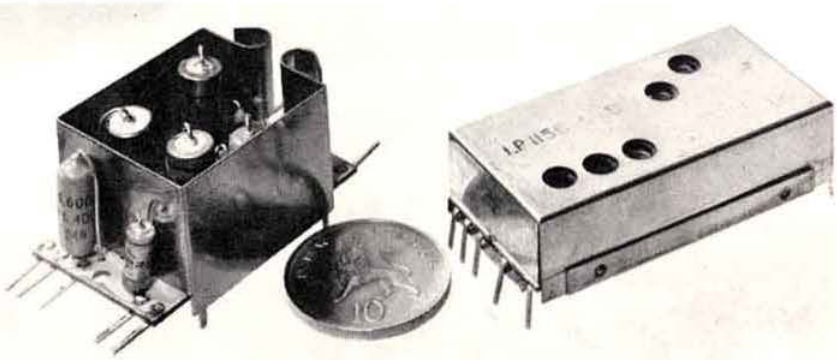
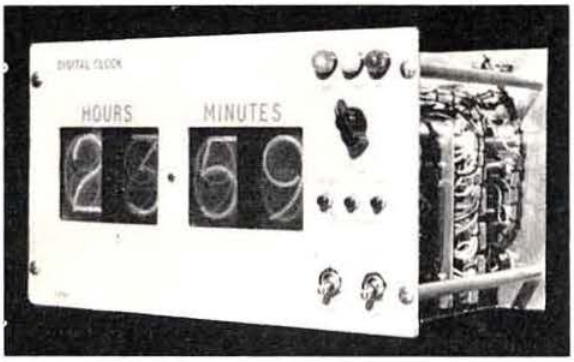
MAY 1969

RADIO COMMUNICATION

Included in this issue





Journal of the Radio Society of Great Britain

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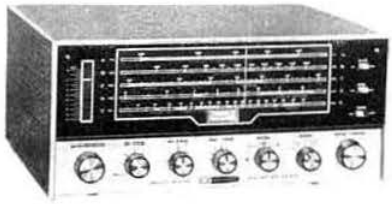
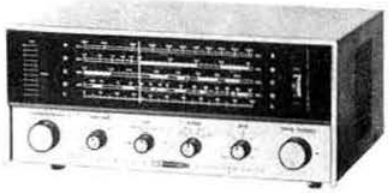


5 Band SW Receiver. GR-54 kit. **£44.16.0.** Carr. 9/-.



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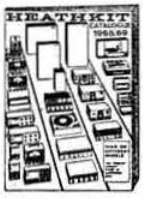

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First of all let me apologize for last month's ads—I just went on and on and on. The poor old printer didn't have small enough type to get it all in! Sorry, lads, I'll try and be a bit briefer this month. Concentrate more on flogging. Incidentally, some people have asked me "Now look here, Bill Lowe, if the stuff you flog is so damn' good, how come no-one else sells it?" This is a fair question and warrants a fair answer. In the case of Sommerkamp —quite a few people advertise it besides myself. Sommerkamp hold the European Agency and any dealer can order through him. Snags: (1) you have to order in at least dozen lots; (2) You have to pay cash in advance, and (3) the 50 per cent temporary import levy. These combine to put off the vast majority of dealers. When I first started out and money was tight, I couldn't afford big orders either so I passed on many a Sommerkamp at cost just in order to get cash into the till quickly. That's why at one time a lot of dealers were handling it, they got it from me. Now, I have managed to raise more capital and can buy in bulk and don't have to pass it on to the trade. With regard to Star and Inoue, the position is much the same except that in this case I import directly from Japan and have to order in even larger amounts. From your point of view this is a Good Thing because instead of paying a rake off to the European Agent, another to the U.K. Agent and a third to the Dealer, you only fork out one massive rake off to me (Ha, Ha he shrieked, saliva drooling, mine, all mine). Actually my rake-off is not so damn' big. You obviously don't believe that—so will you believe this—I have fixed the selling price high enough to give myself a profit but such a small profit as to effectively prevent the big boys from taking over, simply because it is not worth their while. That's why I don't give discounts and also of course, why I can't wholesale to the trade—there just isn't enough profit in it. Enough for one yes, but not enough for two. So, Gentlemen, when you buy your Inoue, you are getting it pretty cheaply. The alternative to what I have done is to fix the price to allow me to supply to the trade at an attractive discount. Then, of course, everyone would be selling it. It would naturally cost you a lot more, but there you go, that's what happens. I haven't done this (good old Honest Bill) simply because I haven't the capital to go into the wholesale business. And if I had, I wouldn't, because there's always someone ready to tell the factory that they can sell more and they should have the Agency, not Bill Lowe and so on and so on. If the profit is big enough, it'll attract the Big Boys and I'm hopeless with a knife. No, I'll just take a small profit and business which doesn't attract the City Slickers. Right, Sir, does that answer your question? So when I say I believe my stuff to be best value I'm not just whistling. Let's look at it—

SOMMERKAMP:

The FR-500 receiver. I don't know whether it will bring you Ultimate Performance or Perfection or some such advertising nonsense, but I do know that you won't get a receiver as good at anywhere near the price. It covers top band to 10. 3 segments of 10 provided as standard and we have the xtals for the fourth segment (29.5–30·1) in stock as an optional extra at 35/- if you want it. It has ceramic transfilters for AM. These are the things that some advertisers call "mechanical filters for superb selectivity." This is of course, complete nonsense—they're not bad but they're not proper mechanical filters. A proper mechanical filter 2·4 kc/s wide with 6/60dB shape factor of better than 2 to 1 is provided for SSB and for CW this filter is backed up by a single xtal filter. It has a notch filter, switchable sidebands (xtal controlled) ½ microvolt sensitivity, 1 kc/s readout. In short it is a very good Rx indeed and nothing can touch it at £130.0.0.

The companion Tx, the FL-500 is equally as good—it does not however, cover Top Band. This stuff is so well known and popular that I don't have to say any more. The FL-500 is £145.0.0.

In the transceiver line, I can show you the complete Sommerkamp range:—

The FT-150. Mobile or fixed station. Both 12v dc and 240V ac supplies built in. All transistor except driver and PA. All bands 80-10, all of 10. For anyone going mobile—quite honestly you don't have any choice. For fixed station, fine, but you are paying for a dc psu you're not using. At all events, here again it is so well known that I need say no more. £215.0.0.

The FT-500. Big brother. ("My brother Sylvest' bigga da muss," etc. as the old Music Hall song says). 500 Hairy watts pep input. Built in psu 80 to 10 (all of 10). Gentlemen—10/- a watt. £250.0.0.

The FT-250. We have the first in the country at the moment (March). Whether we'll have any more by the time you read this, I don't know. Anyway, it's a nice little rig—supplied less psu at £160.0.0. I don't think you'll beat this price. Most chaps can rustle up a psu (if you can't we can fix you up) and for £160.0.0 you get a tip top 9 mc/s crystal filter rig covering 80-10 (all of 10 of course) with 200W pep input. Better than ½ micro volt sensitivity for 10dB S + N/N ratio. The filter shape factor is an incredible 1·61 to 1 and the size a very compact 13 × 6 × 11 in. deep, (smaller actually than the FT-150). The tuning, 15 kc/s per turn is slow enough for anyone and construction is the usual high standard. Better get your name on the waiting list! Price once again, an incredible £160.0.0 ready built.

OPTIONAL EXTRAS: There aren't any. *All the above Sommerkamp transceivers* have fitted as standard:

VOX, xtal calibrator, independent receiver tuning plus or minus 6 kc/s, and switchable sidebands.

The only thing I can think of to compete with this new Sommerkamp rig is the Inoue IC-700 series.

For £180.0.0 you get a complete Rx, Tx and psu. The Tx, although separate uses the Rx vfo and acts as a transceiver with of course, receiver independent tuning plus or minus 5 kc/s.

The Rx is all transistor, 12V dc or 240V ac. Single conversion, 9 mc/s xtal filter. FET's widely used. This is a very quiet very sensitive Rx free of birdies which at £85.0.0. is real value for money. All I say is—try other Rx's around this price, particularly transistor efforts, then try the Inoue IC-700R. If you are a listener hoping to get a licence, you can always add the Tx and psu later—another £95.0.0 and you're on the air. Not only on the air, but on the air with a beautiful signal. The companion Tx is transistor except for vfo mixer, driver and PA (2 × 6146B). I'd like to note that it uses a pair of 6146B's operated for a very conservative 150W pep. Result: long life, clean signals and no offensive spurii.

If you are thinking of a rig, one of the above should fit the Bill. Why not drop in and cast a bloodshot optic over them, take a long butcher's at the circuit diagrams and generally delve. We'll be happy to hook any of them up for you.

Enough of new stuff—let's push some secondhand bits. Actually, we've always got a pretty good stock of s/hand items but it changes so fast we have a job keeping up. Not much point giving details now (in March) because sure as eggs are eggs, the item *you* want will be sold. However, we've still got a few Noise Generators left. These are beautiful things—plug your audio into 'em, plug the rf into your Rx (switchable 43, 75 or 400 ohms). Twiddle the knobs as per complete instructions provided and read off your Noise Figure directly in dB's. We have, however, found one very big snag and that is that these things tell the truth. Old Harry's favourite converter which he lashed up himself and which he swears blind has a NF of less than 2dB turns out, according to these noise generators which I understand are made by Marconi, to be around 4½ dB. Now Harry is an expert, he knows far better than Marconi, and quite obviously the Noise Generators are no good. For chaps like Harry we will if you wish, butcher the noise generators to make them read what the heck you like—then you can proudly demonstrate your home made converter with its less than 1dB NF. Price £12.10.0.

Anyways—lots of s/hand stuff chaps. Drop us a line and we'll send you lists. You will of course, enclose a sae—a big 'un is best!

In the new line, our 2m converters seem to be catching on. Rather nice 4 valve efforts—twin triode cascode rf—IF 28-30 mc/s. They require 6·3V ac and 150-200V dc. A local VHF fanatic was very dismayed to find they outperformed his latest "state of the art" device, which he had constructed with loving care and which outperformed anything on the market. Not any longer ole buddy! ! At £10.0.0 you can't go wrong. We have also 15 and 10m versions with a 5 mc/s IF at £7.10.0 each.

