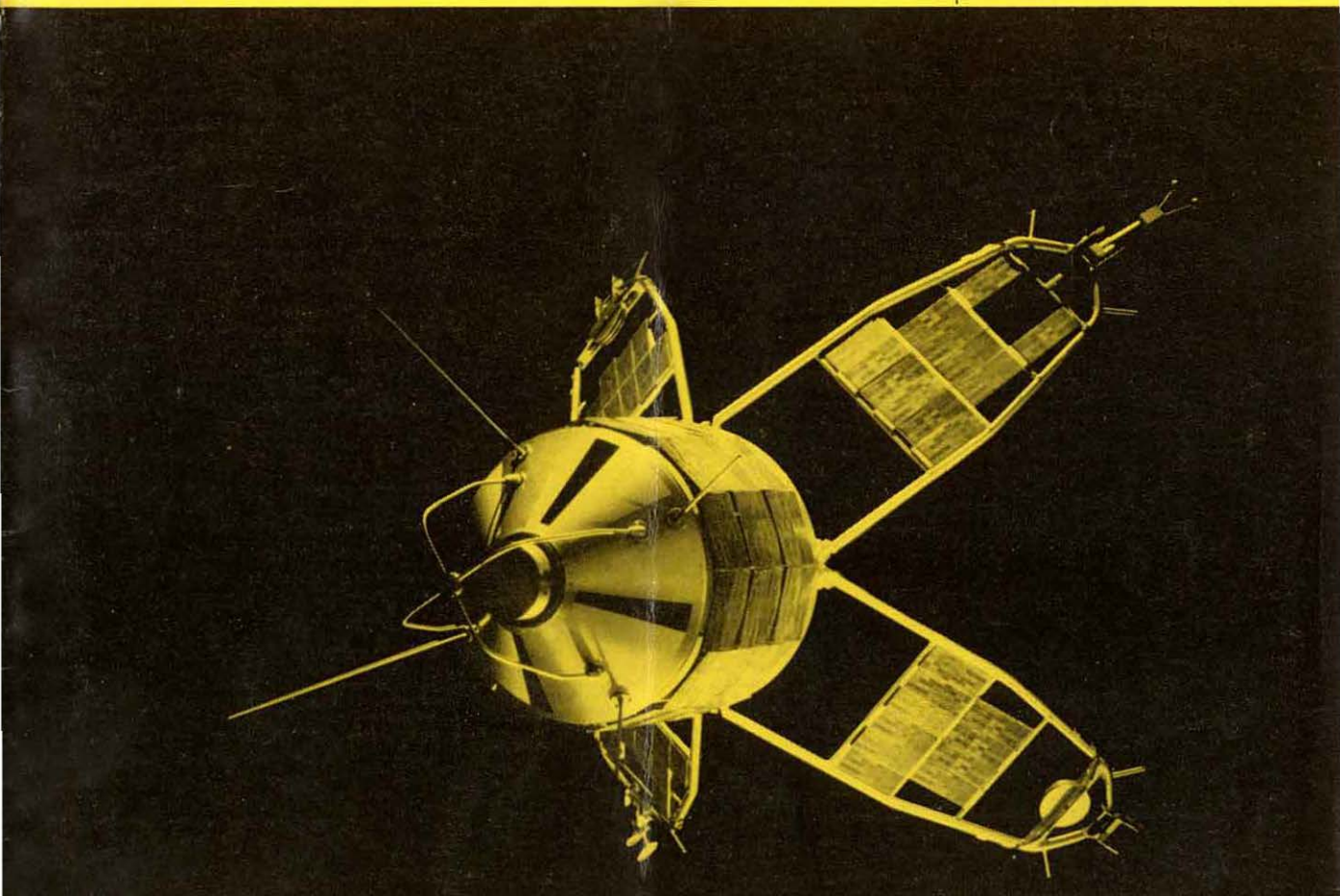
RSGB BULLETIN

JUNE 1967
VOL. 43, No. 6

(see page 400)



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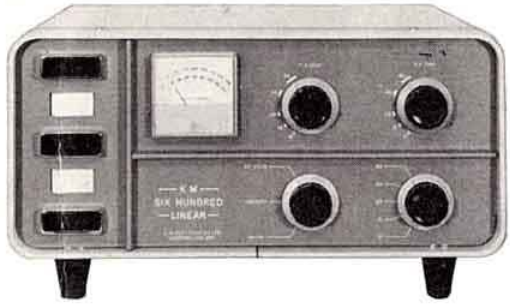

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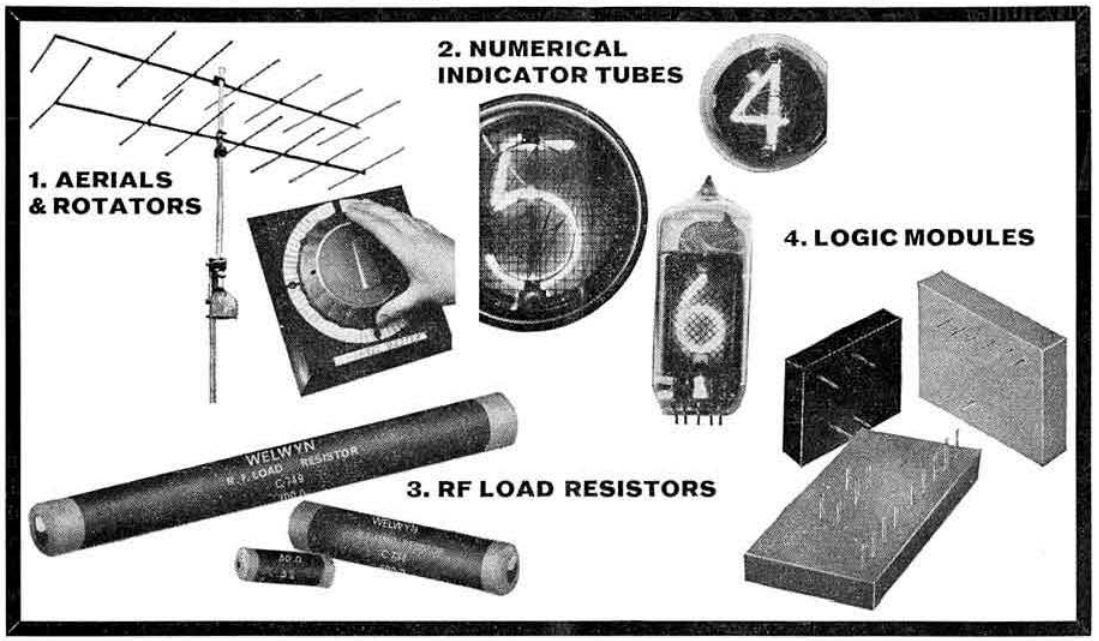

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If you are contemplating construction of the receiver design Mr. L. Williams BRS25769 published in the R.S.G.B. Bulletin for January 1967, you will find our new data sheet on the subject invaluable. Ask for Data Sheet R-8.

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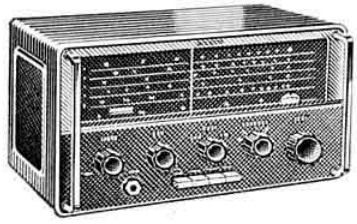

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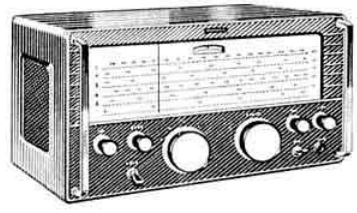

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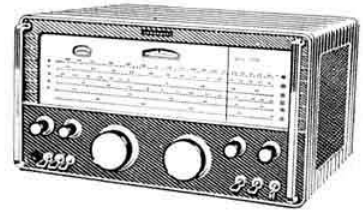

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RSGB BULLETIN

Incorporating RADIO COMMUNICATION

JUNE 1967
VOLUME 43 No. 6

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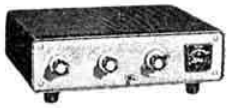

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SPECIFICATIONS—RF Input: 200 watts PEP. **Sideband generation:** Crystal lattice band-pass filter method. **Stability:** 200 c/s per hour after warm-up. **Carrier & unwanted sideband suppression:** 45db. **Frequency coverage:** HW-12A, 3.6-3.8 Mc/s; HW-32A, 14.2-14.35 Mc/s. **Receiver sensitivity:** 1 μv for 15db (S + N)/N ratio. **Receiver selectivity:** 2.7 kc/s at 6db, 6.0 kc/s at 50db. **Output:** 50 ohm fixed (unbalanced). **Operation:** LSB, USB. **Audio output:** 1 watt at 8 ohms. **Mike input:** Hi-Z. **Tube complement:** Fourteen tube heterodyne circuit: (3) 6EA8's mic. amp. VOX relay amp., IF amp., RF amp., Recvr. mixer; (5) 6AU6's, VFO, VOX amp., IF amps., Xmtr. mixer; (1) 6BE6, VFO isolator (HW-12A), Het. osc. and mixer (HW-22A & HW-32A); (1) 12BY7 Driver; (1) 12AT7 Xtal. osc., product det.; (1) 6EB8 Audio amp. and output; (2) 6GE5 RF output. **Power requirements:** 800 VDC at 250 MA peak, 250 VDC at 100 MA, —130 VDC at 5 MA, 12 VAC or VDC at 3.75 amperes. **Cabinet dimensions:** 6¼ in. H × 12¼ in. W × 10 in. D.

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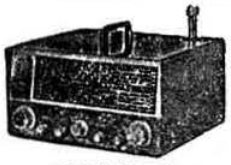

GC-1U Receiver

DX-100U Transmitter

RA-1 Receiver

HIGH SENSITIVITY GENERAL COVERAGE RECEIVER. Model RG-1. Frequency coverage from 600 kc/s to 1·5 Mc/s and 1·7 Mc/s to 32 Mc/s. Send for details.
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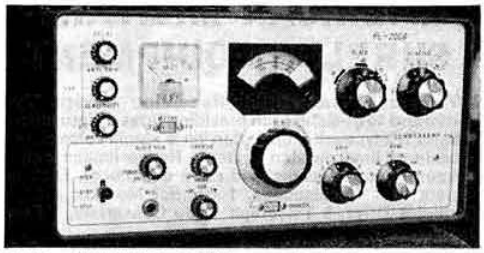

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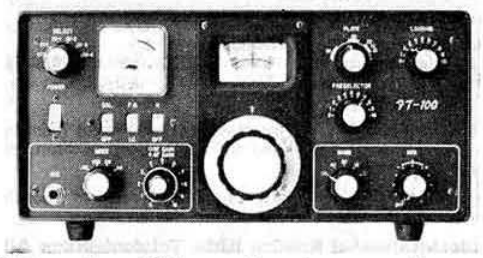

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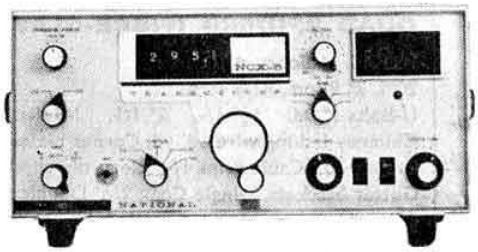

NCX5 Mk.II top quality transceiver, 80-10; 200W p.e.p. SSB, AM, CW. **£225** less p.s.u. (p.s.u. kit £25).

Full details on request.

As the readers of my ads. well know (both of 'em!), I have been pushing Sommerkamp gear for some time now and I am happy to say that this gear has very definitely become prominent around the bands. Ask anyone who owns one for an opinion—much better advertisement for Sommerkamp than I could possibly produce. Also, read G3EDD's report in the May *Bulletin*. I'm quite sure that this will convince you that Sommerkamp, without any shadow of doubt, is unequalled for value. From my point of view the fact that Somerkamp is more or less a household word is good, because I can now economise a bit on advertising space!

I have been appointed *Sole Agent* for the National Radio Company—mind you, I have accepted the Agency with certain very firm reservations. Firstly, I told National that if they would take a cut in their profit, I would take a cut in mine. After a stiff, bloody and no-holds-barred battle, I won, with the result that we have knocked the previous prices down. Secondly, I am marketing a p.s.u. kit which is very easy to build, at a price of £25.0.0. This uses brand new parts throughout of very conservative ratings. The transformer and swinging choke are custom built to a high specification and the complete unit will be really trouble-free. As the American units are designed to operate from 220 volts rather than 250, they do tend to hum and vibrate (some manufacturers worse than others—no names, no pack-drill!), but using a British made transformer cures this right smartly! Also, of course, there is the little matter of price—the National p.s.u. is £58.0.0. whereas my kit is, let's be honest, better and more conservatively rated although not so pretty, at £25.0.0. If, of course, you want the £58.0.0. p.s.u. you will make me very happy because my profit is more and I will joyously supply it. Further, if you only want parts of the kit (e.g., transformer) it is perfectly O.K. by me.

Finally, I have got my way on service—service with a very large capital S. Comprehensive pre-sales check and alignment—full after sales service —full guarantee—no, repeat no, delays.

What this all adds up to is a top value NC200 at £185.0.0. complete with p.s.u. kit and the incomparable NCX5 Mk.II at £250.0.0. complete with p.s.u. kit. When you consider the previous price of the NC200 plus NCXA p.s.u. was £238.0.0. and the NCX5 plus NCXA p.s.u. was £300.0.0. I think you will agree that the new reduced prices represent top value. To those who think all dealers are crooks, especially Bill Lowe*, I would suggest you do three things—firstly check the *dollar* price of U.S. equipment currently available in this country against the sterling prices. Secondly, talk to someone who actually operates an NCX5 Mk.II (nobody near you? Hang on a few weeks, there dam' soon will be!!)—*not*, of course, to someone who's never actually seen one but knows all about them! Thirdly, make your cheque payable to J. B. Lowe!

Gentlemen, I respectfully suggest that once again I have backed a winner (Smart Alecky little nit!!) and look forward to receiving your life's savings in due course. If you and your family have to starve to buy an NCX5 I will graciously allow you to inhale some (only a bit, mind!) of the smoke from my cigar and your wife to gather up the odd globule of caviare that falls from my sloppy chops.

Incidently, I'll give you a tip for another pair of winners—the Lafayette HA.500 and HA.700. How on earth they do it for the money is utterly beyond me. In the new line I have the Sommerkamp range, the Lafayette range, Codar stuff, TC.99 walkie talkies, TS600G 10m transistor transceiver and lots of other stuff.

Secondhand—AR88D's, Drake 2B, NC.190, KW Vespa, RGI, SX24, Super pro, AT5, Homebrew AM/CW rig, HR 22, KW77, TCS12, etc. etc. Loads of bits and pieces—wide spaced variables, transformers, chokes, meters, coils, relays, headsets, bug keys, test gear etc.,—far too much to list. Best thing you can do is send me a s.a.e. (large) and I'll send you the current stock lists.

As a matter of interest, I now have 2 shops going within a few yards of each other—one for Rx's and Tx's and the other for bits and pieces, surplus, test gear and just plain junk, so if you aren't too far away, drop in and I'll lighten your wallet.

H.P.—certainly.

Trade-ins—definitely, but I make it a policy to sell only equipment which I can thoroughly recommend—good stuff gets a good allowance but poor stuff (and I don't give a dam' HOW much you paid for it) gets a very low allowance. Just because you get robbed blind by a fast-buck merchant doesn't mean I am going to rob MY customers. No Sirree! I lose a heck of a lot of business this way and hurt an awful lot of feelings, but even though I lose money now, I feel that what I'm doing is RIGHT and what is right must eventually pay off. M'lud, the defence rests.

73 de Bandit Bill,
VE8DP/G3UBO.

*All dealers are crooks, especially Bill Lowe.

J. B. LOWE

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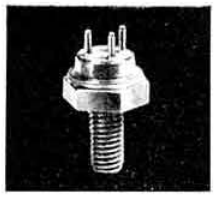


RCA 'overlay'

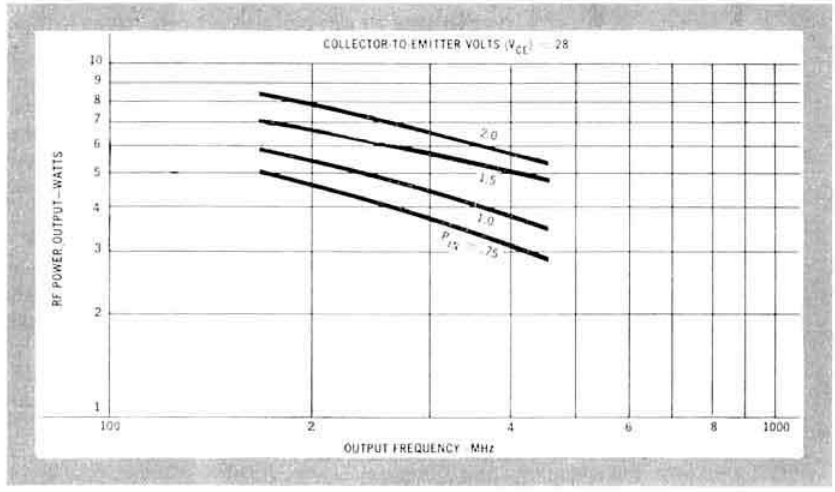
	TYPE	V_{CB}	V_{CE}	P_{OUT} WATTS	P_{IN}	MHZ	V_{CE}
*	2N3553 (TO 39)	65	40	2·5 MIN	0·25	175	28
				2·5 TYP	0·5	260	28
*	2N3375	65	40	7·5 MIN	1	100	28
				3 MIN	1	400	28
*	2N3632	65	40	13·5 MIN	3·5	175	28
				10 TYP	3	260	28
*	2N3733	65	40	14·5 TYP	4	260	28
				10 MIN	4	400	28
	2N4012	65	40	2·5 MIN	1	1000 (TRIPLER)	28
				3 TYP	1	800 (DOUBLER)	28

* 12 volt FM and 28 volt AM versions also available

available from stock - on demand!

plus NEW 2N4440 'overlay'

P_{out} = 5W (min.) @ 400 MHz; P_{in} = 1.7W



RCA now introduces 2N4440, a new high performance version of "overlay" type 2N3375—the industry's most famous rf-power device. Specified for Class A, B, and C service, this premium transistor extends solid-state performance for rf amplifier, multiplier, or oscillator service into the 175 to 400 MHz range.

The latest addition to RCA's extensive "overlay" family, 2N4440 offers:

P_{out} = 5W (min.) @ 400 MHz; P_{in} = 1.7W
P_{out} = 6.5W (typ.) @ 225 MHz; P_{in} = 1.7W
BV_{cev} = 65V (max.)
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Typical gain bandwidth product
500 MHz (@ 28V V_{ce}, 150 max. Ic)

Add to this performance the efficiency of an isolated-collector stud package (TO-60) and the increased reliability of 100% Power Rating Testing (each unit is tested at maximum power level for one second), and you have an important new design tool for VHF, UHF, and Microwave communications circuits.

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John Arminson Rouse, G2AHL

The President and Council record with deep regret the death, suddenly at his home near Guildford, Surrey, during the afternoon of Friday, 26 May, 1967, of John Arminson Rouse, G2AHL, General Manager and Secretary of the Radio Society of Great Britain. John Rouse joined the staff as Assistant Editor in October 1952, was appointed Editor in January 1962 and became General Manager of the Society in January 1964.

Prior to the war John Rouse held an artificial aerial licence (2AHL), changing this for a full licence (G2AHL) after war service with the Royal Signals in India where he operated as VU2AL.

Mr. Rouse had been taken ill in early January this year and although not fully recovered he had recently been working at home and journeyed to Headquarters two or three times a week.

The President and Council on behalf of all members express their deep sympathies to Mrs Hazel Rouse and her daughter Sarah in their great loss. J. C.

A fuller tribute to the memory of John Rouse will be published next month

OVERLAY TRANSISTORS

What they are and how to use them: an interim report

By SVEN F. WEBER, B.Mus., ARAM, G8ACC*

Prelude

IF one looks at page 19 of the January 1966 RSGB BULLETIN, ("Technical Topics" by G3VA: "Microwave Power Generation"), it should be obvious where this article started life! In fact, G3VA's mention of "overlay" transistors was the first time yours truly had ever heard of them and, as I was at that time playing around with semiconductors trying to get useful amounts of power out on 70cm, I was most interested. That month also, another magazine devoted to radio carried an advertisement for overlay transistors (*Wireless World*, January 1966), so I promptly wrote off to the manufacturer concerned asking for details. And the details I got made me sit up and take notice, so—after a lot of thought—I invested in some of these devices. This article, in other words, is a resumé of some of the experiences I have had using them in the past year with a little bit of theory. Experiments are still going on when I can afford the time and the cash.

Allegro Con Brio

Overlay transistors are of silicon epitaxial planar *n-p-n* construction with (in the 2N4012) 156 microscopic square elements forming the emitter, tied together in parallel with a diffused grid and an overlay of metal using a photo-etching technique. To quote RCA from their 2N4012 data sheet; "this arrangement provides a substantial increase in emitter periphery for higher (high frequency) current or power, and a corresponding decrease in emitter and collector areas for low input and output capacities . . . offers greater . . . . efficiency."

Sostenuto

Overlay transistors can provide—if care is taken—a very much worthwhile increase in output power and efficiency at u.h.f. due to their low series resistance compared with other transistors (see Table 1).

TABLE 1

Type	Freq. Mc/s	Drive W	Output W	Ft Mc/s	Design
2N3375	100	2	10	400	TO-60
	400	2	5		
2N3553	50	0·5	10	400	TO-39
	200	0·5	3·5		
2N3632	50	3	20	400	TO-60
	200	2	10		
2N4440	225	1·7	6·5		TO-60
	400	1·7	5		

If care is taken, as was just said! All transistors have very limited heat dissipation (11½, 7 and 23 W respectively for the first three with infinite heat sinks at 25°C) and they *can* pass a great deal more current than is good for them. As I know, only too well: once having done a stupid thing like burning transistors out, one treats them with a little bit more respect.

In Tempo

With an overlay type of structure, as with most other types of transistors, the collector-base capacity varies with the voltage on the collector. And that means that such a device can use the non-linear capacitance of the collector-base junction to generate harmonics of the input frequency, like a varactor. An overlay transistor, because of its low series resistance (1·8 ohms in the 2N4012: extrinsic base spreading resistance and the collector series resistance associated with the varactor capacitance) can generate harmonics at an efficiency comparable to a good varactor with the advantage that the output power is more than the drive. At the "present state of the art," power handling capabilities are limited but, no doubt, this will not always be so.

TABLE 2

Function	Type	Drive W	Output W
Tripling from 145 to 435 Mc/s	BAY96 Varactor	15	13
		40	27
Tripling from 145 to 435 Mc/s	2N4012 Overlay	1	3
		1·5	3·5
Doubling from 218 to 436 Mc/s	2N4012 Overlay	2	5
Doubling from 109 to 218 Mc/s	2N3553 Overlay	0·25	2·5 (Typical figures)

An overlay transistor operates in two completely distinct ways as a frequency multiplier. It must give gain at the input fundamental frequency and function as a varactor diode to make harmonics. In fact the 2N4012, which is especially made for multiplier service, gives power gain up to around 1400-1500 Mc/s as a quadrupler or quintupler (the cut-off frequency of the varactor diode in this device is 24 Gc/s and the F_{max} of the transistor is 800 Mc/s. Dissipation is 11½ W at 25°C), and soon (*Electronics*, 21 March, 1966) overlay transistors will be available with gain up to 5 Gc/s.

Andante

Capacitance is the rate of change of *charge* with voltage (e.g. $C = dQ/dV$). If the *capacity* varies with voltage, however, decreasing (say) while the voltage increases e.g.: $C = a(V + b)^{-n}$ where a, b and n are constant, these two results can be combined: $dQ/dV = a(V + b)^{-n}$. If a little calculus is applied to solve for Q (mine just about got that far), one can see that the charge $Q = a'(V + b)^{1-n}$ provided n is not equal to 1. Or, $V + b = a'Q^{1/1-n}$. In a semiconductor diode junction, b is the contact potential and n depends on the abruptness of the junction. If the junction could be made with no diffusion (i.e.: a really abrupt junction), $n = 0{\cdot}5$; and b can be neglected, so that $V = a'Q^2$, which means that the output will be twice the frequency (mainly) of the input.

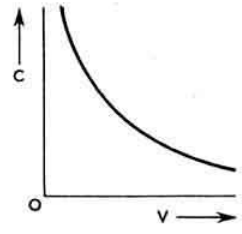


Fig. 1. Capacity decreasing with voltage in a junction diode.

*65 Combemartin Road, Southfields, London, SW18.

If the capacity were loss-less, the efficiency would only be limited by circuit losses, and in good varactor-diodes the efficiency can be as large as 90 per cent.

If we want higher harmonics, for example the third, this second harmonic current (or voltage) has to beat with the fundamental allowing sum and difference frequencies to appear. Quadrupling the frequency can be done as well: the second harmonic beats against the fundamental giving the third harmonic and this will beat again against the fundamental giving the fourth. For quintupling, the third harmonic beats against the second and so on. These harmonic currents (or voltages) must be allowed to circulate in " idler " circuits—which include the varactor as a circuit element.

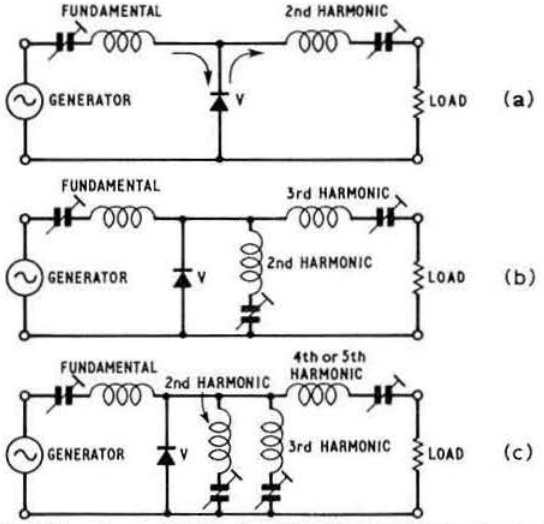


Fig. 2. Varactor multipliers in outline; the diode is in the shunt configuration. (a) 2nd harmonic, (b) 3rd harmonic, (c) 4th and 5th harmonics.

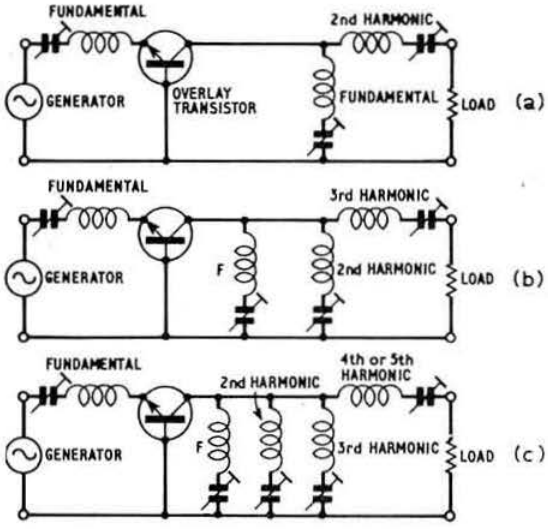
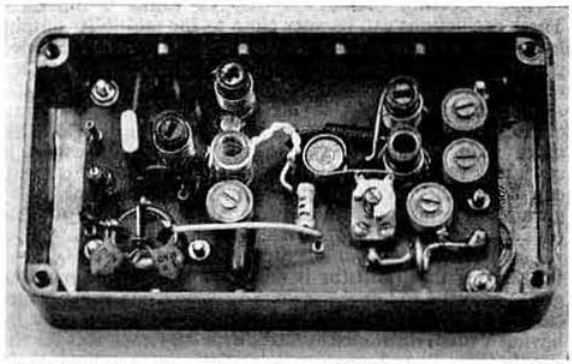


Fig. 3. Overlay transistor multipliers. The collector-base junction is a shunt connected varactor diode. (a) 2nd harmonic, (b) 3rd harmonic, (c) 4th and 5th harmonics.



A 432 Mc/s 150 mW exciter using a 2N3553 driven by a GM290. The circuit is shown in Fig. 15.

Allegretto

Now the collector-base junction in an overlay transistor—and many other types of transistor—is very much like a varactor, and so the same circuit conditions apply to it with one exception, if one can call it that. A transistor is a three terminal device: the input is applied to a separate electrode from the one in which the output is recovered. Because of this, it is necessary to have a fundamental frequency idler in the output circuit to get gain at this frequency or, the same thing, to get fundamental current flowing through the collector-base junction. This idler develops the drive for the non-linear capacitance to make harmonics.

All the circuits in Fig. 3 use transistors in the common-base mode, which is very like the shunt configuration of a varactor. If the common-emitter circuit is decided upon, a series-resonant circuit becomes essential between the base and ground for whatever the final frequency in the output is. The common-emitter input circuit is shown in Fig. 4. This is more akin to the series configuration of a varactor.

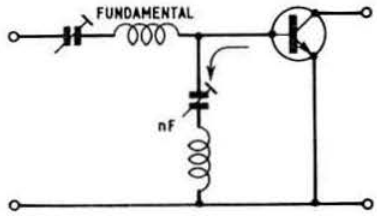


Fig. 4. Common emitter input circuit.

Andante Come Prima

In the common-base multiplier there is one less tuned circuit to bother about than in the common-emitter mode (one feels as if six arms are needed to cope with all the adjustments to a quadrupler common-emitter stage!). So why is the common-emitter configuration used?

If the input drive power level is low, the common-base circuit is considerably more efficient and provides more gain. If the input power is pushed up, the efficiency goes through a maximum and then starts to decrease and is overhauled by the common-emitter circuit for efficiency and output power at large input drives (around $\frac{3}{4}$ W in the 2N4012). So the common-base arrangement saturates at lower power levels than the common-emitter. Therefore it seems wise to use the common-base circuit for low power stages and common-emitter for the QRO or p.a. stage.

Adagio Doloroso

All non-linear circuit elements are especially prone to instability and it is difficult to know where to begin so as not to frighten people off.

High frequency oscillations may be rather a nuisance. These oscillations can be very close to the multiplier output frequency and they become very evident when the drive power is removed! Sometimes they have no centre frequency and one gets a band full of noise. According to the RCA Application Note (SMA-40) on overlay transistors, common-emitter circuits were found to be less troublesome on this score than common-base. In my experience, which is obviously very limited, this type of instability can come with equal frequency in either mode and was equally curable by grounding emitter or base with as short a lead as possible (this was up to 450 Mc/s).

Low frequency oscillations can be present as well because the gain of the transistor is considerably higher when one goes down the frequency scale. Sometimes one is lucky and can get away with it but it is far better to make sure by having a small resistance in series with the r.f. chokes for the supply (Fig. 5), and *parametric oscillations* can occur if these l.f. oscillations are allowed to interfere with the harmonic output (if C in Fig. 5 has not got a low impedance to the l.f. oscillations as well as to the signal frequency).

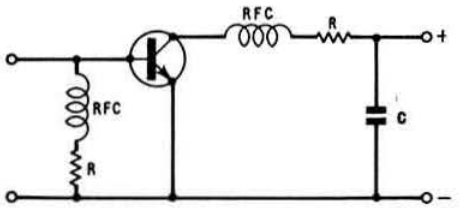


Fig. 5. Small resistance in power supply leads to stop low frequency oscillations. C must have a low impedance at both signal frequency and below.

Possibly *hysteresis* could lay fair claim to be the most annoying type of instability to plague experimenters with overlay transistors. This shows its ugly head when tuning up: sudden jumps (and how!) of output power when the input power is altered. The tuned circuit resonant frequency apparently alters with the drive level, and common-base circuits seem to be worse in this respect than common-emitters. Speaking from experience, the two most infuriating aspects of this type of instability are on the one hand, having tuned several stages of overlays up, tuning the last trimmer for maximum output collapses the whole drive and one has to start again with the first one—though this can happen with ordinary transistors (in my case, my store of expletive very soon ran out); secondly, due, perhaps, to one of the other causes of instability coupled with hysteresis, the whole lot takes to the air and starts passing hundreds of amps. The transistors have a sufficiently low resistance to do this but not enough heat conduction to the chassis to get away with it. Apparently, the newer experimental types are less prone to this, but even so, it *is* essential to have some form of fast cut-out in the power unit, for example, tunnel diode[1], s.c.r.[2], or Eccles Jordan/Schmitt[3] switch, where the cut-out can be measured in microseconds.

A tailpiece: I've had a 2N3553 oscillate strongly at 800 Mc/s on Veroboard, and all my "look-see" meters went crazy because of it, due to my not having connected the parallel copper strips in parallel at *both* ends. . . .

Vivace Non Troppo

For efficient amplifiers and multipliers, the best use of the input driving power must be made. This will be impossible unless one has a "conjugate" match to the input of the transistor to make it look like a plain resistive load. In Table 3, input impedances are quoted for the transistors mentioned earlier:

TABLE 3

	Type	50 Mc/s	100 Mc/s	200 Mc/s	400 Mc/s
Series input impedances at: $I_C = 100$ mA $V_C = 28$ V Values in ohms	2N3375	$15 - j2{\cdot}5$	$14 - j1$	$13{\cdot}5 + j0{\cdot}5$	$14 + j7{\cdot}5$
	2N3553	$14 - j2$	12	$12 + j3$	——
	2N3632	$12 - j3$	$11 - j2$	10·5	$13 + j5$
	2N4012	$15 - j2{\cdot}5$	$14 - j2$	13·5	$14 + j7{\cdot}5$

So one has at least to balance out the reactive part to make more efficient use of drive. Somewhat better is to have an impedance transformer (pi, L or T section) to balance both source and input and, what comes to the same thing, these couplers are to make sure that only the desired frequency component (current or voltage) should be available across the load. The impedances are given in Table 3 are only typical, and would again be altered by physical layout—which is another reason for using couplers.

"Pi" sections can be designed with data given in the RSGB *Amateur Radio Handbook* on p. 187, taking into account the reactive components. But often the capacitors are inconveniently large and the inductors too small.

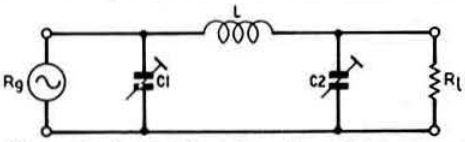


Fig. 6. Pi coupler to transform impedance from non-reactive generator to a similar load.

$$X_{C_1} = R_g/Q\,(1 + \sqrt{\frac{R_L}{R_g}});\ X_{C_2} = X_{C_1}\sqrt{\frac{R_L}{R_g}};$$

and $X_L = X_{C_1} + X_{C_2}$.

"L" sections are not quite so easy to find in the literature for non-engineers (like me). The simplest way of considering an L coupler is that C1 and L in Fig. 7 are a series tuned circuit at the drive frequency, and the *series* impedance of R_g and C2 should match the load impedance (Table 3).

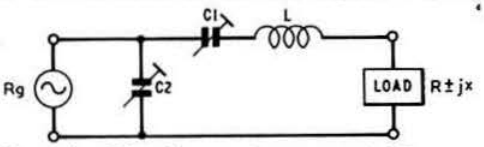


Fig. 7. L coupler. C1 and L are series resonant at the generator frequency. C2 matches generator to load.

If the generator impedance is unknown, just cut and try. But with transistor output circuits acting as generators, fairly good guesses can be made from published data even if an impedance bridge is not available—and most of us haven't got a unit of this type anyway.

