBERS ONLY

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Car Badge (RSGB Emblem with call-sign)*	11/6
Car Badge (RSGB or RAEN Emblem)	7/6
RSGB Tie (Maroon or Dark Blue)	16/–
RSGB Blazer Badge (Black or Dark Navy Blue)	7/6
Stereo Block (RSGB or RAEN emblem)	10/–
Area Representatives Badge (ARs only)	10/–
Members Headed Qto. Paper (100 sheets)	10/6
Call-sign Lapel Badge (with RSGB or RAEN Emblem, pin or stud fitting)*	6/–
Call-sign Lapel Bar*	5/–
Tie Clips (with RSGB Emblem)	5/–
RSGB Lapel Badge ($\frac{1}{2}$ in. size) stud or pin fitting	2/–
Plastic Window Sticker (RSGB or RAEN Emblem)	1/3

* *Delivery 6-8 weeks*

AN ORDER FORM IS PROVIDED ON PAGE 207

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FOR SALE

SELL MY HOME BREW TX complete with heavy duty power pack. Built round Geloso V.F.O., £12 o.n.o., or consider exchange together with my H.R.O. RX. Band Spread Coils, for Eddystone RX.—F. D. Nurse, G3RBI, 10 Wenwell Close, Aston Clinton, Bucks.

HALLICRAFTER 38E, as new, £20, o.n.o. V.H.F. RX 100-150 Mc/s, £10, o.n.o.—F. A. Whitehurst, Rose Land, Clark Lane, Bollington, Macclesfield, Cheshire.

K.W. VALIANT T.X., new, only 2 hours on the air. Mint condition, £28, o.n.o. H. R. Skelhorn, School House, Lowerhouse, Bollington, Macclesfield, Cheshire.

WHAT IS A C S E 2A10?

AVO VALVE TESTER. Good order, fitted with modern miniature sockets and with Manual with test data for up to date valves, £4. Wavemeter D. Mk. II as new condition, £4. Packing and carriage extra.—G3DJQ, Little Orchard, St. Lawrence, IOW.

HRO Bandspread coils, 40m, 20m, 15m, 10m, £3 each. Q5er unmodified, £5. Two Minimitter 465 kc/s, Crystal filters, £4; SX28 needs attention, £5.—May, 7 Parkwood Road, Hastings, Sussex.

VANGUARD 10-160m. factory built, £40. HRO and power unit G.C. coils.—Derrington, 10 Hillside Road, Sutton Coldfield (Four Oaks 1141).

COMPLETE CLEARANCE. Components, etc., too numerous to advertise. Inexpensive. S.A.E. list.—BRS.26401, 2 Fitzgerald Avenue, Seaford, Sussex. 'Phone 4961.

EQUIPMENT of the late G3GXB. Offers for LG300 RF Section, S.A.E. for lists, variety of items, BULLETINS and Short Wave Mags to: Mrs. Greenwood, 3 Brierly Road, Shafton, Barnsley, Yorkshire.

AR 88D. Very good condition, rewired. " S " meter. RCA speaker, spare valves, with homebrew 2m conv., £38. Tel.: Halstead Essex 2152.

APPOINTED Northern Agents for KW. Electronics. Full KW range now in stock. We can supply National, Eddystone Eagle and Lafayette equipment. NCX3 & PSU, £110. LG50 Tx., £25. Eddystone 940, £80; 840A, £25; 840C, £45; TW Topmobile, £14; AR88D, £40; AR88D, £35. Codar and Joystick range in stock.—Stephens-James Ltd., 70 Priory Road, Liverpool, 4. ANField 3141 & 7829.

K.W. VANGUARD, 10-80m. Simple 160m. Mod. Kit available. Unmarked as new. £35. No offers.—G3OLY, 6, Wheathill, Letchworth, Herts.

SELLING Eddystone 840C, 500 kc/s to 30 Mc/s. Perfect condition, £45 o.n.o.—Morphew, 17 Upland Road, Ipswich, Suffolk. IPS. 77242.

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