SUNDRIES:

Teisco DM-501 dynamic microphone, high impedance	£2 15 0
Plain morse keys, polished brass with ball bearing pivots	18 6
C.W. Practice sets, key plus buzzer	15 0
Bug keys	£4 0 0
Katsumi C.W. Monitors, high speed relay, built in with spare contacts for break in CW	£7 15 0
AR88D manual reprints	15 0
VHF/UHF 50 ohm dummy loads	£2 10 0
COLLINS 5 cycle VFO's, one left	£35 0 0

Tubular trimmers, ½-5pF or 3-15pF 1/- each or 10/- dozen. Feedthroughs, 500V 1000pF screw type, 1/- each or 10/- doz. Standard Belling Lee coax plugs, metal, 1/4 sockets, 1/-. Octal B7G or B9A plugs 2/6 each. SE-05 1000 piv 500mA rectifiers, the ones you can trust, 4/6 each. Panel indicator lamps for standard lilliput bulbs, red or green, 2/6 each. Lilliput bulbs 1/- each. PL259 plugs 5/- each. Reducers 1/3 each, sockets 5/- each. I have a very nice line in brand spanking new capacitors. Top quality at junk prices.

ELECTROLYTICS:

Can type with mounting clips.
100mF/350V 5/6; 100-100mF/350V 6/8; 100mF/450V 7/2; 40-40/500V 7/3; 100mF/500V 7/9; 100-100/450V 13/2.
Minute low voltage types:
16mF/16V 8d each, 7/- doz; 10mF/16V 6d each, 5/- doz; 100mF/12V 8d each, 7/- doz; 100/12V 6d. each, 5/- doz; 33mF/16V 8d. each, 7/- doz; 100mF/16V 1/- each, 10/- doz.

TANTALUMS:

4/38V, 10/12V—all at 1/6 each. Believe it or not lads, these are normally around the 12/6 mark!

DISCS:

·01/500V 6d. each, 5/- doz; ·001/500V 4d each, 3/6 doz; 50V types ·002, ·005, .01 3d each, 2/6 doz. ·02, ·05 4d each, 3/6 doz.

SWITCHES:

DPDT slide switches 2/-.

KNOBS:

2⅜ in dia. fluted, 2/-. AR88 type, 1⅜ in. 1/6, 1·5/16 in. 1/3.
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300 ohm twin feeder, good for 200W, 6d. a yard.

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"Marksman"—25W	£1 11 6
"Marksman"—25W kit with solder, 2 spare tips and soldering aid.	£2 1 6

All the lovely new stuff can also be inspected at Alan Whitford's, G3MME, 37 Chestnut Drive, Polegate, Sussex. Telephone No. Polegate 4659, evenings and weekends for those who can't get over to Matlock. If you can't get over to either Alan or myself, send me a sae and I'll send you my latest lists.

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73, The Bandit, VE8DP/G3UBO

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KITS **CHINNOR, OXON**

NEW. Complete 2 metre transmitter. 6BH6, 6BH6, QQVO3-10, QQVO3-10: Metered. 6 or 12 volt heater. Built into case 6 in. × 5 in. × 6 in., **£19 18 6d.**, inc. spare set of valves and 8 MHz crystal. Delivery 21 days. Less P.S.U. and Mod.

QQV03-10.2 metre TRANSMITTER KIT
6BH6-6BH6-QQV03-10-QQV30-10. 6 or 12 volt heaters. Inc. Valves AE relay 6 or 12 volt. Less Crystal 8 MHz. Modulator. PSU & Chassis. Delivery 7 days. Postage 3/6 **£4 17 6**

4 metre version. As above. Delivery 21 days.
2 metre transmitter kit. 6BH6—6BH6—QQV03-10—QQV03-20a. 6 or 12 volt heaters. Includes AE relay, 6 or 12 volt; and kit of spare valves. Full circuit and point to point wiring instructions. Items not included: Chassis Crystal (8 MHz), Modulator or PSU Delivery 7 days. Postage 4/6 **£12 18 6**
Or less spare set of valves: £9 18 6.

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Skeleton mains power unit kit. Primary 100 to 240v AC. Sec 500v at 350 ma, 50v at 50 ma and 6.3 at 6 amp. Transformer, 4¾ × 4 × 4 plus 1½" under chassis. 2 chokes, Bridge rectifier (solid state) complete plug in unit. C's & circuit. Postage 10/6 **£5 15 0**
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MOBILE SOLID STATE MODULATOR KITS

NEW. Skeleton QQVO3-10/OC35-NKT404 Transistor Mod. kit. Transformers and P.P. Output transistors, inc. heat sinks and circuit. Postage 3/6 **£1 17 6**
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QQVO3-20a as above. Postage 4/6 **£2 17 6**
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De Luxe 12 volt input. 15 watts output. Pre-tested wired and dipped printed circuit boards. OC700a and OA81 limiter. NKT 224 emitter follower. NKT223a amplifier. NKT224 emitter follower. NKT404/OC35 driver. Push Pull NKT404/OC35 output. Complete with transformer (includes P.A. winding) to match QQV03-20a. Inc. tailored mike, press to talk 300-3500 Hz. Average *wiring* time 30 minutes. Less chassis Postage 6/6 **£7 17 6**

Standard Model 12 volts imput. 15 watts output. OC71 amp. OC72 amp. on pre-tested wired and dipped, printed circuit board. NKT 404/OC35 driver. P P. NKT404/OC35 output. Including transformer to suit QQV03-20a. Inc. tailored mike 300-3500 Hz. Less chassis. Postage 6/6 **£4 15 0**

QQV03-10 modulator and audio amplifier dual purpose kit, relay switched. OC 200 mod. compressor, NKT223 emitter follower, NKT223a Tx mod. amp and Rx audio amp. NKT 223s emitter follower. NKT404 Tx and Rx driver. P.P. NKT 404 Mod. and Audio output. Complete with transformers. Pre-tested wired and dipped printed circuit board. Inc. tailored mike, press to talk. 300-3500 Hz. Less chassis. Postage 4/6 **£4 18 6**

Built with selected radiotelephone components. All kits include instructions & circuits. Negative or positive earth. Delivery ex stock unless otherwise stated.

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HEAVY DUTY Postage 6/6 **£4 12 0**
DE LUXE DUAL Postage 6/6 **£6 18 6**
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NEW POPULAR
12 volt DC input. 300v DC 150ma output, or 175v at 100ma. Built on aluminium chassis 6 in. × 4 in. × 2½ in. with Toroidal transformer (2¼ in. × 2 in. × 1⅜ in.) mounted on top of chassis. Postage 4/6 **£6 18 6**

HEAVY DUTY COMPACT
12v DC in. 390v DC 200ma out.: or 160v at 145 ma. Built on chassis 8 in. × 5 in. × 2½ in. with Toroidal transformer (2¾ in. h. × 2½ in. w. × 2½ in.) and large heat sink mounted on top of chassis. Postage 6/6 **£8 18 6**

DE LUXE DUAL OUTPUT
12v DC in. 400v DC 200ma out plus 250v at 150ma: or 200v only, on relay version. Built on aluminium chassis 8 in. × 5 in. × 2½ in. with Toroidal transformer (3¼ in. h × 2¾ in. w. × 2¼ in.) and heat sink mounted on top of chassis. Postage 6/6 **£11 15 0**

All above available with inputs and outputs relay controlled at 37/6 extra. All units are fully fused. Transformers are completely potted. Negative or positive earth without change, complete and working with 3 months Guarantee. Delivery 21 days. Outputs are measured with mobile vehicles. With static vehicle they will be a little lower.

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2 metre converter AFZ 12 1st RF amp. AFZ 12 2nd RF amp: AFZ 12 osc-multiplier GEX 66 mixer: or equivalent transistors of equal performance. Built on printed circuit. Will operate from 8 to 14 volt neg. or pos. earth. Space inside case (5 in. × 2 in. × 6 in.) to take battery for portable use. IF adjustable from 12 to 29 MHz. Crystal supplied is in this band, but cannot be specified at this price. Low noise figure. Guaranteed for 3 months. Delivery 14 days. Postage 3/6 **£8 17 6**

Garex ABP70. Transistorised 70cm converter. GM0290a grounded base RF amp. GM0290a mixer. Two trough line circuits at 432 Mc/s. (Cathodeon) VHF crystal 4½ db.noise figure. Built on copper clad fibre glass laminate and housed in 4½ in. × 3½ in. × 2 in. diecast box. IF 28-30 MHz ex stock; 12 volt DC operation. Post paid **£14 17 0**

Marine Depth Finder complete ready built unit. Fully transistorised, 12v input. Postage 6/6 **£17 10 0**

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6V6/EL84pp to QQV03-20a Postage 4/6 **17 6**
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Transformers
NEW. Toroidal for transistor P.S.U. 2½ in. × 2 in. × 1⅜ in. 300 volt at 150 ma plus sec. tap. 12 VDC in. Potted, bridge rec. Inc. circuit. Postage 2/6 **£1 7 6**

Toroidal for transistor power supplies. With secondary tap up to 390V 200ma 12V. DC input. New 2¾h × 2½ × 2⅞ circuits provided. Postage 2/6 **£2 7 6**

Transformers Soil Heating 5v 10a underrated potted ceramic insulators new P. & P. 10/6 wt 14 lbs. **£1 5 0**
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Ferrite Pots. 0.6 high, 0.9 wide, **1/6** per doz. LA13 **7/6**, LA77 **4/6**, LA2702 at **2/6**. Postage 1/9

Resettable counters 5 columns 48v Postage 2/- **£1 10 0**

Capacitors 330 pf silva mica 2% box of 500 **£1 0 0**
0.1 350vwkg 1⅜ × ⅞ **3/-** per doz
0.05 350vwkg 1⅜ × ⅞ **1/-** per doz
type 660 moulded. All new
WIMA MKB2 4μf 250V **2/6**
WIMA MKB2 4μf 100V **2/6**

Slider Resistors
100 ohm 1¼ × ⅛ in. dia. 4 for **1/-**

Potentiometers
Professional type 1 meg. Log 1/- each, 10/- per doz. 1¼ dia. 1¾ overall inc. pins.

Valves QQV03-10 **6/6**
QQV03-20a/C1134 **38/6**
QQV06-40a/5B94 **£1 18 6**
TD03-5/DET 23. 2000 MHz Disc Seal triode **12/6**
ECC88 **5/0**, 6AM4 **8/6**, 12AX7 **3/6**, 6AQ5 **2/6**
EL84 **4/-**, EL38 **10/-**

Postage, large type 1/- & small type 6d each.

All valves guaranteed for 3 months

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GS 10 C's GS 10 B's

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Region 11.—North Wales.	M. Williams, GW3LCQ, "Dwyros", 12 Penrhos Avenue West, Llandudno Junction, Caerns.
Region 12.—North-East Scotland.	A. W. Smith, GM3AEL, 1 Sclattie Place, Bankhead, Bucksburn, Aberdeenshire.
Region 13.—South-East Scotland.	I. W. Sheffield, GM3VEI, 5 Sciennes, Edinburgh 9.
Region 14.—West Scotland.	N. G. Cox, GM3MUY, 191 Maxwell Avenue, Westerton, Bearsden, Glasgow.
Region 15.—Northern Ireland.	J. Thompson GI3ILV " Albany," Newry Road, Armagh, N. Ireland.
Region 16.—East Anglia.	W. J. Green, G3FBA, Meadway, Links Avenue, Brundall, Norwich, Norfolk, NOR 86Z
Region 17.—Southern.	C. Sharpe, G2HIF, 20 Harcourt Road, Wantage Berks.