If a resistance R is in parallel with a reactance X (positive for inductance, negative for capacitance) and the series resistance r and resistance x are required:

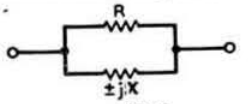


Fig. 8(a)

$$r = \frac{RX^2}{R^2 + X^2} \text{ and } x = \frac{R^2X}{R^2 + X^2}$$

or the other way up:

Fig. 8(b)

$$R = \frac{r^2 + x^2}{r} \text{ and } X = \frac{r^2 + x^2}{x}$$

therefore $r/x = X/R$.

Piu Lento

" T " section coupling is rather difficult to find out about, but they have their uses—if they can be designed. Pi sections can be considered as voltage sources in conjunction with a generator, whereas T sections are current sources, which could have some advantages when using (overlay) transistors. The easiest way to get the component values is through transforming from Pi to T[4]:

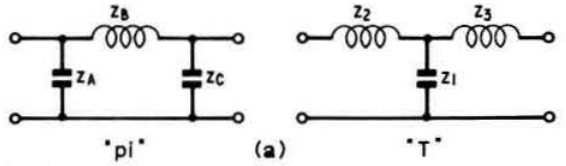


Fig. 9(a)

which are delta and star networks respectively:

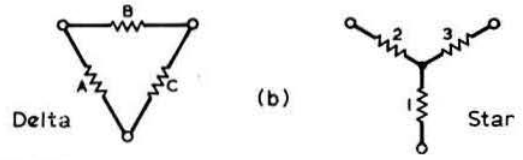


Fig. 9(b)

assuming, of course, that the reactive components have been allowed for in the pi coupler. $Z_1 = \frac{AB}{A+B+C}$ $Z_2 = \frac{BC}{A+B+C}$ and $Z_3 = \frac{CA}{A+B+C}$.

Table 4 gives typical published output impedances of the four semiconductor devices mentioned earlier on in this article.

TABLE 4

	Type	50 Mc/s	100 Mc/s	200 Mc/s	450 Mc/s
$V_C = 28V$	2N3375	300+22pF	250+14pF	125+10pF	50+10pF
$I_C = 100$ mA	2N3553	300+24	200+15	100+10	50+8
Values in ohms	2N3632	250+35	125+22	50+18	25+14
and picofarads	2N4012	350+22	250+14	125+10	50+10

Vivace Di Nuovo

In fact the coupling arrangements work very well—if the right sort of equipment is on hand to set them up. If it isn't, alignment can take quite a long time. Unfortunately non-linear capacitance multipliers can divide as well as multiply, and with both together some of the spurioids which they can make could be sufficiently close to the final frequency to slip through. The standard pi-coupler is normally a high pass arrangement and the T is normally a low pass filter, so perhaps the best circuit to use if one hasn't any esoteric measuring equipment is a band-pass, as was used in G6JP's article [5] on varactor triplers, for the output circuits. The RSGB BULLETIN (January 1967, p. 44), published a letter by G6JP and G3MNO decrying alignment using power output alone—without some indication as to what frequency the power is

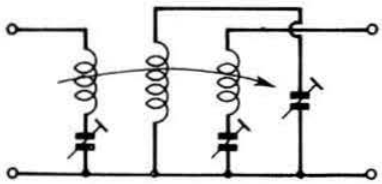


Fig. 10. Bandpass filter.

Two dummy loads suitable for very low power at u.h.f. The upper device uses a modified TV attenuator, and the lower one is assembled from a standard Belling-Lee plug.

on, if it is at all. I agree with this letter most strongly, and without any reservations. Alignment should in *all* cases be carried out with a dummy load, and the units should quite definitely *not* be connected to their aerials before all the bugs have been ironed out.

For medium power stages (1—2 watts output), it is possible to make a very simply dummy load which stays mainly resistive to well above the frequencies that have been talked about here. Take a composition resistor (50 or 68 ohms Grade 1) with axial leads, and fit inside a standard B-L (or other) plug. With some plugs one can squeeze a 2 watt resistor in quite comfortably. Cut out a thin copper or brass shim to fit in the end of the plug and drill a hole sufficient to take the resistor wire, fit together and solder up.

The idler circuits should be designed with the same care as the output circuits. They should tune *with* the transistor to the frequency concerned and should have as low a series resistance as possible at that frequency (high Q). This means not only having thick wire (and, if possible, silver plated) but also having the minimum inductance possible, taking into account the transistor capacity at that frequency. One way of doing this would be to make coils with an air inductance of somewhat less than the desired value and tune them to resonance with a suitable dust core (blue or yellow cores; use half or quarter of a slug), with as large an external capacity as possible.

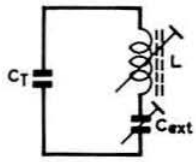


Fig. 11. Idler circuit. C*ext* and L make a resonant tuned circuit with the output capacity of the varactor (collector-base) junction.

Coda and Postlude

As was said before, transistors—especially power types—need more than adequate heat-sinking, and input drive has to be strictly controlled. It is no good having a transistor getting rid of 10 watts on a piece of metal which is only a couple of square centimetres, and it is even less use pumping 3 watts of drive into a transistor which is only supposed to take 2. There won't be any more power output—and that last sentence can be taken as one likes. It'll just depart for nether regions rather rapidly, leaving you swearing.

It seems pretty well impossible to modulate an overlay transistor on its collector alone (they share this fault with ordinary power transistors). One source of trouble is the high value of collector impedance consequent upon Fig. 12(a). Here the power is approximately proportional to the voltage ($P = aV$), so the collector current must be constant. The collector a.c. resistance is the change in V_C (0 — 28V) compared with the change in I_C, which would be very small,

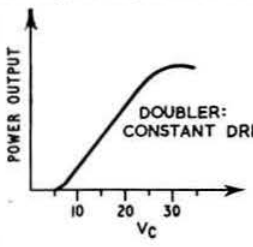


Fig. 12(a)

indicating that the collector impedance is very high. More serious is the detuning effect (see above " hysteresis ") with changes in h.t. voltage, which makes any depth of modulation out of the question. If the modulating voltage is pushed up too far, the transistor can easily burn out.

Modulated drive can be applied as with varactors: the power output is essentially a straight line compared with drive input (for multipliers).

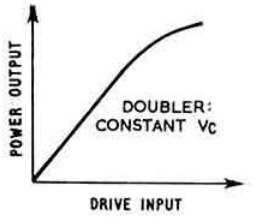


Fig. 12(b)

Fig. 12(b) indicates how power output varies with drive and constant collector voltage. Certainly the simplest way of modulating any transistor transmitter is by f.m. or n.b.f.m., with the advantage of a slight power increase if everything is driven to its limits, compared with a.m.

Another point concerns capacitors and inductors. There are *no* pure-bred beasts in this stable. Any *C* has some *L* and any *L* has some *C*, (i.e.; a 3·3 pF ceramicon with ¾ in. leads resonates around 400 Mc/s) and, although it is possible to tune out what shouldn't be there, it is best to have as far as possible only what is really necessary. This is especially true when it comes to grounding electrodes: ¼ in. of 16 s.w.g. wire has 2 nanonenries inductance, which means about 6 ohms reactance at 400 Mc/s, and ½ in. of 28 s.w.g. has as near 30 ohms as makes no difference[6].

One last point. Don't load the crystal oscillator too heavily. With modern high frequency, high overtone crystals and a reasonable transistor in the oscillator stage, output should be limited to about 5 or maybe 10 mW. Or, in plain English, don't match the oscillator to the next stage. This could very well mean having an extra buffer stage, but it's well worth it for stability and convenience. And the cost of one of the low power devices of this type is not too outrageous (RCA charged 50s. in September 1966 for a 2N3553 unit). The low power units seem to have more gain than the high power transistors; a 2N3553 gives about 12-15 dB (or more) gain as a straight through power amplifier on 150 Mc/s, so that the 10 mW output from the oscillator could easily be knocked up to 0·25 W—which is quite sufficient to be getting on with.

The next article by Sven Weber, G8ACC, will describe a suitable tunnel diode power supply.

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[1] " Switches," GE *Tunnel Diode Manual.*

[2] " Simple Thyristor-protected P.S.U.," *Wireless World*, April 1966.

[3] " A Power Supply for Experimental Transistorised Equipment," RSGB BULLETIN, February, 1966.
Reference Manual of Transistor Circuits, Mullard Ltd.

[4] " Theory of Networks," *Radio Designer's Handbook* (Langford Smith), Chapter 4.

[5] " A Varactor Tripler for 70cm," RSGB BULLETIN, November 1966.

[6] "Hanging on Cs at High Frequencies," T. D. Towers, *Wireless World*, December, 1966.

Miscellaneous

RCA SMA-22, " V.H.F. Power Sources using Varactor Multipliers."

RCA SMA-36, " Design of Large Signal V.H.F. Transistor Power Amplifiers."

RCA SMA-40, " Frequency Multiplication using Overlay Transistors."

Mullard Technical Communications, No. 78, November 1965: " Design of High Power U.H.F. Trebler."

Electronics, 21 March, 1966: " Overlay Transistors Move into the Microwave Region."

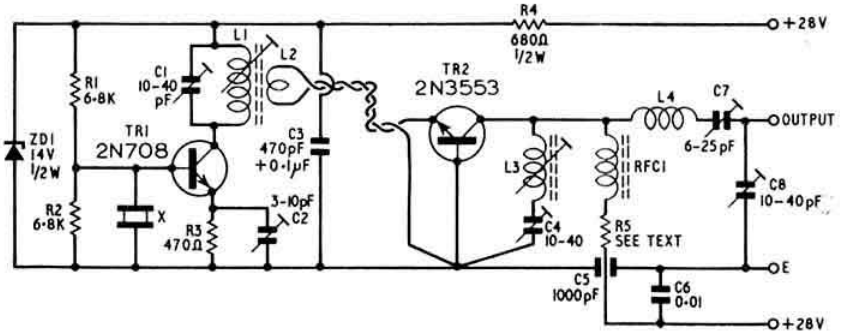


Fig. 13. A 145 Mc/s exciter with approximately 0·5 watts output. L1, 6 turns, 18 s.w.g., spaced wire diam., ¼ in. diam.; L2, 2 turns, 22 s.w.g. insulated, interleaved with L1; L3, 7 turns, 18 s.w.g., spaced wire diam., ¼ in. diam., tuned with dust core; L4, 5 turns, 18 s.w.g., spaced wire diam., ¼ in. diam., self supporting; RFC1 + R5, 30 turns, 28 s.w.g. enam. nichrome wire, on ⅛ in. × ½ in. ferrite core; TR1, 2N708; TR2, 2N3553; X, 72 Mc/s 2MMW overtone crystal; ZD1, 14-volt Zener diode, ½ watt.

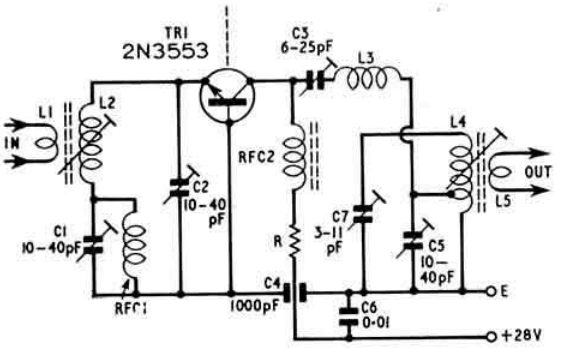


Fig. 14. A 145 Mc/s amplifier. L1, 1 turn, 22 s.w.g. insulated, interleaved with L2, ¼ in. diam.; L2, 2 turns, 18 s.w.g., spaced wire diam., ¼ in. diam., dust core tuned; L3, 5 turns, 18 s.w.g., spaced wire diam., ¼ in. diam., air-spaced; L4, 5 turns, 18 s.w.g., tapped 1 turn, spaced wire diam., ¼ in. diam., dust core tuned; L5, 1 turn, 22 s.w.g., interleaved with L4, ¼ in. diam.; RFC1, 2, as Fig. 13; TR1, 2N3553. A heat sink will be necessary, but as the collector of this transistor is connected to its case, some insulating material must be used.

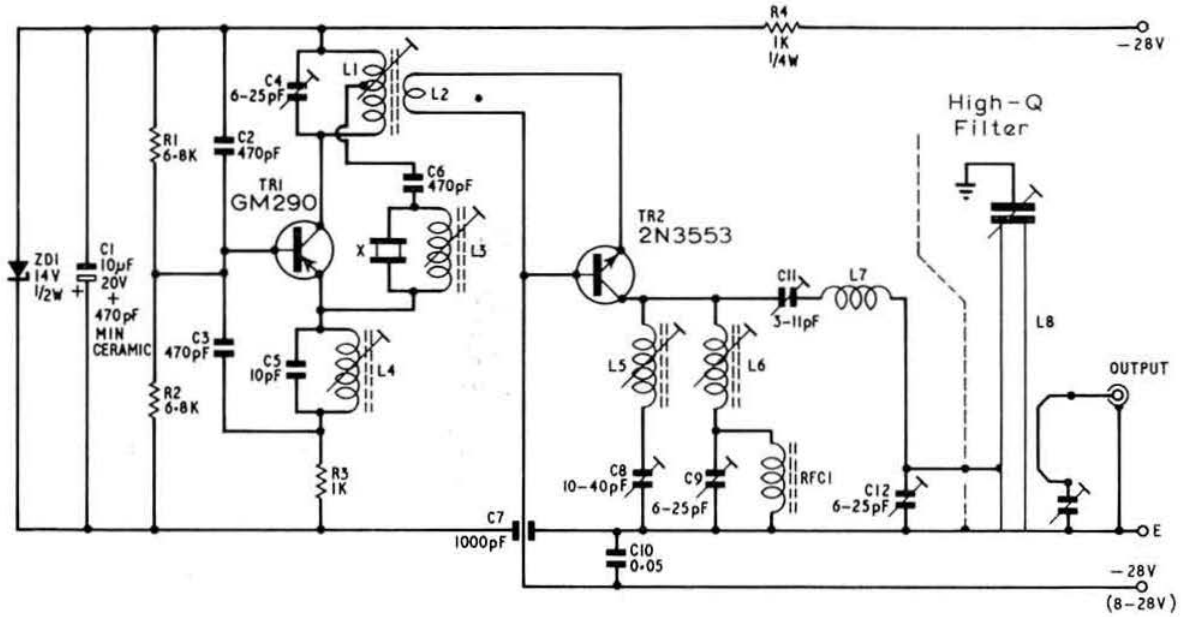


Fig. 15. A 432 Mc/s exciter with an approximate output of 150 mW. L1, 3 turns, 18 s.w.g., spaced wire diam., ¼ in. diam., tapped 1 turn from h.t. end, dust core tuned; L2, 1 turn, 18 s.w.g., insulated, interleaved with L1, twisted length not greater than ¾ in. to TR2; L3, 6 turns, 18 s.w.g., spaced wire diam., ¼ in. diam., dust core tuned; L4, 5 turns, 18 s.w.g., spaced wire diam., ¼ in. diam., dust core tuned; L5, 4 turns, 18 s.w.g. spaced wire diam., ¼ in. diam., dust core tuned; L6, 2 turns, 18 s.w.g., spaced wire diam., ¼ in. diam., dust core tuned; L7, 1½ turns, 14 s.w.g., ¼ in. long, ¼ in. diam., L8, Any high *Q* filter (see RSGB *Amateur Radio Handbook*, Third Edition, page 147); RFC1, as Fig. 13; TR1, GM290; TR2, 2N3553; X, 145 Mc/s 2MMW overtone crystal; ZD1, 14-volt Zener diode, ½ watt.

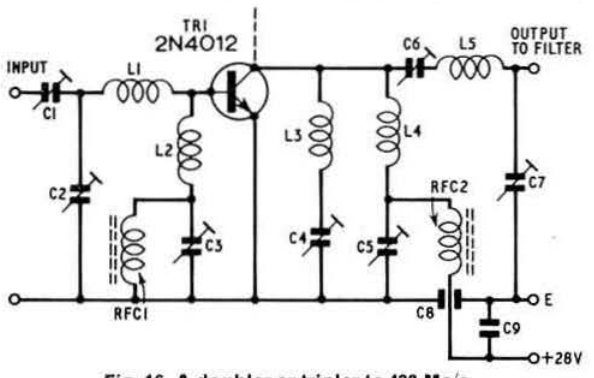
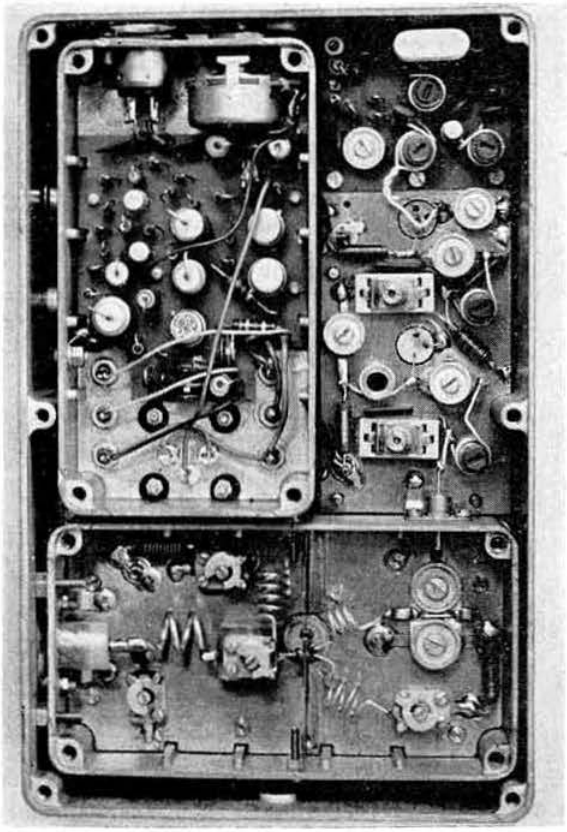


Fig. 16. A doubler or tripler to 432 Mc/s.

Doubler (218 Mc/s input): **C1, 5–30 pF; C2, 5–30 pF; C3, 2·5–5 pF air spaced; C4, not used; C5, 3–11 pF air spaced; C6, 3–11 pF air spaced; C7, 6–25 pF; C8, 1000 pF; C9, 0·05 μF ceramic; L1, 2 turns, 18 s.w.g., spaced wire diam., ¼ in. diam., L2, 2½ turns, 18 s.w.g., ⅛ in. spacing, ¼ in. diam.; L3, not used; L4, 4 turns, 1/16 in. spacing, ¼ in. i.d.; L5, 2 turns, 14 s.w.g., ⅛ in. spacing, ¼ in. diam.**

Tripler (145 Mc/s input): **C1, 8–50 pF; C2, 5–30 pF; C3, as doubler; C4, 10–40 pF; C5, 6, 7, 8, 9, as doubler; L1, 3 turns, 18 s.w.g., spaced wire diam., ¼ in. diam.; L2, as doubler; L3, 4 turns, 18 s.w.g., 1/16 in. spacing, ¼ in. diam.; L4, 3 turns, 18 s.w.g., 1/16 in. spacing, ¼ in. diam.; L5, as doubler.**

RFC1, as Fig. 13; RFC2, ⅛ in. × ¼ in. ferrite core, 10 turns, 24 s.w.g. nichrome. Transistor, 2N4012; make certain that this transistor has enough heat sinkage and that the case is at r.f. earth potential.



An experimental 432 Mc/s complete transmitter. The oscillator/multiplier stages are in the upper right-hand section, the p.a. is below, and the modulator is in the box top left.

Converting the (Highband) Pye Reporter for Two Metres

By P. J. GROVES, G3MWQ *

THE presence of the Highband Pye Reporter Radiotelephones on the surplus market provides a neat and convenient way of going mobile on 2m, especially as the units continually appear, unlike some sets which were released *en bloc*. The conversion of these reporters to provide 2m mobile coverage is fairly simple, provided that the principle of operation is understood. Basically, the unit consists of a vibrator pack power supply running off the 12 volt battery which is called on to deliver about 4 amps on receive or transmit. This supplies the receiver h.t. which is switched to the transmitter by a 12-volt relay when on transmit.

*58 Rosemary Road, Kidderminster, Worcs.

The transmitter section is quite straightforward, and consists of an EF91 (V12) crystal oscillator, running on the crystal fundamental, doubling or tripling in the anode circuit to feed the next stage V11 (EL91) which multiplies to feed in turn the doubler V13 (L77). This stage then provides the drive for the p.a., an ECC91 (V10) double triode, giving an r.f. output of about 1 watt. The p.a. is modulated by V9 (EL85) which also serves as the final audio stage on receive.

The receiver section in its original form is crystal controlled on a spot frequency, and is double conversion. The method employed to achieve this with one crystal is quite ingenious, and it is important to understand the method before attempting conversion. The receiver has a fixed second i.f. of 2·9 Mc/s, and a variable first i.f. which is the crystal frequency plus or minus 2·9 Mc/s.

The precise method of obtaining these conversions from a crystal is best seen by an example. An 11 Mc/s crystal is set to triple to 33 Mc/s (V4), which is fed to a quadrupler (V2) producing a frequency of 132 Mc/s. If this 132 Mc/s is now heterodyned with a signal at 145·9 Mc/s a difference frequency of 13·9 Mc/s is produced. This is the first i.f. The next step is the conversion of this to the second i.f., which is achieved by heterodyning with the original crystal oscillator at 11 Mc/s to produce the difference of 2·9 Mc/s (V5, V6, and V7). Thus, to tune the range 144-146 Mc/s, we have to provide a variable oscillator in the region of 11 Mc/s.

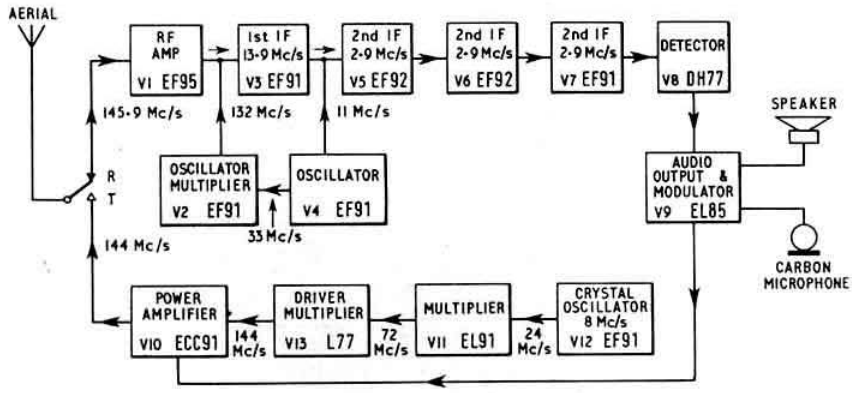


Fig. 1. Block diagram of the Pye Reporter (highband version) radiotelephone.

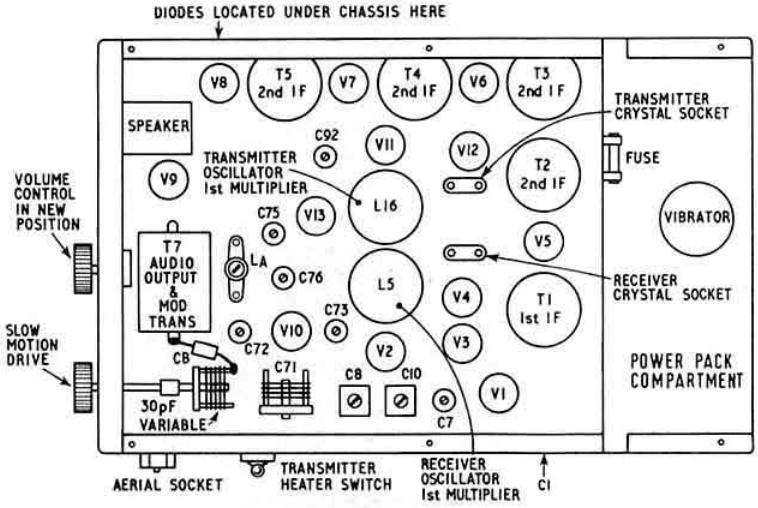


Fig. 2. Chassis layout of the Pye Reporter as seen after the modifications have been made.

The Amateur Band Conversion—(1) Transmitter

Conversion to 2m operation is in two stages, first the transmitter then the receiver. However, the mechanical jobs are best tackled before the electrical, but they are fortunately quite minor. First of all the audio transformer T7 (see Fig. 2) should be unscrewed, and swung aside. The stud with the maker's name should then be removed from the front panel by unscrewing, and the volume control transferred from its home in the top right hand corner to this

new hole. The audio transformer may now be replaced in its original position. The hole vacated by the volume control will provide, at a later date, for the slow motion drive for the tuning capacitor.

The transmitter section should next receive attention. There are two possibilities; either a 12 Mc/s or 8 Mc/s crystal can be used. If a 12 Mc/s crystal is used then the transmitter can be lined up without further modification, following the sequence 12 to 36 to 72 to 144 Mc/s. However, if an 8 Mc/s crystal is used, the sequence must be 8 to 24 to 72 to 144 Mc/s. This presents the problem that the first multiplier stage tuned by L16 does not tune down to 24 Mc/s without padding. This is remedied by using a 5 pF capacitor between L16 and earth (see Fig. 6).

Alignment is the next step, and to facilitate this the makers have provided a useful socket on the right hand side of the cabinet (see Fig. 4), from which drive readings may be obtained by connecting a 500 μA or 1 mA meter between the appropriate pole and earth.

First, L16 should be adjusted for maximum drive to V11, followed by C92 for maximum drive to V13, and then C76 for maximum drive to V10. The p.a. tank circuit should then be adjusted by C71 for maximum r.f. output. If you are lucky, and pick the correct sequence of harmonics first time, you should hear a strong signal on the 2m converter. However, it is usually best to check the alignment with the aid of a g.d.o. if possible. If no g.d.o. is available, then the aerial output socket may be tightly coupled to the aerial input of the main station converter, progressively tuning up the transmitter stages while reducing the coupling to the converter, until the maximum S meter reading is obtained. Should trouble be encountered with the p.a. going into self oscillation, then the neutralizing capacitors C72 and C73 should be carefully adjusted with the crystal out of its socket until no r.f. is obtained. In fact, it is wise to pay special attention to this even if no trouble is suspected. Finally, a check on the r.f. output should be made with a meter, to watch for any tendency to increase or decrease within two minutes of switching to transmit. If this happens it would be as well to fit new valves, because if any lack of drive occurs there is a tendency for the modulation to become distorted.

(2) Receiver

Modification of the receiver is more complicated, especially the alignment, but it is quite easy if carefully done. To get the best performance from the receiver, it is wise to line up the i.f. strip on 2·9 Mc/s with a signal generator before commencing further work.

The crystal for the receiver oscillator must now be replaced by a coil, a fixed capacitor, and a variable capacitor as shown in Figs. 2 and 5. With the values given, it should be possible to tune the oscillator over a wide range by means of the slug in the coil. The wiring to these components must be made quite rigid, and the slug tuned while listening on another receiver on 11 Mc/s. It should be possible to produce a rock-steady note at about 11 Mc/s, tunable over a small

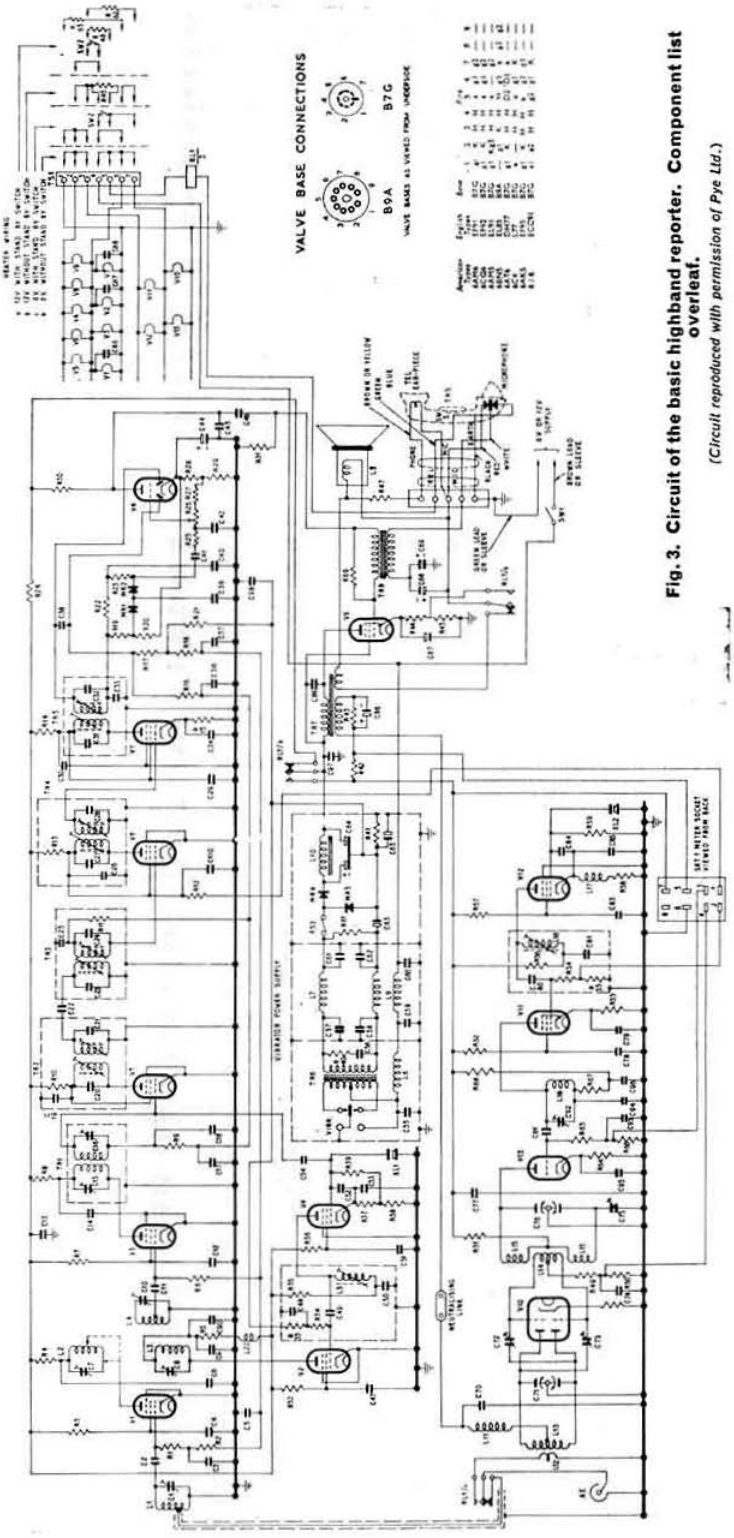


Fig. 3. Circuit of the basic highband reporter. Component list overleaf.

(Circuit reproduced with permission of Pye Ltd.)

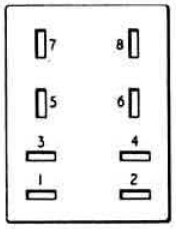


Fig. 4. Front view of the test socket. A 500 μA, 170 ohm meter between the following pins and chassis gives comparative readings for alignment. Pin 1—S meter (screen and anode of V6); Pin 2—V11 grid current; Pin 3—V13 grid current; Pin 4—V10 grid current; Pin 5—p.a. anode current (−ve); Pin 6—ground; Pin 7—p.a. anode current (+ve).

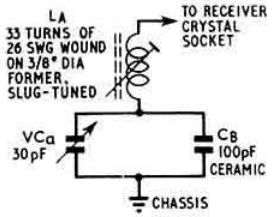


Fig. 5. Circuit of the variable oscillator to replace the crystal in the receiver local oscillator.

range by means of the variable capacitor VC_a. The next step is the most difficult one, and is based on the assumption that no matter how far off alignment the receiver is, then it should still be possible to hear something on 2m, if the signal is strong enough. This may be a fallacy, but it worked quite well for the writer. The method is to couple the aerial input very close to the aerial output from the main station 2m transmitter, and carefully tune the slug in the coil L until a signal is heard. When the signal is heard, it is then worthwhile to check that the oscillator is running on the calculated frequency around 11 Mc/s, and that a " birdie " is not being received. Once the correct signal is received, it is a simple matter to line up the circuit, progressively loosening the coupling to the main transmitter. The best sequence is to tune the first i.f. (T(R)1) for maximum output, not forgetting that there are top and bottom trimmers in the can, followed by the multiplier coil L5, and then trimmers C10, C8, C7, and C1.

COMPONENTS LIST FOR THE PYE PTC117 REPORTER

C1	3-33pF	Air Trimmer	
C2	10pF	Ceramic	±10%
C3	330pF	Silver Mica	±20%
C4	330pF	Silver Mica	±20%
C5	0.001μF	Disc Ceramic	Hi-K
C6	0.001μF	Disc Ceramic	Hi-K
C7	3-33pF	Air Trimmer	
C8	3-33pF	Air Trimmer	
C9	330pF	Silver Mica	±20%
C10	3-33pF	Air Trimmer	
C11	47pF	Ceramic	±10%
C12	0.002μF	Disc Ceramic	Hi-K
C13	0.001μF	Tub. Paper	350V
C14	0.002μF	Disc Ceramic	Hi-K
*C15	3-33pF	Air Trimmer	
*C16	3-33pF	Air Trimmer	
C17	0.001μF	Disc Ceramic	Hi-K
C18	0.002μF	Disc Ceramic	Hi-K
*C19	2000pF	Tub. Ceramic	-25%) +50%)
*C20	100pF	Silver Mica	± 2%
*C21	100pF	Silver Mica	± 2%
C22	1.5pF	Ceramic	±¼pF
*C23	100pF	Silver Mica	± 2%
*C24	100pF	Silver Mica	± 2%
*C25	2000pF	Tub. Ceramic	-25%) +50%)
*C26	2000pF	Tub. Ceramic	-25%) +50%)
*C27	100pF	Silver Mica	± 2%
*C28	100pF	Silver Mica	± 2%
C29	0.002μF	Disc Ceramic	Hi-K
C30	0.01μF	Tub. Paper	350V
*C31	100pF	Silver Mica	± 2%
*C32	100pF	Silver Mica	± 2%
C33		NOT USED	
C34	0.05μF	Tub. Paper	200V
*C35	47pF	Ceramic	±10%
C36	0.05μF	Tub. Paper	200V
C37	0.01μF	Tub. Paper	200V
C38	10pF	Ceramic	±10%
C39	330pF	Silver Mica	±20%
C40	0.25μF	Tub. Paper	150V
C41	0.002μF	Disc Ceramic	Hi-K
C42	0.001μF	Disc Ceramic	Hi-K
C43		NOT USED	
C44	25μF	Electrolytic	25V
C45	0.005μF	Disc Ceramic	Hi-K
C46	0.002μF	Disc Ceramic	Hi-K
C47	330pF	Silver Mica	±20%
*C48	0.002μF	Disc Ceramic	Hi-K
*C49	47pF	Ceramic	±10%
*C50	0.002μF	Disc Ceramic	Hi-K
C51	0.002μF	Disc Ceramic	Hi-K
C52	8.2pF	Silver Mica	±¼pF
C53	27pF	Silver Mica	± 2%
C54	2pF	Ceramic	±¼pF
C55	0.001μF	Tub. Paper	200V
C56	0.06μF	Tub. Paper	400V) a.c.)
C57	330pF	Silver Mica	±20%
C58	330pF	Silver Mica	±20%
C59	0.001μF	Disc Ceramic	Hi-K
C60	0.001μF	Disc Ceramic	Hi-K
C61	330pF	Silver Mica	±20%
C62	330pF	Silver Mica	±20%
C63	32μF	Electrolytic	200V
C64	16+16μF	Electrolytic	350V
C65	50μF	Electrolytic	12V
C66	2μF	Electrolytic	200V
C67	25μF	Electrolytic	25V
C68	25μF	Electrolytic	12V
C69	25μF	Electrolytic	12V
C70	0.002μF	Disc Ceramic	Hi-K
C71	1-10pF	Butterfly Air Condenser	
C72	0.8-2.5pF)	Air Trimmer	
C73	0.5-2.5pF)	Air Trimmer	
C74	0.002μF	Disc Ceramic	Hi-K
C75	2-12pF	Air Trimmer	
C76	1-10pF	Butterfly Air Condenser	
C77) to C79)	0.002μF	Disc Ceramic	Hi-K
*C80	100pF	Silver Mica	± 2%
*C81	0.002μF	Disc Ceramic	Hi-K
C82)	0.002μF	Disc Ceramic	Hi-K
C83)			
C84	8.2pF	Silver Mica	±¼pF
C85	27pF	Silver Mica	± 2%
C86	330pF	Silver Mica	±20%
C87)	0.01μF	Tub. Paper	200V
C88)			
C89	0.002μF	Disc Ceramic	Hi-K
C90	0.01μF	Tub. Paper	350V
C97	0.01μF	Tub. Paper	500V
C98	0.01μF	Tub. Paper	200V
C110	0.002μF	Disc Ceramic	Hi-K
MR1	Min Selenium Rectifier M.1		
MR2	Min Selenium Rectifier M.1		
MR3	H.T. Rectifier		
MR4	H.T. Rectifier		
R1	100kΩ	RMA9	±20%
R2	470kΩ	RMA9	±20%
R3	47kΩ	RMA9	±10%
R4	10kΩ	RMA9	±20%
R5	10kΩ	RMA9	±20%
R6) R7)	100kΩ	RMA9	±20%
R8	10kΩ	RMA9	±20%
R9	470kΩ	RMA9	±20%
*R10	10kΩ	RMA9	±20%
*R11	470kΩ	RMA9	±20%
R12	470kΩ	RMA9	±20%
*R13	10kΩ	RMA9	±20%
R14	4.7kΩ	RMA8	±10%
R15	1kΩ	RMA9	±10%
R16	330kΩ	RMA9	±10%
R17	150kΩ	RMA9	±10%
R18	470kΩ	RMA9	±20%
R19	47kΩ	RMA9	±10%
R20	39kΩ	RMA9	±10%
R21	47kΩ	RMA9	±10%
R22) R23)	330kΩ	RMA9	±10%
R24	1.5kΩ	Wirewound	± 5%
R25	1MΩ	RMA9	±20%
R26	250kΩ	Potentiometer	
R27	39kΩ	RMA9	±10%
R28	1.5kΩ	RMA9	±10%
R29	12kΩ	RMA9	±10%
R30	47kΩ	RMA9	±10%
R31	150kΩ	RMA9	±10%
R32	47kΩ	RMA9	±10%
*R33	470kΩ	RMA9	±20%
*R34	1MΩ	RMA9	±20%
*R35	4.7kΩ	RMA9	±20%
R36	47kΩ	RMA9	±10%
R37	560Ω	RMA9	±10%
R38	4.7kΩ	RMA9	±10%
R39	100kΩ	RMA9	±20%
R40	1kΩ	RMA9	±20%
R41	39Ω	RMA8	± 5%
R42	10Ω	RMA9	±10%
R43	3kΩ	Wirewound	± 5%
R44	390Ω	RMA8	±10%
R45	150Ω	RMA9	±10%
R46	22Ω	Wirewound	± 5%
R47	1.5kΩ	RMA9	±10%
R48	220Ω	RMA9	±20%
R49	1kΩ	RMA9	±20%
R50	4.05Ω	Wirewound	± 2%
R51	1.5kΩ	RMA8	±20%
R52	15kΩ	RMA9	±20%
R53	470Ω	RMA9	±10%
*R54	100kΩ	RMA9	±10%
*R55	100Ω	RMA9	±10%
*R56	1kΩ	RMA9	±20%
R57	15kΩ	RMA9	±20%
R58	470Ω	RMA9	±10%
R59	100kΩ	RMA9	±20%
R60	120Ω	RMA8	±10%
R61	47kΩ	RMA8	±10%
R62-R68		NOT USED	
R69	220kΩ	RMA9	±10%
R76	68Ω	RMA9	±10%

NOTES:-

Erie type resistors :-
RMA9 equivalent rating at 70°C - ⅛W
RMA8 " " " - ¼W
RMA2 " " " - 1 W

* These components are mounted in cans.

V1	Mullard	EF91	Brimar 6AM6
V2	"	EF91	Brimar 6AM6
V3	"	EF91	" 6AM6
V4	"	EF91	" 6AM6
V5	"	EF92	" 6CQ6
V6	"	EF92	" 6CQ6
V7	"	EF91	" 6AM6
V8	Osram	DH77	" 6AT6
V9	Mullard	EL85	" 6BN5
V10	"	ECC91	" 6J6
V11	"	EL91	" 6AM5
V12	"	EF91	" 6AM6

SW1	On/Off Switch
SW2	Toggle Switch S.P.S.T. 6 amp
SW3	Pressel Switch in Tel. Handset
RL1/3	Receiver-Transmitter relay
XL1	Receiver crystal to spec. P4
XL2	Transmitter crystal to spec. P4
SKT1	Meter socket
VIBR	Vibrator 6V 12V.
TH5	Telephone Handset & Lead
LS	Loudspeaker 3Ω
FS1	Fuse 500mA

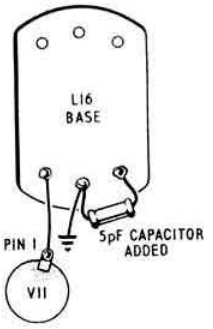


Fig. 6. The position of a padder capacitor added to L16 to enable an 8 Mc/s crystal to be used in the transmitter.

This roughly aligns the receiver, and the variable capacitor VC_a may now be fitted to its slow motion drive. The value given should tune the entire band with a little spare. To set this capacitor to tune the entire band you need one and two signals of known frequency towards the band edges, and after using these to find the correct setting of the slug in L_a, this slug should be fixed with a drop of wax. A final peaking up of the circuit produces a receiver which compares favourably with the main station receiver for sensitivity. It should, however, be noted that the sensitivity does fall off towards the band edges, if the receiver is aligned at band centre, and it might be as well to try stagger-tuning the circuits to produce a more even response.

Conclusion

Although the set worked on produced no great troubles, a little squeezing or stretching of the coils in both the transmitter and the receiver might be necessary in another set.

An improvement in the noise limiter performance may be made by changing the diodes (see Fig. 3) for brand new OA81s, and in the audio by changing V9 for a new EL85.

These modifications have produced a mobile station which works very well locally on a halo, and also gives good results from high ground with more distant stations. The modulation is unfortunately of carbon microphone quality, but is quite readable provided sufficient drive to the p.a. is maintained.

MOBILE RALLIES

Medway Mobile Rally, 11 June, 1967

Mote House, Mote Park, Maidstone, Kent.

Organized by the Medway Amateur Radio Mobile Rally Committee.

Royal Naval Air Display, 17 June, 1967

RN Air Station, Lee-on-Solent, Hants.

Talk-in stations on 160m and 70·26 Mc/s.

Programme includes Flying Display and Hovercraft demonstrations. Doors open at 12.00 with the Air Display scheduled for 14.30-18.00.

Hunstanton Bucket and Spade Party, 18 June, 1967

Brookes Refreshment Rooms Car Park, Hunstanton (Nr. the Pier).

Talk-in station: G3ANM/P on 160m.

ARMS Mobile Rally, 18 June, 1967

RAF Alconbury, Huntingdonshire.

Talk-in stations operational on 160m and 2m.

Static displays include operational aircraft, police dogs and ponies etc.

Longleat Mobile Rally, 25 June, 1967

Longleat House, Nr. Warminster, Wiltshire.

Attractions include Lion reserve, Stately Home, Beautiful Park Grounds, and refreshments.

RSGB National Mobile Rally, 9 July, 1967

Gilwell Park, Chingford, NE London.

(Overnight camping is permitted on the site)

South Shields Mobile Rally, 9 July, 1967

Bents Park Recreation Ground, Coast Road, South Shields.

Talk-in stations: G3DDI on 160m (from 11 a.m.) and G3SFL on 145·8 Mc/s (from 12 noon).

Rally competitive events will begin at 2 p.m. and will include driving events, concours d'elegance, and audio and other quiz events. Light refreshments will be available on the site from midday.

Colchester Mobile Rally, 16 July, 1967

Colchester Zoo.

Talk-in station will be operational on 160m, 4m and 2m.

Reading Mobile Picnic, 16 July, 1967

Childe Beale Trust Pavilion, Lower Basildon, Pangbourne, Berks.

Talk-in station: G3ULT, 160m and 2m.

Admission to grounds reduced to 2s. 6d. by display of club sticker. Send s.a.e. to G8APH.

Worcester Mobile Rally, 16 July, 1967

Cornish Mobile Rally, 23 July, 1967

Pentire Head, Newquay, Cornwall.

Organized by the Cornish Radio Amateur Club.

Saltash Mobile Rally, 30 July, 1967

Calstock Playing Fields, Nr. Saltash.

Talk-in station operational on 160m, 80m, 4m and 2m.

Derby Mobile Rally, 13 August, 1967

Rykneld School, Derby.

Organized by the Derby and District Amateur Radio Society.

Swindon Mobile Rally, 3 September, 1967

Lydiard Park, near Swindon, Wilts.

Organized by the Swindon and District Radio Club.

RSGB Woburn Rally, 10 September, 1967

Harlow Mobile Rally, 24 September, 1967

Organized by the Harlow and District ARS.

3 Very Happy Fiestas

THE MIDLANDS, SCOTTISH and LONDON V.H.F. CONVENTIONS

THAT three conventions devoted to v.h.f. and u.h.f. could be held on three consecutive Saturdays, each attracting a capacity attendance, would have been considered at one time to be not just remarkable but rather unlikely. Even this year, when it happened, there must have been a few people around who wondered beforehand whether enough support would be forthcoming to warrant three-in-a-row like this.

There need have been no doubts; v.h.f. activity in the UK is in such a bounding state of health that opportunities for fraternal and technical getting-together are seized whenever they present themselves, whether nationally at conventions like this year's three or regionally at the local v.h.f. groups now springing up in many areas.

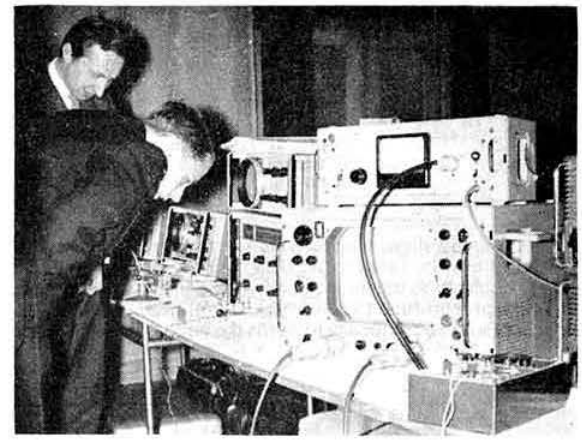
So far as the first of the trio—Wolverhampton, 29 April—was concerned, the recipe for success had been written a year before when the first Midlands V.H.F. Convention took place at the town's Park Hall Hotel. When it was decided to go to the same venue for the 1967 event and to present a similar programme ground-plan to last year's, success was certain. Land communications to Wolverhampton are good, and the hotel itself is a dream of a conference centre, complete with a huge banqueting hall and small meeting rooms off, hilltop sited for good QSO-potential from vehicle-mounted aerials.

Added to this was the expertize of a vigorous v.h.f.-minded committee capable of getting such star speakers as G2JT down from Lancashire and G2FKZ up from London to give their now celebrated lectures on " Aerial Power Tactics " and " Radio Weather," plus G3BA on v.f.o. and s.s.b. techniques for the very highs and Plessey's N. A. Lockley on some intriguing transistor transmitter designs for u.h.f.

As last year, Slade Radio Society's Television Group relayed each lecture by CCTV to screens installed in the big hall. If you couldn't get into the lecture room, or wished to sample the proceedings between wandering round the two exhibitions of demoralizingly good home-built equipment and the always enticing trade stands, this facility was made for you.

As for being demoralized, the G3LLJ noise-measuring device must have transformed many converters from prides-and-joys to children of sorrow—and very usefully, too, by showing their owners where a bit of improvement in noise factor would help.

Another example of the organized informality which has made both the Wolverhampton conventions so enjoyable



Pictures from the Park Hall, scene of the Midlands V.H.F. Convention at Wolverhampton on 29 April. In order, top to bottom:

The noise measuring and counting gear used by G2JT in his lecture on Aerial Power Tactics at the Park Hall Hotel Convention comes in for a close inspection.

Some but not all the Midlands men who helped organize the 29 April convention to such a resounding degree of success are in this picture together with two visitors from across the water. Left to right: G6FK, GI3GXP, President A. D. Patterson GI3KYP, G3KYU, G4LU, G3BA and G3GTW.

Stan Brown, G4LU, who was chairman of the Midlands V.H.F. Convention, is *not* talking about 150 watts on V.H.F. Field Day; faces were much more serious than this when he did. The general tone of his after-dinner discourse is reflected in the President's expression!

Note.—More than 60 pictures were taken at Wolverhampton, and may be seen on application to Don Kirk, G3GTW, 58 High Street, Sedgley, near Dudley, Worcs., who can give price information.

was the late-afternoon alfresco gathering on the banqueting room balcony for a discussion session on 4m bandplanning. No decisions on this *sub judice* topic—but no hard words either.

Then as the grand raffle was launched at six o'clock the trade exhibitors folded up and silently stole away to leave the room clear for the setting of the tables for the hundred-plus who would be at the dinner. And here again the enjoyable informality was maintained, for apart from "The Queen" there were no toasts and no speechifying—instead, after-dinner talks by Chairman G4LU, by Guest of Honour GI3KYP, President of the RSGB, and by G5UM, in that order.

After welcoming the President, G4LU made sympathetic reference to the absence of G6FO (Austin was under doctor's orders), and then went on to give a hilariously controversial discourse that threw up enough subjects for debate to fill many pages of the BULLETIN. In particular, he let drop the suggestion that it would be no bad thing if the full licensed power were to be used on V.H.F. National Field Day: ". . . let's use Field Day to advance the technical state of our hobby" declared Stan.

Next, the President, ranging widely over a number of very current topics such as the Wireless Telegraphy Bill of 1967 and the action taken by the RSGB to represent the amateur position; and of course the new Headquarters (he was due to enlarge on these subjects next day at the Official Regional Meeting nearby at Tamworth).

After G5UM had said a word or two about "Four Metres and Down," with a tribute to its earlier conductors, G2AIW and G2UJ, it was time for Stan (G4LU) Brown to wind up the dinner-table proceedings, but not by any means to declare the convention closed: almost two hours still remained for talk-sessions and the odd fixed-mobile contact from the cars outside.

And next year? We will just say that it's fortunate the Park Hall Hotel allows room for expansion.

Seven days after Wolverhampton, Edinburgh; and here is a report from the Society's V.H.F. Manager, Geoff Stone, who was there:

THE FOURTEENTH SCOTTISH

G3FZL writes:

The fourteenth Scottish V.H.F. Convention was held in Edinburgh on 6 May. There was a very good attendance of 64 for the lecture session of the Convention, opened by Tom Douglas, G3BA, in his forthright and entertaining manner with a talk on the technical problems associated with the use of v.f.o.s on v.h.f. He described his Variverter and showed how this could be developed into a Transverter to give s.s.b. operation on v.h.f.

There followed a report by the Dunfermline V.H.F. Group from Harry Mackie, GM3FYB, and Fraser Shepherd, GM3EGW, on their recent moonbounce tests with the USA. These were unfortunately abortive on this occasion: after the loss of a 4CX250B valve and instability in the receiver an s.w.r. check indicated that all was not well. The fault was traced to a high resistance joint in the feed system caused by electrolytic corrosion between a brass and aluminium part. Work is in hand to replace the aluminium with brass to prevent a recurrence. Improvements to the receiver parametric amplifier are also being made. Everybody wishes them well in their pursuit of the first GM-W contact on 70cm.

After this talk G3FZL spoke of the problems likely to be encountered when using varactor multiplier devices in v.h.f. transmitters, and FETs in v.h.f. converters.

The Scottish Convention was noteworthy for an excellent display of home constructed equipment, including a flying spot television scanner. Of special interest were pen recordings taken by Ian Sheffield, GM3VEI, of signals from GB3LER on 4m. Ian is one of the RSGB Scientific Studies team engaged on auroral investigations and it is good to show work such as his.

The final part of the proceedings at Edinburgh was a discussion to decide where to hold the Convention next year, and it was agreed that Stirling would be an ideal venue. A committee of three representing the Edinburgh, Glasgow and Dunfermline areas was charged with the organization.

At the dinner in the evening, at which there was an attendance of 45, Colin Davidson, GM3LAV, proposed the toast to the Society with traditional dry Scottish humour, and the response was made by GM3EGW, the Zonal Council Member who officially represented the Society. Towards the end of the evening the Jock Kyle Memorial Cup was presented with great acclaim to Sid Rowden, GM6SR, for the great assistance he has given, especially to newcomers. It was agreed all round that this award was going to a recipient who practised his Amateur Radio in many ways as Jock Kyle had done. GM3UM is to be congratulated on his efforts in organization of the event.

AND so from Edinburgh on the sixth down south to London for . . .

THE THIRTEENTH ON THE 13TH

How would a change of venue be received for the Thirteenth Annual International V.H.F./U.H.F. Convention, held for so many years in central London? Naturally, the answer to this one interested the organizers more than a little. The answer: overwhelmingly favourable.

The Winning Post Hotel (some appropriateness in the name) was easy to get at, had vast car parking, and by turning over a complete suite to the Convention allowed the event to operate in a wholly self contained way. No view-obscuring pillars in the hall, no excessive heat that might be sleep-inducing during the afternoon lectures, and a fine stage so that the lecturers themselves were visible to all. And how many was "all"? More than 160.

As at Edinburgh and Wolverhampton, some highly topical lectures on subjects much in the BULLETIN print at the present time had been arranged. First of all V.H.F. Manager Geoff Stone introduced Arnold Mynett, G3HBW, "*the* authority on FETs", to talk about these devices. He made them sound simple to use by comparing their circuitry with valve circuitry. An elegant cascode with FET followed by bipolar had many members of the audience busy copying down.

Precisely half an hour later G3FZL introduced Mr. J. E. Saw of Mullards, not himself a transmitting amateur but clearly a professional who enjoyed doing his bench work, and finding out things, in much the same way as *we* do. His subject: Varactors as Frequency Multipliers. Later, members were able to see in the adjoining exhibition room a tiny 470 Mc/s varactor unit he had made, which seemed to have nothing to it—except knowing how.

Variety was imparted to the programme by inserting after the varactor lecture a showing of the AEI film "The Radio Sky"—instructive, never condescending, a "cert" for any radio club meeting. One quote from it stuck in the mind: that radio astronomy is so accurate that it is the equivalent of measuring the diameter of a sixpence at ten miles.

After the teabreak came a lecture by G8AMA, full of dry humour that helped make the subject of overlay transistors easier to understand than it probably is. Again much copying of circuits by the audience. Finally, Geoff Stone introduced what he called "The Heath Rees Consortium" whose job it was to explain the mysteries of that "next band up," 13cm. "Five of us are now working on 2300 Mc/s equipment" said G3HWR, who went on to show what would be needed in practical terms, including some beautifully finished

cavity wavemeters. Then a dramatic touch: he held in the air a pint-sized 8-over-8 aerial as another member of the " consortium " switched on a 13cm receiver—and there was G5FK pounding away on c.w. from Wembley, eight miles away.

With the lecture session finishing just after half past five there was ample time for the ever-important ragchews and social gettings-together that help make conventions worthwhile, and time too to go round the exhibition of " Pro " and " Am " produced equipment in the lounge-bar outside the main hall. After judging the latter, President Patterson, GI3KYP, and Dr. J. A. Saxton pronounced G2AIH as winner and holder of " The 1962 V.H.F. Committee Cup " for his 70cm sideband rig. " It took me 18 months to build " said Norman Hyde.

The President and Dr. Saxton were at the centre of the top table at the dinner at 7.30 p.m., along with a distinguished gathering of other invited guests to a total assembly of 108, a record for London conventions.

Proposing the toast of " The Society " Dr. Saxton did not simply express his pleasure at being invited but said he hoped to attend future V.H.F. Convention dinners either as a guest or not: " I am proud to say I am a fully paid up member of the RSGB." In the course of his speech he welcomed the close co-operation that existed between the RSGB and the CCIR Study Group 5 (of which he is chairman).

In his reply GI3KYP said he wished to thank Dr. Saxton formally and publicly for the help and close co-operation that characterized the relationship between the Society and the Radio and Space Research Station, of which Dr. Saxton is director. Speaking on many current Society affairs such as the new HQ (" matter very active ") and the possibility of a British amateur radio satellite (" if any group in the country is prepared to take on the design work involved the Society would be most glad to have their proposals"), President Patterson emphatically scouted the theory that any " Big Brother " attitude existed between the members and Headquarters. " If any rules are made they are for and by the membership."

Norman Caws, G3BVG, developed this point when he replied to the G5UM toast of " The London U.H.F. Group." Norman welcomed the development of local groups not only as technical and social fraternities but as units for gathering members' views together for passing up the chain to Council. He dwelt on that burning topic of the moment, the new W/T Bill, and read out to the assembled company a short verbatim transcript of the statement made the week before in the House of Commons about the close co-operation that exists between the Radio Services Branch of the GPO and the Society.

In listening to G3BVG we could not help wishing that what he had to say should be noised abroad to all those British amateurs who for some reason or another still do not belong to the Society. No better demonstration of the importance of solidarity (cliché word but you know what we mean) has come for a long time.

Lastly, the toast to " The Visitors" by G6NZ received reply from Past President Dr. R. L. Smith-Rose with wit and wisdom characteristically juxtaposed (" Experience is what enables you to recognize a mistake the second time you make it ").

Three memorabilia presented after the speechmaking were the European V.H.F. Trophy to Albert Latham, EI6AS, for consistent DX work and the furthering of international friendship; the constructors' cup to G2AIH; and the PZK Trophy presented by the Polish National Society to the leading station in the second section of the IARU contest last September, which went to the G2JF group, on whose behalf it was accepted by G3DAH from Fred Lambeth, G2AIW. Fred is secretary of the V.H.F. Working Group of IARU Region 1.

Last knockings: the winning dinner ticket number brought a 10-element J-beam to G3JZG (there will be an even bigger signal out of Willenhall now). And Geoff Stone announced amid acclamation that next year's Convention would be held in the same venue in the last week of April, 1968—the only date left for April, May and June of 'Sixty Eight.

* * *

Which brings us to the end of a necessarily concise report of the three V.H.F. Conventions-in-a-row of 1967, except for one thing: an acknowledgment to all three organizing committees and helpers who made them possible at all. They do not look for long credit-titles in print; the fact that each of the three events can be reported as having been highly successful is their own reward. They are now thinking about the preliminaries for *next* year!

J. H.

Project Oscar

By W. BROWNING, G2AOX

The *EU-OSCAR* built by DJ4ZC on behalf of IARU Region 1 has been delivered to California, tested and packaged, and has joined the queue for launching into orbit, which it is hoped will be in June or July.

OSCAR 5 will be very similar to *OSCAR 3*, operating as a translator in the 2m band, with an input frequency of 144·100 Mc/s ± 20 kc/s, and an output frequency of 145·900 Mc/s ± 20 kc/s. The output power will be 1 watt. A two channel telemetry will operate on 145·950 Mc/s with a continuous carrier and the usual HI HI call-sign; the time cycle will be representative of the temperature and battery voltage. The expected battery life is four weeks, and it is hoped that the orbit will be similar to *OSCAR 3*, i.e., about 575 S/miles high and near circular.

Further notifications will be given on the RSGB Sunday News Bulletins and on the SSC net on 3783 kc/s at 19.15 BST. After the launch, G2AOX will be heard on approximately 145·000 Mc/s with orbit information and predictions. Caution should be exercised by those who may hear reports from the USA on the h.f. bands with orbit data, as their times are always for a S/N Equator crossing and may or may not be GMT, and the height will possibly be given in Nautical and not Statute miles (or even in kilometres).

To convert N Miles to Statute Miles multiply by 1·152
S Miles to kilometres multiply by 1·609
Kilometres to S Miles multiply by 0·620
Statute Miles to N Miles multiply by 0·868

The *AUSTRALIS* Project has been held up with receiver trouble, but it is hoped this will be cured in June, when it will be sent to California.

All reports and details of contacts made or stations heard should be sent to G2AOX, giving date, orbit no., time in GMT, and beam heading in degrees. These will then be catalogued and passed to the USA for their records and necessary confirmations.

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* Co-ordinator for Great Britain and Eire. 47 Brampton Grove, Hendon, London, NW4.

THE 13th LONDON

Convention Pictures from "The Winning Post", Whitton

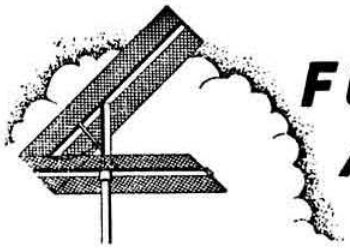
Some of the 160-plus who attended the afternoon lecture session at the London V.H.F./U.H.F. Convention on 13 May. On the platform: Mullard's J. E. Saw, lecturing on varactors.

Guest of honour at the dinner: Dr J. A. Saxton, director of the Radio and Space Research Station.

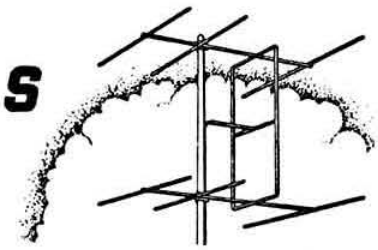
(RIGHT) **The builder: Norman Hyde, G2AIH. The trophy: The 1962 V.H.F. Committee Cup. The exhibit: a sideband transmitter for 70cm, judged best entry by President Patterson and Dr Saxton in the constructors' competition.**

Fred Lambeth, G2AIW, European v.h.f. secretary, presents the "PZK Trophy" to the G2JF team for their IARU contest success last September . . .

. . . and G3DAH accepts the trophy on behalf of "John Fox", who was compelled to miss the convention on account of illness. *(All prints by G3LEI)*



FOUR METRES AND DOWN



By JACK HUM, G5UM*

Towards the Microwaves . . .

REMEMBERING that DX is relative, there are circumstances when a contact over 14 miles *is* DX, and these circumstances came about on 7 May when G5FK at Wembley worked G3RPE/P sited on a Chiltern hilltop near Hemel Hempstead. The band: 2300 Mc/s. The signal strength: S9 plus both ways.

In reporting this important piece of u.h.f. history-making Heath Rees, G3HWR, says that G5FK is also receivable at the G3RPE home site on another hill near Hemel, but that the path is not yet reciprocal. " It will come," he is sure.

So will further contacts on " Thirteen," without any doubt, if the intense interest being shown in this band by the North West London group is anything to go by. Six are nearly operative.

As for " Twenty three," G3HWR thinks as many of us do that this is going to be its year of promise. " Anyone who works less than 30 stations this year is just not in the running."

By the time this piece appears the first of the three 23cm contests of 1967 will be over; those in September (V.H.F./NFD) and October (open event) are to come. There will be more 1296 Mc/s activity in the UK than ever before, giving rise to the possibility that someone somewhere is going to be the first to win the RSGB " Four Metres and Down " award for this band (three countries and 20 counties).

A suggestion from G3HWR; print a list of active 23cm stations and frequencies normally used. We will with pleasure, if operators will scribble the necessary information on a postcard and send it to " Four Metres and Down."

. . . Towards the Moon (and back)

"Remembering that DX is relative . . ." The phrase cails for some re-examination when Earth-Moon-Earth transmission is the mode. All congratulations to Peter Blair, of Chelmsford, for once again proving that the ultimate in DX can be worked given the needful patience equated with expertise. The 432 Mc/s tests organized with Stateside were rewarded over the weekend of 15-16 April by contact via E-M-E with W2IMU/2, to whom also congratulations on adding HB9RG as well as G3LTF to his 70cm transatlantic list.

These successes came not from fleeting opportunity but as the result of methodical preparation at both ends and superb equipment, and the determination to plug away for weeks on end if need be.

Any moment there should be news that another US station has " got across " on 432 Mc/s via the moon: W2FZY/2, who has the benefit of a 60 ft. dish!

Auroral Opening

Arriving home from work after 1 a.m. on 3 May, Charlie Sherrit, GM3EOJ, of Aberdeen observed Northern Lights in the sky, so of course he tried 2m. Significantly, an auroral rasp on GB3LER was evident. Then four SM/LA contacts came.

The opening folded up, to resume at midday, with GB3LER again taking on an " A " tone. Result: more GM3EOJ contacts with Scandinavia plus GM3TFY near Edinburgh (the man with a nose for aurorae), while the beacons LA1VHF at RST55A, GB3GI at 57A and GB3VHF at 45A were all there.

GM3EOJ uses 90 watts; the 4-over-4 aerial was at 35° during the above opening.

Charlie regrets the non-appearance of other UK stations on 2m at the time; almost certainly, further northabout DX would have been worked. Moral: put out c.w. CQs whenever you can during the current auroral season.

Techniques on " Four "

" Are our techniques good enough on 4m? " The question, put here a month or two back, comes in for some trenchant comment from G3LMT of Exeter. He makes the point that the EF91/6AK5 type of front end just is not good enough when used in conjunction with a fairly high powered transmitter.

He observed: " On 2m most transmitting amateurs seem to have fairly good receivers. They have to if they are to hear any DX—and DX generally means continental stations. On 4m this attraction does not exist, so people seem to end up by using all sorts of junk for receivers, often in company with high power transmitters—and the London area stations seem to be the worst offenders. The attitude all too often seems to be that any darn thing will work on ' Four,' so forget signal-to-noise, selectivity, sensitivity and noise factor. As anyone who has done serious work on ' Four ' will know these things are almost as important as on 2m."

In a parting shot on this subject G3LMT expresses the fear that the general attitude towards receivers is getting the band a bad name, which it certainly does not deserve.

Beaconry

How valuable an indicator of conditions the beacon service may be is suggested by the reception of GB3GW at Swansea (144·25 Mc/s) by BRS15744 (R. A. Ham) at Storrington in Sussex. In a recent five day spell of steadily improving conditions BRS15744 logged GB3GW at an average RST569 over most of the period until the barometer, which had been rising from 30·1 to 30·5, dropped suddenly to 30·0, and out went the beacon.

It is worth remarking that the path distance in this instance is a matter of 155 miles; and that GB3GW does not beam Sussex way at all (heading is ENE).

* * *

Good news from BRS Gibson, who has had much to do with GB3GEC, is to the effect that all is not lost where this beacon is concerned—far from it. Recent technical troubles have stemmed from this Thames-side beacon's unavoidable

* Houghton-on-the-Hill, Leicester. Send reports for the July issue by 12 June and the August issue by 10 July.

subjection over a long period to extremes of humidity and corrosion. The fact that it did so well for so long is creditable indeed.

What had turned into the nation's 70cm marker is likely to be with us again later this year (D.V., all else being equal, and weather almost literally permitting!). A thorough overhaul is pending, including rebuilding the transmitter extensively to solid state circuitry.

Its return will be eagerly awaited a surprising distance up country from Hammersmith.

* * *

G3OCB of Truro reports that an aerial fault which came to light at GB3CTC has been rectified and this valuable marker should be back to normal by now. The 70cm transmitter is nearly complete.

Contest News

Comparing the recent 70 Mc/s Open Contest with the March " Two Metre Open," BRS15744 comments on the remarkable similarity of barograph traces on the two week-ends. As will be vividly recalled, the 2m event coincided with a big influx of German signals at great strength. " If only the Continentals were allowed to use ' Four ' the 70 Mc/s Open would have been another contest man's dream!" sighs BRS15744.

From our own observations of the 4m contest it seemed that a considerable proportion of participants had decided to go portable possibly as an escape from TVI at home. The BRS15744 log did indeed show no less than 22 " away from home " stations heard at Storrington from a total of 97 in 28 counties.

No complaints this time, though, about portable entrants' advantage: there was a special section for them in the April 70 Mc/s Open.

One portable signal that *did* get a lot of the UK operators sitting up and taking notice was that of EI7AF, who with his 20 watter atop a 1600 foot ridge of the Slieve Blooms worked twenty of them. The 4-element Yagi really paid off. Robert did not enjoy quite so much luck during the 7 May 144 Mc/s Portable Contest, probably because not enough people were prepared to listen out for c.w. at the bottom end of the band where he was operating, or if they did, possessed inadequate receivers (EI7AF has a theory about this).

Bearing on the advantage gained by well sited stations, G3AHB of Slough comes up with a unique suggestion. After agreeing with the widely expressed view that *non*-portable v.h.f. contests should be from home QTH only, Les goes on to suggest the use of a points multiplier system as follows: for stations less than 100 ft. a.s.l. multiply the score by 3; for stations less than 500 ft. a.s.l. multiply the score by 2; for those above 500 ft. no multiplier. G3AHB concludes: " Quite a different pattern would emerge in the results, which until now have appeared to be very similar for contest after contest. The above suggestion would encourage more participants, and many of us placed at low QTHs would feel it worthwhile having a go."

Still in a contest context, now read on. . . .

Slow Down, Mike-Man!

Ruminating on the April 70 Mc/s Open Contest, Bert Allen, G2UJ, tells us that he was very impressed indeed by the high standard of operating to be heard from most participants in what was a very enjoyable event. He raises one or two points about operating habits which could be usefully borne in mind to help improve procedure still further in future contests.

For example, several operators " would have been well advised to give their calls much more slowly and clearly. Gabbling a call-sign when sending CQ is inexcusable, and when the signal is weak makes it unreadable."

Rather more annoying than this, though, is the " asides " man. Says G2UJ: " Another thing which narks me in contests is the ' clever ' type calling CQ (usually gabbled) and carrying on a witty (?) conversation with someone else at the same time."

We have all met them and probably will continue to do so just as long as there are people around who regard a microphone as an effects machine (which it isn't) instead of as a device for conveying intelligence quickly and economically (which it is).

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
GB3GI	Strabane, N.I.	145·990 Mc/s	A1	N/SE
GB3GW	Swansea	144·250 Mc/s	A1	E.N.E.
GB3LER	Lerwick	145·995 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	F1	North-West

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
11 April	10.20 GMT	130 c/s low
18 April	15.02 GMT	296 c/s low
25 April	14.00 GMT	160 c/s low
2 May	15.17 GMT	210 c/s low

Video-DX

The comments made here about DX reception of television have unearthed a surprising amount of activity in this field—surprising at any rate to those of us who had been unaware just how much of it goes on.

For example, BRS26760, Doug Bowers of Saltash in Cornwall, has logged a dozen ex-UK countries from as far away as the Canary Islands. When conditions are right he has been able to switch from Russia to Italy and across to Spain for two or three hours at a session.