HF CERTIFICATES MANAGER	C. R. Emary, G5GH, c/o RSGB HQ.
VHF CERTIFICATES MANAGER	F. E. A. Green, G3GMY, 48 Borough Way, Potters Bar, Herts.
FILM LIBRARY CURATOR	R. A. Cathles, G3NDF, 4 Dawnay Road, Great Bookham, Leatherhead, Surrey.
INTRUDER WATCH ORGANIZER	C. J. Thomas, GW3PSM, 59 Maendy Way, Cwmbran, Monmouthshire. NP4 1HW.
PUBLIC RELATIONS OFFICER	Mrs Sylvia Margolis, 95 Collinwood Gardens, Clayhall, Ilford, Essex.
QSL BUREAU MANAGER	A. O. Milne, G2MI, 29 Kechill Gardens, Bromley, Kent.
RECORDED LECTURE LIBRARY CURATOR	A. O. Milne, G2MI, 29 Kechill Gardens, Bromley, Kent.
SLOW MORSE PRACTICE TRANSMISSIONS ORGANIZER	M. A. C. MacBrayne, G3KGU, 25 Purlieu Way, Theydon Bois, Essex.
VHF MANAGER	G. M. C. Stone, G3FZL, 11 Liphook Crescent, Forest Hill, London, SE23

QTC

AMATEUR RADIO NEWS

The Post Office Bill

This Bill has currently been under examination by a Standing Committee of the House of Commons. Mr G. D. Wallace, MP, is a member of the Standing Committee, and has obtained clarification from the Postmaster General concerning a procedure that was not entirely clear.

Responsibility for licensing stations of the amateur service will pass to the Minister of Posts and Telecommunications by the terms of the Bill and the new Post Office Corporation will not be concerned with these licences. However the types of communication in which amateurs engage are within the monopoly of the Post Office Corporation and so a licence (from the Corporation) to infringe the monopoly will be needed as well as the licence from the Minister of Posts and Telecommunications to use radio.

The position is not as complicated as it might appear as the Bill contains a clause permitting the Corporation to grant "general" licences. Such a general licence will authorize all persons who hold the Minister's amateur licence to run systems in accordance with that licence and it is not intended that there shall be any charge for this. Therefore, although the mechanism has changed the individual amateur licensee will not be aware of any change when the Bill comes into effect.

Space Service Conference

The present position regarding the World Administrative Radio Conference dealing with space communication and radio-astronomy is that the date of this will not be known until after the meeting of the ITU Administrative Council which commences in Geneva on 3 May. This meeting will also decide the agenda and scope of the Conference.

The Society is well aware that there may be some pressure on the vhf and uhf allocations of the amateur service. Liaison is being maintained both with the UK GPO and the ITU at Geneva. The Space Conference will also be a major item on the agendas of the IARU Region 1 Conference which opens in Brussels on 5 May.

Trade Take Over

Jackson Brothers, the well-known component manufacturers, have bought the trade mark and manufacturing rights of Wavemaster variable capacitors from the Webb Condenser Company. They are producing most of the Wavemaster range and further lines will be added as opportunity offers.

RSGB Lecture Meeting

DX—Aurora or Sporadic-E? was the title of the symposium presented by three members of the Society's Scientific Studies Committee at a meeting held on Friday, 28 March at the Institution of Electrical Engineers, Savoy Place, London, WC2. The President, Mr J. W. Swinnerton, G2YS, introduced the speakers, Messrs R. G. Flavell, G3LTP, C. E. Newton, G2FKZ and D. Hayter, G3JHM. The various aspects of the subject were illustrated by slides and diagrams. In concluding the meeting, Dr J. A. Saxton, Director of the Radio and Space Research Station, thanked the speakers on behalf of the 70 members present.

Radio and TV Servicing Booklet

Those leaning towards a career in radio and television servicing might be well advised to obtain a useful new booklet published by the Department of Employment and Productivity. Entitled "Radio and Television Servicing," it outlines opportunities in the trade in all branches from domestic equipment to more advanced work. The booklet costs 1s 9d plus post from any branch of HMSO.

Affiliated Societies

The following Societies are now affiliated to RSGB:

THE QUEEN'S OWN CAMERON HIGHLANDERS WAR MEMORIAL BOYS' CLUB (RADIO SECTION), Planefield Rd, Inverness.
SECRETARY: W. M. Begg, 68 Tomnahurich Street, Inverness.

EXETER AMATEUR RADIO SOCIETY
SECRETARY: E. G. Wheatcroft, G3HMY, 27 Lower Wear Road, Countess Wear, Exeter.

BISHOP WORDSWORTH SCHOOL AMATEUR RADIO SOCIETY
SECRETARY: A. F. Vizoso, G3XUB, The Close, Salisbury.

BURNHAM BEECHES RADIO CLUB
SECRETARY: F. K. Hopkins, 27 Hampshire Avenue, Slough, Bucks.

SLOUGH COLLEGE OF TECHNOLOGY RADIO AMATEURS' CLUB
SECRETARY: E. C. Palmer, G3FVC, William Street, Slough, Bucks.

LUTON SIXTH FORM COLLEGE AMATEUR RADIO SOCIETY
SECRETARY: P. J. Moss, 81 Stockingstone Road, Luton, Beds.

NORTH RIDING AMATEUR RADIO GROUP
SECRETARY: J. S. Jones, G3VLM, 39 Seaview Drive, Scarborough, Yorks.

UNIVERSITY OF BRADFORD UNION RADIO SOCIETY
TREASURER: J. Hanson, G8AYJ, 26 Pemberton Drive, Bradford 2, Yorkshire.

Two Metre Foxhunt

A two metre foxhunt is being organized for 11 May by G3EMU and G3TDP. The start is at 2.30 p.m at the Motorway Cafe service area on the M2 Motorway near Gillingham in Kent. The fox will be G3EMU/M and he will call on the quarter hour on 144·32 MHz. He will be within ten miles of the start. A one inch map of the area should be used. There will be an entry fee of 2s 6d to provide a prize for the winner. Further details from G3TDP, A. Groombridge, Cavalry Farm, Stowting, Ashford, Kent.

Licensing Figures

Radio licensing stood thus on 28 February, 1969:

Amateur Sound (A)	13,115
Amateur Sound (B)	1,473
Amateur Sound Mobile (A)	2,591
Amateur Sound Mobile (B)	143
Amateur Television	184
Model Control	15,364

Stolen Equipment

The President of the Bristol ARC, Tom Boucher, G3OLB, has asked us to point out that his transmitter was stolen from his car outside the Bristol ARC Headquarters on Thursday, 6 March this year. The transmitter was for am and cw on 160 and 80 metres with a built-in 12 volt psu. It measured about 10 in by 9 in by 3 in and it has a black leatherette covered front panel with a bronze coloured, hammer finish, wrap around case. Anyone having any knowledge of this set is requested to contact the relevant authorities as soon as possible.

Million-air?

So you think you've got tvi problems? Then spare a thought for W4GJO in Sarasota, Florida. He's at the wrong end of a $1,000,000 law suit from a neighbour with trouble. Grid has a clean bill of health from the FCC and the ARRL TVI Committee and he is in liaison with ARRL's attorney. Don't let this give the neighbours ideas!

Region 14 ORM

The Region 14 ORM will be held on 10 May in the Arts Guild, Campbell St, Greenock. RSGB will be represented by the President, Mr J. W. Swinnerton, G2YS, and by the Zonal Representative, Mr A. F. Hunter, GM3LTW. The meeting starts at 1400 and there will be a continuing programme of films and lectures from 1430. A room to meet friends with a running buffet will be available. There will be an entrance fee of 5s levied at the door and there will be talk in stations on 2 and 4 metres. Further details from the Regional Representative, Mr N. G. Cox, GM3MUY, 191, Maxwell Ave, Westerton, Bearsden, hear Glasgow.

RSGB Dinner Club

A meeting of the Dinner Club was held on Friday, 18 April at the Kingsley Hotel, WC1 when 42 members and guests were present. Amongst the overseas visitors were PY2ETJ, VU2MD, K1JPR, VK3AAO, WA2CSP and WA5GOB/C. VU2MD gave a short talk mentioning the difficulties preventing the development of amateur radio in India.

The next meeting of the Dinner Club will be held on Friday, 18 July at 7.30 pm for 8 pm at the Kingsley Hotel. The meeting is completely informal and overseas visitors, members and their ladies will be most welcome.

Area and Regional Representatives

The following Regional Representatives have been appointed or re-appointed. Their addresses can be found on page 303 of this issue.

Region 4 Mr T. Darn, G3FGY
Region 5 Mr S. Granfield, G5BQ
Region 11 Mr M. Williams, GW3LCQ
Region 13 Mr I. W. Sheffield, GM3VEI
Region 14 Mr N. G. Cox, GM3MUY

The following Area Representatives have been appointed or re-appointed.

GREATER MANCHESTER (NORTH)
A. B. Langfield, G3IOA, 201 St Mary's Road, Moston, Manchester M10 0BN.

NORWOOD AND SOUTH LONDON RSGB GROUP T. J. Knappet, G3XFT, 279 Brownhill Road, London, SE6.

CHELTENHAM
H. M. Davison, G3TVW, 22 Montgomery Road, Cheltenham, Glos GL51 5LB.

PETERBOROUGH
D. Byrne, G3KPO, Jersey House, Eye, Peterborough.

British Railways Amateur Radio Society

The address of the BRARS was omitted from the call book. The secretary is Mr H. A. J. Gray, BRS23279, "Eleven," Swanton Drive, East Dereham, Norfolk.