Two faitly old Bush receivers which are used were quite easy to modify to permit reception of 625 negative and 819 positive modulation as well as the customary 405 line mode. The aerial: 3-element Yagi.

For u.h.f. (where he has logged Spain on Channel 24) Doug feeds a tuner direct into the Bush aerial socket, setting the receiver to the low end of Channel 1.

Last month not altogether seriously we asked: " But do television stations QSL? " BRS26760 says they do. He sent reports to Swedish and German TV stations and received in return a test card QSL from the former, and from the German one a QSL and picture card of the station.

Doug thinks it would be a good idea to initiate a letter budget or news-sheet to circulate among people keen on DXTV. If you like the idea drop him a line at 95 Grenfell Avenue, Saltash.

Tech Corner

From **G3HWR** (Heath W. Rees, London NW3):

In connection with methods of generating s.s.b. for use on 145 Mc/s attention should be drawn to the importance of reducing unwanted products to the minimum possible level.

For example, I would question whether the G3BA design discussed in the April issue offers a sufficiently high order of suppression of the 131 Mc/s drive, namely −60dB. Given a sideband output of 100 watts the figure of −60dB represents 100 μW, which is strong enough to cause interference to other services such as aircraft on 131 Mc/s.

I well remember some work done by G3LAR with a transistor transmitter giving a measured output of 150 μW. This was readable on phone at seven miles; his best contact on c.w. was well over 50 miles!

The current GPO specification for v.h.f. mobile equipment calls for an output to be less than 2½ μW on any frequency " well removed " from the nominal output frequency, i.e., other than sidebands, and states that *additional suppression* may be needed for adjacent fixed stations.

Sideband power in the next 25 kc/s channel is specified as 10 μW maximum when the transmitter is 100 per cent modulated; at this level interference up to three quarters of a mile is to be expected.

It seems to me that the amateur service could usefully pay close attention to the dangers of emitting unwanted products from transmitters, not only to accord with the terms of the licence but also to avoid filling up the v.h.f. spectrum with " dirt."

From **G8ACE** (John Hazell, Hatfield):

There is one simple answer to the problem of 2m radiation from 70cm transmitters: keep the multiplier power low and use buffer amplifiers to increase power on the band required. Working back from the 70cm p.a., a QQV03-20A can be fully driven by a QQV02-6 buffer amplifier, which in turn is driven by a QQV02-6 tripler. The latter's drive requirements call for quite a small 2m exciter unit.

From **G8AKR** (Eric Sabin, Shrewsbury):

Double instead of treble! It is not difficult to reach 216 Mc/s with three pentodes starting with an 8 Mc/s crystal in " cockeyed Colpitts " 6AG7 to 24 Mc/s, then another 6AG7 tripler to 72 Mc/s, thence to 216 Mc/s by a further tripler such as a 5763. This line-up will give a couple of watts at 216 Mc/s to drive something like a 6AM4 or A2521 doubler to feed the p.a. at 432 Mc/s.

To triple to a higher power level use something like a QQV03-10. For the final doubler-driver a varactor is worth considering; it doubles rather more efficiently than it trebles and the circuitry is simpler.

Useful circuit information on two transmitters, the first giving 2 watts at 70cm from an A2521 and the second giving 10 watts from a DET19, is available on request from The M.O. Valve Co. Ltd., Brook Green, London W6.

I think most folk on 70cm triple from 2m; but it seems logical to multiply by lower increments as valve efficiency decreases with frequency increase.

Expeditionaries

Interested in working GC on 70cm? Then write G8ARS, John Oliver, 50 Queensway Drive, Bridgnorth, Shropshire, for a schedule on the nights of 25 August, 27 August and 1 September, between 8 p.m. and 10.30 p.m. clock time. He will be operating as GC8ARS/P in Jersey using n.b.f.m. to a varactor feeding an 8-over-8. John says: " Regret no other dates than the above acceptable: have to preserve matrimonial sanctity ! "

* * *

A reminder that the G3BA-G3BHT v.h.f. expedition (2m only) will be on its way to Ireland on 10 July (see this page, March). Not much time left to fix a sked (remember an s.a.e.) via Tom Douglas at 141 Russell Bank Road, Four Oaks, Sutton Coldfield. The team will be operational in the 12 days from 12 July in EI/GI. Sadly, G4LU cannot go: business pre-occupations.

* * *

Dovetailing with the Birmingham 2m safari to Ireland there is to be a Southampton 4m one. The sponsors: Southampton University Radio Club, known here as G3KMI. The dates: 20-30 July inclusive, with special attention to the RSGB 4m Portable Contest. The special call sign: EI3SU/P—and there will be a special QSL. The equipment (it sounds potent): 50 watts a.m./s.s.b./c.w. into a 4-over-4 J Beam at 30 ft.—and an FET converter, into the bargain. No skeds—but keep beams turned west *at any time* during the above 10 days.

Here and There

The Technical Merit Award of the ARRL has been made to W6DNG and VK3ATN for outstanding moonbounce work.

* * *

If your licence is of recent date and your call-sign is not in the 1967 edition of the RSGB *Callbook*, always announce your location when calling CQ above 70 Mc/s. People listening to you will welcome this information to help them align their beams on to you.

* * *

" During the April 70 Mc/s Open Contest it was again evident that the receivers of many stations were not covering the whole band. This is not only frustrating to calling stations but surely is very bad practice."—G3LMT.

* * *

Call-sign G3WIR newly allotted to the Burnham Beeches Radio Group in South Bucks operates 2m alternate Monday evenings and members would like Monday Activity Nighters to look out for it. Watch also for G3WIR/P during portable events.

* * *

Almost everything in the radio line seems to have been thought of for the next International Ham Convention at Knokke in Belgium. Dates: 15, 16, 17 September. Details: from G2JF. And plenty of v.h.f. interest is promised.

* * *

The Cornish V.H.F. Group meets on the third Thursday of every month, at the Coach and Horses, Rydar Street, Truro, at 7.30 p.m. Clive Bowden, G3OCB, can tell you more about it if you haven't been.

* * *

Next meeting of the South East V.H.F. Group: 23 June, Rutherford College, University of Kent, Canterbury, 7.30 p.m. Subject: the G6CJ Aerial Talk. Last meeting on 12 May (G3BA on V.F.O./S.S.B.) attracted no less than 45 (phew!).

* * *

Just a reminder that G3RWM is the 4m crystal exchange man. Send him details of your " wanteds " or " surpluses " and a stamped addressed envelope for details of other people's. Don't send him crystals, though. QTH: Ray Martin, 76 St Paul's Crescent, Coleshill, Warwick.

Crystal Calibration at V.H.F.

By B. PRIESTLEY, G3JGO*

THE traditional method of producing 10 or 100 kc/s calibration pips at v.h.f. is to square up the fundamental frequency to produce sufficient harmonics and selectively amplify the desired frequency range. Since the lower harmonics are fundamentally stronger, it is difficult to avoid harmonics of noticeable strength appearing at the receiver tunable i.f. [1, 2]. The use of a tunnel diode pip generator [3] is a considerable improvement, giving harmonics of equal strength to well above 300 Mc/s in my experience, but still generating a whole string of harmonics. A system which only works at the desired frequency seems preferable and two possibilities were examined.

Alternative System

If a carrier is modulated with a 100 kc/s square wave, sidebands at 100, 200, 300 kc/s are produced. If the carrier is accurately centred on 145 Mc/s then calibration pips can be produced over the 144-146 Mc/s band with a 100 kc/s signal which only contains appreciable harmonics up to the 10th. This system is quite practicable, using the simple modulator shown in Fig. 1, and is an ideal way of checking the sweep width of a wobbulator but suffers from the snag that the accuracy of the markers is dependent on the carrier frequency. However, the error in a crystal controlled oscillator at, say, 36 or 72 Mc/s may be no worse than the error in a 100 kc/s oscillator when multiplied by 1450 so the system is quite workable. The error in the 100 kc/s oscillator is only multiplied by a maximum of 10 and so should be quite negligible. The system, however, seemed a trifle cumbersome.

The Method Chosen

If the modulation above is applied to an *oscillator* at the desired centre frequency, a remarkable thing happens when over-modulation occurs. The carrier and sidebands disappear, and are replaced by a series of harmonics of the modulation. Consequently there is no need for an accurate crystal and multiplier, a simple s.e.o. being adequate. My first experiments were done by feeding 100 kc/s into the 'phones socket of a valve grid dip oscillator. Encouraging results were obtained at 28 and 144 Mc/s, but rather more voltage swing was required for 100 per cent results than was available from the transistor oscillator in use [4].

The system shown was made up and found to work very well indeed. As a suitable *p-n-p* v.h.f. transistor was not available the system was tried out at 28 Mc/s with an OC170, but it will work equally well at 144 or 435 Mc/s provided the stability precautions described by G2HIF are observed.

Practical Details

It is most important that the oscillator is stopped and started afresh by each cycle of the modulation. To ensure reliable starting and to check that the frequency is in the centre of the band, disconnect the oscillator from the modulator at point X, apply 4·5 volts and juggle the values of C1, C2 and R1 as necessary. Now reconnect the modulator and switch on. Make sure that the oscillator tuning only controls the strength and not the frequency of the pips. Also, beware of too high a value of C4, as this will keep the oscillator running through the off half cycle of the modulation. For once it is important to over-modulate!

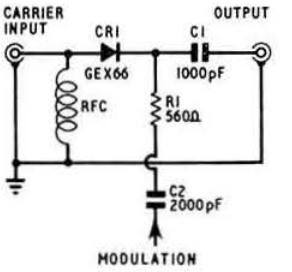


Fig. 1. The simple modulator. RFC should be chosen to suit frequency.

With the supply polarities changed the system would work equally well with *n-p-n* transistors, or with other forms of s.e.o. provided rapid starting and stopping is possible. A valve version is quite practicable, but less convenient.

References

[1] "Obtaining Reliable 10 kc/s Frequency Markers in the Two Metre Band," G3LTF, RSGB BULLETIN, November 1964.

[2] "A Transistorised Band Edge and Centre Marker for Two Metres," P. K. Blair, J. R. Gazeley, BRS20533, RSGB BULLETIN, February 1961.

[3] "100 kc/s Crystal Marker for V.H.F," C. Sharpe, G2HIF, RSGB BULLETIN, July 1966.

[4] "A Transistorised Crystal Calibrator," B. Priestley, G3JGO, RSGB BULLETIN, June 1966.

This article is published without full approval of the Society's Technical Committee.

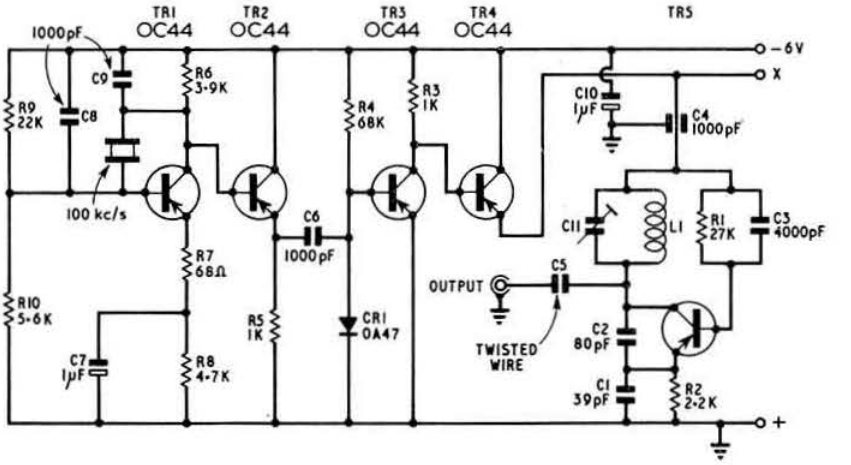


Fig. 2. Self excited oscillator with a 100kc/s modulator. C1, C2, R1, L1 and VC1 will depend on the type of transistor used for TR5, which is selected according to the working frequency. In the prototype TR5 was an OC170, C11 was omitted and L1 was 8 turns of 20 s.w.g. wire ½ in. long on a ½ in. diam. former. This was for use at about 28·7 Mc/s.

* 43 Raymond Road, Langley, Slough, Bucks.

THE MONTH ON THE AIR

By JOHN ALLAWAY G3FKM

WITH the current controversy over QSL Managers continuing unabated your scribe would like to add a crumb of comfort to those still awaiting the arrival of QSL cards confirming desirable QSOs made a considerable time ago. Do not despair! A report from G3HDA announces the arrival of two QSLs—one from W6YAW for a contact in 1950, and the other (which arrived by Air Mail) from a W0 to whom Mick has sent a report in February 1948!

The International Amateur Radio Hall of Fame, as announced in August 1966 *MOTA*, has been abandoned. This was to have been sponsored by the Hallicrafters Co., but after further consideration of the position they have decided that it would be better for such a project to be supported by a non-commercial group.

G3WAO, who acts as QSL manager for G3UJB/MM aboard the M/V "*Rakia*" points out that he has been instructed by the GPO to use the /MA suffix (maritime alternative) when in port. Brian runs 100 watts of c.w. and is only permitted crystal controlled operation while using his G call, but understands that when he arrives in New Zealand shortly and obtains a ZL call he will be able to use his ZL/MM call *on any frequency*! He likes to QSO the UK and may be found on 14,020, 14,040 and related frequencies on 21 and 28 Mc/s.

ARRL are studying the extent to which normal propagation conditions were disrupted by an artificial ionosphere cloud fired by rocket from Wallops Island, Virginia, on the evening of 30 March. Amateurs having knowledge of disruption of normal conditions at that time, on any frequency, are asked to forward details to ARRL HQ, 225 Main Street, Newington, Conn, USA 06111.

A change in the American regulations means that transmission of both call-signs need only take place at the end of a contact. At other required identification times only the call-sign of the transmitting station need be sent. This legalizes "tail ending" as far as our W/K cousins are concerned. Also stations operating portable or mobile need only transmit the call area numeral instead of the exact QTH. These are two changes in procedure which could well be copied by the UK authorities.

Friends of Bob Snyder, ex-9V1LP, will be interested to know that he is now in Norway, where he expects to be for about a year. He may be reached at: c/o Amoco Norway Oil Co., 6 Fridtjof-Nansens Plass, Oslo, Norway. He is at present applying for a licence and should soon be on the air with an LA call.

Your scribe would be interested to hear from anyone who knows the present whereabouts of "Ron" who operated from Heard Is. in 1949, using the call-sign VK1VU.

News From Overseas

During a recent QSO with ZD7KH your scribe learned that activity from St. Helena is on the increase. ZD7RW and ZD7JM had just arrived on the "*Capetown Castle*," ZD7SD is already active, and ZD7SE, although at present without any gear, occasionally uses the ZD7KH station. George, ZD7IP, was due to leave on 24 April, and ZD7FF is not active at the moment. G3GVC reports a QSO with ZD7DI on 28 Mc/s s.s.b. during which he was given the information that the new St. Helena beacon station ZD7WR began operation on 28,981 kc/s on 5 May.

DXpedition of the Month reports that s.s.b. equipment is now on the way to VP8IE (S. Georgia) and should reach him by late June. QSLs for this s.s.b. operation will be handled by *DOTM*. It is also stated that some long overdue logs have been received from CR5SP. QSL cards for 5R8AM and VS9OSC will be dealt with by K2KTK. VK9DR and VK9XI may be QSL'd via *DOTM* or VK6RU.

G3NBQ is now on Mauritius with his VQ8CG call. Cards will be sent out by G3APA, his QSL manager, as soon as the first log duplicates are received.

A letter has been received from Phil Lorden, ex-9G1CC, saying that he has not been in Ghana since last September, and that he regrets to say that his call-sign has been used since then by a pirate. He has been receiving QSLs for QSOs on 3·5 Mc/s c.w. during December 1966 and January 1967 which regretfully he cannot confirm. The Ghana authorities do not re-issue call-signs so it is certain that any contacts with "9G1CC" since 5 September last year are with the illicit station.

Robin Diamond, VP8IU (ex-G3SFN), has written from his present QTH on Argentine Island with some notes on current VP8 activities. He says that VP8IK, who was active from his QTH during the period January 1966 to February 1967, has left for the UK, VP8IE and VP8HO are on a.m. and c.w. from South Georgia, VP8JD is on Signy Is., (S. Orkneys) and VP8IY is on from Deception Is. in the S. Shetlands. Robin has an "under water" version of the KW2000A (it was submerged in sea water for three days in 1966!) and says that the other VP8's and he himself are on the lookout for UK contacts although they seem to make very few; the best time seems to be around 20.00.

The Utah DX Association advises (via G3DO) that a net of Utah stations will be found on 14,240 kc/s between 04.00 and 06.00 every Tuesday, all with their beams toward Europe. During June and August some members will be operating from Nevada and Wyoming.

"QSL via W2CTN . . . (Part Two)"

The remainder of the list of stations for whom W2CTN acts as QSL Manager is as follows: VP4TR, VP5BP, VP6PV, VP7BP, VP7CS, VP8AI, VQ1GDW, VQ1HT, VQ1SC, VQ2EW, VQ2HD, VQ2IE, VQ2JM, VQ2WM, VQ3CF, VQ3HH, VQ3HV, VQ4IV, VQ5IG, VS6FX, VS9MB, VS9MP, VR2DK, VU2GW, VU2JA, YS1CN, YS1IM, YS1MM, YS1RSE, YS1SB, ZB1BX, ZB1FA, ZB1RM, ZB2I, ZC4CZ, ZC4SG, ZD2DCP, ZD2KHK/NC, ZD3F, ZD3H, ZD5M, ZD8BC, ZD8HB, ZD8HL, ZD8RH, ZE1AY, ZE1BK, ZS3EW, ZS6CN, ZS7M, 3A2BZ, 3A0DK, 4W1C, 4W1D, 4W1F, 5A2CW, 5A3CAD, 5A4TC, 5B4AA, 5B4CZ, 5B4RA, 5B4TC, 5H3HH, 5H3HV, 5J3LR, 5N2ACB, 5N2DCP, 5N2KHK, 5X5IG, 5Z4IV, 7X3CT, 7Z1AA, W0GTA/8F4, 9G1BQ, 9G1CW, 9G1DV, 9J2IE, 9L1BC, 9M4LP, 9M6BM, 9Q5IG, 9V1LP, and 9Y4TR.

*10 Knightlow Road, Birmingham 17. Please send reports to arrive not later than **14 June** for the **July** issue, **12 July** for **August** and **16 August** for **September**.

Top Band News

A bulletin received from Stew, W1BB, detailing his experiences during his recent visit to Japan, shows that there will be considerable activity from there on 160m in the not too distant future. The spot frequency allocation of 1880 kc/s has now been extended into a band between 1907·5 and 1912·5 kc/s, thanks to the efforts of JA1FG and JARL. Stew looks forward to the time when the first contact between Japan and the East Coast of the USA takes place, but this would seem to be a very sticky one since the path passes very near to the pole with consequent absorption of signals. KL7FRY (on Shemya Is. in the Aleutians) is looking for contacts with the Eastern US on 1803 kc/s approx. at 09.30 to 11.00 on Saturdays and Sundays. He has an 800 ft. aerial and hopes to increase it to 2000 ft. soon.

W0VXO's trip to S. America seems to have been a success, but no reports of contacts with Europe have been received. He worked a number of Ws and was so pleased with his results that he is considering making another trip next year. It is hoped that KS4CC, Swan Is., will be on the band soon, and WA6SBO has also mentioned the possibility of Top Band operation during his marathon trip.

9J2BC has tried two skeds with 9H1AE, but no success so far. He has been using 1805 kc/s and thinks that things will be tricky as the lowest static level in Zambia is in June/July whereas these are the two worst months in Malta.

Rotary of Amateur Radio

The number of G Rotarians that have expressed interest now stands at 36, which includes two GM's, one GI, one GC, and one GD. The Sunday morning net at 09.00 GMT on 3690 kc/s is presided over by G8ON. When these notes appear the Rotarian Conference at Nice on 21-25 May will be over, but ROAR members were notified that F2GP of Soissons and F8GV of Nice would listen for s.s.b. on 14 Mc/s and it is hoped that many British members made contact. A special QSL has been issued for the Convention.

It should be pointed out that Round Table members are very welcome to join in Rotary nets.

Contests

The **Venezuelan Contest** starts at 00.00, 1 July and finishes at 24.00, 2 July, and is a phone-only affair (a.m. and s.s.b.). All bands 80 to 10m will be used and stations should exchange a figure consisting of the RS plus serial number of QSO starting from 001. There are single operator single or multi-band, and multi-operator multi-band categories. Stations outside the Americas score 2 points for working a YV, and 1 point for working stations in other American countries. There is a multiplier of 1 for each country, YV call area, and US call area worked. In the case of multi-band entries the sum of the multipliers from all bands is used as multiplier. A separate log sheet should be submitted for each band, and should show: date, time, station, number sent, number received, if multiplier, and points. A most attractive certificate is awarded to entrants who work five YV's plus five other American countries, with trophies for the highest scorers, and a silver medal for each continental winner. There is a special trophy to commemorate the 400th anniversary of the founding of Caracas to be given to the top single operator non-American station. It is requested that 10 IRCs be sent with logs if the entrant is eligible for an award. Send entries before 15 September to: R.C.V. Independence Contest, PO Box 2285, Caracas, Venezuela.

Awards

A reminder in this, Canada's Centennial year, of some awards issued by the Ontario DX Association for contacts with Canadian stations. The **Centennial Award** requires contact with 100 different stations in Canada, Newfoundland or Labrador during 1967, with a minimum of 1 contact with each call area VE1-VE8 and either VO1 or VO2. Contacts

One of the best known amateurs in Italy is Al, I1AMU

may be mixed or any mode, and no QSLs are needed. Log entries should be certified by two licensed amateurs or one radio club official, and the award is free of charge. Applications should be sent to PO Box 717, Station "Q", Toronto 7, Ontario, Canada. The **Provincial Capitals Award** is issued for contacts with all the capital cities of Canada's provinces since 31 March, 1949. These are St. John's, Charlottetown, Halifax, Fredericton, Quebec City, Toronto, Winnipeg, Regina, Edmonton and Victoria. All c.w., all a.m., all s.s.b and mixed classes are available, with special endorsement for all one band or mode. The **St. Lawrence Seaway Award** is awarded for contacts with 10 amateurs situated on the St. Lawrence Seaway route, one of whom must be in each of Greater Toronto. Greater Montreal, Quebec City, and Port Arthur or Fort William. Contacts must have been since July 1959. The **Trans-Canada Award** is for all one band/mode or mixed QSOs with five stations in each of the eight VE call areas since WWII, plus five QSOs with VO and one with a VE0. One of the VE8's must be in Yukon and another from one of the offshore islands of NWT. The charge for each of these three certificates is 10 IRCs, and applications (QSL cards or certified list) should be sent to the address given above.

The N. and W. Vancouver ARC offers a certificate to commemorate the 100th birthday of British Columbia and Canada. This is obtained by working three club members, and is free. Members include VE7s AHX, AIO, AK, AKA, AOF, APC, ARO, ARU, ASV, BCW, BEA, BIU, BKD, BKS, BOA, BPY, BQL, BQN, BQU, BQY, BSU, BTW, BUK, CA, EQ, HJ, JN, JY, MQ, OF, QV, RR, VF, and VE6JW. A list of members worked should be sent to Don Short, 1381 Oakwood Crescent, North Vancouver, BC, Canada.

DXCC News

A statement issued by ARRL dated 4 May sets out the conclusions reached by the DXCC Awards Committee following a meeting on that date between the Committee, the directors of the League and Dr Donald Miller. The Committee have carefully considered the position with regard to the K1IMP/KC4 operation, but in view of the fact that in their opinion the visit was unauthorized by the Coastguard they feel that they have no choice other than to withdraw credits for contacts with this station's activity from Navassa Is. They have established that a licence was issued by the Indian authorities to Dr. Miller for operation during January 1967 *from Bombay* using the call-sign VU2WNV. They also state that a letter from the Indian Government Department of Communications dated 4 March

had been received which denied that the letter dated 3 January, a photocopy of which Dr Miller had produced in evidence, had in fact been written by them. This letter was alleged to have contained permission to operate from the Laccadive Is. Unfortunately the original from which the photocopy was made cannot be located. The Committee therefore feels that no valid licence or authorization from the Indian Government was issued, and therefore announces that DXCC credits for contacts with VU2WNV are withdrawn.

"Aldabra (VQ9AA/A), Des Roches (VQ9AA/D), Glorieuse (FR7ZP), and Minerva Reef (1M4A). In its 20 February, 1967 statement the Awards Committee announced the suspension of DXCC credits for the above four operations, because of the receipt of evidence that at least some QSL cards were transmitted by or on behalf of Dr Miller for contacts which never took place. Subsequent investigations have disclosed several other such instances. However, the voluminous correspondence which has been received by the Committee from many interested amateurs has not indicated any widespread mishandling of cards; indeed, an appraisal of the evidence so far received, including that from Dr Miller, leads the Committee to conclude that handling of the cards, except perhaps in isolated instances, has been as proper and accurate as could be expected in an overall operation involving so many cards. The Awards Committee is thus pleased to announce lifting of the suspension for the four areas mentioned, and that credits for contacts with VQ9AA/A, VQ9AA/D, FR7ZP, and 1M4A, will continue to be granted."

With regard to future operations by Dr Miller the statement goes on to say: "Although all of the difficulties which arose in connection with Dr Miller's prior DXpeditions have not yet been completely resolved to the Committee's satisfaction (and a review of some of these operations is continuing), the Awards Committee now rescinds its action withholding credits for future operations by Dr Miller. However the Awards Committee will not authorize the granting of credits for any future DXpedition by Dr Miller or any other person or group until it has been assured that the DXpedition was properly conducted in all respects, including licensing authority, actual presence at the claimed location, and so on."

DXpeditions

A letter from VK4RZ gives the news that he left Brisbane on 10 May on his way to **Tonga**, where he expected to arrive before 1 June. He hopes that he will be on from Nukualofa on 20, 15 and 10m using his VR5RZ call-sign, and says that he will make special efforts to contact UK stations in view of the fact that conditions were so poor to Europe during his last visit there in 1961. Operation will be mostly s.s.b., but there will be some c.w. used, and the equipment will consist of a KWM 1 and separate receiver. John hopes to be there until the end of June.

The University of Manchester ARS is making an expedition to St. Agnes Is., in the **Scillies**, during the period 23 June to 2 July. The call will be GB2IS, and all bands from 160 to 10m will be used, with G3VUM/P also active on 144·100 Mc/s. Skeds on c.w. or a.m. may be fixed by contacting G3UJI, S. R. Turner, Hulme Hall, Victoria Park, Manchester 14, before 20 June.

G3OHC will be taking a KW2000 to ON, DL and LX during the period 17 June to 1 July. He will be using the calls ON8IN, G3OHC/DL and G3OHC/LX. He will be on all bands 80 to 10m and will be pleased to arrange skeds.

The projected VS9SBL operation by VS9ABL had to be abandoned due to the uncertainty of return transport arriving in Aden by the date of Brian's scheduled return to the UK. There is a slight possibility that the trip may take place later in the year.

Amateur station PE2EVO at the Netherlands permanent exhibition of the evolution of industry, science and technology —Evoluon—at Eindhoven, with PA0PAZ at the operating position.

After several weeks trying to obtain permission to operate from Mali, Iris and Lloyd Colvin decided to abandon the project and moved to **Gambia**, from where they have been active with the call-sign ZD3I.

The Southampton University Radio Club will be operating from **Eire** between 20 and 30 July, on all bands 160 to 10m and also 4m. They will have the call EI3SU, and QSLs should be sent to G3KMI, Southampton University Radio Club, Southampton University.

Wally, K5YZL/KH6, will be going to **Kure Is.** on 23 June. He hopes to be on the air from there for one week using a TR3 and beam. He may use either his own call or that of the club station KH6EDY.

Latest news of W9WNV is that he is waiting to see whether funds will be high enough for him to return to the Indian Ocean area. He is contemplating joining forces with WA6SBO whose vessel was damaged by bad weather while en route for Clipperton. It is understood that the "*Antipodes*" had to be towed back to California by the US Coast Guard following the mishap.

Band Reports

Conditions seem to be very much as expected for the time of year, with a falling off of the DX activity on 28 and 21 Mc/s. Your scribe would be interested to receive comments concerning the usefulness or otherwise of this section of *MOTA*. The following contributors are thanked for their assistance: G2BOZ, GM2HCZ, G2IC, G2LB, GW3AX, G3HCT, G3HDA, G3IAR, G3KSH, G3SML, GM3SVK, G3UMV, G3URX, G3VJG, G3VOK, G4MJ, G8DI, G8JM, G8VG, SM2BYD, 9J2BC, BRS20317, BRS20439, BRS27358, BRS27806, BRS28198, A3738, A3942, A4038, A4568, A5105, A5126, A5182, and A5224.

7 Mc/s S.S.B.: HS4AK (22.20), HZ1AT (21.45), OY5S (15.24), PZ1CF (21.20), ZP3AB (23.36).

14 Mc/s S.S.B.: CR5SP (06.32), FW8RC (07.25), HK0AI (20.35), JT1KAA (11.50), JY6GVM (20.30), KB6BZ (11.02), KH6EDY (Kure Is., 17.45, 06.00), KJ6BV (11.16), WA5NUS /KJ6 (12.00), KS4CC (07.26), TR8AG (19.40), VK2AVA/2 (Lord Howe Is. 05.36), VP8IU (20.39), VR3O (11.15), VR6TC (19.20), K8NHW/XV5 (21.00), YN9BSM (22.30), YV7BI (07.27), ZD9BH (18.35), ZK1AR (08.47).

14 Mc/s C.W.; FB8XX (23.57), FB8YY (08.15), FO8BU (07.58), JT2AB (17.25), JW3NI (22.40), VK2AVA/2 (07.25), VR4CR (13.08), K6KA/YA (15.00).

21 Mc/s S.S.B.: KG6FAE (16.20), W0ICJ/KM6 (08.50), KS4CC (07.20), VK9DR (13.12), VK9KS (T.N.G. 12.10),

VR6TC (21.10), ZD7KH (16.43), 5LA2FD (Liberian Field Day Stn. 18.20), 5W1AA (07.25), 9M6JP (15.13).

21 Mc/s C.W.: AC3PT (11.53), CR5CA (20.00), FB8WW (13.48), FB8XX (04.30), FB8YY (11.06), FK8AT (09.50), JW5JF (12.52), KB6CZ (12.39), PY7APS/0 (Fernando do Noronha, 20.50), TR8AS (13.37), VK9VM (11.02), VP1VR (14.45), VR2EK (10.00), VS9MB (17.30), YJ8BW (09.37), ZD3I (13.45), ZL2QM (20.45), 9Y4LA (23.35).

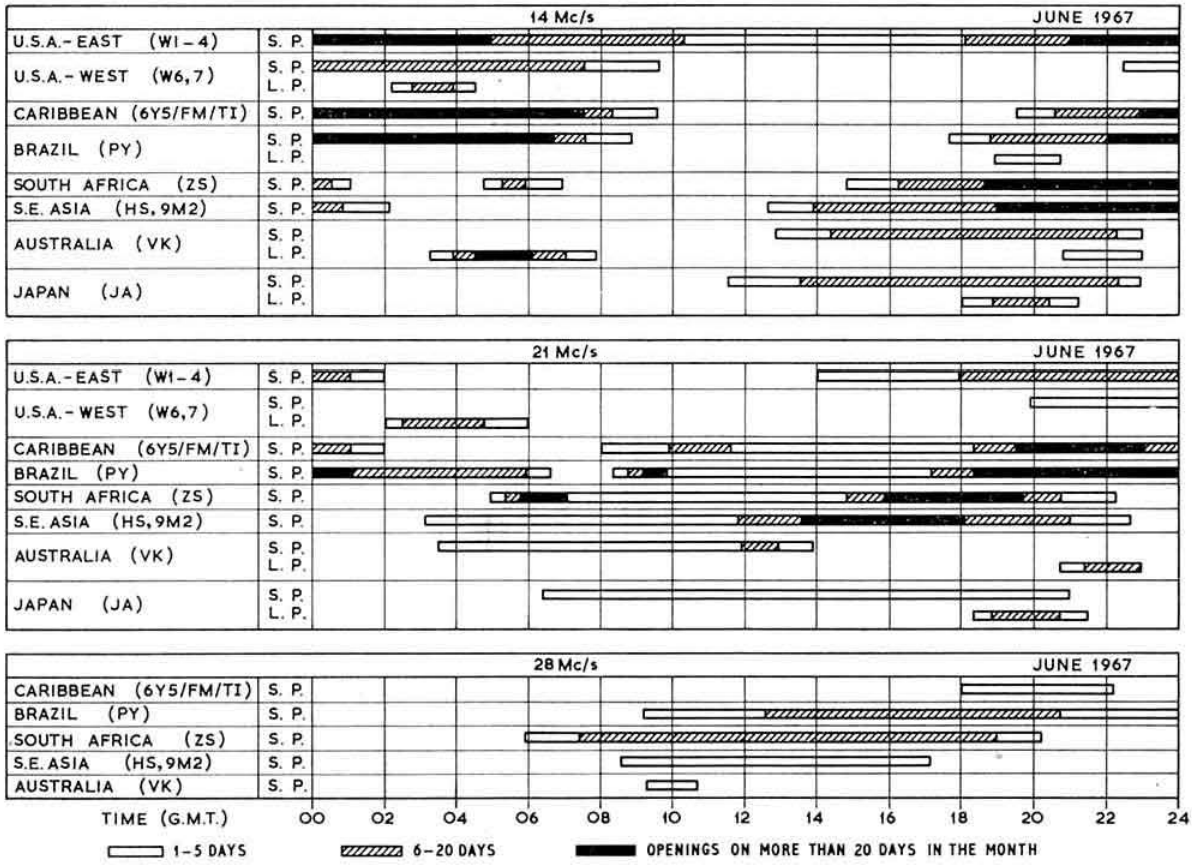
28 Mc/s S.S.B.: FH8CE (11.25), HZ1KE (16.55), OA8V (13.27), VP8JC (16.44), VQ8CJ (14.45), VS6FZ (11.10), XW8BJ (11.39), 4W1G (13.52).

28 Mc/s C.W.: CE4AD (18.26), ST2SA (18.15), 5R8CQ (16.11).

Herman, HK1QQ, alias TJ8QQ, has now obtained licences to operate from **Central African Republic, Tchad,** and **Gabon,** with the call-signs TL8QQ, TT8QQ and TR8QQ respectively. He is awaiting the arrival of a beam and s.s.b. equipment.

EA9EJ has been very active from **Rio de Oro,** and has been worked in the early mornings as well as between 17.00 and 24.00. He has two crystal frequencies, 14,115 and 14,125 kc/s, but hopes to obtain crystals soon to enable him

PROPAGATION PREDICTIONS



June, July and August, as typical summer months, are very unfavourable for DX propagation, because the F2 m.u.f's during daytime are much lower than during the winter months. This will mean that on 28 and 21 Mc/s many DX areas will not, or only seldom, be heard. On 28 Mc/s even Africa and South America will not come through with certainty, except on days with above average F2 m.u.f's. North America and Japan will not be heard. On 21 Mc/s also, the summer conditions will be unfavourable. North America, Australia and Japan will, therefore, only come through on days with above average F2 m.u.f's. The West Coast of North America may be worked in the early hours of the morning and Japan and Australia in the late evening via the long path. In the generally poor DX conditions on 28 and 21 Mc/s Southern European stations will, usually, be somewhat better placed than those further north. One small consolation arises from the sporadic-*E* short skip conditions on 28 and 21 Mc/s during the summer for contacts over distances from 300 to 1250 miles. While the F2 m.u.f's during daytime are lower in summer than in winter, those at night are usually appreciably higher. For this reason 14 Mc/s offers excellent night time DX during the summer. This band will be open to North and South America for the whole of the night.