Pirates Fined

Following Post Office enquiries into the suspected use of unlicensed wireless telegraphy equipment, the following convictions have been obtained on using wireless transmitting apparatus without the appropriate licence, contrary to the provisions of Section 1 of the Wireless Telegraphy Act, 1949. At Wallington Magistrates Court on 26 September, 1968, P. E. J. Tester of 102 Spencer Road, Caterham, J. D. Foster of 5 Steyning Close, Kenley, N. F. Oughton of 190 Blue House Lane, Oxted and V. G. Weber of 49 Purley Oaks Road, Sanderstead were each ordered to pay £1 1s. costs. All were given absolute discharges except for Mr Tester who was given a conditional discharge. At Hinckley Magistrates Court on 17 October 1968, G. B. Newstead of 46 The Fleet, Stoney Stanton was fined £10 on each of two charges and ordered to pay £5 5s. costs, totalling £25 5s. Also at Hinkley on the same day, C. Francks of 6 Frisby Road, Barwell, Hickley was fined £15 on each of two charges and ordered to pay £5 5s. costs, totalling £35 5s. At Middlesbrough Magistrates Court on 21 October, 1968, P. R. Cope of 81 Southwell Road, Middlesbrough was fined £5 and ordered to pay £5 costs and forfeit his transmitting equipment. At St. Albans Magistrates Court on 13 November, 1968, D. P. Wickes of 35 Oakwood Road, Bircket Wood, St. Albans was fined £10 and ordered to pay £3 costs and forfeit his transmitter.

TVI Advice

"There is nothing discreditable about finding that one is causing tvi." Although agreeing with Pat Hawker many amateurs find their first case of tvi rather an unpleasant shock, and are at a loss as to exactly how to proceed. The help of a local TVI Group composed of experienced and well equipped amateurs is an ideal situation, but, as yet, few groups are in existence. For this reason the GPO Liaison/TVI Committee has in the past dealt with members technical problems as well as planning permissions, negotiations with the GPO and many associated problems.

Technical queries will now be dealt with directly by **G3XIW/JGO** at the address below. Any problems of a "political" nature should, as previously, be sent to the GPO Liaison/TVI Committee at Headquarters. A questionnaire form will be sent to any member who is in trouble, on request. All correspondents are urged to give the fullest possible details so that an appropriate answer may be given as quickly as possible. Members obtaining advice will be asked to close their case by supplying details of the effective cure. Information obtained in this way will then be used to help others.

It is also hoped to have available for sale to members various types of filters; an announcement of availability will be made in *Radio Communication* in due course.

Technical queries should be addressed to: Mr & Mrs B. Priestley, 43 Raymond Road, Langley, Slough, Bucks.

Royal Signals ARS Presentation

On Monday 14 April, General E. S. Cole, Past President of RSGB, presented on behalf of the Royal Signals Amateur Radio Society a plaque commemorating the cordial relationship both societies have enjoyed and in recognition of the work carried out by Radio Amateurs. RSGB President John W. Swinnerton, G2YS then formerly thanked General Cole, and in return presented him, for addition to the RSARS library a copy of the latest RSGB publication, the VHF/UHF Manual.

Others attending this informal function were Colonel Brindley, President RSARS and Major D. Barry, G3ONU, Secretary RSARS. On the RSGB side were Immediate Past President, John Graham, G3TR Council Members and Past Presidents, Roy Stevens, G2BVN, Eric Yeomanson, G3IIR (also Vice President), Geoff Stone, G3FZL, Ted Ingram, GM6IZ, Norman Caws, G3BVG (also Treasurer), Len Newnham, G6NZ, and Council Member Tim Hughes, G3GVV. Also attending were General Manager, Eric Dowdeswell, G4AR, Associate Editor, John Adey and RSGB Public Relations Officer Sylvia Margolis.

Mullard Award for 1969

In accordance with Rule 5, the Council invites nominations for consideration for the Mullard Award for 1969. Such nominations should be sent in writing to the General Manager at RSGB Headquarters to arrive not later than 30 June, 1969.

The terms and conditions governing the Mullard Award, are as follows:

(i) The Award is offered annually by Mullard Limited during the pleasure of the Directors of that Company.

(ii) The Award will take the form of a gift in kind (preferably electronic or electrical apparatus and/or books) to the value of £25, and a plaque.

(iii) The Award will be made to the member of the Radio Society of Great Britain resident in the United Kingdom who in the opinion of a Committee consisting of three representatives of Mullard Limited and three representatives of the Council of the Radio Society of Great Britain, has, through the medium of Amateur Radio during the preceding calendar year, rendered outstanding personal service to the community by his own endeavour or by his own example of fortitude and courage.

(iv) The presentation of the Award will take place on a date and at a place to be decided by the Committee.

(v) Each year, the Radio Society of Great Britain shall, through its official journal, invite nominations for the Award. Each such nomination shall be supported by at least three Corporate Members of the Society and shall be accompanied by a brief factual account of the personal service rendered by the nominee.

The RSGB News Bulletin Service

Every Sunday morning the RSGB News Bulletin, (GB2RS), is broadcast. The News Bulletin can be received on either vhf or hf, which gives almost complete coverage of the British Isles. It keeps radio amateurs informed about the latest happenings in the world of Amateur Radio and gives notice of future events.

This is the schedule for the RSGB News Bulletin:

Time (BST)	Frequency (MHz)	Location of Station
09.30	3·6	SE England
	145·1	SE England (beaming N)
10.00	3·6	Severn Area
	145·1	SE England (beaming W)
	145·8	Aberdeen (beaming W)
10.15	145·8	Belfast
	145·8	Belfast (beaming S)
10.30	3·6	N Midlands
	145·8	Aberdeen (beaming SW)
	145·3	Birmingham Area (beaming NW)
11.00	3·6	NW England
	145·3	Birmingham Area (beaming SW)
11.30	3·6	SW Scotland
	145·5	Leeds (beaming N)
12.00	3·6	NE Scotland
	145·5	Leeds (beaming E)

Exhibitions—Beacons—Conventions—Contests—Local Events Rallies — Scientific Projects— Meetings— Licensing— Clubs Propagation Reports—Lectures—Field Days—Expeditions.

A Simple Transistor Portable D/F and General Purpose 160m Receiver

By G. L. MILLS, G3EDM*

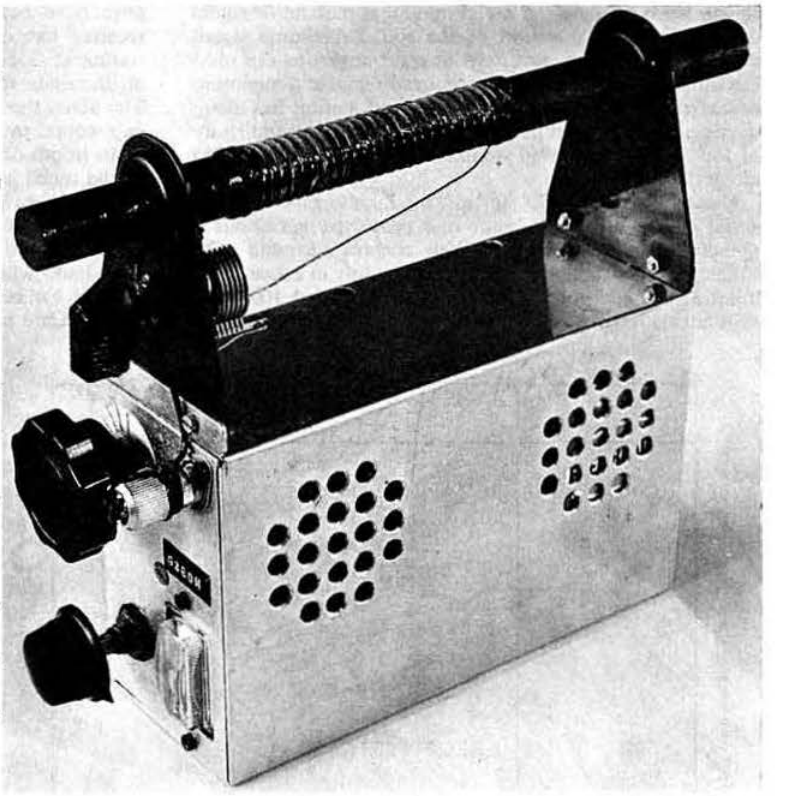


Fig 1. Completed receiver.

Direction Finding has gained popularity in Essex through the regular D/F contests held in recent years by both the Chelmsford and Colchester amateur radio groups. The author commenced his active participation early in 1967, at the invitation of the Chelmsford group, by joining G3KPJ in the hunt for two hidden stations, G3EIX/P and G3PDK/P, in one afternoon.

DF-ing is not restricted only to the 160m band, but at these frequencies one is able to maintain contact with the hidden station from a base control station quite easily for ranges of 20 miles in daylight. The base control station is not usually at the starting point of the hunt, but is situated so that it is able to be heard easily anywhere within a 20 mile radius of the starting point. The hunt is normally timed to take about two hours but in the event that the hidden transmitter is not found in this time it is relatively simple for the base control station, in agreement with the hidden station operator to extend this time. The mode of operation used is amplitude modulation of the transmitters which enables the receivers to be quite simple in concept.

The now common usage of transistors and packaged stages in commercial receivers has meant that these components have become available to the amateur constructor. The packaged stages used in the construction of this receiver are the Mullard AF module no. LP 1153 and the IF module no. LP 1156. These semiconductor devices and most of the other components are obtainable from LST Components of Brentwood, Essex.

*47 Highfield Road, Billericay, Essex.

General Description

The specific requirements of a D/F receiver for amateur use may be summed up as:

(i) simplicity of construction
(ii) ease of operation
(iii) adequate selectivity, stability and gain
(iv) portability
(v) sufficient power for several hours continuous operation
(vi) light weight
(vii) cheapness

The construction of the receiver case is illustrated in Figs. 2 and 2a and the material used is $\frac{1}{16}$ in aluminium sheet for the case and internal screen and $\frac{1}{16}$ in paxolin sheet for the supports for the ferrite rod. The layout of the controls and S-meter enables their readings to be ascertained when looking along the length of the rod. This lay-out is desirable since the receiver is used to locate the direction of minimum

signal. With a ferrite rod aerial minimum pick-up of signal occurs along the direction of the rod. (Maximum signal pick-up occurs from directions at right angles to the rod.) Looking along the rod with the received signal at a minimum means that the direction of the received station lies along the direction of the rod. There is, however, a basic ambiguity of 180° since the received station may lie in either direction along the rod.

Use of the packaged i.f. and a.f. modules together with an aerial having a high *Q*-factor (the prototype aerial has a *Q*-factor of between 250 and 300) ensures adequate gain. In fact daylight receiving ranges considerably in excess of 20 miles are at all times possible from other fixed 160m 10-watt am stations. At night, stations from all over the British Isles have been received. Because of its directivity the receiver has made possible QSOs from the main 160m station at G3EDM which were suffering heavy interference on the main receiver used with its omni-directional aerial. The aerial used is 25 turns of enamelled copper wire of 24 swg wound over a length of about four inches on a 8 in to 10 in length of $\frac{3}{8}$ in diameter ferrite rod. The high *Q*-factor of the tuned aerial together with the selectivity of the pre-aligned i.f. strip gives adequate selectivity for D/F hunting.

The complete receiver including a PP9 Ever Ready battery weighs 3 lb and is of a shape which enables it to be held in the right hand while tuning is carried out with the free hand. It must *not* be carried by the ferrite rod aerial used as a handle. Care must be exercised to avoid knocking the rod

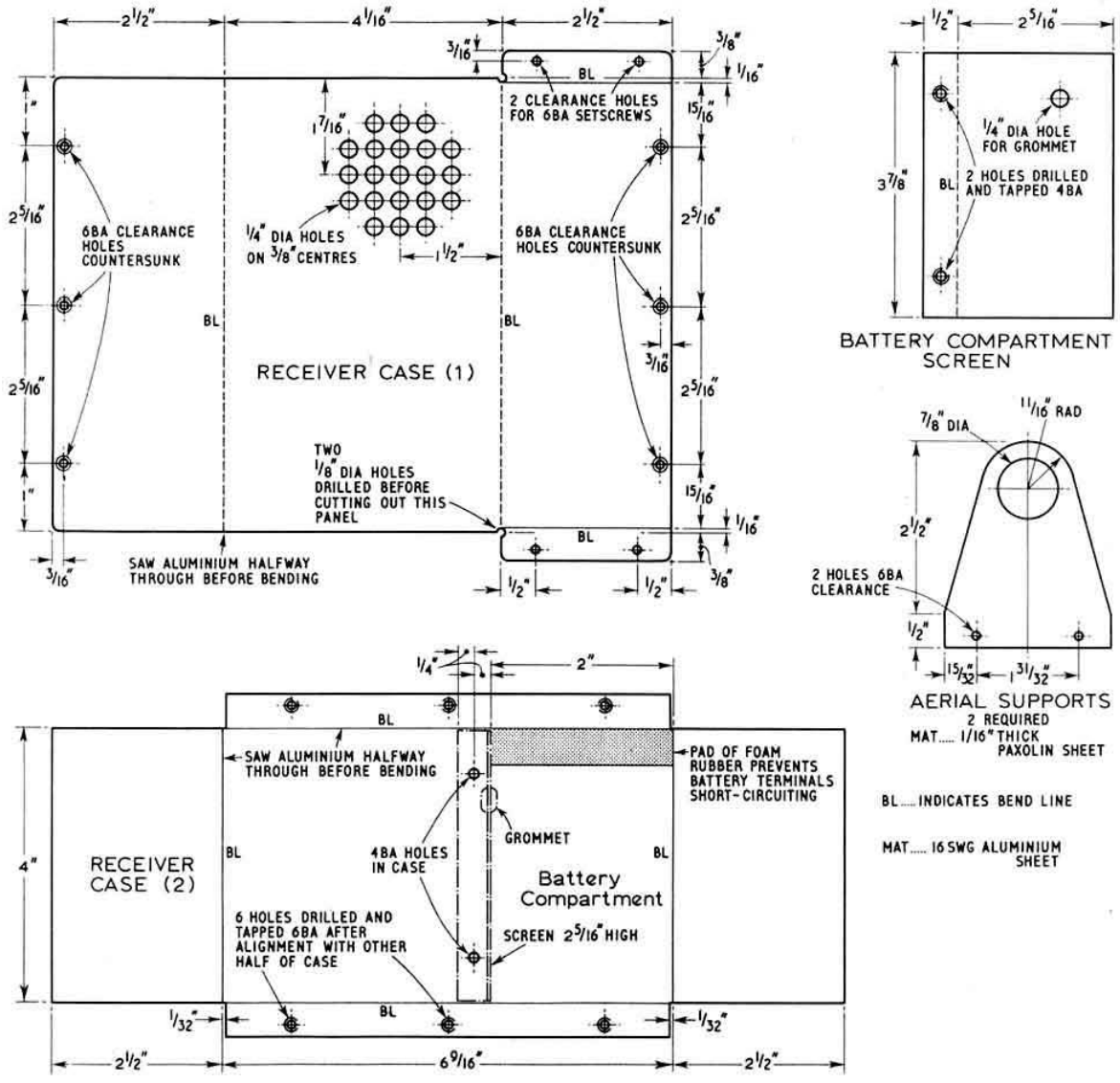
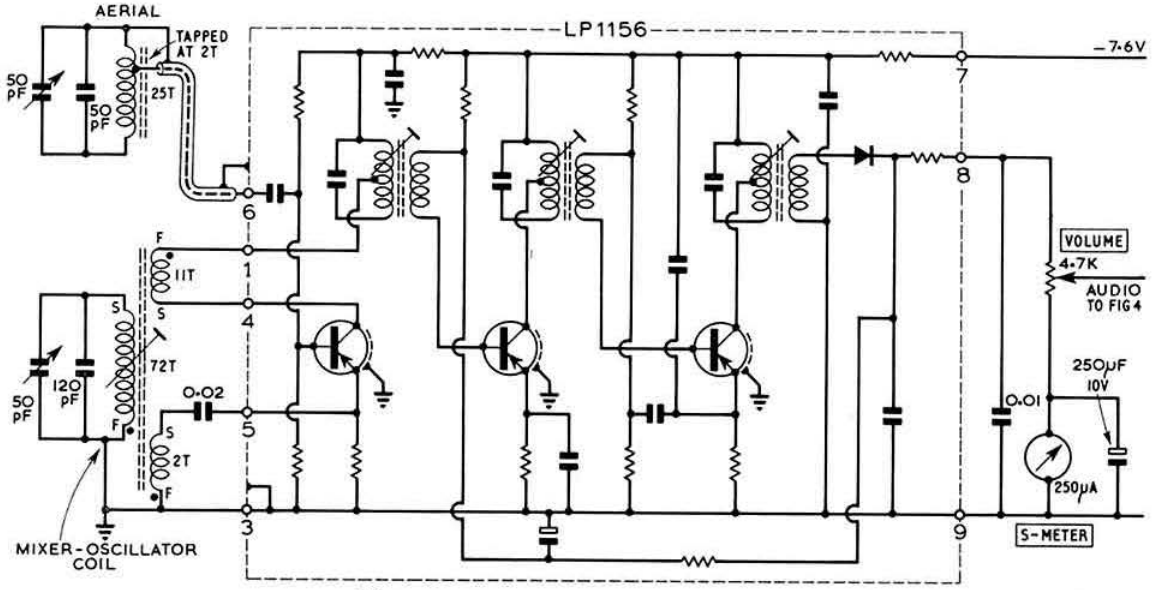


Fig 2



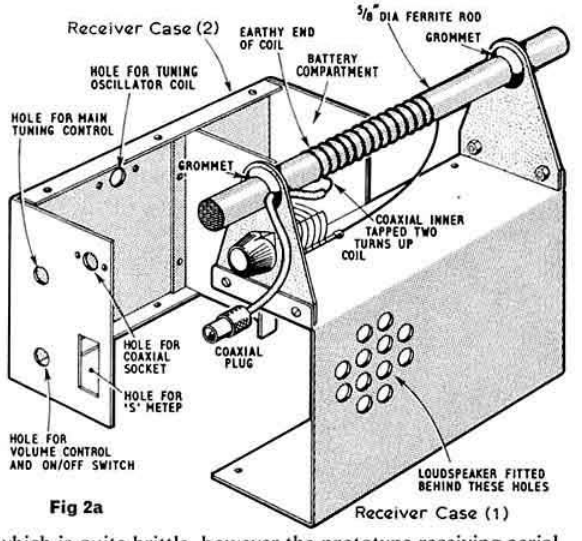


Fig 2a

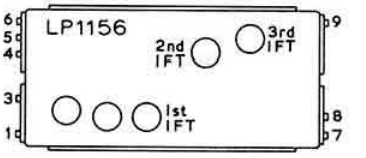


Fig 3. Circuit of the mixer-oscillator and i.f. amplifier.

which is quite brittle, however the prototype receiving aerial has lasted more than two years to date.

The use of a reclaimed loudspeaker from a defunct transistor or broadcast receiver and parts which are to hand in the majority of shacks enables the receiver to be built for a quite modest price. Bearing in mind that the prototype has been used as a general purpose portable top band receiver while jobs outside the shack are being done it is good value for money. It has enabled much more listening on 160m at times when it was not possible to have been in the shack and this has in fact promoted my own 160m transmitting activities.

The Circuit

The high *Q*-factor ferrite rod aerial ensures adequate signal for the mixer oscillator stage which consists of a home-made coil together with the first transistor in the i.f. module type LP 1156 (Fig. 3). This stage uses an AF115 and is tuned by the main tuning control (large knob in photograph of Fig. 1) and oscillates at 470 kHz above the received frequency. Since this tuning is not ganged to the capacitor which tunes the aerial there are no tracking difficulties in the construction of this receiver. The mixer oscillator is followed by two stages of i.f. amplification using AF117 transistors and single tuned i.f. transformers. The detector circuit uses an OA90 diode and the audio output is filtered through a capacitor resistor network. The diode load is, in fact, the 4·7 k ohm audio volume control. The S-meter is placed in the earthy end of this diode load to measure the direct current and a 250 μA instrument of Japanese origin was found suitable. It is necessary to bypass the instrument to audio frequencies by connecting a 250 μF 6V working electrolytic across it, and this also serves to damp the instrument movement when the receiver is being carried. The S-meter reads backwards on very weak or no signals but by mechanical adjustment of the zero under no-signal conditions this may be corrected (the meter then gives a small positive reading when the receiver is switched off). The aerial is tuned by a separate air-spaced tuning capacitor. Ganging this capacitor to the mixer-oscillator tuning capacitor was considered unnecessary and by the use of separate tuning capacitors the receiver may be prevented from being over-loaded by detuning the aerial when nearing the hidden transmitter.

The circuit of the audio stages is shown in Fig. 4. The

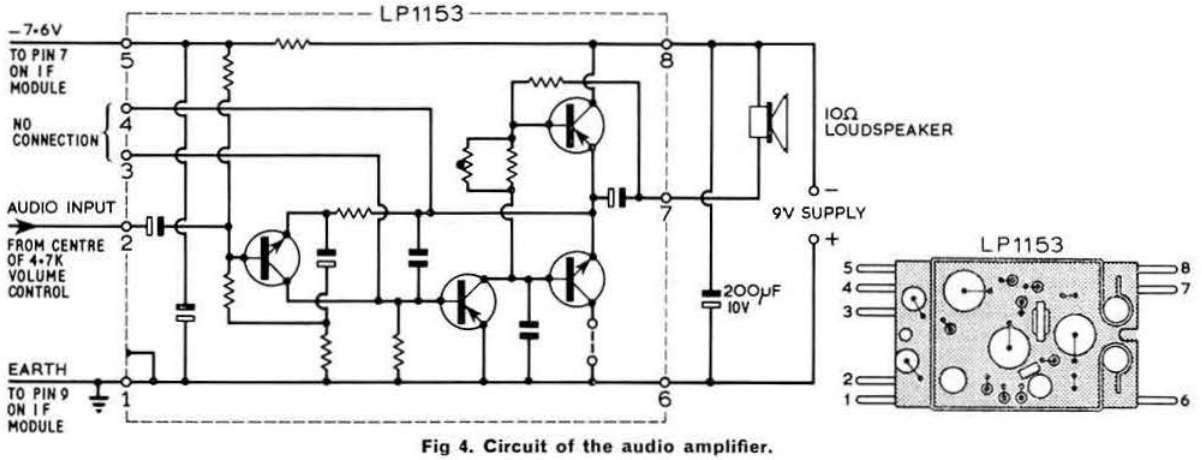


Fig 4. Circuit of the audio amplifier.

components within the dotted lines in both Figs. 3 and 4 indicate those components contained in the modules.