The most favourable period for contacts with South Africa will be from about 19.00 to 23.00 GMT. As it is now winter in the Southern Hemisphere the noise level is relatively low, so that stations in South Africa can receive European stations on 14 Mc/s at night relatively well. On 7 and 3·5 Mc/s the DX possibilities will be rather poor during the night because the nights are short and the static level is high. On 3·5 Mc/s in the early hours of the morning local traffic will not be affected by the dead zone.

The provisional sunspot number for April 1967 was 65·3 with solar activity evenly distributed throughout the month. The predicted smoothed sunspot numbers for August, September and October are 94, 98 and 101 respectively.

QTH CORNER

EA6AR	via DL7FT, Franz Turek, Petunienweg 99, 1 Berlin 47, Germany.
GB2IS	via G3UJI, Steve Turner, 51 Hilton Road, Harpfields, Stoke-on-Trent, Staffs.
HB0AFM	Langgruetstr. 104, 8047 Zurich, Switzerland.
HB0GJ	PO Box 293, 8040 Zurich, Switzerland.
JY6GVM	W6GVM, 4660 Fair Oaks Boulevard, Sacramento 25, Calif.
KB6CZ	via K4MQG, 1114 Crestview Drive, North Augusta, SC, USA.
KH6EDY	USCG Loran Stn., Box 36, FPO San Francisco, Calif 96640.
KL7EBK	via DL7FT (see EA6AR).
PY7AOA/0 **PY7APS/0**	via PY7AKW, Box 842, Recife, Brazil.
TG9EP	via DL7FT (see EA6AR).
TL8QQ	via W4DQS (see below).
TR8AG	via CR6GO, PO Box 73, Luso, Angola.
TR8QQ	via W4DQS (see below).
TT8QQ	via W4DQS, 928 Trinidad St, Cocoa Beach, Fla. USA.
VK2AVA/2	Lord Howe operation only, via WA2RAU, Dr Sam Rosen 39 Old Orchard Rd, New Rochelle, NY, USA.
VP2AM	c/o IAL, PO Box 150, St Johns, Antigua.
VP2GZW	via WA4UOE, 340 S.W. 64th Way, West Hollywood, Fla., 33023. USA.
VQ8CG	via G3APA, 48 Westhill Road, Coundon, Coventry, Warwicks.
VS9OSC	via K2KTK, 4231 Maykes Road, Syracuse, NY, 13215, USA.
K8NHW/XV5	via W6FAY, Box 11173, San Diego, Calif.
ZD31	via YASME, PO Box 2025, Castro Valley, Calif, USA 94546.
ZD7DI	via RSGB.
ZD7KH	via RSGB. For W/VE via K2HVN, 860 Atlantic Street, Lindenhurst, NY. USA.
ZD9BH	via DOTM PO Box 7388, Newark, NJ, USA 07107.
3V8BZ	via DL7FT (see EA6AR)
5N2ABB	PO Box 80, Kaduna, Nigeria. (Not Box 68 as given in April MOTA).
5R8AM	via K2KTK (see VS9OSC).
5W1AA	Box 498, Apia, Western Samoa.
8RIC, 8RIS	PO Box 739, Georgetown, Guyana.

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RSGB QSL Bureau, G2MI, Bromley, Kent.

to operate at the top end of 14 Mc/s.

FO8BU, who is Gerard Perony, ex-F5IG, 6W8AB, and 5T5AB, is causing quite a stir on 14 Mc/s c.w. almost daily. He is located on Mangareva Is. in the **Tuamotu Archipelago.** At present this counts as Tahiti for DXCC purposes, but is a separate country for DUF purposes.

A new operator has been activating KH6EDY (**Kure Is.**) on 14 Mc/s s.s.b. around 06.00 and 17.00 near 14,215 kc/s. He will be there until the end of the summer.

AC3PT, **Sikkim,** has been active on 21,028 kc/s between 11.00 and 16.00. He has been heard trying out s.s.b. which was unfortunately not very readable. It is reported from **Pakistan** that licences will soon be re-issued and that our AP friends will be back on the air. K8NHW/XV5 has been cleared by the Vietnamese government for contacting other amateurs, including Ws, and therefore his QSLs will be valid for DXCC.

1967 Countries Table

	1·8 Mc/s	3·5 Mc/s	7 Mc/s	14 Mc/s	21 Mc/s	28 Mc/s	Total
G3IAR	10	48	38	125	94	51	366
G3VOK	14	36	6	38	1	7	102
GM3SVK	16	15	26	100	75	23	255
G3KSH	—	26	27	47	33	42	175
G3JVJ	14	10	2	1	2	4	33
G3PQF	1	22	19	20	13	29	104
G8VG	1	18	23	44	52	54	192
G8DI	—	19	18	56	46	16	155
SM2BYD	—	18	57	—	29	—	104
G3ING	3	11	6	4	6	1	31
G3LNS	1	9	—	16	9	8	43
G3VWC	3	5	22	16	18	3	67
9V1LK	1	4	21	84	40	38	188
G3VJG	—	2	8	18	12	61	101
G3OJV	1	1	22	21	16	20	81
G8JM	1	—	10	140	58	30	239
9J2BC	—	—	2	29	16	43	89
A3942	12	51	52	106	60	49	330
BRS25429	5	53	40	114	77	76	365
A5004	4	54	30	118	43	49	298
A4568	6	40	37	154	111	86	434
BRS28198	1	41	34	126	63	50	315
A5273	4	34	16	45	28	18	145
A4886	8	27	35	218	87	53	428
A4182	3	29	25	69	56	48	230
BRS27806	3	23	40	116	121	103	406
A5105	1	25	10	78	62	40	216
A5126	3	18	7	57	28	10	123
A4038	7	12	15	97	156	82	369
A5135	2	17	12	57	31	8	127
A4552/VK	—	1	2	80	10	2	96

This month's table is in order of 1·8 plus 3·5 Mc/s totals.

Very many thanks to all contributors, and special thanks and acknowledgements are due to the following: The **L.I.DX. A. Bulletin** (WB2EPG), **The DX'er** (W6PHF), **DX News Sheet** (Geoff Watts), **The DX'er's Magazine** (W4BPD), **The West Gulf DX Bulletin** (WA5LES). **Florida DX Report** (W4BRB), **CQ DX** (ARI), **On The Air** (ON4AD), **DX'press** (PA0FX), The **HKARTS Newsletter** (VS6FO), and the **NARS News** (5N2ABA). Please send all items for **July** issue to arrive by **14 June,** for **August** issue by **12 July,** and for **September** issue by **16 August.**

Mediaeval and Modern

Barhol, Tallington and Uffington are obviously place names of great antiquity. Each is a small village a few miles to the east of Stamford and between them lies Casewick Hall and its Park. The churches at all three places are magnificent examples of mediaeval or earlier craftsmanship with all the attendant expense of maintenance falling upon present day small communities.

Conversation and consequent opinion at a recent meeting of the Stamford Radio Society has come down on the side that, generally speaking, mobile rallies or gatherings of that nature tended, but rarely, to be anything but a form of self-centred expression.

One member wondered whether there was a chance for a branch of modern science to materially help towards maintenance of links with great endeavour of the past. From the suggestion has grown the fact that a " mobile gathering " will take place on Saturday, 8 July in Casewick Park on the occasion of a grand three churches fete, opening at 2.30 p.m.

The Grand Event in this lovely park (the home of the Hon. Mrs Trollope Bellew) will include numerous sideshows, daredevil diving in flames into water, a gymkhana, clay pigeon shooting, golf driving range.

Talk-in stations for mobiles will be on 160m and 145·65 Mc/s. A DX station will also be in operation and an area 150 yards North East of the hall reserved for Amateurs.

The call-sign GB3BTU has been applied for. A cordial invitation is extended to all interested to attend this and those who come are assured of many worthwhile attractions in this hitherto completely private estate.

New Catalogue from G. W. Smith and Co.

The *Catalogue of Electronic Components and Equipment*, published by G. W. Smith and Company (Radio) Limited of 3 and 34 Lisle Street, London, WC2, contains 152 pages on which are listed a wide variety of components and equipment. The catalogue benefits from a comprehensive index and the modest purchase price of 5s. may be reclaimed by the use of two coupons when making purchases either by post or personal calls at either of the Company's two shops. The preparation of such a catalogue is no easy task but it is certain that all those interested in electronics will consider the effort well worthwhile.

TT21 Improved

Since the introduction of the TT21 several years ago, some refinements have been made, and these have resulted in a better knee to the anode current—anode voltage characteristic, thus allowing the anode to swing down to a lower voltage. This results in an increase in the power output of around 10 per cent. At the same time it has been found possible to reduce the heater current from 1·6 to 1·4 amps.

About two years ago, a mechanical improvement was introduced by changing the beam plate connection from the cathode to the base shell pin, thus enabling the beam plates to be earthed separately and thus be independent of the cathode potential.

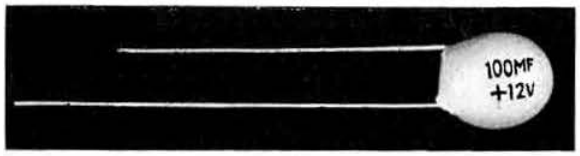
The new ratings are summarized as follows:

Output in the load circuit

Class AB1 (s.s.b.)	110 watts p.e.p.
Class C (a.m./c.w./f.m.)	146 watts
Class AB1 fixed bias (audio)	140 watts per pair

A new valve data sheet, Issue 3, is available from the M-O Valve Co. Ltd., Brook Green Works, Hammersmith, London, W6.

Miniature Low-cost Electrolytic Capacitors



A new series of Sprague miniature electrolytic capacitors is being marketed by WEL Components Ltd., 35-37 Greyfriars Road, Reading, Berks. Size has been kept to a minimum by using an epoxy dip escapsulation, which also possesses advantages of excellent humidity protection and prevention of electrolyte leakage. Values range from 10 μF to 100 μF at 12 volts (sizes 11·2 × 9·5 × 6·3mm to 13·6 × 11·7 × 7·1mm), and a 125 μF 6-volt version is also produced. Prices in quantities of 1 to 24 are 7·2d. to 9·4d. each, according to type.

Quartz Crystals

Crystals for frequency control and filters are obtainable in single units from Crystal Electronics Ltd., of 1 Shore Road, Hythe, Southampton and typical prices are as follows:

1·4 Mc/s to 1·99 Mc/s, 42s.; 2·0 Mc/s to 4·99 Mc/s, 40s.; 5·0 Mc/s to 14·99 Mc/s, 32s. 6d.; 15·0 Mc/s to 20·0 Mc/s, 40s. These prices are all subject to an additional 2s. 6d. for post and packing.

Normally, crystals in small quantities can be supplied within three to four weeks. Crystal Electronics Ltd. offer technical advice covering all aspects of crystal problems, including oscillator circuitry and filter applications, and will be pleased to assist members in these matters.

27-30 SEPTEMBER 1967

BOOK THE DATE NOW

THE PLACE: THE ROYAL HORTICULTURAL NEW HALL, VICTORIA, LONDON, SW1.

THE EVENT: THE INTERNATIONAL RADIO ENGINEERING AND COMMUNICATIONS EXHIBITION.

At the new venue the RSGB Show will have new facilities and features: the latest equipment from the Radio and Space Research station at Chilbolton; the prototype of OSCAR III; and communication receivers of many types.

Make certain that your item of home constructed equipment will be on show. We would like to receive offers now and enquiries should be sent to Alan Gibbs, G3PHG, who is co-ordinating the home construction exhibit.

All HM Services will be represented and several Government Departments will show their latest equipment.

Single Sideband

By G. R. B. THORNLEY, G2DAF*

Alignment of a G2DAF-Type Receiver *Part 4*

HAVING obtained satisfactory operation from the conversion oscillator (V3) and checked the grid current values as described in Part 3 of this series, the receiver was now ready for alignment of the signal frequency circuits on each of the eight ranges. This includes those coils associated with the r.f. valve V1 and the first mixer V2 and tuned by the two-gang variable capacitor—the PRESELECTOR control.

Signal Frequency Circuits

The values of inductance used in the individual coils have been selected by the designer to resonate in each amateur band with a high L/C ratio in order to give a high dynamic resistance and the largest practicable signal voltage output. To maintain the L/C ratio reasonably constant throughout the 1·5 Mc/s-29·5 Mc/s reception bands, the C value reduces progressively as the bandswitch is shifted from 160m up to 10m. This means that the PRESELECTOR tuning capacitor is almost fully meshed on 80m, about two-thirds meshed on 40m, between a third and a half meshed on 20m, quarter meshed on 15m and about one-fifth meshed on 10m. On 160m, because the tuning range of 500 kc/s is a large proportion of the centre band frequency (500 : 1900), approximately 1 : 4, the capacity change necessary between 1·5 Mc/s and 2·0 Mc/s is almost all the available value of 50 pF and on this band the preselector knob requires re-adjusting each time the main frequency tuning knob is moved.

In practice it is very convenient to engrave the front panel showing the correct position of the PRESELECTOR tuning control for each of the amateur bands. Assuming that the knob is fitted to the shaft in such a way as to follow accepted convention—the frequency going higher as the control is turned clockwise—the panel engraving should be similar to that shown in Fig. 1.

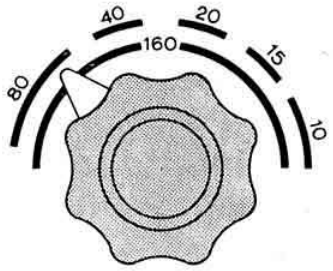


Fig. 1. Preselector tuning control, showing how the receiver panel should be engraved to show the control knob position for each of the amateur bands. This illustration assumes that clockwise rotation reduces the tuning capacitance value.

With semi-circular rotor plates the variable capacitor has a "straight line capacity" law (i.e. the capacity value is directly proportional to the angular rotation). From this it can be seen that on the 10m band the resonating value is around 5 to 10 pF; on the 15m band around 15 pF; on the 20m band around 20 pF; on the 40m band around 27 pF, and on the 80m band between 30 and 45 pF. For correct alignment and operation the PRESELECTOR control should be set to the correct position for each band before any adjustment is made to the coil inductance values. Having set the correct value of the tuning capacitor the two signal frequency coils in use for that particular amateur band must be made to resonate correctly by adjustment to the dust cores only.

After connecting the Marconi TF 144G signal generator to the receiver aerial input socket and setting the attenuator to a convenient value—100 μV unmodulated—the signal generator was set to the mid-band frequency on each of the amateur bands in turn, and with the PRESELECTOR control set to the appropriate value as shown in Fig. 1, the main tuning was set to the mid-band position and the aerial input and r.f. anode coil dust cores carefully adjusted to obtain the maximum S meter reading. As the TF 144G does not operate beyond 25 Mc/s an Advance DI signal generator was substituted for the three 10m ranges (for alignment only it is possible to use the second harmonic with the TF 144G operating in the 8-15 Mc/s range position).

The signal generator output was then reduced to 10 μV and the alignment on each band checked once again, while a note was made of the S meter readings obtained. These are given in Table 1. It will be noted that there is a sub-normal reading of S3 on the 15m band. Investigation (on the lines indicated in Part 3) showed that the 40m r.f. anode coil was self-resonant at 21 Mc/s and was absorbing energy from the 15m band tuned circuits. This undesirable "suck-out" was cured by wiring 10 pF silver mica capacitors across both the 40m band aerial input and r.f. anode coils. (It is necessary to apply equal loading to both tuned circuits in order to maintain accurate tracking over the 500 kc/s bandwidth.) Re-checking the 15m range showed that the S meter reading had increased from S3 to S5—a value in line with the readings on the other amateur bands, and therefore indicating an acceptable performance.

Initially it was found that the 10m coils would only resonate with the PRESELECTOR two gang capacitor almost fully meshed—about 35 pF in use. This indicated low inductance. On unsoldering and removing the coils from the chassis they were found to be eight turns each. These were replaced with Electroniques "G2DAF Receiver" 10m coils in the writer's possession, and it was noted that these coils had 10 turns each and resonated at the correct PRESELECTOR capacity value. It would appear that 8 turn coils had been supplied to G3OCX in error—these coils were coded LZ28 for the aerial input and BP28 for the r.f. valve anode.

Spurious Signals

It must be clearly understood that for every setting of the tunable i.f. section, the receiver will accept at roughly equal strength *three* separate and distinct signals: the intermediate frequency itself, the heterodyning less the tunable i.f., and the heterodyning frequency plus the tunable i.f.

To take an example; if the receiver was switched to the 80m band and tuned to 3·7 Mc/s, the i.f. would be tuned to 5·3 Mc/s. As the heterodyning crystal in use for this band is 9 Mc/s, the receiver would accept the 9 Mc/s less 5·3 Mc/s (difference frequency) input on 3·7 Mc/s and also the 9 Mc/s plus the 5·3 Mc/s (sum frequency or second channel) at 14·3 Mc/s. It would also receive any signal on 5·3 Mc/s and would do this even if the conversion oscillator were inoperative. It can therefore be seen that signal inputs on 3·7, 5·3 and 14·3 Mc/s would all be accepted by the second i.f. cir-

* 5 Janice Drive, Fulwood, Preston, Lancs.

cuits and fed through the following receiver stages. There is only one part of the whole receiver where this can be prevented from happening. That is in the front end tuned circuits between the aerial input socket and the first mixer grid.

It is important to realize that the required attenuation of the unwanted inputs is directly dependent on the " goodness factor " of these two tuned circuits. These must be of high *Q* construction with low loss coil formers and switch banks and with the coils resonated correctly on the wanted signal frequency. Additionally if the required second channel attenuation and i.f. break-through attenuation is to be obtained the aerial input impedance must also be correctly matched to the coil on each of the amateur bands required.

As the signal frequency stage alignment had been completed and appeared to be satisfactory, this was an appropriate time to check the receiver for spurious signals appearing. Accordingly the TF 144G signal generator was removed and the standard 80m transmitting aerial (132 ft. centre fed with 75 ohm coaxial cable) connected to the receiver input socket. The R.F. GAIN control was set to maximum, the band change switch to 160m, and after correctly setting the PRESELECTOR tuning, V3 was removed from its socket in order to disable the conversion oscillator. The main tuning dial was then traversed across its 500 kc/s tuning range, at the same time observing the absence or otherwise of spurious signals. V3 was then replaced in its socket and the band change switched to 80m, great care being taken to ensure that the PRESELECTOR was correctly resonated to obtain the maximum S meter reading on some known amateur 80m band signal. The conversion oscillator was then disabled by removing V3 and the main tuning traversed across the 500 kc/s range as previously. This procedure was repeated on each of the remaining six ranges.

It was noted that while the 20, 15 and 10m bands were clear, spurious signals were appearing right across the 500 kc/s tuning range on the three low frequency bands—160, 80 and 40m. A large number of these signals were identified as being within the first i.f. range (5·0 to 5·5 Mc/s). However, there were other signals not bearing any direct frequency relationship (for instance second channel or image interference) and there was an overall mushy background of signal noise indicating overload and crossmodulation. Clearly, strong commercial teletype and broadcast transmissions—outside the amateur bands—were breaking through at sufficient amplitude to overdrive the first and second mixers. This indicated sub-normal performance and lack of selectivity in the signal frequency circuits, and the additional possibility of an abnormally large signal input at the r.f. valve grid.

It had already been observed during the initial front end alignment that adjustment to the dust cores of the r.f. anode

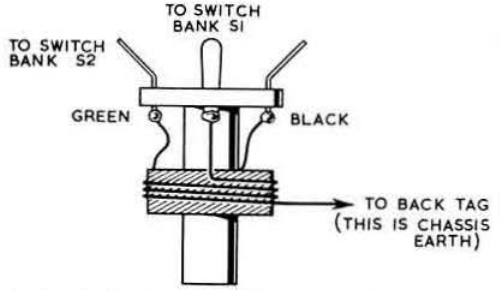


Fig. 2. An Electroniques aerial input coil. The connections from the existing primary winding are cut away from the two lead-out tags, and a new primary of 28 s.w.g. enamelled wire overwound on the secondary pie in the direction shown. 160m, 3·5 turns; 80m, 2·5 turns; 40m, 1·75 turns. These values give the correct primary input impedance of 75 ohms.

TABLE 1

Front End Alignment S Meter Readings

Band	Meter	Remarks
10	S4·5	
10	S4·5	
10	S4·5	
15	S3 (5)	S5 after 40m absorption was cured. (see text)
20	S5	
40	S6	
80	S7	
160	S8	

Notes:
All readings taken with 10 μV c.w. input into aerial socket from Marconi TF144G or advance DI signal generator. Receiver R.F. gain at max, a.g.c. in slow position, s.b. switch at l.s.b.

coils on the lower frequency bands was " sharp " and very critical, but that core adjustment to the r.f. grid coils was much " flatter " and had less effect on the receiver S meter deflection. Accordingly it was suspected that the spurious signal break-through was caused by excessive damping by too large primary windings on the Electroniques 160, 80 and 40m aerial input coils.

These three coils were taken out of the chassis and the existing primary windings disconnected by cutting away from the lead out tags. New coupling coils were then overwound on the outside of the secondary pie as shown in Fig. 2. The modified coils were then replaced in the chassis and each dust core checked to ensure that alignment was still correct and that the circuit was correctly at the resonance peak.

On re-checking for spurious signals as previously described with the conversion oscillator disabled, it was found that the previous signal mush and out-of-band signal break-through had completely disappeared with the exception of two places on the dial where weak teletype was audible from the loudspeaker but not strong enough to move the S meter. This teletype persisted even when the aerial feeder was removed from the receiver input socket. Moving the hand towards the three-gang i.f. tuning capacitor caused the signal strength to increase, and holding a sheet of aluminium to the underside of the chassis caused the teletype to disappear. This clearly indicated that the two unwanted signals were within the i.f. band—5·0 to 5·5 Mc/s—and that there was sufficient field strength within the workshop to be picked up by the unscreened tunable i.f. coils located on the chassis underside. There is a moral here: if you get weak i.f. break-through, disconnect the aerial from the receiver. If the break-through persists, suspect direct pick-up by the tunable i.f. circuits and try additional screening round the coil compartment and round the tuning capacitor.

Noise Factor

It has already been stated that it is dangerous to attempt to align a receiver on an off-air signal that has been roughly tuned in. A little consideration will show the reason for this ruling. A constructor lacking suitable test instruments could peak the 455 kc/s i.f. transformers for maximum white noise —he would not however be able to tell whether the transformers were peaked at the centre or to one side of the pass-band of the mechanical filter. He could therefore finish up with a pronounced slope on the overall response curve and wonder why all received transmissions had a peculiar hollow sounding voice quality.

The constructor could also bring his aerial downlead in close proximity to the tunable i.f. input coil and having roughly tuned in a suitable commercial signal could proceed to align the tunable i.f. coils for maximum S meter reading.

(Continued on page 403)

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.

G2DAF Receiver Bandswitch

Mr Thornley comments in Part 3 of his articles (April BULLETIN) of possible difficulty with the smaller diameter switch wafers that are being used by constructors building receivers to his design. The closer spacing of contacts to rotor give rise to the danger of capactitive coupling of out of circuit coils absorbing power from coils in circuit.

Readers may therefore be interested in my method of shorting out coils not in use when one of the coils is to be used at two or more of the bandswitch positions as in the G2DAF receiver.

The wafers used on the switch assembly are single pole twelve way, with the rotor stop set to give eight positions. The layout of the wafers in the diagram, Fig. 1, is schematic to clearly demonstrate the circuit action. Coils to be used once per position e.g. 160, 80, 40, 20 and 15m are connected to a wafer with a shorting plate in the normal fashion. The unused contacts at positions 9, 10, 11 and 12 may be linked and connected to the " cold " end of the coils, the wiper being connected to the appropriate aerial, grid or anode circuit. An additional wafer without a shorting plate is mounted close to this. The " hot " end of the coil that has to remain in circuit for more than one position, e.g. the 10m coil, is connected to the wiper of this switch. The contacts are linked together in two groups: " A " and " B ". Group " A " connects the contacts—that are " made " when the 10m coil is required in circuit—to the wiper of the first switch.

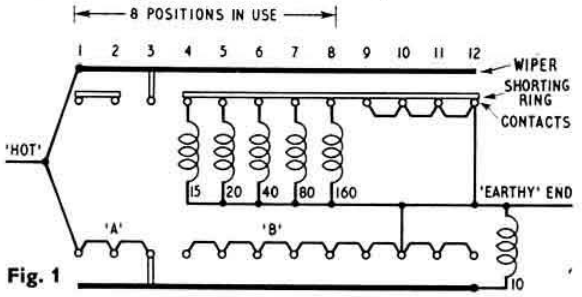


Fig. 1

The " B " group, being the shorting link, is returned to the " cold " ends of the coils. This ensures that the 10m coil is shorted out at all positions other than the three shown at which it is required in circuit.

With regard to the question of space, the bandswitch assembly already more or less occupies a cylindrical area across the chassis so that the extra wafers could normally be accommodated. Note that the first conversion stage already has eight coils of which three are allocated for the 10m band. Therefore just a single wafer with shorting plate is required here.

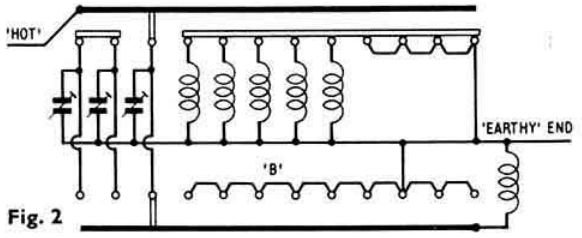


Fig. 2

The second diagram, Fig. 2, is an alternative arrangement when it may be required to use a different preset capacitor across this " odd man out coil " at each of its " in " positions. In this case there is no group " A," just three individual links straight across from one wafer to the other and one trimmer connection to each link. It will be seen from the diagrams that this principle is quite flexible and adaptable to a variety of uses.

HAROLD ORMROD, BRS27637

Hoylake,
Wirral, Cheshire.

Three Cases of TVI

Further to my letter of 6 April, published in the May BULLETIN, the GPO London Region Engineers have asked me to make it clear that they only maintain sufficient stocks of filters to deal with their current needs and potential users of filters with whom they are directly in contact. They cannot cope with requests outside their own territory. Applications for filters by other persons should be made to the Telephone Manager (Radio Interference Section) of their own district. It is also pointed out that as prices vary from time to time, the cost of individual items may be subject to variation.

I trust you will be able to find space as early as possible to indicate the above amendments to my letter.

R. A. CATHLES, G3NDF

Great Bookham, Leatherhead, Surrey.

Coax or Twin?

In Mr Gibbings' (G3FDW) excellent article, " The TVI Problem on Four Metres," published in the May issue, the following sentence occurs (page 293).

> " The 4m signal flowing down the outer braid of the coax to the TV set, and causing severe earth currents to flow in the TV chassis causes detection to take place right in the video and audio circuits."

and again on page 294:

> " It was found that the vertical polarised signal on the outer braid of the coax downlead caused front-end overload via a nearby vertical polarised TV aerial."

These are profound statements of much greater importance than is generally realized and does not apply only at 4m but at almost all frequencies.

It should throw severe doubt on the use of coaxial cable as a feeder for reception or transmission wherever a balanced aerial system is used, and except for ground planes most fixed stations use balanced aerials (*note that this does not necessarily apply to mobile systems*).

The statement "the 4m signal flowing down the outer braid of the coax. . . ." is the key to the whole position and should once and for all dispose of the myth that the outer braid of coax is cold or earthy. It is *NOT*. Earthing or grounding the outer conductor of coaxial cable is *not* effective one quarter of a wavelength from the genuine earth connection (anyone who has ever used a shorted stub should realize that) unless the s.w.r. is 1 : 1. This can only occur at one spot frequency. So, for practical purposes we can assume that the s.w.r. is *not* 1 : 1 and that one quarter of a wavelength from genuine ground the outer braid of the coax *IS LIVE*. By a quarter of a wavelength we must understand that this refers not only to the fundamental but also to any harmonic which may be present.

On reception, therefore, any radio frequency signal reaching the coaxial feeder may be expected to flow down the outer braid of the coax with whatever results this may cause.

On transmission the same considerations apply. A quarter of a wavelength from true earth the outer braid can no longer be regarded as grounded. And here again the quarter wavelength may mean that of a harmonic, not only the fundamental. Further, only if the matching system is perfect and the transmitter is used on one spot frequency can the s.w.r. be truly regarded as 1 : 1. Thus the outer braid must be suspected of becoming " live " under certain (probably many) conditions.

Once the outer braid is live it will radiate. Since the inner conductor is surrounded by the outer braid the current flowing in the inner conductor, which is 180° out of phase, cannot cancel the radiation from the outer braid.

If twin feeder is used (either in reception or transmission) the current in the one leg will be 180° out of phase with the current in the other leg and their radiation will cancel.

The purists will point out that the two currents may not be exactly equal and, therefore, may not completely cancel. This is possible but the cancellation will be very much more nearly complete than in the case of coax where the poor inner being surrounded by the braid hasn't a hope of doing any cancelling at all.

For the purists, however (and the writer pleads guilty to being one), the cure is to use screened balanced twin. Here any radiation due to unbalance in the two legs is screened by the braid which is *NOT* connected to the chassis of the apparatus, whether transmitter or receiver, but can be left floating or earthed as a Faraday screen so that the " signal flowing in the outer braid " DOES NOT reach the chassis. It may be earthed independently but this rarely has much effect, the Faraday screen being quite effective.

Naturally the twin lead must then be matched to the coax input to the TV receiver or the output of the transmitter with an appropriate balun. They are now readily available.

E. M. WAGNER, G3BID

London, NW3.

QRA Locators

Nearly all the written matter which has appeared in the BULLETIN on the subject of QRA has been concerned with arguing the merits or demerits of grid systems in general, although in some of it a note of annoyance with QRA because of its illogicality is evident. I am not going to argue about whether or not the adoption of a grid system would be a good thing—I leave that to those who will have to use it—my argument is going to be simply that if a grid system is used, it should not be the QRA method, and I want to show why not.

The reasons for adopting a grid system are usually to obtain greater accuracy, more simply, while reducing ambiguities, although in the case of the radio amateur there seems to be another reason—to speed the checking of contest logs.

Latitude and longitude is without doubt the most comprehensive grid system, and is still the only universal grid internationally used and recognised, but is open to objection because of the length of a designator required to give reasonable accuracy, and it cannot easily be shortened without ambiguity. This immediately brings out the two main points about grids—that they cannot have both high accuracy and lack of ambiguity without the designator becoming rather long, and that they should be capable of being easily shortened to provide only that degree of both required.

We now come to the two basic decisions to be made; what accuracy and how much ambiguity can we allow?

Point one: accuracy. Since all contest scoring is on a distance basis, the accuracy of the locating system should be taken into account when working out scores. However, if the accuracy is made sufficiently high there would be no need to do this; hence the locator method should have at least sufficient accuracy for this. I estimate the necessary accuracy to be about ½ mile (see appendix).

Point two: ambiguity. It is easy to work out simple grid systems covering only small areas, but I think we should not be too insular in our approach. Although nearly all our v.h.f. contacts are going to be within the continent of Europe for the foreseeable future, satellites have already been used to work outside this area, and in any case why should grid reporting be confined to v.h.f. bands only? Any grid we adopt ought not to be constructed in such a way that it cannot be stretched to cover the larger continents without ambiguity, or indeed to cover the world.

Now, look at the QRA system bearing the above points in mind.

The maximum accuracy as normally used is 3·53 km at 52°N (half the diagonal of a square of sides 5 km) or about 2·2 miles, although the addition of another letter would make it about 0·73 mile, much nearer the suggested figure.

The system is ambiguous over any area covering more than 26° of latitude or 52° of longitude, meaning that it cannot even cover all Europe, and will certainly not cover Australia or the USA. The importance of this point is lessened if it is assumed that call-signs will resolve ambiguities, although with the existing system certain countries would still have trouble, since they would not be able to choose their own points of origin.

QRA certainly fills the requirement of speeding log-checking, but then so would any grid system based on latitude and longitude, which must be known before the QRA grid can be constructed.

QRA's biggest disadvantage, to my mind, is its incredible untidiness. It is virtually impossible to translate it into lat. and long. without using a map and doing it graphically. If one wishes to do it mathematically the steps involved are so complicated the result is almost bound to be wrong (see appendix). This results from the practice of numbering squares instead of sides, and the change of rule between successive sub-divisions. I cannot see any justification at all for it, and I cannot accept the glib answer that " no-one's going to want to turn it into lat. and long. anyway, old boy " when there is a simpler system available.

The National Grid, with all other national grids, can be dismissed as not being tied to lat. and long. and therefore not universal, but there is a military grid known as Georef which I consider worthy of serious consideration.

Georef is a world-wide grid based on lat. and long. and which therefore could be superimposed on any map showing the meridians and parallels, as can QRA. In its full form, it is unambiguous world-wide, but it can easily be contracted for our purposes as necessary, and can be extended to give any accuracy. Briefly, it divides the world into 288 quadrangles each of 15° sides, each denoted by a unique combination of two letters. Each is then further sub-divided into 225 one-degree squares (two more letters) and each of these divided into 3600 rectangles of one-minute sides, (four numbers) giving an accuracy of one mile. Further sub-divisions can be made to any degree of accuracy, using seconds and fractions of second of arc. This grid can be drawn up even more easily than a QRA grid, since most of the lines already exist on any map showing lat. and long. and log checking is just as easy. Furthermore, the designator is no longer than for QRA, for the same accuracy:

		Accuracy
1. Lat./long.	51° 08′ N, 00° 04′ W	4245 feet, 10 figures.
2. National Grid	TQ 2539	2321 feet, 6 figures.
3. QRA	ZL 70 D	11580 feet, 5 figures.
4. Georef	QG 5608	4245 feet, 6 figures.
5. QRA extended	ZL 70 DD	3860 feet, 6 figures.

It can be seen immediately that the Georef system has no disadvantages compared to QRA, is considerably easier to use, much more logical, has world-wide application, and should certainly be adopted in preference to QRA if we adopt a grid system at all.

I hope that the relevant committees of the RSGB will give this matter some serious thought before it is too late and we are saddled with a system we shall eventually regret adopting.

W. BLANCHARD, G3JKV

Furnace Wood,
East Grinstead,
Sussex.

Appendix

(1) Most contests are won with score differentials of less than 10 per cent. If differentials due to positional inaccuracy of more than 2½ per cent. are to be avoided, all measured distances must be good to within 1¼ per cent. If the average distance of v.h.f. contest QSOs is 100 miles, then each station must know position to within 0·625 miles to allow for a total error of 1·25 miles.

(ii) QRA conversion to lat./long.

(*a*) A table is required to convert the first two letters to lat./long. degrees.

(*b*) Numbered squares:

1st digit 7—add 3¾′ to lowest lat. from letters, except 70 when 11¼′ is added.
6—add 11¼′ to lowest lat. from letters, except 60 when 15′ is added.
. . . . . etc.

2nd digit 0—1° 54′ added to long. if first letter is A to M otherwise 0° 06′ added only.
1—0° 06′ added to long. if first letter is A to M otherwise 1° 54′ added.
2—0° 18′ added to long. if first letter is A to M, otherwise 1° 42′
. . . . . etc.

(*c*) Lettered squares:

A—6¼′ added to lat., 6′ to long.
B—6¼′ added to lat., 2′ to long. if first letter A to M, otherwise 10′.
C—3¾′ added to lat., 2′ to long if first letter A to M, otherwise 1° 42′.
. . . . . etc.

There are a total of 26 rules plus a table required.
For Georef there are 7 rules and no tables.

News from Headquarters

Wireless Telegraphy Bill, 1967

Many members reacted to the *Current Comment* in the April issue of the BULLETIN and a large number of M.P.s approached the Postmaster-General following the receipt of letters from constituents expressing anxiety as to the effect of a section of the Bill.

Mr G. D. Wallace, M.P., continued his efforts on behalf of the Society and the amateur service, and Mr R. F. Stevens, G2BVN, was invited to attend a meeting of the Conservative Broadcasting Committee at the House of Commons to explain the Society's views. Subsequently, Mr Wallace and Mr P. Bryan (the Opposition spokesman on broadcasting and allied matters) tabled amendments to the Bill.

Clause 7, about which the Society has expressed concern was discussed at length at sittings of the Standing Committee on 2 May and 4 May. In reply to Mr G. D. Wallace, M.P., the PMG, Mr Edward Short, made, *inter alia*, the following remarks:

" My hon. Friend has paid a tribute to the close working relationship between the Radio Services Department of the Post Office and the Radio Society of Great Britain. That collaboration will, of course, continue, and I can give my hon. Friend an assurance that before I made any Order that might bear in any way on the interests of radio amateurs there would be consultation with the Radio Society of Great Britain. There is a further safeguard in that any Order could be prayed against. I hope that, with the assurance I have given, my hon. Friend and hon. Members opposite will not feel it necessary to press their Amendments."

At the time of writing the final position is not known, but in the view of the Society the position of the Amateur Service has been made quite clear and recorded reassurances have been given. It is gratifying that the efforts which have been made, affecting both members and non-members alike, have received support from both sides of the House of Commons and a considerable success has been achieved.

Special Advertisements for Members

As a new service, the Council has decided that members' announcements of equipment for sale or required will be published in the RSGB BULLETIN without charge, subject to the following rules:

(1). Announcements must not exceed 30 words, plus the member's address. The announcement must relate to Amateur Radio.
(2). Copy must be received **at RSGB Headquarters** not later than the first of the month preceding publication.
(3). Copy must be accompanied by the wrapper from the previous month's issue of the RSGB BULLETIN. The address printed in the announcement will be that appearing on the wrapper.
(4). Please type or print your announcement—Headquarters can accept no responsibility for errors.
(5). Although every effort will be made to include announcements, no guarantee of inclusion in a specific issue can be given.
(6). The new service will be experimental for a period of six months.
(7). No trade announcements can be accepted under this scheme.

Amateur Identification

The Federal Communications Commission has issued a proposal to change US amateur identification rules. The amendments require transmission of call-signs of both stations only at the end of a contact. At other required identification points the call of the transmitting station alone would be enough. Stations operating portable or mobile would need to transmit only the call area numeral instead of the exact location. Comment deadline on these proposed amendments was 30 June, 1967.

Scout Jamboree

The World Jamboree of the Boy Scout movement will be held this year at Farragut State Park, Idaho, USA from 1 August through to 9 August. The US Federal Communication Commission, the Boy Scouts of America, the World Scout Bureau in Ottawa, Canada, the amateurs of Idaho and the American Radio Relay League are working together to ensure that Amateur Radio will be well-presented to the boys.

The primary demonstration station is K7WSJ—" World Scout Jamboree "—to be set up with three operating positions in tents on the camp grounds. Its primary frequencies will be: **C.W.**—3,525 kc/s, 7025 kc/s, 14,025 kc/s, 21,025 kc/s and 28,025 kc/s. *Phone:* 3,950 kc/s, 7,290 kc/s, 14,290 kc/s, 21,290 kc/s and 28,590 kc/s.

Frequencies in the 40 and 80m bands are probably going to be used primarily for North American working, and in any case must conform to FCC assignments. However, when conditions permit intercontinental working, the operators will announce frequencies to be tuned within the world-wide allocations, though transmission will still be on or near the stated frequency.

Another station, probably to be located off campus and manned by the Idaho operators, will use the call K7BS for third-party communications domestically and with those countries permitted to handle such messages.

Chief Operator of K7WSJ is Albert Kahn, W8DUS, assisted by Perry F. Williams, W1UED (Assistant Secretary of ARRL). Negotiations are under way for permission to allow operation of the station by licences of other nations. In any case, attempts will be made to line up enough operators for the station to remain open around the clock during the " Jamboree on the Air ": 5, 6 August.

Cover Picture: Aerial 3

The British-made satellite, *Aerial 3*, was launched from the California Rocket Range at 16.00 GMT on 5 May. The orbit height varies between 310 and 370 statute miles and the orbit period is 95·7 minutes. Radio equipment carried in the satellite can be heard on 136·560 Mc/s. The five experiments were selected for the satellite payload in consultation with NASA. They are:

(i) Terrestrial noise experiment (Radio and Space Research Station). High frequency radio noise will be measured and also the distribution of noise sources (mainly lightning discharges).

(ii) Studies of the high atmosphere (Meteorological Office). A detector will measure the vertical distribution of atmospheric molecular oxygen.

(iii) Very Low Frequency Experiment (University of Sheffield). This comprises a study of l.f. signals and whistlers between 3 and 20 kc/s.

(iv) World-wide survey of the ionosphere (University of Birmingham). Probes will measure the electron density and temperature near the satellite.

(v) Mapping of galactic noise sources (University of Manchester). Noise generated in the ionosphere will be measured by a receiver sweeping between 2 and 5 Mc/s.

G2BVN

73 Magazine

Production of the American *73 Magazine* has been disrupted for a short time owing to snow storms between the publishing offices and printers. Regular circulation has now recommenced.

SSA English DX News Bulletin

The Swedish national Amateur Radio Society, SSA, is now transmitting a DX news bulletin on 7025 kc/s at 14.00 GMT every Saturday under the call SM5SSA. The Bulletin is sent in English at a speed of about 14 w.p.m. and has been introduced to stimulate 7 Mc/s activity. Information for inclusion in the bulletins can be transmitted direct to the operators (SM5ACQ and SM5DXU) who are QRV at 13.00 GMT every Saturday on 7025 kc/s or posted to PO Box 213, Vasteras, Sweden.

Mullard Meetings

Film meetings arranged by Mullard Ltd. will be held on the following dates: 12 June, Coventry (Hotel Leofric), 13th Blackpool (Norbreck Hydro Hotel), 14th Blackburn (White Bull Hotel), 21st Glasgow (Grosvenor Restaurant), 22nd Edinburgh (Grosvenor Hotel), 27th Londonderry (Union Hall), 29th Belfast (King George VI Youth Centre), 4 July, Gateshead (Five Bridges Hotel), 5th Carlisle (County Hall), 12th Swansea (Dolphin Hotel), 13th Cardiff (Park Hotel). The theme of the talk at each meeting is Colour Television followed by a series of demonstrations including colour mixing. The PAL system will be discussed after which the film " The Discovery of Television " (produced jointly by Mullard Ltd and the BBC), will be screened. RSGB members are cordially invited to attend any of these meetings. To assist accommodation and catering arrangements a postcard should be sent in advance to Mr Ian Nicholson, Films & Lectures Organization, Mullard Ltd., Mullard House, Torrington Place, London, WC1.

The Radio Sky

A 16mm colour film entitled "The Radio Sky" made by AEI is now available on free loan from the Central Office of Information, Central Film Library, Government Building, Bromyard Avenue, London, W3. The film runs for 28 minutes, is in three reels, and features the development of radio astronomy from 1933 to the present time. It is numbered UK 2617.

Inter-Youth Club Link

A Youth Club in Cheshire wishes to establish contact with an Amateur in Southern England, Scotland or Ireland with similar youth club interests, the object being to set up an nter-club link.

Communication would be primarily by means of tape recordings with occasional radio " skeds " from club premises. Equipment is available for two or four track recording and radio equipment for all h.f. bands.

Interested parties should contact F. Houghton, G3VZM, Lily Ponds Cottage, Cottage Drive West, Gayton, Wirral, Cheshire.

Grafton Field Day

Grafton Radio Society's Annual Field Day will take place on Sunday, 2 July, at the usual location, Tumulous Hill, Hampstead Heath, London, NW3. Operation will take place all day on 160m (G3AFT/P), 4m (G3THQ/P) and 2m (G3VUE/P)—there is also the possibility of an s.s.b. station on the h.f. bands, but this is by no means certain and the call-sign not yet determined. Visitors to the site will be most welcome.

Callbook Correction

G3THJ, S. Cheetham, 98 Lynton Road, Hillside, Southport.

Thanet Mobile Rally

The Thanet Mobile Rally held on 7 May and organized by the Thanet Radio Society had an attendance of over 40 cars at the cliff top site overlooking Pegwell Bay, Ramsgate. In spite of an adverse weather forecast, which probably kept the numbers low this year, there was sunshine and blue skies all day, with a cool breeze from the sea. Twenty-two mobiles were worked on 160m, four on 2m and three on 4m. An early arrival making sure of parking space was VK2TX who arrived the previous evening armed with a KW2000 for his morning sked with VK-land whilst touring Britain.

Prizes were awarded to the following: furthest distance travelled G3SWT/M; furthest 160m contact G3SWT/M; furthest 4m contact G3VOF/M; furthest 2m contact G3OIZ/M; valve identification competition G3JKY/M.

Silent Keys

We record with sorrow the passing of the following amateurs.

A. Courtney Phillips, ex-G3JFZ, of Walmley, Warks.

G. C. Clarke, G3NJL, of Chingford, London.

K. Shaw, G3OVY, of Chertsey, Surrey.

E. L. Hoad, G8ABO, of Clanfield, Hants.

H. G. R. Smith, BRS26327, of Walthamstow, London.

Obituary

S. WILLIAMS, GI3PWD

The Belfast and District Group regret the passing of one of their most modest members, at the age of 26. Since childhood Stanley bravely carried a burden of very indifferent health.

In Amateur Radio he found an interest which made that burden a little lighter. He was a very regular attender at Group meetings and was greatly interested in group activities although he was unable to take much active participation.

To his father and mother we extend our deepest sympathy.

S. F.

H. W. E. WILLIS, G6OU

Old-Timer Ted Willis, G6OU, of Basingstoke, Hampshire, passed away on 4 May. Ted was in his 83rd year and, although born in Windsor, had lived for the past 55 years in Basingstoke. His first receiving licence came in 1912, followed by service in the RNAS during World War I, with his call G6OU being issued in 1920.

A one-time cinema projectionist, pioneer in the radio-relay field and electrical contractor, Ted was President of the original Basingstoke Amateur Radio Society, started just after the last war and, on the occasion of his 80th birthday, in 1965, he was made a Life Member of the present Basingstoke Amateur Radio Club. Active for many years on 10 and 2m, Ted was particularly well known on the latter band, where he made the first G-HB contact in 1953.

All his many friends, made in 47 years of Amateur Radio, will mourn his passing.

F. A. H.

Wing Commander J. S. WILSON, G2UW

His many friends will be sad to learn of the death of Wing Commander John Stanley Wilson, G2UW, of 5 Allington Gardens Boston, Lincs, on 29 April. Although in poor health for some years, he died very suddenly, and his passing will come as a shock to all—especially those amateurs he contacted regularly on 160 and 80m.

A keen supporter of RAIBC, Stanley's friendly voice was often heard in their nets; it will be very much missed.

He was born in Boston, the only son of the late Dr Wilson, and his family moved to London when he was five. He was a dental surgeon in the Royal Air Force from 1936 to 1960, when he retired to Boston. Married for 36 years, he was 58 years of age, and leaves a widow, Mrs Ella Wilson, one daughter, Miss Penny Wilson, of London, and one son, Flt/Lt A. H. P. Wilson, who is serving with the RAF in Malaya. Much sympathy is extended to them in their sad loss.

D. B.

Society Affairs

A Brief Report on the April, 1967 Meeting of Council

THE meeting was held on Monday, 3 April, 1967, and was attended by The President, Mr A. D. Patterson (in the Chair), Messrs. B. Armstrong, N. Caws, J. Etherington, J. C. Graham, E. G. Ingram, H. E. McNally, L. E. Newnham F. K. Parker, J. F. Shepherd, R. F. Stevens, G. M. C. Stone, G. Twist, E. W. Yeomanson (Members of the Council), Mr. D. W. Robinson (Assistant General Manager) and H. J. Hallen (Headquarters Staff).

Apologies for absence were submitted on behalf of Mr J. C. Foster, Mr J. W. Swinnerton and Mr John A. Rouse.

Membership and Affiliation

Council elected 178 members (128 Corporate and 50 Associate) and accepted ten applications for transfer from Associate to Corporate Membership.

Affiliation was granted to the following:

Rugby College of Engineering and Technology Amateur Radio Society
35 (SM) Signal Regt. Amateur Radio Club.
North Liverpool Radio Club.
Leyton Amateur Radio Society.

Representation on Council of Class B Licensees and Short Wave Listeners

The President tabled a suggestion that certain Council Members should accept special responsibility for representation of the views of members falling in the above classes.

During considerable discussion, the view emerged that all members of Council do in fact represent all classes of membership and that special representation for a group or groups was not necessary. It was thought that Council members were aware of the views of the members of the Society in their own areas and that representation on a geographical basis rather than for particular classes was desirable.

New Headquarters Building

A survey report had been received on the property in Doughty Street, London, WC1, and following this, a quotation for treatment of wood infestation had been requested from Rentokil Limited. The result of this survey was awaited.

Title of the Society's Journal

This matter had been referred from the previous meeting and a suggestion was made that the title should be changed to COMMUNICATION. A number of other titles that might be suitable were considered but, in all cases, the names were already in use or had been registered by other publishers. It was agreed that members should be asked for their views by an announcement in the BULLETIN. (At its meeting on 12 May, 1967, the Council agreed to the use of the secondary title *Radio Communication*. No decision to change the name of the RSGB BULLETIN has yet been made, however.—EDITOR).

Use of Hertz as a unit of frequency

After decisions taken by Societies and other bodies throughout the world had been reported, it was decided that there should be no change in publications in hand, but that all new publications would use the unit Hertz and that the RSGB BULLETIN would adopt this unit in January, 1968.

History of the Society

It was reported that this should be available in September, 1967.

IARU Region 1

It was reported that the Cyprus Amateur Radio Society had become a member of the Region 1 Division.

The President had written to the Prime Minister of The Gambia, Patron of the recently formed Gambia National Radio Society, asking if a meeting could be arranged during the Prime Minister's forthcoming visit to London.

Planning Permission for Towers and Masts

A draft letter to the Minister of Housing and Local Government was considered and the matter was referred to the next meeting to permit further consideration of the points involved.

Wireless Telegraphy Bill 1967

The implications of Part 2 of this Bill were considered and the actions already taken by the Society were approved. The Society may be asked to supply a specialist observer when the Bill reaches the Committee stage.

White Paper—Reorganization of the Post Office

This was noted and no action was considered necessary at this time.

Longleat National Mobile Rally

Council approved an expenditure of up to £10 in connection with the hire of tent and tables for the Rally.

Public Relations Officer

A report was tabled on behalf of Mrs S. Margolis and Council expressed their appreciation of the work being carried out.

RAEN

It was reported that the Radio Amateur Emergency Network in Cornwall had been placed on standby in connection with the *Torrey Canyon* oil incident. (See page 404.)

Minutes of Meetings of Committees

The Minutes of the following Meetings were received as reports: Membership and Representation Committee (3.2.67), Exhibition (17.2.67), V.H.F./U.H.F. Contests (23.2.67), GPO liaison and TVI (24.2.67), Finance and Staff Committee and joint meeting with the Membership and Representation Committee (3.3.67), V.H.F. (6.3.67), H.F. Contests (9.3.67), Scientific Studies (13.3.67).

The Council was in session for 4¼ hours.

Special Events Station

The Medway Amateur Receiving and Transmitting Society is planning to run two special events stations. The first will be on 17 June in connection with the Medway Towns' Dutch Week, when, of course, contacts with Dutch stations will be sought in particular. The call-sign will be **G2FJA/A,** operating from the Riverside Rooms, Chatham, Kent. The second occasion will be on 22 July, when the society will be operating with the call **GB3BP** from the BP (Kent) Ltd. Social Club, Hoo, Rochester, Kent. Skeds for both days may be arranged with P. J. E. Carey, G3UXH, 29 Miskin Road, Hoo, Rochester, Kent.

"We took our Harp to a Party and Everyone asked us to Play . . . !"

By SYLVIA MARGOLIS, RSGB Public Relations Officer*

The appointment of a Public Relations Officer for the Society earlier this year was an experiment, and a very cautious one. It was so worded that, if it failed to draw a response from the members, or to click with the Press, we could all back out without too much loss of dignity and having spent little of the Society's money. The I-told-you-so characters would have been delighted.

To everybody's surprise (mine not the least), the response from the members has been most gratifying. With every post come newspaper cuttings, accounts of local PR ventures and offers of help with our scheme to set up a national grid of public speakers who would go out to local organizations and project a favourable image of Amateur Radio (see May RSGB BULLETIN). Many of these letters contain really useful and constructive suggestions, many of which had never occurred to me and which have given me lots of lovely new ideas with which to plague the Council! Every suggestion will be given careful thought and we shall act on several of the immediately workable ideas.

The RSGB Dinner Club is doing very nicely—at least as well as the Luncheon Club used to, which is all we hoped for. Plenty of interesting overseas guests attend and the atmosphere is exactly what we had planned—relaxed, friendly, informative but non-technical. It's sometimes 11.30 or later before people look at their watches.

It is early in the tourist season yet for the "Welcome-to-London" Scheme to have had many calls, but those people who have used the scheme seem very pleased with what we do for them. The first "customer" was VK2TX, Phil Levenspiel, who promptly joined RSGB! Incidentally, a British amateur called me to ask for the phone number of our New York *vis-a-vis* and I was sorry to tell him that no such thing exists. All I could do to help him was to introduce him to our own personal W2 friends who would be glad to meet him during his trip to New York. So RSGB have, in this scheme, scored another first. No other national society has a working system to welcome and assist visiting foreign amateurs! I am very proud of this and I hope you are too!

The idea of appointing a PRO was to lift the pressure as much as possible from our over-worked and under-accommodated HQ staff. So, when they got an enquiry for assistance from Peter O'Donnell, the author of the Modesty Blaise books and the daily series in the *Evening Standard*, they very properly channelled him to the Public Relations Officer. The result, after careful consultation (and a smashing lunch!) was the birth of two new radio amateurs—G3QRO, Modesty Blaise, and G3QRM, her colleague, Willie Garvin. Their first adventures will appear soon in the London *Evening Standard* and the theme will be developed in the next Modesty Blaise book. The first Modesty Blaise book sold 500,000 (half-a-million) copies in paper-back!

We gave great thought as to whether this would indeed be a wise move for Amateur Radio, but Mr O'Donnell is a perfectionist for detail and wants us to collaborate with him at every stage of Modesty's amateur radio operation. She will probably operate mobile s.s.b. in the first adventure, using all-British equipment. As she is a skilled lapidary and used to handling tools and gadgets, we hope to have her building her own gear at some time. Miss Blaise is, of course, a woman of exceptional intelligence and integrity and will certainly operate entirely within the terms of the licence! We like the idea of a QSO going:

"The name here is Mod."
"Hundred per cent, Mod!"

* 95 Collinwood Gardens, Ilford, Essex.

Single Sideband

(Continued from page 397)

Again he would not know whether the received transmission was actually in the 5·0 to 5·5 Mc/s i.f. passband. It could in fact be 910 kc/s away on the i.f. second channel, and he would then finish up with the tunable i.f. operating over the range 5·9 to 6·4 Mc/s and wonder why he could not find any amateur signals when he attempted to line up the front end circuits.

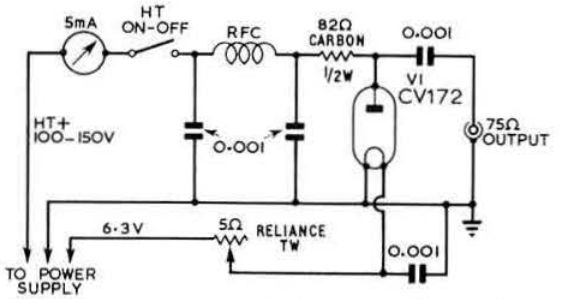


Fig. 3. Noise generator circuit. This unit may be constructed in an aluminium box measuring 6in. × 5in. × 2in. deep. Its use and construction is described in detail in the September 1952 issue of the "Bulletin" and in the RSGB *Amateur Radio Handbook*, third edition.

These considerations and the previous remarks in regard to the number of out-of-band spurious signals that could easily be getting through to the grid of the first mixer will emphasize that alignment of all stages must always be undertaken using a stable signal source of known frequency. However a constructor of the G2DAF Communication Receiver who does not have a commercially manufactured signal generator with a calibrated output attenuator need not despair. A simple roughly calibrated, home-made oscillator with plug-in coils, or the station g.d.o. can be used as a signal source.

It is quite true that without the calibrated output attenuator it is not possible to undertake signal-to-noise ratio measurement. However for a number of years it has become common practice to rate receiving equipment with a "noise factor." Noise factors are normally quoted in dB, and the piece of apparatus necessary for noise measurement—the noise generator—is simple, costs little money, and can be constructed by most amateurs with parts to a large extent already available in the junk box.

A suitable circuit of a noise generator used by G2DAF is given in Fig. 3. Interested amateurs will have time to make this up before Part 5 of this series is published.

To be continued

Radio Amateur Emergency Network News

By S. W. LAW, G3PAZ*

Go West Old Man!

FURTHER to our report last month on the activities of the Cornwall Group during the " oil emergency " in March, we trust that those of you who have arranged holidays in the area will seek out the members who helped in no small measure to ensure that your vacation was not ruined—*and* gave up their own Easter holiday to do it. Not only that, but they have created what we believe to be a record for the longest RAEN stand-by to date.

The sight of that filthy brown mass threatening to engulf the lovely sands and pretty coves of his home county led Geoff Cooper, G3VJB to realize that, although this was not the type of emergency envisaged when the regulations were drawn up, the situation did (as the Press had pointed out) constitute a National Emergency. As Ted Bowden, G2AYQ, the County Controller was not immediately available, the Deputy Controller, John Watson, G3AET, was contacted. Group members were alerted and stood by on 4m and 80m. The Police Communications Officer had been informed of the Group's readiness to provide communications, but as yet matters were under control. The Post Office was made aware of the situation and, when the Police Superintendent at Newquay eventually asked if the Group could take instructions from the Surveyor of the Newquay Urban District Council (who was in charge of the operations), it was agreed that the relevant part of the licence regulations might be waived for the period of the emergency.

By Tuesday evening, 28 March, a 4m base station had been installed in the Council Offices and satisfactory communication established with two mobiles operating on or near the beaches. Full operation was achieved on Wednesday —G3AET travelled daily from Falmouth (25 miles each way), G3VJB brought his holiday forward, G3NKE took some leave due to him, G3VGO gave up part of his remaining days from duties at school, and Dave, G3VCV, assisted when he was not engaged as Air Crew on the aircraft going out daily to report on the menacing oil slicks. Edna, G3UGO, even went mobile with her children (who no doubt thoroughly approved!). During the evening hours the team was supplemented by G3THT, G3WBW and G3VWK. Technical effort was provided by G3XC and G2BHW who kept the equipment up to scratch during its long stint.

An unexpected snag cropped up when it was decided to expand the linkage to the beaches by the use of walkie-talkies crystal controlled on 28·5 Mc/s. A station located in Dayton, Ohio using 500 watts into a 5-element beam rendered operation impossible over even so short a distance as 900 yards! This led to yet another slight *contretemps* when G3VGO/M decided to use 4m from the sands to replace the unusable 10m link, secure in the knowledge that there were a number of tractors at work should he get stuck. When he eventually did, however, two tractors together were unable to shift the car. Fortunately a powerful caterpillar job was in the vicinity and eventually rescued the car from the encroaching oily tide! G3VGO has now developed a healthy respect for the viscous properties of that sand.

After eight days of operation the situation was a little more in hand and the RAEN links were no longer required. The authorities asked that the facilities be kept available should matters worsen with a weather change, so the station at " Oil Base " was left *in situ* for a while. Fortunately, as has been reported elsewhere, the emergency passed and the station was eventually dismantled. The gear, some of which

Joe Johnson, G3THT, at the control station in the Council Chambers at Newquay. *(Photo by G2AYQ*

Geoff Cooper, G3VJB, receiving instructions before moving off to one of the beaches at Newquay.
(Photo by G2AYQ)

was kindly loaned by G3RBS, G3OFN and G6LV, was re-installed in the various home QTHs, there to await the next callout. (Can you hear that voice " IT CAN'T HAPPEN HERE, OLD MAN! ").

Thanks are due, not only to the RAEN personnel taking part, but to certain Post Office officials (some of them licensed amateurs) who cleared the way for this particular operation, certain aspects of which provided a nice problem under the existing regulations. Needless to say, this cannot be permitted to create a precedent, but it does point to a possible re-consideration of the scope of the regulations as they affect the definition of user service where the delegation of authority might be advantageous in hitherto unlooked-for circumstances.

Finally, may we join with the County Controller G2AYQ in thanking all those who took part in this long operation. We only hope that Ted didn't run out of application forms for the spate of new members that came along as a result of the fact that **it did happen**! Also let us congratulate a group so well organized that the unavoidable absence of the CC

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

at the start of the emergency (although fully aware, let us hasten to add) did not delay the call-out in any way.

RAEN Committee

A meeting of the RAEN Committee was held at RSGB Headquarters on Saturday 29 April at 11 a.m. Present were the Hon. Chairman, G3BPT; Hon. Secretary, BRS16075; Deputy Chairman, G3ION; Committee Members G3VK, G4VF, G6NZ, G2UK, G3IIR and G3PAZ. A welcome guest was Mr E. G. Gregory of the British Red Cross Society. Some most interesting points were discussed bearing on this most important User Service, and the Committee was unanimous in thanking Mr Gregory for his great assistance, and for his kindness in giving so much of his valuable time to this liaison. A number of other matters were discussed during the day and satisfaction was expressed at the satisfactory progress of RAEN to date. The Cornwall Group (see report) was unanimously praised for their excellent work, and the meeting concluded soon after 5 p.m.

Can You Help?

New member G3VRI, who is sightless, is having difficulty in obtaining suitable 4m equipment. What about it, chaps!

Better Late!

You dilatory types who have not yet sent in your cards for registration may not realize that you are not covered by insurance until you do so—moreover you won't get a Newsletter. Calamity!

RSGB Slow Morse Practice Transmissions

The following Slow Morse Practice transmissions are sponsored by the RSGB. Alterations and additions to this list should be sent to the Honorary Organizer, M. McBrayne, G3KGU, 25 Purlieu Way, Theydon Bois, Essex.

Clock Time	Call-sign	Mc/s	Town
Sundays			
09.30	†G3KZZ / G3TNF	1·920	South Shields, Co. Durham
09.30	G3HZL	1·940	Isleworth, Middlesex
09.45	G3USK	1·975	Mablethorpe, Lincs.
10.00	G2FXA	437·400 to North	Stockton-on-Tees
10.00	G3TTK	1·850	Coalville, Leices.
10.15	G3CGD	1·875	Cheltenham
10.30	G2FXA	437·400 to South	Stockton-on-Tees
10.30	G3SFO	1·850	Doncaster, Yorks.
10.30	GI3JEX	1·860	Belfast
11.00	G2PFZ	1·915	Liverpool
11.00	G2FXA	1·900	Stockton-on-Tees
12.00	G3VNC	1·825	Hertford
12.00	GM3HBY	1·832	Glasgow
12.00	G3SVD	1·870	Reading, Berks.
12.00	G3HVI	1·890	Stoke-on-Trent
12.00	G3GNS	1·910	Weston-super-Mare
14.30	G3UGF	1·844	Halifax, Yorks.
18.00	G3WFC	1·915	Brentwood, Essex
19.30	G3WGU	433·500 to South-east	Bispham, Lancs.
20.45	G3IFF	1·992	Havant, Hants.
Mondays			
18.30	GW3UMB	1·880	Colwyn Bay
18.00	G3SWR	1·980	Middlesbro', Yorks.
18.30	G3NCZ	1·920	Blackburn, Lancs.
19.00	G3WGU	1·910	Bispham, Lancs.
19.00	G3JKY	29·500	Beckenham, Kent
19.00	†GC4LI / GC2FMV	3·600	Jersey, C.I.
19.00	G3NNW	433·080	Rochdale, Lancs.
19.30	G3VBI	1·910	Goole, Yorks.
20.00	G3USK	1·975	Mablethorpe, Lincs.
20.00	G3KAN	1·990	Northampton
20.00	G3IBJ	1·910	Southampton, Hants.
20.15	G3SAZ	1·845	Ashford, Middx.
20.30	G3TOF	1·915	Harlow, Essex
20.45	G3IFF	1·992	Havant, Hants.
21.30	G3SVD	1·870	Reading, Berks.
Tuesdays			
19.00	G3UPA	1·850	Sutton Coldfield, Warks.
19.00	G3PXX	1·875	Neston, Wirral
19.30	G5UF	1·970	Dorchester, Dorset
19.30	G3SWP	1·850	Doncaster, Yorks.
19.30	G3WGU	433·500 to South-east	Bispham, Lancs.
20.00	G3FWW	1·880	Burnham-on-Sea, Soms.
20.00	G3TPV	1·910	Hythe, Hants.
20.00	GM3UWX	3·590	Bishopton, Renfrewshire
20.30	G2ABC	1·915	Woodford, Essex
20·45	G3IFF	1·992	Havant, Hants.

Clock Time	Call-sign	Mc/s	Town
Tuesdays *(contd.)*			
21.30	G2ABC	144·060 / 144·750	Woodford, Essex
22.00	G3HZM	1·925	Manchester
Wednesdays			
18.30	G2FXA	1·900	Stockton-on-Tees
19.00	G3NNW	433·080	Rochdale, Lancs.
19.30	GM3HBY	1·832	Glasgow
19.30	G3WGU	433·500 to South-East	Bispham, Lancs.
20.00	G8QU	1·970	London N22
20.30	G3HZL	1·845	Isleworth, Middx.
20.30	G3KGU	1·915	Theydon Bois, Essex
20.30	G3SJE	1·870	Harrow, Middlesex
20.45	G3IFF	1·992	Havant, Hants.
21.00	G3HVI	1·890	Stoke-on-Trent
21.00	G3RIS	1·980	Cromer, Norfolk
Thursdays			
18.00	G3SWR	1·980	Middlesbro', Yorks.
18.30	GW3UMB	1·880	Colwyn Bay
18.30	G3NC	1·968	Swindon
19.00	G3LGK	434·326 to South-West	Ilkeston, Derbys.
19.00	G3WGU	1·910	Bispham, Lancs.
19.30	G3GNS	1·910	Weston-super-Mare
19.45	G3LGK	434·326 to South-East	Ilkeston, Derbys.
20.30	G3LGK	434·326 to North-West	Ilkeston, Derbys.
20.45	G3IFF	1·992	Havant, Hants.
21.00	†G3ROE / G3TIQ	1·915	Harlow, Essex
Fridays			
18.30	G3NCZ	1·920	Blackburn, Lancs.
19.30	G5UF	1·970	Dorchester, Dorset
20.15	G3SAZ	1·845	Ashford, Middx.
20.30	G3TLF	1·915	Harlow
20.45	G3IFF	1·992	Havant, Hants.
21.00	G3RIS	1·980	Cromer, Norfolk
21.30	†G3UCZ / G3SUU	1·915	Pudsey, Yorks. Bradford, Yorks.
21.30	G3JCS	144·525	Caversham, Berks.
Saturdays			
10.00	G3TTK	1·850	Coalville, Leices.
13.00	G2FXA	1·900	Stockton-on-Tees
14.00	GI3JEX	1·860	Belfast
14·00	†GC4LI / GC2FMV	3.600	Jersey, C.I.
20.00	G3KPO	1·980	Peterborough
20.30	†G3TLJ / G3UXI	1·925	Roydon, Essex Harlow, Essex
20.45	G3IFF	1·992	Havant, Hants.

† Alternately

Channel Islands, Northern Ireland, Scotland and Wales are inadequately covered by this service to the SWL. The Honorary Organizer would be pleased to hear from any member in these areas or any other part of the British Isles, who would be willing to make regular Slow Morse Practice transmissions.

CONTEST NEWS — RESULTS—REPORTS—RULES

First Top Band Contest 1967

Position	Call	County	Score
†1	G3KMI (operator G3SQX)	HE	745
‡2	G3BMY	SE	733
‡3	G3SJJ	NM	696
4	G3RVM	NR	665
5	G3NKS	SY	629
6	GM3KMR	MN	603
*	G3GIZ/A	CH	599
7	GM3FXM	FE	586
8	G3TAD (operator G3SWH)	ST	573
9	G5RP	BE	568
10	G3BDQ	SX	567
11	G3SVW/A	LE	566
12	G6LD/A	YS	564
13	GW3CW	DB	508
14	G3CXX	LE	500
15	G3TLH/A	YS	493
16	G3TAA	LD	490
17	G3IGZ	LD	489
18	G8AB	EX	471
19	G3SZF	HF	457
20	GM3OXX	MN	452
21	G3NNW	LE	430
22	G3VIP/A	LN	426
23	G3SYM	SY	407
24	G3OVL	SY	404
25	G3RZP	EX	395
26	G3UQL	EX	359
27	G3VNC	HF	354
28	G3NQT	EX	342
29	G3AKF	DT	339
30	G3NSY	SE	333
31	GM3VEV	AN	306
32	GI3SSR	DW	303
33	G3RTU	LE	300
34	G3VPW	NM	289
35	G3KTA	SY	256
36	G8RZ	CD	254
37	G3TPJ	EX	247
38	G3UVT	NM	238
39	G3USZ	EX	215
40	G3OYU	KT	191
41	GM3ORX	DU	190
42	G3VFD	KT	173
43	G3IGU	YS	161
44	G2VV	MX	119
45	G3JJZ/A	KT	113
46	G3VSI	LD	79
47	G6OO	LN	29

† Somerset Trophy ‡ Certificate of Merit * Multi-Operator (GW3TOW & G3TZO)

The first Top Band Contest of 1967 took place on Saturday and Sunday, 18-19 February 1967.

The number of entrants submitting logs show a sharp drop at 48 against the corresponding contest last year when 70 logs were received. It could well be that this was due to the contest being held over the " Long " period of 22.00 Saturday to 08.00 Sunday. Several entrants commented on the length of contests. It should be mentioned that the Contest in November will be a " short " one to make up for this.

The winner this year is E. F. Taylor, G3SQX, who operated under the call-sign G3KMI of the Southampton University Radio Club. His 159 scoring contacts came from 25 adjacent county stations and 134 5-pointers.