Construction

The photograph in Fig. 1 indicates the arrangement of the controls and the general appearance of the finished receiver. The photograph in Fig. 5 shows the internal layout which is not considered critical. The main points to observe are to keep the main tuning capacitor connections to the oscillator coil and the connections from the coil to the i.f. module reasonably short and clear of other components. The tuning slug is accessible through a hole in the receiver rear panel.

The oscillator mixer coil is wound on a $\frac{5}{16}$ in diameter former with adjustable dust iron slug. The 72 turn winding of 36 swg enamelled copper wire is put on first to occupy about $\frac{13}{16}$ in. The other two windings of the same gauge are wound over the centre of the 72 turn winding. The start(S) and finish(F) of the windings should be as shown in Fig. 3. Should the oscillator not oscillate, as indicated by lack of noise when the volume control is well up, try reversing the connections from the 11 turn winding to pins 1 and 4 of the i.f. module.

A 10 ohm speaker is a must, 7 to 15 ohm will be satisfactory, a 3 ohm speaker will be quite unsuitable.

Figs. 2 and 2a show the mechanical details which indicate that the receiver case is basically in two parts each forming a U-section. However, a diecast box could be used if preferred. The connection to the aerial is by small diameter coaxial cable and coaxial plug and socket which enables complete separation of the two parts for ease of access.

The coil details are given as a guide and it may be found necessary to adjust these to suit the values of other components which are available. With the case open it is an easy matter to hear the oscillator on the main station receiver, and it should, of course, lie within the approximate range 2270 to 2470 kHz in order to cover the whole of top band. It is, of course, possible for the receiver to work and cover top band if the oscillator frequency is in the range 1330 to 1530 kHz, and if broadcast stations are heard one's suspicions should be aroused that the oscillator frequency is low. A grid dip oscillator is useful for checking the ferrite rod tuning but is not absolutely necessary for, if the ferrite aerial is connected

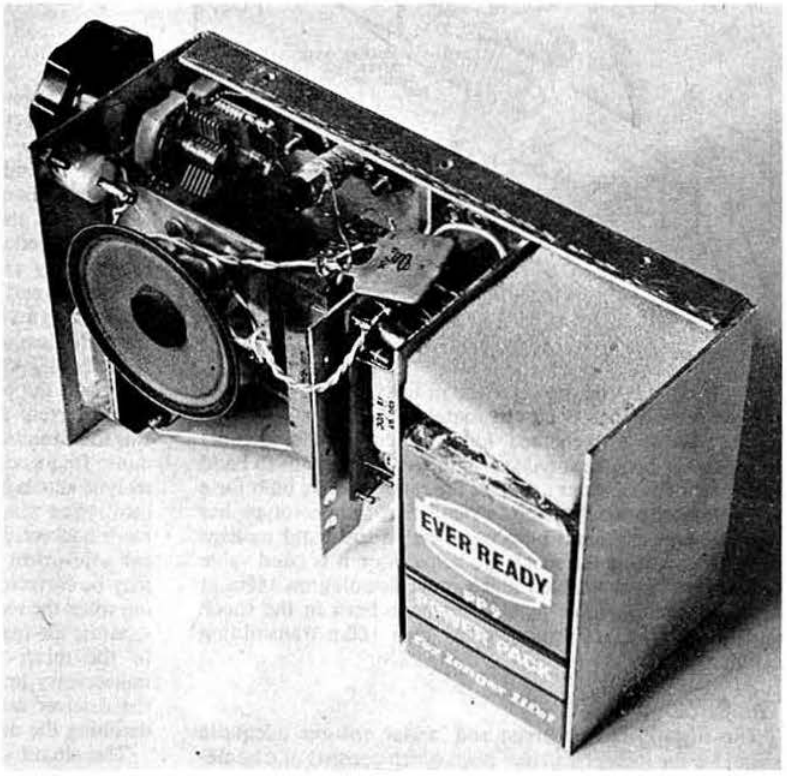
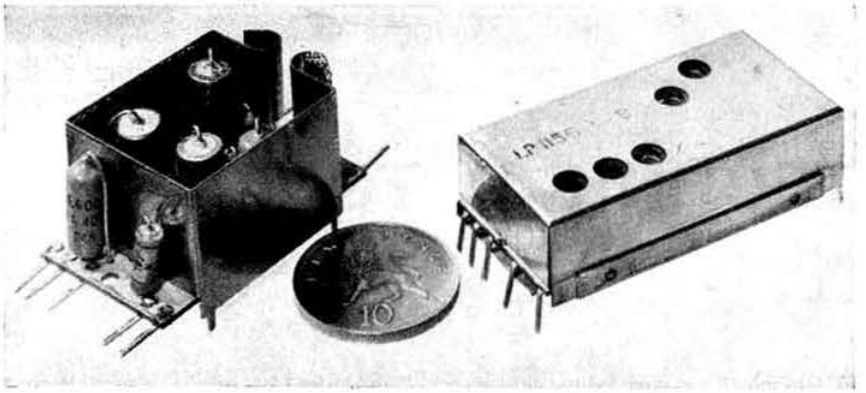


Fig 5. Internal layout of the receiver. The module shown is not the LP1153.



The audio (left) and i.f. modules.

to a general coverage receiver tuned to a regular station in top band, varying the ferrite rod tuning capacitor should result in a visible peak on the S-meter as the rod aerial comes into resonance. If the aerial tuning is suspect the general coverage receiver will reveal the resonant frequency outside top band.

Using the Receiver in D/F Hunts

The principle of direction finding to locate a hidden (or pirate) station is that it is necessary to take two "fixes" from two locations suitably spaced; in the first instance, say, two or three miles apart if the hidden transmitter is within twenty miles. When taking a fix it is far easier to find the null or minimum position rather than the maximum signal position. The null position occurs when the ferrite rod is in line with the direction of the transmitter and so the magnetic compass reading is taken in this direction.

The simple ferrite rod aerial gives an ambiguity of 180° that is to say the receiver does not tell you which direction along the compass bearing the signal is coming from. If the compass bearing is due east, the signal could equally as well have come from due west. However, if you travel north or south to the second location the fix will normally resolve the ambiguity. Consider the sketch in Fig. 6. The first fix was taken at location A and the receiver indicated that the transmitter was *either* north-east or south-west from location A. Having travelled to location B our second fix is taken and indicates that the transmitter is in *either* a north-west or south-east direction. However, on transferring these lines through A and B on to a map, we find that they intersect at the hidden transmitter. Since in practice our bearings will not be completely accurate (through a variety of causes) our first two bearings will simply reduce our area of search rather than pinpoint the hidden transmitter. Consider the sketch in Fig. 7. Because of the uncertainty of direction at A and B, our search will be in the area shown double hatched. The two lines passing through A define the accuracy with which we can measure the direction of the signal, and they could easily be five degrees apart; that is to say, our bearing of due north-east is subject to an error of plus or minus 2½°. The same applies to the fix from B.

The next step is to travel toward the double hatched area and take a further bearing. This process is continued until the hidden transmitter is reached. It may all sound easy from this description but in practice it tends to get more difficult as you get close in, and some people claim it is necessary to use auxiliary devices at close range. However, this particular receiver holds the Chelmsford amateur radio society record without the use of other equipment.

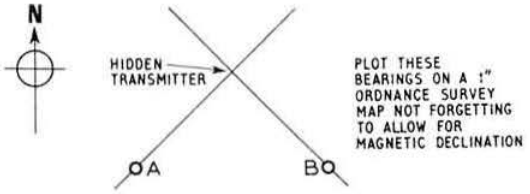


Fig 6

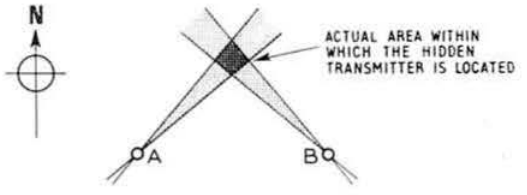


Fig 7

Conclusions

The receiver has proved itself simple to build. G3IJB, G3VOP, G3PLB and G3WRU have built receivers based on the prototype. The original idea for the use of the modules is due to Roy Martyr, G3PMX, of the Chelmsford Amateur Radio Society who also kindly tested the i.f. strips used. As mentioned earlier, the receiver, being portable, can be used almost anywhere for listening on the 160m band and has enabled me to get on with jobs without being tied to the shack. It has also proved invaluable in tracking down interference caused by unsuppressed vacuum cleaners and the like and it is surprising how co-operative people are when presented with the noise they are generating. Also the presence of a well disciplined D/F organization provides a strong deterrent to illegal operation in the already crowded 160m band.

TECHNICAL TOPICS

By PAT HAWKER, G3VA

THIS month it is intended to "cut the cackle" and instead to pack in as many different items of varying interest as possible. So no exhortation, but right down to what we hope will prove to be a variety of practical topics.

Fast Squelch with FET Gate

FET devices as voltage variable resistors have been the basis of several circuits in *TT* recently. This characteristic of FETs is used to provide a switch or "gate" in a fast-acting squelch circuit described by David Tong of Glasgow University in *Electronics* (17 March, 1969).

It is well-known that any squelch that knocks off the first syllables of speech, or holds the loudspeaker "on" too long, can prove annoying. On the other hand, fast response is difficult to achieve, particularly in transistor af stages, because of large input and output capacitances slowing down the biasing of the amplifier.

The arrangement of Fig 1, while perhaps not the simplest squelch circuit, has very short turn-on and turn-off and is claimed to be free of clicks. TR1, 2, 3, constitute a Schmitt trigger which governs the effective source-drain resistance of the FET gate in the af signal path. With TR3 "off" the FET represents a resistance of about 0·25-megohm, and little signal gets through. In the other state, the FET resistance drops immediately to about 500 ohms, letting the signal through with negligible attentuation. Sensitivity of the squelch, in terms of the signal amplitude needed from the i.f. stage to trigger the FET is governed by R1. The author suggests a value for C of 0·1 μF. It is claimed that effective squelch is possible even with signals whose amplitudes are about equal to the noise peaks.