In second place, only 12 points behind, is I. T. Cashmore, G3BMY, who was third last year and is a veteran of Top Band contests. His score came from 11 local contacts and 140 5-pointers.

Conditions seem to have been good in the first few hours but dropped off towards the end. There were no reports of Ws being heard but there were numerous contacts with the OK stations from whom there are 13 check logs.

Comments from Logs

" Was surprised to find this a ' long ' contest having been expecting and looking forward to a ' short ' one " (G3BMY) (This was a mistake!). " Would like to see more short contests with cumulative scores " (G3OYU). " Thoroughly enjoyed contest—especially longer time—did much better than last year due to improvement in efficiency " (G3SVW). " Let's keep two 10 hour contests " (G3TAA). " Shorten the contest to 5 hours " (G3SHW). " Enjoyed the contest " (G3VPW). " Conditions in the SE between 04.00 and 07.00 unmentionable—at times only signal was S9 T5 (but musical) note from " Ginger Tom " asleep on RX " (G8AB). " Enjoyable contest—publish details of antennae if possible " (GM3KMR) (see below). " Not so well attended as in previous years " (G3RTU); and finally long comment from G3SQX on the time lag in publishing results—" unbelievable " and information " so sparse as not to be worth having." He sums up quite correctly by saying that most of his comments have been criticisms of the Committee!

It does, however, seem to have been an enjoyable contest.

Equipment in Use

G3SQX: Transmitter, 807, AR88D, centre-fed half-wave inverted -V, centre at 150 ft.

G3BMY: Home-made transceiver with triple conversion on receiver side, half-wave end-fed aerial.

G3SJJ: KW Vespa, KW201, half-wave 40ft. high.

G3RVM: HRO, inverted-V, apex 80 ft. high.

CONTESTS DIARY

18 June	—Rugby D/F Qualifying Event
2 July	—Fourth 144 Mc/s Contest (Portable)*
8-9 July	—1·8 Mc/s Summer Contest
16 July	—Oxford D/F Qualifying Event
23 July	—Third 70 Mc/s Contest (Portable)*
30 July	—Stratford-upon-Avon D/F Qualifying Event
2-3 September	—V.H.F. NFD/IARU Contest (see page 108, February, 1967)
10 September	—80 Metre Field Day (see page 259)
17 September	—D/F National Final
7-8 October	—Second 1296 Mc/s Contest (Open)*
7-8 October	—RAEN Rally
7-8 October	—VK/ZL Oceania DX (Phone) Contest 1967
14-15 October	—RSGB 21-28 Mc/s Telephony Contest (see page 257)
14-15 October	—Second 432 Mc/s Contest (Open)*
14-15 October	—VK/ZL Oceania DX (C.W.) Contest 1967
28-29 October	—RSGB 7 Mc/s DX Contest (Phone) D/F National Final
11-12 November	—RSGB 7 Mc/s DX Contest (C.W.)
18-19 November	—Second Top Band Contest
3 December	—Fourth 70 Mc/s Contest (C.W.)

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

G3NKS: 5763 p.a., AR88D, centre-fed half-wave at 60 ft.
GM3KMR: 6L6 p.a. HRO-MX, half-wave end-fed.
G3GIZ/A: KW2000A, half-wave 40 ft. high running NS.
GM3FXM: 5763 p.a., Eddystone 750, half-wave dipole.

Comments from Committee

The standard of log-keeping in these contests is always outstanding. There are several comments on the duration of the contest and these will all be considered before next year. There is also comment on the scoring system and this will be reconsidered. The results however, show a fairly widespread geographical distribution in the " top twenty."

The rules provide for a certificate of merit for the best check-log submitted by a non-transmitting member. A. A. Goacher, A3942, sent in a very useful log and will receive the certificate of merit.

The Maitland Trophy is awarded to the Scottish member with the highest aggregate number of points in this contest combined with the Second 1·8 Mc/s Contest 1966. This trophy will therefore go to GM3KMR who scored 556 points in the 1966 contest and 603 points in this contest for a total of 1159 points and a clear lead over GM3FXM who has a total of 1015 points.

The following are thanked for sending in check logs which are always welcome.

GM3KHH, GM3AWF, G6HD, G3MWF, G4VF, G3DHV, G3NKL, G3OJE, G3GJY, G5AO, OK1AAU, OK2KEY, OK1AES, OL5ADK, OK3KAS, OK1AOV, OL4AFI, OK2KGV, OL1AGS, OK1XC, OK1ALZ, OK1AJP, OK1NK. Listeners log: A3942 (Certificate of Merit).

Low Power Contest 1967

Position	Call-sign	Points	Power	County code
1	G3IAR	7500	0·45 W	KT
2	G3JVJ	7120	0·5 & 4 W	SX
3	G3BIK	6330	0·45 & 2·5 W	ND
4	G3IGU	6050	0·5 & 4 W	YS
5	G3DOP	5840	0·4 W	WK
6	G3EUE	5500	0·45 W	SY
7	G3NEO	4240	0·4 W	YS
8	G3CWL	2900	0·48 W	SY
9	G3HZL	2860	5 W	MX
10	G3IZC	2640	0·5–5 W	LR
11	G3OKY	1025	0·5 & 1·2 W	KT

Disqualified—G3ITF General Rule 6. (Multi-operator).

The 1967 Low Power Contest was held on Sunday, 2 April and produced only one half as many entries as last year's event. If support for the 1968 Contest is not an improvement on this, the H.F. Contests Committee may decide to discontinue the contest.

The winner was M. Crowther-Watson, G3IAR, of West Kingsdown, Kent, with R. A. Wybrow, G3JVJ, of Haywards Heath, Sussex, as runner-up. In third place was E. Chicken, G3BIK, of Newcastle-on-Tyne. All three also entered the 1966 event when they were placed tenth, fifth, and eighth respectively.

Equipment

G3IAR used half of a 12AU7 as a p.a. with a d.c. input of 0·45 watts, and an NXC-5 as a receiver. G3JVJ had a TT11 in the p.a., and an AR88D. G3BIK employed a transistorized transmitter running at 0·45 and 2·5 watts into a 2N3053 p.a. stage, while G3DOP operated the only "all transistor" station. With the exception of a full wave loop (G3NEO), a 33 ft. loaded vertical (G3HZL), and a 400 ft. end fed wire (G3EUE) the aerials were half wave. A number of stations commented that conditions were quite poor, and this was not helped by a clash in the last two hours with a European contest. It was suggested by two entrants that in future these hours be omitted.

Comments from Competitors

G3JVJ felt that the scoring differential between half a watt and five watts was too great. "It's hard to make up your mind whether to struggle with 0·5-1 watt and get 50 points every time, or push the power to 5 and work the new counties for 100 points —so I mixed it"—G3HZL. " Hard going up here in the north"—G3BIK.

Awards

Subject to the approval of Council, the 1930 Committee Cup will be awarded to G3IAR, and a certificate of merit to G3JVJ.

Listeners' 144 Mc/s Contest 1967

Posn.	Name	BRS/A	Score	Stns. heard	QRAs heard		Converter R.F.	Receiver	Aerial
1	R. Ham	BRS15744	1466	126	19	SX	AFZ12	680X	8 ele.
2	C. Baker	A5032	1270	123	17	HF	ECC84	AR88	4 ele.
3	E. MacDuff	BRS26234*	1232	78	20	SX	—	—	6 ele.
4	R. Thomas	BRS15822	1103	78	15	LD	6CW4	HRO	5 ele.
5	A. Goacher	A3942*	1085	86	14	SX	2N3819	EC10	4 ele.
6	A. Watts	A4871	792	56	12	WR	6CW4	HE-30	8 ele.
7	T. Cooper	BRS28005	353	27	5	SX	—	—	6 ele.
8	M. Arnold	A5271	222	34	2	BS		Shorrock Mk. V	6/6

* Portable stations.

With 126 entries in his log, R. A. Ham, BRS15744, retains first place in the results. C. Baker, A5032, who did not compete in the 1966 event, takes second place. His log included three French and six German stations, one of the latter using the relatively new DK prefix. The only London entrant, R. Thomas, BRS15822, made good use of the bonus with 22 c.w. stations logged.

Comments from Competitors

" All through the contest I was troubled by numerous spurious signals (the result of using a previously untried combination of converter and receiver)"—A3942.

A5032, commenting that the scoring favours operators situated near the intersection of QRA rectangles, recommends that the points per distance system should be extended to listeners' contests.

"Scoring is easier, but not quite so fair "—A4871.

Logs

Contestants are reminded that the full location sent by the station heard should be recorded (see V.H.F./U.H.F. Listeners' Championship Rule 4 (f)).

Awards

Subject to Council's approval, Certificates of Merit will be awarded to the winner and runner-up.

A. J. G.

D/F Qualifing Events

The following are details of the **Rugby Qualifying Event**
When: Sunday 18 June, 1967.
Organizer: G. H. Taylor, G3MDC, 80 Grosvenor Road, Rugby, Warwickshire.
Map: Ordnance Survey, Seventh Series, Sheet 132.
Location: NGR 595554, Near Mantles Heath, 6 miles south of Daventry.
Assembly time: 13.00 BST, for first transmission at 13.20 BST.
Frequencies & Call-signs: To be announced at the start.
Tea: Will be held at the AEI (Rugby) Recreation Club, Hillmorton Road, Rugby, NGR 517744. Will intending competitors please advise the organizer as soon as possible of the number in their team who will be requiring tea.
Rugby Cup: The winner of this event will be awarded the Rugby Cup for the year 1967.

The following are details of the **Oxford Qualifying Event**
When: Sunday 16 July, 1967.
Organizer: E. L. Mollart and M. P. Hawkins, 17 Spinfield Mount, Marlow, Bucks.
Map: Ordnance Survey, Sheet 158.
Assembly Time: 13.00 BST for 13.20 BST start.
Location: 2¼ miles south of East Hendred, NGR 456851.
Frequencies and Call-signs: To be announced at start.
Entries and Tea: Intending competitors should notify the organizers as soon as possible, stating the number in the party who will require tea.

Rules for the RSGB 7 Mc/s DX Contest 1967

Radio Amateurs throughout the world are invited to take part in the fifth RSGB 7 Mc/s DX Contest to be held on 28-29 October and 11-12 November, 1967. Because of lack of support in previous years, there will be no Multi-Operator section.

Rules

1. **Duration:** Each section of the contest will take place between 18.00 GMT on the Saturday and 18.00 GMT on the Sunday as follows:
Phone: 28-29 October, 1967. **C.W.:** 11-12 November, 1967.

2. **Eligible Entrants:** The contest is open to licensed amateurs in all parts of the world who must operate in accordance with the terms of their licences.

3. **Contacts:** Contacts must be made in that portion of the 7 Mc/s band for which the entrant is licensed. Contacts with unlicensed stations will not count for points. Proof of contact may be required. Only one contact may be made with a specific station, whether fixed, portable, mobile or alternative address in each section. Duplicate contacts must be logged and clearly marked as duplicate without cliam for points.

4. **Contest Exchanges:** An exchange of RST (or RS) reports followed by a three figure serial number starting with 001 for the first contact and increasing by one for each successive contact and for each separate section (for example, 58002, etc.) must be made before points can be claimed.

5. **Entries:** Entries (*a*) should be clearly typed or written on one side only of foolscap or International A4 size paper; (*b*) must be ruled in columns headed (in this order): (i) Date/Time (GMT); (ii) Call-sign of station worked; (iii) I sent him; (iv) He sent me; (v) Bonus points; (vi) Total points claimed; (*c*) must be addressed to the **Contests Committee, Radio Society of Great Britain, 28 Little Russell Street, London, WC1, England,** the name of the contest being clearly shown on the top left hand corner of the envelope which must be postmarked not later than 27 November, 1967. Log sheets must be available from RSGB Headquarters.

SAMPLE COVER SHEET

RSGB 7 Mc/s DX Contest 1967 **Claimed score** .....

Call-sign .....

Name .....

Address .....

Transmitter ..... Aerial(s) .....

Receiver .....

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

Date ..... Signed .....
Failure to provide and sign the declaration may involve disqualification of the entry.

6. **Scoring:** British Isles stations may not work each other for points. Overseas stations may only claim points for contacts with British Isles stations (G, GB, GC, GD, GI, GM and GW).

Each completed contact between a British Isles station and a station in any one of the six Continental areas will score as follows:

Contacts between British Isles and Continent of Europe	5 points
Contacts between British Isles and Continent of North America	15 points
Contacts between British Isles and Continents of South America, Africa and Asia	25 points
Contacts between British Isles and Continent of Oceania	50 points

Bonus Points:

British Isles Stations: A bonus of 20 points may be claimed for the first contact with each new entry. For the purposes of scoring, the **RSGB Countries List** will apply with the exception that VE, VK, W/K, ZL and ZS call areas will each count as separate countries.

Overseas Stations: A bonus of 50 points may be claimed for the first contact with each British Isles country-numeral prefix, i.e. G2, G3, G4, G5, G6, G8, GB, GC2, GC3, GC4, GC5, GC6, GC8, GD2, GD3, GD4, GD5, GD6, GD8, GI2, GI3, GI4, GI5, GI6, GI8, GM2, GM3, GM4, GM5, GM6, GM8, GW2, GW3, GW4, GW5, GW6, GW8.

7. **Awards:** Provided that the adjudicated score is 600 or more points certificates of merit will be awarded to the overall leaders and runners-up in each section and to the leading station in each of the other five British Isles countries. Certificates will also be awarded to the leading station in each overseas country, VE, VK, W/K, ZL and ZS call areas counting separately as in Rule 7. Awards will only be made if there are 10 or more entries in any section.

Listeners' Section

1. **Duration:** Each section of the contest will take place between 18.00 GMT on the Saturday and 18.00 GMT on the Sunday as follows:
Phone: 28-29 October, 1966. **C.W.:** 11-12 November, 1967.

2. **Eligible Entrants:** The contest is open to short-wave listeners throughout the world. All entrants agree to be bound by these rules. Only the entrant may operate his receiving station for the duration of the event. Holders of amateur transmitting licences are not eligible to take part.

3. **Entries:** Entries (*a*) should be clearly typed or written on one side only of foolscap or International A4 size paper; (*b*) must be ruled in columns headed (in this order) (i) Date/Time GMT; (ii) Call-sign of station heard; (iii) Report and serial number sent by station heard; (iv) Call-sign of station being worked: (v) Bonus points; (vi) Total points claimed; (*c*) must be addressed to the **Contests Committee, Radio Society of Great Britain, 28 Little Russell Street, London, WC1, England.** The name of the Contest must be clearly shown on the top left hand corner of the envelope, which must be postmarked not later than 27 November, 1967. Log sheets are available from RSGB Headquarters. All entries must contain the following declaration:

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

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

4. **Scoring:** British Isles entrants may only log **overseas stations working UK stations in the contest.** Overseas entrants may only log **British Isles stations in contact with overseas stations in the contest.** A station whether fixed, portable, mobile or alternative address may be logged only once for the purpose of scoring. *CQ or test calls will not count for points.*

For British Isles entrants, each completed log entry of a contact between a British Isles station and a station in the following continents will score as indicated:

Continent of Europe	5 points
Continent of North America	15 points
Continents of South America, Africa and Asia	25 points
Continent of Oceania	50 points

For overseas entrants, each completed log entry of a contact between the British Isles station and any other station in the contest will score as ndicated:

Where the listener is in continent of Europe	5 points
Continent of North America	15 points
Continents of South America, Africa and Asia	25 points
Continent of Oceania	50 points

5. The Committee reserves the right to disqualify any entrant whose log is consistently inaccurate.

Bonus Points:

British Isles Entrants: A bonus of 20 points may be claimed for the first station logged in each new country. For the purpose of scoring the **RSGB Countries List** will apply, with the exception that VE, VK, W/K, ZL and ZS call areas will each count as separate countries.

Overseas Entrants: A bonus of 50 points may be claimed for the first station logged in each British Isles country—numeral prefix, i.e. G2, G3, GM4, etc., as listed in Rule 7 for the Transmitting Contest.

6. **Awards:** At the discretion of the Council, certificates will be awarded to the British Isles leading entrant and runner-up and to the leading entrant in each overseas country.

Grafton Top-Band Contest 1967

The contest this year was held on 1 April (c.w.) and 8 April (phone). Although only 20 or so entries were received, from a high number of participants, they were sufficient to produce a definite result, and the leading five in the Open Section and leading three in the Members' Section are shown below.

Open Section

Position	Call		Points
1	G3OLB/A	(also phone winner)	113
2	G3LIV	(also c.w. winner)	103
3	G3OMK		78
4	G3UGF		54
5	GD3VNQ		45

Members' Section

Position	Call		Points
1	G3SIL	(also phone and c.w. winner)	106
2	G3VUE	(also leading first year station)	52
3	G3ONS		42

RSGB Publications

28 LITTLE RUSSELL STREET, LONDON, WC1

	Post Paid UK
RSGB PUBLICATIONS	
Technical Topics for the Radio Amateur	10/8
Log Book	7/3
Amateur Radio Call Book (1967 Edition)	6/6
Radio Amateurs' Examination Manual (Fifth Edition)	5/9
Guide to Amateur Radio (Twelfth Edition)	5/9
Service Valve and Semiconductor Equivalents	5/6
S.S.B. Equipment	3/–
Communications Receivers (Second Edition)	3/–
Morse Code for Radio Amateurs (Fourth Edition)	2/–
ARRL PUBLICATIONS	
Radio Amateur's Handbook (ARRL)	44/-
Buckram Bound	52/–
Antenna Book, 10th Edition	18/6
A Course in Radio Fundamentals	10/–
Hints and Kinks, Volume 7	10/–
Mobile Manual for Radio Amateurs	23/6
Radio Amateur's Operating Manual	7/9
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 Handbook, Vol. I	28/–
Antenna Roundup	23/6
Antenna Roundup Vol. 2.	30/–
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/–
Parametric Amplifiers	15/–
Simplified Maths for the Hamshack	4/6
Test Equipment Handbook	4/6
V.H.F. Antenna Handbook	15/–
RADIO PUBLICATIONS INC.	
Beam Antenna Handbook	28/–
Better Short-wave Reception	24/6
Cubical Quad Antennas	22/–
Electronic Construction Handbook	22/6
S-9 Signals	8/6
EDITORS & ENGINEERS	
Transistor Radio Handbook	42/6
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.)	37/–
‡ *Mailed direct from USA*	
MISCELLANEOUS PUBLICATIONS	
Basic Electricity (*Dover*)	25/6
Basic Theory and Application of Transistors (*Dover*)	11/6
Dictionary of Electronics (*Penguin*)	8/–
Dictionary of Radio and Television (*Newnes*)	38/–
Electrons, Atoms, Metals, & Alloys (*Dover*)	19/6
Foundations of Wireless (*Iliffe*)	22/3
Guide to Broadcasting Stations (*Iliffe*)	6/6
How to Listen to the World (*New Edition*)	26/–
Ham's Interpreter (5th Edition)	8/6

	Post Paid UK
Log Book, 150 pages, opens flat (*Martins*)	22/6
Manual of Transistor Circuits (*Mullard*)	13/6
Matter and Light—The New Physics (*Dover*)	16/3
Outline of Radio and Television (*Hawker*)	34/6
Radio Amateur Operator's Handbook (*Data*)	5/6
Radio Amateur's Vocabulary (German/English)	9/3
RCA Linear Integrated Circuit Fundamentals (RCA)	22/6
Semaphore to Satellite (ITU)	70/–
Short Wave Listening (*Iliffe*)	13/2
Short Wave Receivers for the Beginner (*Data*)	6/6
Short Wave Radio and the Ionosphere (*Iliffe*)	12/–
Understanding Television (*Data*)	40/–
Wireless World Radio Valve Data	10/6
World Radio-TV Handbook (1967)	32/–
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
Beginner's L.P. (0-15 w.p.m.) + book	50/–
Advanced L.P. (9-42 w.p.m.) + book	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 3¾ i.p.s., up to 14 w.p.m,)	20/–
SHACK AIDS	
Easibinders, round backed, gold blocked, for RSGB Bulletin	16/6
Easibinder Year Stickers (1965, 1966 or 1967)	1/6
Admiralty Great Circle Map (In Postal Tube)	8/–
RSGB Countries List	1/–
Panel Signs, transfers (*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
Blick Dry Print Lettering (Letters and Numerals, Black)	2/6
RSGB MEMBERS ONLY	
Bound copy RSGB Bulletin (Vol. 42–1966)	25/–
Car Badge (De Luxe with call-sign)*	25/–
(Postage on overseas orders 5/6 extra)	
Car Badge (RSGB Emblem with call-sign)*	18/–
Car Badge (RSGB or RAEN Emblem)	9/–
Leather Key Fobs, with RSGB Diamond attached —Black, Natural, Red, Green, Blue	7/–
RSGB Terylene Tie (Maroon or Dark Blue)	16/–
RSGB Blazer Badge (Black or Dark Navy Blue)	8/–
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)*	8/6
Call-sign Lapel Bar*	7/–
RSGB Lapel Badge (½ in. size) stud or pin fitting	2/–
Plastic Window Sticker (RSGB or RAEN Emblem)	1/3

**Delivery 6-8 weeks*

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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.

WE start this month with an international flavour. From Malta and the National Radio Club we learn that it recently received a donation of two RBC-5 Communication receivers from the *USS Cascade*. These receivers cost in the region of $3000 each when new. Thanks go from the Amateur Radio Club to the two American Amateurs on board the *Cascade* for making this donation possible. Included were also a number of excellent electronics publications, which, together with a gift from Voice of America, should make what must by now be a very comprehensive library.

Reports from other clubs overseas are more than welcome for Clubroom and we look forward to receiving more in the near future.

Bradford RS recently met to hear a talk by G3RXS on IBM Computers at work followed by The Human Machine as a Radio Operator—an RSGB Tape Lecure, and Lightning—its Nature and Effects. This was presented by the Northern Heights Amateur Radio Society. Membership is currently running at 25, of which 10 are juniors; an encouraging sign. *G3HJP.*

Bromsgrove and District ARC is this month the first (of many no doubt!) to report its AGM. Apart from this, the club visited Birmingham Telephone Exchange, a visit which lasted some two and a half hours. The club shack has now been equipped with operating and work benches and a Top Band transmitter. Watch out for G3VGG on Top Band and during NFD with the newly built transmitter designed for battery operation only.

Cambridge and District ARC is fortunate in having among its members Brian Armstrong G3EDD and Peter Simpson G3GGK. The club usually has a preview of their laboratory tests on items of equipment which appear in the BULLETIN as a technical review. The latest given by Brian Armstrong was on the Sommerkamp F Line (a subsequent review appeared in the May RSGB BULLETIN, while at an earlier meeting Peter Simpson gave a first-class demonstration on how to line up a modern superhet receiver. At several meetings recently the urgent need for larger premises has been obvious. The junior Section is expanding rapidly, and had a good write up in the local press. To top it all Peter Long has now been issued the call G3WIZ—Gee Whiz! *G5BQ.*

Cheshunt and District RC met on 5 May, when Top-Band DX was the subject of a talk by Keith Spencer, G3RPB. The talk concluded with a recording of a QSO between G3RPB and an American station. Although the meeting was well attended there was a pronounced lack of licensed members. *G3EGD.*

Chester and District ARS held its Annual Dinner on 21 April at the Oaklands Hotel, Chester (see photo). After a most enjoyable dinner the evening concluded with a film show of the Society's recent DXpedition to the Isle of Arran. *G3TZO.*

Chippenham and District ARC held its first AGM on 25 April when 25 members were present. Following a report on what was a very successful first year, the inaugural Committee stood down and a new committee was elected. *G3PQG.*

One hundred and fifty members, yes 150, of the **Civil Service RS** attended a lecture given by the British Heathkit agents Daystrom Ltd. There is no doubt that the members of Daystrom staff, Mr Smith and Mr Evans enjoyed answering questions put by members and guests.

Cheltenham RSGB Group. Following a showing of two excellent films on modern electronic developments and magnetic tape applications, a business meeting was held to further discuss the proposed merging with Cheltenham Amateur Radio Society; both are long established clubs. Several members felt that misleading reports had been published, giving the impression that the matter had been concluded and one or two heated exchanges occurred. Eventually G8ML, G3JFH and G3PEO were elected to the negotiating Committee, which will meet three members already selected by the CARS. G3MA is to be invited to Chair subsequent meetings. *G3CGD.*

During May, John Parnell, Treasurer of the **Cornish Radio Amateur Club** delivered a talk entitled " Ham Radio in Africa," quoting anecdotes which brought a great deal of laughter. How would you like to travel 100 miles for spare components! The S.S.B. Group met on 11 May when the 15 attending members were shown home constructed sideband equipment. *G3NKE.*

Crawley ARC held its seventh Annual Dinner on 17 March at the Crawley Forest Hotel, but found a rather poor attendance this time compared with last year's event. However, it would seem that those who turned up had a good evening. With any event such as this a club requires the support of its members; only 56 members supported this year compared with 95 last year. The result: a large financial loss this year compared with a profit last year. Members also enjoyed what is described as the " fathr and mother " of junk sales and a visit to British United Airways, Gatwick Airport. *G3FRV.*

At the recent AGM of **Cray Valley RS,** Arthur O. Milne, G2MI, was re-elected its President, S. W. Coursey, G3JJC, was elected Chairman and D. Buckley, G3VLX, was elected Secretary. A very welcome recommendation by the retiring Treasurer was the reduction of the annual subscription by five shillings. The questionnaire circulated to all members and returned by about half the membership has brought some useful criticisms and suggestions which will give the Committee plenty of food for thought. At the last meeting Phil Horwood, G3FRB, gave a very interesting talk on " Modern Sideband Equipment " and demonstrated the research, ideas and engineering ingenuity which goes into the production of high class commercial equipment. The s.s.b. manpack GR.345 was taken along and stripped down by modules to let the members see what a high degree of construction is achieved in such equipment. *G3VLX.*

Dorking and District RS held regular meetings during the past month. Unfortunately a scheduled talk on the production of electronic equipment was cancelled at a late stage, and had to be replaced by a brains trust which, understandably, did not meet with the same enthusiasm. For those who may be interested in the ex-GPO van used by the Club for DXpeditions here are a few details. The van is a 1950 Morris type LC commercial vehicle, engine 1946-1953 series, 2050 cc. We've been asked to point out that this is *not* the BMC engine. Why we don't know! *G3MBK* (Note change of address: Flat C, 11 Palace Road, Surbiton, Surrey.)

We have not had a report from **Ealing and District ARS** for many months but they have made up for it with this month's report. RSGB Vice President John Graham, G3TR, travelled up from Crawley on 18 April to talk on the RSGB, and brought to light many unknown and interesting facts about the work of the RSGB. It was unfortunate that only a dozen or so members turned up. The previous weekend the Society made its first serious entry in a 4m contest, and gratifyingly, reports from London described the signal from Ditchling as fantastic! This is hardly surprising as the equipment consisted of a 6-over-6 fed by 45 watts! On 23 April its second Foxhunt was held, with the fox at Bentley Heath, Herts. Thanks *and curses* (for only three cars found the QTH after four hours) go to G3WDK for organizing and loaning equipment for the event. Concluding activities were two tape lectures, a Junk Sale and a discussion on the Wireless Telegraphy Act 1967. In the chair was G3OUF. *G3OUF.*

Echelford ARS reports a steady growth in membership with the total now standing at 72. Production of its newsletter has now been eased with the purchasing of a duplicating machine.

Edgware and District RS held an interesting lecture with the return visit of G6RNK/T at its meeting on 23 May. G3PWK is at present a welcome guest at the club but in the near future his army service will be taking him to ZB2 land where it is hoped to arrange skeds once his home station is established. *G3FKI.*

April has been a very busy month for **Grafton RS,** with both the Grafton Contest and the Society's 21st Anniversary taking place in addition to the usual weekly meetings (reports on both these events appear elsewhere in this issue). On Friday, 14 April, Eric Holt, G3MHQ, of the Paddington ARS, brought along the prototype of the Paddington Top Band Transceiver which he explained and demonstrated. The following week, on Friday,

Guests attending the Annual Dinner of the Chester and District ARS on 21 April.

The stand occupied by the Gt Yarmouth RC at the Gorleston Trades Fair, 8-15 April. See page 414.

21 April, Mr G. A. Clark, of the GPO Research Station, Dollis Hill, gave a very interesting talk on Lasers, once again accompanied by a demonstration, but much to the disappointment of the large audience, the instrument he used was not capable of punching holes through the walls! The month ended on 28 April with a Junk Sale especially arranged to help clear the shack of G2BAB, a former member who is shortly moving from the district—and as is usual with these events, a good attendance was recorded. *G3SIL.*

Following the inaugural meeting on 3 March the **Hemel Hempstead and District AR-TS** has grown to 23 licensed radio amateurs, four television amateurs and 41 SWLs. On 21 April a very successful live television transmission was given by G6GDR/T from Abbots Langley to the Club headquarters at Rockers Lane Hall, Kings Langley, a distance of five miles. Despite a large hill in the path excellent pictures were received. The Society is at present experimenting with moonbounce at u.h.f., light modulation transmission (laser beam) and earth transmission. Not bad going! *G3RYI.*

Mid Herts ARS should have had some fun on 13 May when they exhibited at Contact 67—a convention of the town's activities—the call used was GB3WGC. Congratulations go to G3WFM, ex-G8AJD for obtaining his " A " licence. *G3PVK.*

Isle of Wight RS will be operating GB3IIF from the Island Industries Fair from 21 June to 30 June. Operation will be on all h.f. bands, both a.m. and s.s.b. and also 2m v.h.f. *G3NTM.*

Leicester RS have just completed the move to new premises and are busy re-equipping the rooms as workshops and operating rooms. Operation should commence shortly on all bands from 160m to 2m. As with many other clubs preparations are well in hand for this year's NFD with G3PBC as aerial manager and G3MYI constructing the transmitter. *G3PBC.*

Lothians RS reports an interesting lecture on Aircraft Navigation by Sandy McWalter, GM3TSZ. This talk provided an excellent follow-up to a visit by the Society to Turnhouse, several weeks earlier. Later in the month Tom Spears, GM3OWI, gave an interesting talk on the generation and amplification of s.h.f., beginning with some comments in the Hertz controversy—a " hot " topic—and concluded with demonstrations using 3cm transmitting and receiving teaching aids. *GM3PSP.*

Loughton and District RS recently listened to a 40-minute recording made by G3JBS of a 20m s.s.b. QSO with VK6NK, ex-G3NKX, a founder member of the Society. Cliff Waterman, licensed but not yet active made a semi-naked dash in a temperature of 85° F four miles across Perth in Western Australia to make his first contact with home since he emigrated towards the end of 1966.

Mansfield ARS continues to meet at the New Inn, Westgate, Mansfield, on the first and third Fridays of each month at 7.30 p.m. It is hoped a visit to Jodrell Bank may be made during the summer.

The **Midland ARS** has been particularly active with outside events. Since the Birmingham Boat Show its Committee has, with the assistance of the Stoke-on-Trent Society organized the North Midlands Mobile Rally held on 30 April. G5PP and his helpers are to be thanked for their great efforts to make the rally such a success. *G6CC.*

Northern Heights ARS has recently held its AGM when the following were elected: Chairman David Howell, Secretary-Treasurer G3MDW, Minute Secretary G3OMM, Committee, G3UI, G3TCS, G3TXX, G3TFF, G3TQA. *G3MDW.*

Oxford and District ARS has been widening its horizons recently, with talks on Colour Television, Cryogenics and Superconductivity, not to mention a visit to a GPO repeater station. Its D/F enthusiasts have been conducting some unofficial consumer research into the question of which car insurance firms will give them the most favourable rates. The society is also studying the new Wireless Telegraphy Bill to discover what terrors, if any, it holds for the Radio Amateur. *G3UJO.*

Plymouth RC reports on its AGM held on 2 May. It would seem that over the past few months interest and membership has fallen off. A full programme of activities is planned for the forthcoming session when it is hoped to reclaim many lapsed members.

Preston ARS has now moved QTH to the " Windsor Castle " hotel, St. Paul's Square, Preston. There is a private room where future meetings will be held fortnightly at 7.30 p.m. on Thursday evenings. For v.h.f. enthusiasts a transistor receiver is the current club project. *G3DWQ.*

Purley and District RC continues to meet twice monthly. The Junk Sale held on 17 March presented a bit of a problem, when such was the enthusiasm it was found necessary to continue the sale on 7 April, despite an average of one item every 50 seconds. On 21 April E. R. Honeywood, G3GKF, gave what it is reported as being an excellent lecture and demonstration on Laser Beams. *G3FTQ.*

Reigate ATS will be arranging an exhibition of Amateur Radio equipment at the forthcoming Reigate Grammar School Summer Fair on 10 June. As well as a static exhibit, G3REI/A will be operating on 160, 80 and 4m. Remembering previous exhibition stations, the operators would like to apologise in advance for not being able to copy stations lost in QRM from the model trains next door! *G3NKS.*

Saltash and District ARC had an informal visit by the Lady Mayor of Saltash on 7 April. The Mayor was shown a 4m transmitter on the air and explained some of the mysteries and purposes of Amateur Radio by the club Chairman P. Cann. Component identification was the subject of a Quiz Night held on 21 April. *G2DFH.*

South London Mobile Club announces that its secretary is Mr. C. Malcolm, G3UYN, 41a Cambray Road, Balham, London, SW12. *G3UYN.*

Stockport RS is another club to change its QTH, this time after 15 years at the same club room. The first meeting will be on Wednesday 12 July when a " Surplus Gear Sale " is scheduled. Meetings will commence at 8 p.m. at the Royal Oak Hotel, Castle Street, Edgeley, Stockport. With the increased facilities for club activities it is hoped a club station will be operating soon. *G3FYE.*

Stourbridge and District ARS reports keen enthusiasm by *young* members preparing for this year's NFD, while the Committee is trying to find a suitable QTH for the club station. *G3BMY.*

(Continued on page 414)

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).—14, 28 June, 12 July, 8 p.m., 77 Clifton Road, Southport.

Allerton (Liverpool) (SRHS).—Thursdays, 8 p.m., 3rd Allerton Scout Group Headquarters, Church Road, Woolton, Liverpool.

Ashton under Lyne (AUL & DARS).—Fridays, 7 p.m., Rooms F52 and F53, Ashton College, Beaufort Road.

Blackburn—East Lancashire Amateur Radio Club.—6 July, "Constructing Equipment," by G3SXC.

Blackpool (B & FARS).—Mondays, 8 p.m., Pontins Holiday Camp, Squires Gate. Morse tuition from 7.30 p.m.

Bury (B & RRS).—13 June, 11 July, 8 p.m., Old Boars Head Hotel (private room), Crompton Street.

Chester (C & DARS).—Tuesdays, 6 June (Top Band & Two Metre Net Night), 13 June (NFD Discussion), 8 p.m., YMCA.

Crewe & District.—3 July, 8 p.m., Nantwich Road Social Club (Please note change of address).

Eccles (E & DRC).—Tuesdays, 8 p.m., Patricroft Congregational Schools, Shakespeare Crescent, Patricroft. Every Thursday, Club Top Band net 20.30 hours.

Liverpool (L & DARS).—Tuesdays, 8 p.m., Conservative Association Rooms, Church Road, Wavertree.

(ULARS).—No more meetings until October due to examinations.