Adjustable Voltage Stabilizer

Dr A. C. Carr, G3OSU has sent along a novel technique, allowing two silicon transistors to be used to provide adjustable voltage stabilization, in lieu of the more usual zener diodes. He points out that a transistor can function as a zener diode simply by amplifying the emitter-base forward characteristic. The stabilized voltage will be proportional to the amplification, which can be made dependent on the resistor ratios. By using silicon transistors, the breakdown characteristic compares well with low-voltage zeners.

Consideration of the basic circuit (Fig 2a) shows that current flows through the resistors until the V_{eb} reaches 0·6-volt. Then any further increase in current will be almost entirely passed via the transistor, since V_{eb} remains almost constant. The voltage across the device is thus:

$$V = V_{eb} + nR\,(I_{res} + I_b)$$

but since the resistor current remains almost constant, and base current is small, then a constant voltage will be maintained (see Fig 2b) equal to $(n \times 1)V_{eb}$. The minimum current for stabilisation will thus be $I_m = 0{\cdot}6/R$. The "slope resistance" is produced by base current increasing the voltage across nR, and by any increase in V_{eb} with current. If this is neglected, then slope resistance can be considered $(nR)/\beta$.

G3OSU points out that a much smaller slope resistance is obtained by using a Darlington pair of transistors as shown

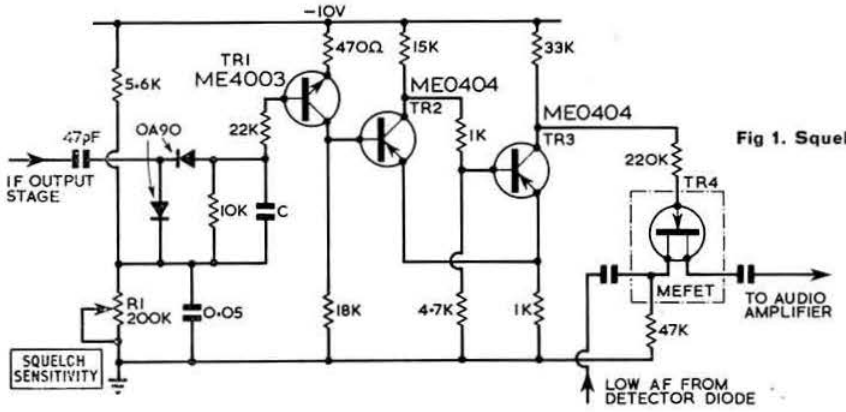


Fig 1. Squelch arrangements using FET gate.

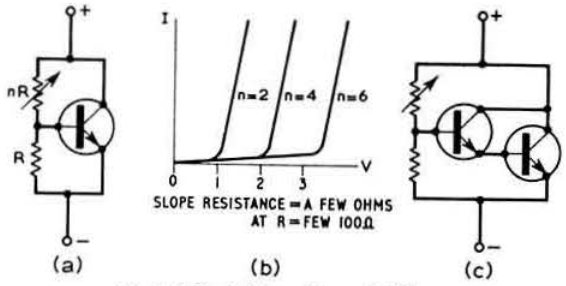


Fig 2. Adjustable voltage stabilizer.

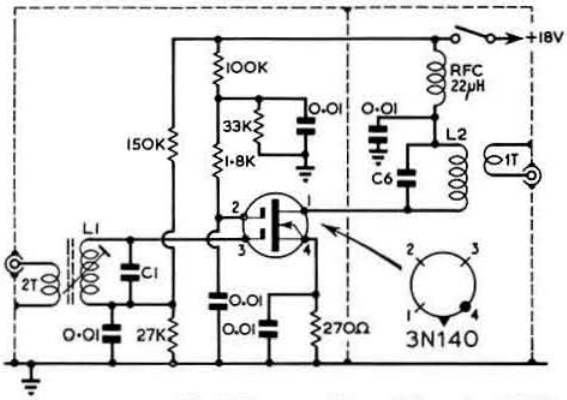


Fig 3. Dual-gate MOS FET preamplifier. Values for 28 MHz C1 8 pF, C6 10 pF, L1, L2 1·6 to 3·1 μH. Values for 21 MHz C1 22 pF, C6 22 pF, L1, L2 no change. Values for 50 MHz C1 8 pF, C6 10 pF, L1 8 turns no 30 enam on ¼ in. dia. former (link 2 turns) L2 as L1. RFC 6·8 μH. Bypass capacitors 1000 pF ceramic in place of 0·01 μF ceramic.

in Fig 2c, where V_{eb} has now become 1·2-volt total. The temperature stability is that of V_{eb}. This circuit thus provides the desired stabilization device with an effective operating value which depends upon the setting of the variable resistor.

Dual-gate MOS FET Pre-Amp

In *RCA Ham Tips* (November, 1968), W2DMR and WB2EGZ present a full constructional description of a 3N140 pre-amplifier capable of some 26dB gain and a noise figure of 2dB at 28 MHz. This would mean that the sensitivity of almost any receiver with this unit ahead of it is likely to be limited by site and/or galactic noise. Coil and capacitor details are also given for putting the unit on 21 or 50 MHz, and it is also suggested that 20dB gain, 2·8dB noise figure is achievable with care on 144 MHz. The biasing conditions for the 3N140 are chosen to provide uniform results with different specimens, and the dc bias level is a compromise between optimum gain and optimum cross-modulation resistance. The unit can be powered from batteries, or from any reasonably well-filtered dc voltage between 15 and 18 volts. In the original, the entire unit with two internal 9-volt batteries measures 4 by 2¼ by 2¼ inches; input and output coax sockets are fitted.

On several occasions *TT* has reviewed the special handling procedure for MOS FETs, but it may be advisable to note briefly the following. The 3N140 is supplied with a protective ring which shorts the leads. This ring should be removed before wiring begins, and a fine, bare wire wrapped around the leads near the case: this shorting wire should not be removed until after all soldering is complete. Should a socket be used, rather than direct wiring, the following rules must be observed: keep transistor leads shorted until transistor is connected to circuit; never insert or remove a device while power is on (this applies to all transistors); when cutting leads, grasp leads and case simultaneously to reduce mechanical and electrical shock. Dual-gate MOS FETs with built-in zener protection against static puncture are becoming available at reasonable prices, and it is hoped to refer to these another month.

No diodes to protect against local transmitter pick-up are shown: this is of little consequence provided that an efficient isolating coax relay is used to switch aerial from transmitter to receiver. Some of the problems of back-to-back protective diodes come over well in a review (*QST*, February 1969) of the Japanese-built Allied A2515 receiver which has TA7150 dual-gate MOS FETs as rf and mixer. It is stated that removal of the germanium protective diodes was necessary in order to eliminate cross-modulation from powerful local broadcast stations, and silicon diodes were fitted in their place; in practice two such diodes were needed in series in each leg before difficulties on this score could be entirely eliminated. Clearly, it is no good fitting MOS FETs to reduce cross-modulation—and then letting this move be countered by introducing cross-modulation from the protective diodes.

TVI Round-up

Among comments received as a result of the various recent notes on modern TVI-suppression are several of general interest.

G5YN reports the use of a ferrite-rod transformer to achieve "spectacular" results in curing TVI from his 3·5 and 7 MHz transmissions. He mentions that PO engineers often use this technique, but with bi-filiar wound transformers on ferrite beads. He also passes on the information that a similar printed circuit filter board to that of the PO type 38A high pass filter is used in the commercially available Labgear unit.

G3JGO is a little concerned lest some readers suppose that ferrite transformers and lossy ferrite baluns are an *alternative* to the better known high pass filters. It should be stressed that the hpf is the most effective way of dealing with fundamental hf coming through the co-ax feeder; whereas isolating transformers and double Faraday loops, etc. are intended for those situations where the rf is getting into the TV receiver along the outer screen of the cable. 'JGO is also a little doubtful whether the resonant transformer—as suggested in the March *TT* by G3SYC—is really needed to reduce insertion loss. Using the G3BA-type untuned transformers (*Radcom.*, January) he has measured, with FX2249 core, a loss of only 1dB or so to 220 MHz, as against 6 to 10dB of double Faraday coax loops.

G3HCT is firmly of the opinion that the correct policy with TVI is to "have a go" at curing it. After a period of staying off, he and G3FKM decided to work towards using any band, any time—and finally achieved success. He makes two useful suggestions. The first is that chasing TVI is very difficult when there is no easy communication between the shack and the viewer(s). G3HCT has a telephone in the shack but suggests a need for a compact 200 mW, 144 MHz, hand portable transceiver, possibly with super-regen detection. This is fine if two amateurs are available, but likely to

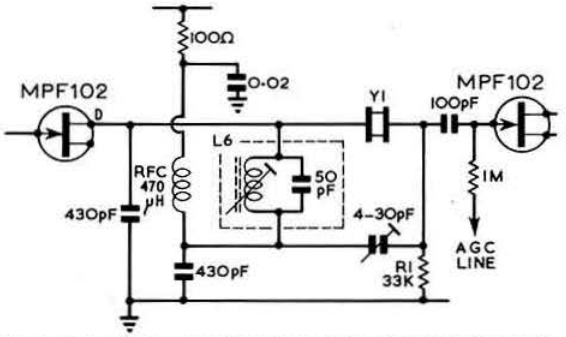


Fig 4. Detail of crystal filter from QST 50 MHz transceiver. Both FETs shown form parts of two cascode i.f. amplifiers. L6 is typically primary of 10·7 MHz i.f. transformer. Value of R1 affects filter characteristics.

be frowned upon by the powers-that-be if either unit is operated by non-licensed viewers. Secondly, he feels there is a need also for a simple "pulser" keying device to overcome the problem that many modern transmitters do not like being run continuously while the amateur pops out to look at the TV screen. This also is a valid point—though here again the PO could hardly (at least officially) approve the use of such devices.

Simple Crystal Filter

A simple but, at least to me, new circuit which allows a single crystal to be inserted into an i.f. strip and the holder-capacitance nulled out without any centre-tapped coils or balanced capacitive potentiometers appears in an all-FET strip for a vhf transceiver by T. H. Campbell, WA7FJC (*QST*, January 1969). Value of resistor, R1, largely controls bandwidth of the filter. The author claims that this approach holds good for crystals from about 3 to 10·7 MHz although, of course, the shape factor of such filters would not be as good as that possible with multi-crystal networks. In this particular design, the filter is interposed between two cascode i.f. stages using four MPF102 JFETs.