Macclesfield (M & DRS).—6, 20 June, 4 July, 8 p.m., The George Hotel, Jordangate.

Manchester (M & DARS).—Wednesdays, 7.30 p.m., 203 Droylsden Road, Newton Heath, Manchester 10.

(SMRC).—Fridays, 7.45 p.m., Rackhouse Community Centre, Daine Avenue, Northenden.

Morecambe.—7 June, 5 July, 125 Regent Road.

North West V.H.F. Group.—Tuesdays, 8 p.m., Club Headquarters, Chapeltown Street, Manchester 4.

Preston (PARS).—15, 29 June, 13 July, 7.30 p.m., "Windsor Castle" (private room), St Paul's Square (Please note change of address).

St. Helens (SES).—13, 27 June, 11 July, 7.30 p.m., IVS Centre, 55 College Street.

Southport (SRS).—Wednesdays, 8 p.m., and Sundays, 2.30 p.m., The Esplanade. D/F Contest on first fine Sunday each month.

(73 SSB Society).—Tuesdays, 8 p.m. (all commencing with a talk on part of the RAE Syllabus), 73 Avondale Road North, Southport.

Stockport.—14, 28 June, 12 July, The Blossoms Hotel, Buxton Road.

Warrington—Culcheth (CARC).—Fridays, 7.30 p.m., The Harrow Inn, Culcheth.

Wirral (WARS).—7, 21 June, 5 July, 8 p.m., Harding House, Park Road West, Claughton, Birkenhead.

REGION 2

Barnsley (B & DARC).—9 June ("Top Band Transmitter," by G3FLQ), 23 June (Ladies Night), 7.30 p.m., King George Hotel, Peel Street.

Bradford (BRS).—13 June (Field Day Inquest), 27 May (Visit to Greenside Woolcombing Co. Bradford), 7.30 p.m., Bradford Technical College, Great Horton Road, Bradford.

Northern Heights.—10 June (Demonstration Station at Halifax Charity Gala), 21 June (Ragchew), 7.45 p.m., Sportsman Inn, Ogden, Halifax.

Scarborough (SARS).—Thursdays, 7.30 p.m., rear of 3 Trinity Road, Scarborough.

REGION 3

Birmingham (Bournville).—Every Friday evening, 8 p.m.

(MARS).—Third Tuesday in the month, 7.45 p.m., Midland Institute.

(South).—Third Wednesday in the month, 8 p.m., Scout Hut, Pershore Road, Stirchley.

Bromsgrove (B & DARC).—Second Friday in the month, 8 p.m., Co-op Hall.

Cannock (CCARS).—First Thursday in the month, Bridgtown Social Club, Walsall Road, Cannock.

Dudley (DARC).—16 June, 30 June, 8 p.m., Art Gallery, Dudley.

Mid-Warwickshire (MWARS).—12 June (Electron Microscope, G3OOQ), 19 June (Junk Sale), 26 June (Electronics in Medicine), 7 Regent Grove, Leamington Spa.

Lichfield (LARS).—20 June (Stabilized power Supplies), Swan Hotel, Lichfield.

Salop (SARS).—8 June (Visit to Shrewsbury Telephone House), 22 June ("The Human Machine as a Radio Operator," by G6CJ), Old Post Office Hotel, Milk Street, Shrewsbury.

Stratford (S-u-A & DRC).—8 June (AGM), Open House alternate Thursdays 8 p.m., Hall's Croft, Old Town Stratford.

Sutton Coldfield (SCRS).—12 June (Closed Circuit TV, G3JZF), 28 June (Natter Night), "The Fox," Walmley, Sutton Coldfield.

Wolverhampton (WARS).—19 June (D/F Discussion), Neachells Cottage, Stockwell Road, Tettenhall.

Worcester (W & DARC).—Informal meeting each Saturday, 8 p.m., 35 Perdiswell Park, Droitwich Road, Worcester.

REGION 4

Burton-on-Trent (B-o-T & DARS).—7 June (D/F Practice—1½ mile radius of Swadlincote—Start 7 p.m. at SK196299—Walking only), 25 June (D/F Practice 3 p.m.-5 p.m.—Start at SK 280210).

Derby (D & DARS).—7 June (Surplus Sale), 14 June (Committee Meeting), 17 June (Exhibition at Brailsford Show), 21 June (Practical Experiment—Proving Formulae), 28 June (Technical Film Show), 7.30 p.m., Room 4, 119 Green Lane, Derby.

Grimsby (GARS).—15 June (D/F Practice event), 29 June (Visit to Humber Radio Station), 7.30 p.m., Grimsby Model Engineers Club Room, Fletchers Yard, Wellowgate, Grimsby.

Heanor (H & DARS).—13 June (Sale of Surplus equipment), 20 June (Transmitting evening), 27 June (Additions to the Electronic Organ—E. West, G3KTP), 7.30 p.m., Room 14, South East Derbyshire College of Further Education, Ilkeston Road, Heanor.

Leicester (LRS).—Mondays, 7.30 p.m., Sundays, 10.30 a.m., Club Room, Gilroes Estate Cottage, Groby Road, Leicester.

Loughborough (LARC).—9 June (Electronics in Chemistry—A. Bower, Esq.), 16 June (Surplus Sale), 23 June ("Radio reminiscing" talk by L. Philpott, G4BI), 30 June (DX night on the air—KW2000A), 7.30 p.m., Club Rooms, Bleach Yard, Wards End, Loughborough.

Newark (NSWC).—Mondays, Thursdays, 7.30 p.m., The Guildhall, Guildhall Street, Newark.

Nottingham (ARCN).—Tuesdays, Thursdays, 7.30 p.m., Room 3, Sherwood Community Centre, Woodthorpe House, Mansfield Road, Nottingham.

Peterborough (P & DARS).—Fridays (8 p.m., Informal), Old Windmill, behind The Peacock Inn, London Road (Opposite Murkitts Garage).

Worksop (NNARS).—Tuesdays (RAE Class), Thursdays (Lecture Night), 7.30 p.m., Club Room, 13 Gateford Road, Worksop.

REGION 5

Bedford (B & DARC).—Meetings at the Dolphin Inn, Broadway, Bedford. Details from G3BVA.

Cambridge (C & DARC).—9 June (Natter Night), 16 June (To be announced), 18 June (Rally at Alconbury—Special Invitation from Capt. "Bud" Martin, USAAF), 23 June (V.H.F. Field Day Discussion), 30 June (Transverters—Introduced by Richard Baker G3USB), Fridays, 7.30 p.m., Club Headquarters, Victoria Road, Cambridge.

Luton (L & DARS).—Tuesdays, 8 p.m., ATC Headquarters, Crescent Road, Luton, Bedfordshire.

March (M & DARS).—Tuesdays, 7.30 p.m., rear of Police Headquarters, High Street, March, Isle of Ely.

Royston (R & DARS).—Wednesdays, 8 p.m., Manor House Social Club, Melbourn Street, Royston, Herts.

Shefford (S & DARS).—8 June (NFD Post Mortem), 15 June (Basic Electronics for Beginners—Part 2), 22 June (Any Questions?), 29 June (Junk Sale and "Natter Night"), Thursdays, 7.45 p.m., Church Hall, High Street, Shefford, Bedfordshire.

REGION 6

Cheltenham RSGB Group.—First Thursday each month, 8 p.m., Great Western Hotel, Clarence Street, Cheltenham.

Gloucester (GARS).—8, 22 June, 7.30 p.m., Lamb Inn, Market Parade.

REGION 7

Acton, Brentford and Chiswick (ABCRC).—20 June (Discussion of 1967 RAE), 7.30 p.m., Chiswick Trades and Social Club, 66 High Road, Chiswick.

Ashford (Middlesex) Echelford (ARS).—29 June (Talk by ZD9BE), St. Martin's Court, Kingston Crescent, Ashford. RAE classes second Thursday of Month at Ashford Grammer School.

Bexleyheath (NKRS).—8 June (NFD Inquest), 22 June (Civil Defence Communications), 7.30 p.m., Church Hall, Chapel Road, Bexleyheath.

Chingford (SRC).—Fridays (except 1st in month), 8 p.m. at Friday Hill House, Simmons Lane, Chingford, E4.

Croydon (SRCC).—20 June, 7.30 p.m., Blue Anchor, South End.

Dorking (DR & DRS).—13 June, 8 p.m., Wheatsheaf, 27 June, 8 p.m., Star & Garter, Dorking.

East Ham.—First and Third Tuesdays, 7.30 p.m., 12 Leigh High Road, East Ham.

Ealing (E & DARS).—Tuesdays, 7.30 p.m., Northfields Community Centre, Northcroft Road, Ealing, W5.

East Molesey (TVARTS).—First Wednesday each month, Prince of Wales, Bridge Road, East Molesey.

Edgware & Hendon (EADRS).—12, 26 June, 8 p.m., John Keble Hall, Church Close, Deans Lane, Edgware.

Gravesend (GRS).—Third Wednesday each month, 7.30 p.m., RAFTA Club, Overcliff Road.

Guildford (G & DRS).—9, 23 June, 8 p.m., Guildford Engineering Society in Stoke Park.

Harlow (DRS).—Tuesdays and Thursdays, 7.30 p.m., Mark Hall Barn, First Avenue.

Harrow (RSH).—9 June (Practical), 16 June (Junk Sale), 23 June (Practical), 8 p.m., Roxeth Manor School, Eastcote Lane.

Havering (H & DARC).—14 and 28 June, Romford.

Holloway (GRS).—Monday (RAE), Wednesday (Morse), Friday (Lecture, 7.30 p.m., Montem School, Hornsey Road.

Hounslow (HADRS).—15 and 29 June, Canteen, Mogden Main Drainage Department, Mogden Works, Isleworth.

Ilford.—Thursdays, 8 p.m., 103 Heath Road, Chadwell Heath.

Kingston (K & DARS).—Second Wednesday each month, 8 p.m., YMCA, Eden Street.

Leyton and Walthamstow.—Tuesdays, 7.30 p.m., Leyton Senior Institute, Essex Road, London, E10.

London U.H.F. Group.—First Thursday in each month, 7.30 p.m., White Hall Hotel, Bloomsbury Square, Holborn.

Loughton.—16, 30 June, 7.30 p.m., Loughton Hall (nr. Debden Station).

Maidenhead (N & DARC).—20 June, 7.30 p.m., Victoria Hall, Cox Green, Maidenhead.

New Cross.—Wednesdays and Fridays, 8 p.m., 225 New Cross Road, London, SE14.

Norwood & South London (CP & DRS).—17 June ("Varactors for V.H.F. and U.H.F.," by Geoff Stone, G3FZL), CD Centre, Catford, London, SE6.

Paddington (P & DARS).—Wednesdays, 7.30 p.m., Beauchamp Lodge, 2a Warwick Crescent, W2.

Purley (P & DRC).—16 June, Railwaymen's Hall, Side Entrance, 58 Whytecliffe Road, Purley.

Reigate (RATS).—14 June (Talk by M. A. Browne of Mullard Research Laboratories lecturing on the Stellar Intererometer supplied to Australia), 7.30 p.m., George & Dragon, Cromwell Road, Redhill.

Romford (R & DRS).—Tuesdays, 8.15 p.m., RAFTA House, 18 Carlton Road.

Scouts (ARS).—15 June, 7.30 p.m., Baden Powell House, Queensgate, South Kensington, SW7.

Sidcup (CVRS).—15 June (Natter Nite), 8 p.m., All Saints Church Hall, Bereta Road, New Eltham.

Slough (SDR Group).—First Wednesday every month, 8 p.m., United Services Club, Wellington Street.

South London Mobile Club.—10 June, 7.30 p.m., Clapham Manor Baths, SW4.

Southgate & District.—8 June, 7.30 p.m., Parkwood Girls School (behind Wood Green Town Hall).

St. Albans (Verulam ARC).—21 June ("Oscilloscopes in the Ham Shack"), 7.30 p.m., Cavalier Hall, Watford Road, St. Albans.

Sutton & Cheam (SCRS).—20 June, 8 p.m., The Harrow Inn, High Street, Cheam.

Welwyn (Mid Herts ARS).—8 June (Preparing for V.H.F./NFD), 8 p.m., Welwyn Civic Centre, Welwyn.
Wimbledon (W & DRS).—9 June, 8 p.m., St. George's Road, Wimbledon, SW19.
Wembley (GECARS).—Every Thursday, 7 p.m., visitors Telephone ARNold 1262. This Club is now open to non-GEC Employees by invitation. Sports Club, St. Augustin Avenue, North Wembley.

REGION 8

Crawley (CARC).—14 June (Informal for details contact G3FRV), 28 June, 8 p.m. ("DX on Top Band" W1BB taped lecture), Trinity Congregational Church Hall, Ifield.
Worthing (W & DARC).—13 June ("Simple Printed Circuits for the Home Constructor," by G6KFH).
Mid-Sussex (M-SARS).—7 June (Informal), 8 p.m., Lindfield Primary School, Nr Haywards Heath. 21 June ("Mobile/Portable evening," 8 p.m., at Jack and Jill Windmills, Clayton, on B2036 NGR TQ 303,135).
Medway (MARTS).—19 June (Lecture, by K. W. Electronics Ltd.)

REGION 9

Bath.—23 June, 7.30 p.m., RNR Training Centre, James Street West, Bath.
Bristol.—23 June, 7.30 p.m., Transport House, Victoria Street, Bristol 1.
(BARC).—Mondays and Thursdays, 7.30 p.m., 43 Ducie Road, Barton Hill, Bristol 5.
Burnham-on-Sea (B-o-SARS).—Second Tuesday in each month, 8 p.m., Crown Hotel, Oxford Street, Burnham-on-Sea.
Camborne (CRAC).—First Thursday in each month, Staff Recreation Hall, SWEB Headquarters, Pool, Nr. Camborne.
(CRAC V.H.F. Group).—First Thursday in each month, 7.30 p.m., The Coach and Horses, Ryder Street, Truro.
Exeter.—First Thursday in each month, 7.30 p.m., George and Dragon Inn, Blackboy Road, Exeter.
Plymouth (PRC).—Tuesdays, 7.30 p.m., Virginia House, Bretonside, Plymouth.
Saltash (S & DARC).—Tuesdays, 7.30 p.m., 16 June (Discussion on forthcoming Mobile Rally), 30 June (Evening Out, Barbecue), Burraton Toc H Hall, Warraton Road, Saltash.
South Dorset (SDRS).—First Friday in each month, 7.30 p.m., Labour Rooms, West Walks, Dorchester.

Taunton.—Alternate Thursdays, 7 p.m., Leature Theatre, Taunton Technical College.
Torquay (TARS).—Last Saturday in each month, 7.30 p.m., Club HQ, Belgrave Road, Torquay.
Wells (WARS).—Mondays from 8 p.m., EMIE (Wells) Sports and Social Club, Chamberlain Street, Wells, Somerset.
Weston-super-Mare.—First Friday in each month, 7.30 p.m., Technical College.
Yeovil.—(YARC).—Wednesdays, 7.30 p.m., Park Lodge, The Park, Yeovil.

REGION 10

Blackwood (ARC).—Fridays (Lecture programme, with section devoted to RAE, 7.30 p.m., Blanche Cottage, off High Street, Blackwood, Mon.
Cardiff (RSGB Group).—Monday, 12 June, 7.30 p.m., ("Introduction to Transistors," by D. M. Thomas, GW3RWX), TA Centre, Park Street, Cardiff.
Port Talbot (ARC).—Tuesday 27 June, 7.30 p.m., Trefelin Workmen's Institute 8-10 Jersey Street, Port Talbot.

REGION 11

Llandudno (CVARC).—15 June (AGM and NFD Settlement), 7.30 p.m., Cross Keys, Madoc Street, Llandudno.

REGION 13

Edinburgh (LRS).—8 June ("Radioastronomy," by I. W. Sheffield, GM3VEI), 22 June, YMCA South St. Andrew Street, Edinburgh.

REGION 14

Ayrshire (AARG).—7, 21 June, 7.30 p.m., Seaforth House, Seaforth Road, Ayr.
Auchenharvie (A & DARS).—8, 13, 15, 20, 22, 27, 29 June, 7.30 p.m., Auchenharvie Community Centre, Stevenston.
North Ayrshire (NAARC ATC).—11 June, 7.30 p.m., Ardrossan ATC, The Academy, Ardrossan.
Glasgow RSGB Group.—9, 23 June, 7.30 p.m., Christian Institute, Bothwell Street, Glasgow.
Glasgow University (GURC).—14 June (AGM), 7.30 p.m., Engineering, North Building, University of Glasgow.
Greenock (G & DARC).—16, 30 June, 7.30 p.m., Arts' Guild, Campbell Street, Greenock.
Motherwell RSGB Group.—16 June (Schoolboy's Night), 7.30 p.m., Carfin Hall, New Stevenston, Motherwell.

REGION 15

Belfast and District RSGB Group.—Third Wednesday in each month, 8 p.m., War Memorial Building, Waring Street, Belfast.

REGION 16

Basildon (BDARS).—Details from G3IJB.
Chelmsford (CARS).—4 July, 7.30 p.m., Marconi College, Arbow Lane, Chelmsford.
Colchester (CARC).—Meetings each Wednesday during term, 7 p.m., Room 40, Colchester Technical College, Sheeper Road, Colchester. RAE class, Tuesday evenings. Details from G3SJO.
Great Yarmouth.—Fridays, 7.30 p.m., The Manager's Office, the Old Power Station, Swanstons Road, Great Yarmouth.
Ipswich (IRC).—16 June (Visit to a Ship), 28 June ("Air Traffic Control," by J. Lockwood), Red Cross HQ, Gippeswyk Hall, Ipswich.
Norwich (NARC).—Meetings every Monday, 7.30 p.m., Old Lakenham Hall, Mansfield Lane, Norwich.

REGION 17

Harwell AERE (ARC).—Third Tuesday in the month, 7.30 p.m., Social Club, AERE Harwell.
Portsmouth (P & DRS).—Wednesdays, 7.30 p.m., Room 5, Twyford Avenue Community Centre, Portsmouth.
Southampton (RSGB Group).—Second Saturday in the month, 7 p.m., Engineering Lecture Theatre, Lanchester Building, The University, Southampton.

RSGB NATIONAL MOBILE RALLY

SUNDAY 9 JULY 1967

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Grafton Radio Society—21st Anniversary Celebration 15 April 1967

Wednesday, 12 April, 1967, was the Twenty-First Anniversary of the inaugural meeting of the Grafton Radio Society, and in order to celebrate this milestone, the Committee organized a Buffet Dance which was held at Beale's Restaurant, Holloway Road, N7, on Saturday, 15 April. Among those present were G2AHB (Founder and Vice-President), G2CJN (President), G2DCU, G2FRP, G3AFC (Vice-President), G3FAA, G3HNB, G3ICT, G3IES, G3JVV, G3KDH, G3KGC (Vice-President), G3KQZ, G3KRH, G3LBM, G3LXP, G3ONS, G3ONY, G3PIH, G3PRK, G3PWM, G3RJN, G3SIL (Hon. Sec.), G3VUE (Hon. Asst. Sec.), G3VYF, G6HW, G8FD, and a number of SWLs, as well as several XYLs and YLs. G2AAN (Vice-President), G3MFO, G3RX (Vice-President), and G3THQ were to have been present but were unavoidably prevented from attending, while G3BWQ, G3MMC and G8PL all had previous commitments—all sent their apologies.

Many of the older members present had left the district and had not seen each other for very many years—and to them this was quite a reunion.

The high-spot of the evening was when the President, Bert Wennell, G2CJN, received a presentation in appreciation of his 21 years' service as an Officer of the Society. It took the form of a digital clock mounted on a wooden plinth with an engraved plaque on the front. Pat Beresford, G3AFC, who made the presentation on behalf of the members, referred to the various positions which Bert has held over the years—Honorary Chairman, Honorary Secretary and Treasurer, Honorary Secretary, Honorary Chairman again, and now President—a really fine record, now permanently enscribed on the plaque. After saying a few words of thanks for this totally unexpected gift, the President then called on the Society's Founder, Bill Jennings, G2AHB, to say a few words. Mr Jennings congratulated Bert on his Twenty-One-Year record, and then spoke of the teamwork of the various committees through the years which was the foundation of a smooth-running and successful club, as Grafton undoubtedly was and is. He concluded by saying that he hoped that he, and all the others present, would still be around to celebrate the second 21 years.

Spot-prizes and a raffle completed what everyone agreed was a very enjoyable and memorable evening.

The presentation of a digital clock to Bert Wennell, G2CJN (right) by Pat Beresford, G3AFC (left) during the 21st Anniversary Celebrations of the Grafton Radio Society.

Clubroom

(Continued from page 411)

Stratford-upon-Avon and District RC is pleased to report that following widespread publicity in the Amateur Radio press last month, the club's projector lens has been recovered. It was accidentally included in a box of junk sold to an SWL at the last Junk Sale! During April, a "Boaster's Evening" was arranged—presumably for verbose members—when they were each permitted five minutes to brag about their latest contraptions. *G3RPJ.*

Surrey RCC has, after careful maths, decided to raise the annual sub from 5s to 10s while retaining the 5s sub for members under the age of 18 on 1 May. *G3KGA.*

Mid-Sussex ARS. The first April meeting proved most interesting when Mike Sutcliffe described his G3HTA receiver. The second meeting proved even more interesting, when John Andrews, G3RMY, spoke on s.s.b., and his version of the G3MVZ transistorized transmitter. *G3RXJ.*

Sutton Coldfield RS met on 13 March to hear a lecture on RTTY by Pat Darragh, G3MNV. A stand at Drayton Manor Mobile Rally was well supported by an excellent turn-out of Society members. *G3LNN.*

University College of Swansea RS will be holding a Top Band D/F hunt on the Gower Peninsula on 11 June for about two and a half hours commencing at 2.30 p.m. The fox will transmit on a frequency between 1·87 and 1·9 Mc/s, with talk-in stations on 1·918 and 144·49 Mc/s using the calls GW3SRG and GW5ZL respectively. Further details and a map of the rendezvous points are obtainable from the club secretary on receipt of a 4d stamp. *GW3UWS.*

Ray Hills, G3HRH, visited **Verulam ARC's** April meeting and demonstrated his excellent solid-state v.h.f. receiver. Disarmingly described by Ray as "containing absolutely nothing original" the receiver turned out to be a masterpiece of ingenuity combining the best features of dozens of previously published circuits in an incredibly small space. Making use of several ready-built circuit modules, suitably modified, this 2m receiver includes such "goodies" as triple conversion, amplified a.g.c., d.c.-tuned b.f.o., noise limiter, S-meter and battery check, and fully stabilized 7V supply regulation—all inside an Eddystone diecast box!

G3HRH showed a companion transmitter of similar dimensions and these two units are used by him as a mobile installation which fits the glove box under the central armrest in his car.

A suggestion that the club might meet fortnightly, instead of monthly as at present, was well-received by a majority of members at the April meeting and the committee is working on arrangements to give this a try. *G3GJX.*

Westmorland RS is the new club name of the Kendal Radio Society which now has a membership of 22. There are, however, a number of licensed amateurs in the Westmorland area who the Society would like to see along. Meetings are now held at 7 p.m. on the first and third Fridays of the month at the Allen Technical College (Annex), Sandes Avenue, Kendal. *G3UEC.*

Wirral ARS has a full programme arranged for June, which includes a Fox Hunt on 21 June and a visit to the Port Radar Station of the Mersey Docks and Harbour Board on 24 June. *G3PXX.*

Gt. Yarmouth and District RC took part in the Gorleston Trades Fair from 8 to 15 April. Operating was confined to 21 Mc/s and it was fortunate that this band was reasonably open during this period. The theme of the exhibition was "The Commonwealth." Members and prospective members should note the address of the new QTH at 98 South Market Road, Gt. Yarmouth. *G3HPR.*

Newsletters were also gratefully received from the North Kent RS, Southgate RC, South Shields and District ARC, Sutton and Cheam RS, Swindon and District ARC, Mid-Warwickshire ARS, Wimbledon and District RS and the Wolverhampton ARS.

It would assist the compiler of clubroom if reports could be typed double spaced and concise in content. If you use long hand please print unusual words.

LOOKING AHEAD

13 August.—Region 1 (NW) V.H.F. Field Day.

26 September.—Electronics, Instruments, Controls and Components Exhibition and Convention, Belle Vue, Manchester.

27-30 September.—RSGB International Radio Engineering and Communications Exhibition, New Horticultural Hall, Vincent Square, SW1.

K.W. Corner

Dartford, Kent

Dear O.M.,

As I write this, summer seems to have arrived with a rush—makes one think of new antennas and towers, N.F.D., Rallies, portable and mobile operation. It may be of interest to know we carry a large stock of Mosley and Hy-Gain Beams and Verticals, also the Hustler Vertical which I mentioned a couple of months ago. We had very satisfactory results from this antenna on all bands using no radials—only a 6 ft. earth stake driven 4 ft. into the ground, the top 2 ft. being used for the antenna base mounting clamps. The outer of the 52 ohm co-ax cable is connected to the stake and the centre conductor to the antenna feedpoint. In the assembly instructions, details are given on how to make wire radials and these were also tried with a very slight improvement in the performance. Of course ground conductivity plays an important part in the performance of any vertical antenna. The Hustler 4-BTV covers 10 to 40 metres and with the top loading section extends the range to 80 metres and the overall height of this would be approximately 25 ft. The cost of both sections is about the same as the Hy-Gain 18 AVQ which is well-known for its 10 to 80 metre performance. Then there is the 3 BXI Tower which we can supply for mounting your beam antennas and CDR rotators. CDR have been in the rotator business longer than most in the U.S.A. and I was interested to read recently of comparisons done with the AR22 model with two other popular brands in the same price range.

One fact impressed me was the figure for stall torque where 525 in. lbs. was quoted for the AR22 against 115 in. lbs. for the nearest competitor. There is also the design factor where CDR use a weather proof bell casing. The weather sealings on the others were, on tests, found to be doubtful. The degree of ruggedness is impressive in the CDR model especially in the heavy spur and pinion gear arrangement. It is also interesting to note that CDR have a range of four models from the " Ham-M " priced at £61 to TR11A at £12 and it is important that the right type of rotator be used for the job. We should be pleased to advise on these matters.

In the range of mobile whips, we stock Webster, Hustler and Hy-Gain, also the British made G3FIF. There is only one U.S.A.-made whip which covers 160 meters and this is the Webster "Big-K". In the case of the Big-K and G3FIF, separate loading coils are necessary for each band. For those of you who are interested in portable operations, have you thought of purchasing a second mobile whip to make a horizontal rotorable dipole? The two whips both fitted with, for example, 20 metre loading coils can easily be mounted horizontally on a small " T " piece and erected on a length of tubing. The feed impedance for such an arrangement would be approximately 75 ohms.

Another point of interest this month is that we have made alternative arrangements with a Finance Company for better H.P. terms and these are particularly reflected in smaller amounts borrowed, that is below about £80. Also we can now offer credit sale terms which require only 10 per cent deposit followed by nine monthly payments. This arrangement may suit some readers where funds for the larger H.P. deposit are not available.

We now have a new linear amplifier in production, the KW1000 which although primarily designed for the North American market looks like becoming popular in many European countries and other places. This is being offered in addition to the popular KW600, another batch of which is being made right now. We are also putting into production a KW Vespa Mark II which will be very competitively priced for its 220 watts P.E.P. rating. Another batch of the standard model KW Vespa is also being made at our works and it is our intention to carry on making both models. Other equipment is under development and I shall keep you informed of our activities.

Yours faithfully, **ROWLEY SHEARS** Sgd.
Managing Director, G8KW

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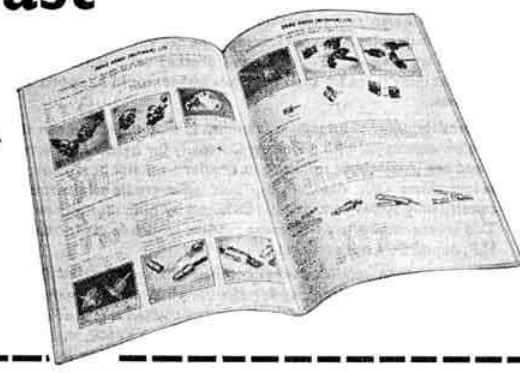

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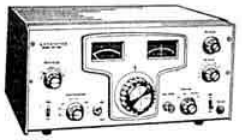

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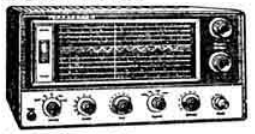

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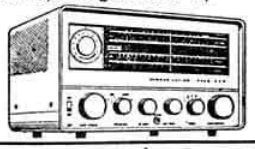

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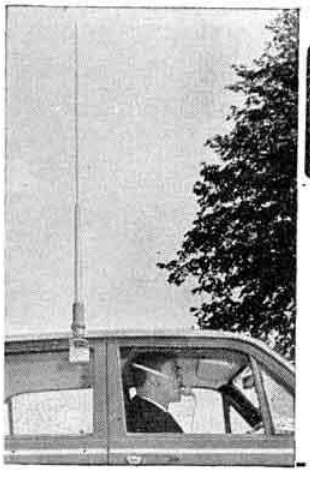

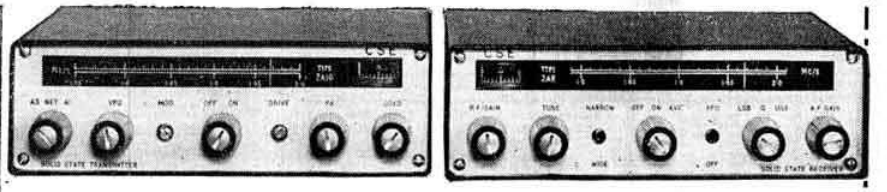

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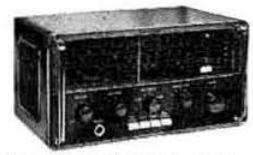

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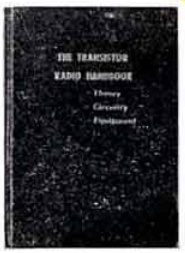

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E1415	30/-	ESU74	80/-	PCL85	8/6							6V6G	5/-	38	4/-	3EG1	40/-
E1524	12/6	ESU208	6/-	PCL86	9/-							6V6GT	7/6	42	5/-	5PC1	30/-
EA50	1/-	EY51	5/6	PEN25	4/6							6V6M	8/-	2158G	6/-	5FP7	25/-
E173	7/-	EY86	6/6	PEN46	3/-							6X4	3/6	50L6GT	8/-	880	80/-
EABC80	5/9	EY91	3/-	PEN200A	3/-							6X5G	5/-	53A	7/6		
EAC91	3/6	EZ40	6/6	PFL200	17/6							6Z5GT	5/3	57	6/-	**Photo Tubes**	
EAF42	8/-	EZ41	6/6	PL36	9/-							6Y6G	8/-	58	6/-	GS16	12/6
EB34	1/6	EZ80	5/6	PL38	16/-							6-30L2	10/-	59	6/-	931A	62/6
EB91	3/-	EZ81	3/6	PL81	7/-							6Z4	5/-	75	5/6	6097	350/-
EBC23	6/-	F/6057	5/-	PL82	5/-							7B7	7/6	76	5/-		
EBC41	8/6	F/6061	5/-	PL83	6/-							7C5	10/-	77	6/6	**Special Valves**	
EBC81	5/-	F/6063	4/-	PL84	6/6							7C6	7/-	78	5/-	ACT6	£8
												7C7	6/-	80	5/6	CV1031	£3.10.0

TRANSISTORS

OC16	20/-	OC81D	3/6	OC201	8/-	XC141	10/-		
OC22	23/-	OC81M	5/-	OC202	13/-	XCC15512/6			
OC25	9/6	OC82	8/-	OC203	12/6	XCC15615/-			
OC35	12/6	OC82DM	3/6	OC204	12/6	XC156	22/6		
OC44	4/6	OC83	5/-	OC206	22/6	2N247	9/6		
OC45	3/6	OC83B	5/-	AAZ12	6/-	2N412	7/6		
OC71	4/6	OC122	5/-	ACY28	4/6	2N585	10/6		
OC72	5/-	OC170	5/6	BCZ11	7/6	2N1090	7/6		
OC73	8/6	OC200	10/6	BY38	7/6	2N1091	9/6		

QS150/15	10/-	VR150/30	5/-	5B254M	40/-				
QS1202	8/-	VU39	8/-	5B255M	35/-				
QV04/7	8/2	VX8122	5/-	5R4GY	9/-				
R3	8/-	VX8124	5/-	5T4	7/-				
R10	5/6	W21	5/-	5U4G	4/6				
RG1-240A	25/-	W118	8/-	5V4G	8/-				
RK72	6/-	W119	9/-	5X4G	8/6				
S23	7/-	X65	5/-	5Y3GT	5/-				
S130	25/-	X76M	7/6	5Y3WGTB	9/-				
SL30P	15/-	X66	7/6	5Z4G	6/6				
SP2	8/6	X118	8/-	5Z4GT	8/-				
SP41	1/6	X145	8/-	6AB6	4/-				
SP61	1/6	Y63	5/-	6AC7	3/-				
SP210	6/6	Y65	4/-	6AG5	2/6				
STV280/40	24/-	Z24A/1K	100/-	6AG7	6/-				
PZ1-35	8/-	Z800U	20/-	6AH6	10/-				
SU2150A	10/-	Z801U	10/-	6AJ7	2/-				
S11G12	10/-	Z900T	12/-	6AK5	5/-				
TDOX-20	70/-	1A3	8/-	6AK7	6/-				
TP22	5/-	1A5GT	5/-	6AK8	5/9				
TP25	15/-	1B22	30/-	6AL5	3/-				
TT11	5/-	1C5GT	6/-	6AL5W	7/-				
TT15	35/-	1D8GT	6/-	6AM5	2/6				
TTR31	45/-	1E7G	7/6	6AM6	4/-				
TZ0520	4/-	1F2	2/6	6AQ5	7/-				
TZ40	40/-	1G6GT	6/-	6AQ5W	9/-				
TZ20	16/-	1L4	2/6	6AS6	4/-				
U81	30/-	1LA6	6/-	6AS7G	15/-				
U12/14	8/-	1LC6	7/-	6AT6	4/-				
U17	5/-	1LH4	4/-	6AU6	6/-				
U18	6/-	1N21	3/6	6AX4	8/-				
U25	13/-	1N21B	4/-	6B4G	17/-				
U26	13/-	1N43	4/-	6B7	6/-				
U27	8/-	1N70	4/-	6B8G	2/6				
U52	4/6	1R4	5/-	6BA6	5/-				
U191	11/6	1S4	5/-	6BA7	5/-				

MANY OTHERS IN STOCK include Cathode Ray Tubes and Special Valves. U.K. Orders below £1 P. & P. 1/-; over £1, 2/-; over £3, P. & P. free. C.O.D. 2/6 extra. Overseas Postage extra at cost.

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29/41' AERIALS each consisting of ten 3', ⅞" dia tubular screw-in sections, 11' (6 section) whip aerial with adaptor to fit the ⅞" rod, insulated base, stay plate and stay assemblies, pegs, reamer hammer etc. Brand new, complete, ready to erect, in canvas bag, **£3.9.6.** P. & P. 10/6.

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IF UNDELIVERED Return to:— RSGB, NEW RUSKIN HOUSE, LITTLE RUSSELL STREET, WCI