Recent Equipments

As a result of new semiconductor devices many professional communications equipments are tending to become ever more complex, rather than physically much smaller. And this tendency can often be seen spilling over into amateur equipments. For instance, consider the details beginning to filter through on a new 300-watt pep transceiver —the Signal/One Model CX7—which makes full use of semiconductor-integrated-circuits (SICs), MOS FETs and the like. According to a brochure which L. Margolis, G3UML has sent along, this 1·8 to 28 MHz transceiver really does appear to pack into one unit almost all the facilities which have ever been advocated for transceiver operation. This is achieved with the help of 16 digital-type SICs, 14 linear-type SICs, 60 silicon transistors (including dual gate MOS FETs in the receiver front-end), and just one ceramic/metal p.a. valve which has a beryllia coupler block to transfer anode heat to its own extruded heat sink.

Frequency read-out of the final four figures (i.e. switched to any desired MHz range, this gives frequency to nearest 100 Hz) is provided on four Nixie-type indicators by a built-in digital counter. Two identical vfo's are incorporated each covering a 1 MHz span, each switchable to either transmit or receive. There is also a dual receive facility to allow simultaneous listening on two frequencies, plus various i.f. shift and combined and detached tuning arrangements. Two crystal filters are cascaded to give an ssb shape factor of 1·5 (6 : 60 dB) ahead of most receiver gain. An optional 300 Hz cw filter has a shape factor of 2 : 1. Image rejection is put at better than 80dB, i.f. breakthrough better than 60dB, carrier suppression 60dB. RF envelope clipper is used for ssb speech processing. Claimed stability is better than 100 Hz drift in first half-hour, less than 50 Hz in any hour thereafter at fixed ambient temperatures. Dynamic range is claimed as "10 μV desired signal modulated less than 10 per cent by unwanted 10 mV signal 10 kHz away, modulated 30 per cent at 400 Hz, or by similar 100 mV signal 5 per cent removed."

These specifications certainly put this unit into the *de luxe* class as far as amateur equipments are concerned, and it would be interesting to know what will be the price tag. Signal/One is a firm associated with Electronic Communications Inc (well-known in the professional field), and a subsidiary of NCR—the big computer firm. One or two previous attempts by various American firms to bring out such advanced units for the amateur market did not get off the ground.

John Rollason, G3WCO, was introduced by DM2XLO to yet another brand-new all-silicon-semiconductor hf professional receiver at the recent Leipzig fair. This is a general purpose high-stability receiver using partial synthesis techniques and claiming a stability better than 40 Hz per 24-hours after a 2-hr warm-up, and frequency setting accuracy better than 100 Hz. First i.f. is an up-conversion 38·3 MHz (bandpass $\pm$ 500 kHz), 2nd i.f. 3·2 MHz ($\pm$ 8 kHz) and 3rd i.f. 200 kHz. Both image and i.f. breakthrough are listed as better than 80dB. The master crystal and interpolation oscillators are in thermostatically controlled ovens. Altogether this EKV receiver is an interesting example which shows that Eastern European firms are still looking to an active future of hf communications, satellites notwithstanding.

Aerial Tuning Unit

Alan Gordon, G3XOI, has been experimenting with a new ATU for 1·8 and 3·5 MHz which appears to offer considerable flexibility combined with efficiency: Figs. 5 and 6. Initially the idea was based on using simply a variable ratio transformer to match impedances, though several alternative networks are now incorporated to increase flexibility. The original unit has been tested in conjunction with a pi-network Codar AT5 transmitter and an aerial of about 67 ft. The 60-turn coil is wound on a 2 in diameter former, 4½ in long. The first tap is at 3 turns and the subsequent ones every 5 turns, making 12 taps in all, the last one being 2 turns from the end. The taps are earthed via a 12-way switch to produce ratios of from 1 : 19 to 29 : 1. Tuning capacitor is about 300pF. G3XOI uses an rf meter based on a bridge circuit using four point contact diodes to assist in tuning up.

The Delta-Loop Beam

Two articles in the same issue of *QST* (January, 1969) sing the praises of a Quad-type configuration of loops that is claimed to offer considerable mechanical advantages over

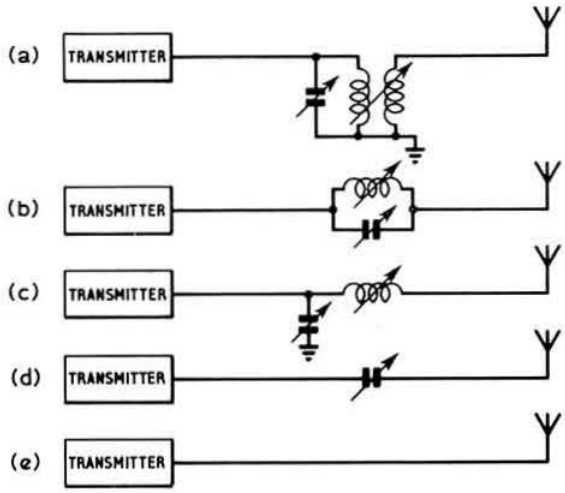


Fig 5. The basic networks incorporated in the G3XOI aerial tuning unit; (a) impedance matching (variable ratio) transformer; (b) parallel network; (c) L network; (d) series capacitor (e) straight through.

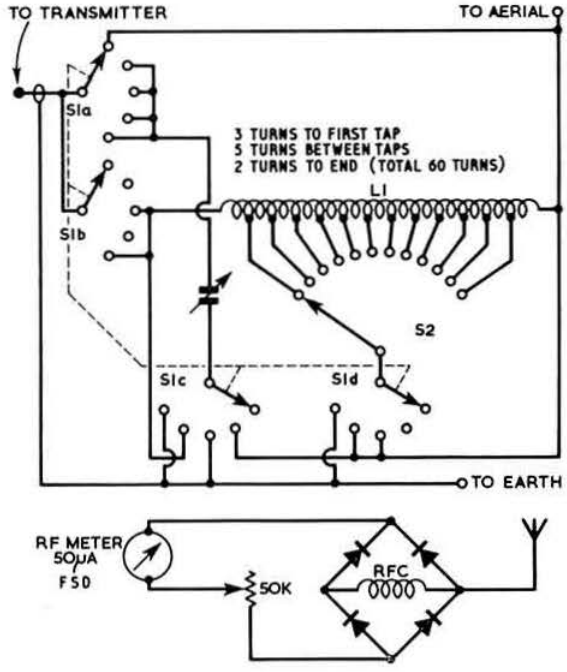


Fig 6. Practical arrangement of the ATU and tuning indicator for 1·8 and 3·5 MHz.

the normal Quad while retaining the performance. The idea stems from H. R. Habig, K8ANV but is also presented by ARRL-staffer W1ICP as being ideal for 21 MHz novice operation with its "plumber's delight" construction, good matching over a band, and effective performance, even when mounted only a few feet off the ground.

Basically, the aerial uses two triangular rather than square

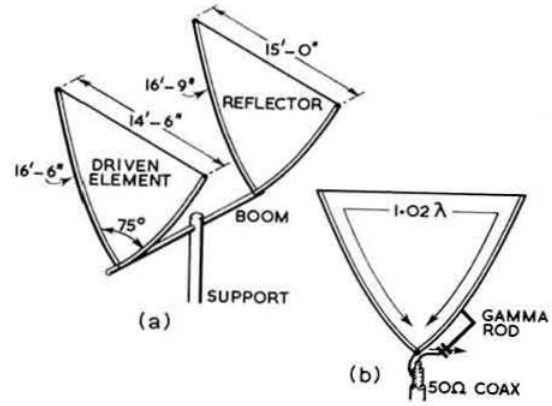


Fig 7. HRH Delta-loop beam. Main dimensions shown for 21 MHz, using 9 ft spacing and 3 ft gamma rod. For 28 MHz driven element 12 ft. sides, 11 ft top, 75° angle. 6 ft 6 in boom spacing to reflector having 12 ft sides, 11 ft 10 in top.

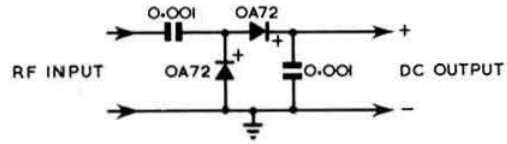


Fig 8. RF probe suggested by BRS26700.

loops: 1005/MHz feet for the gamma-matched driven element, and 1030/MHz feet reflector, spaced 0·2-λ (6 ft 6 in for 28 MHz). The entire elements are above the boom which joins two points at electrically similar potentials, so that the boom need not be insulated from the loops (i.e. "plumber's delight"). Construction takes the form of two V's made of tubing, with the base of the V's solidly mounted on the boom, and then a top section to complete the loop using No 12 or 14 copper wire. The whole structure is made reasonably "solid", and there are no cross supports needed between reflector and driven elements at the top. The high-voltage 100 pF matching capacitor can be mounted in a plastic "freezer" box, and the gamma rod for the 21 MHz version fashioned from 36-inches of rod. The two *QST* articles give full constructional details for both 21 and 28 MHz versions, but it is hoped that Fig. 7 plus these brief notes will allow mechanically-minded readers to figure out their own approaches.

John Pegler, G3ENI has been using "double delta" loops on vhf for several years, and we hope to include his approach to this technique shortly.

RF Diode Probe

J. M. Fournier, BRS26700, writes from Germany to provide details of a cheap, simple, compact and versatile rf diode probe: Fig. 8. Using voltage-doubler type rectification, it has been found useful in the construction and repair of equipment in conjunction with an AVO 8 meter, but would probably prove equally useful with almost any high-sensitivity meter. With the AVO 8 a known rf source of 1-volt indicated 3-volts dc, between 1 to 30 MHz. The probe can be used, with some fall off at either end, at frequencies from 100 kHz to 200 MHz.

As Steady as a Rock *Continued*

By B. PRIESTLEY, G3JGO*

In "As Steady as a Rock" published last March, I attempted to give a practical guide to crystal oscillator design. It has been pointed out that some guidance on the pros and cons of the basic systems may also be helpful. This must necessarily be theoretical but nevertheless, I hope, helpful.

Overtone or Harmonic?

A CRYSTAL unit has an equivalent circuit very similar to a Marconi aerial fed against earth. Because of capacitance at the free end the resonant frequencies of a Marconi aerial are not quite in a 1 : 3 : 5 : 7 : 9. . . . ratio (see Fig. 1) Similarly a crystal unit has a series of modes of oscillation with resonant frequencies **approximately** in the ratio 1 : 3 : 5 : 7 : 9. . . . so that a full equivalent circuit is as Fig. 2. Normally the lowest frequency is most easily maintained particularly in a Colpitts circuit so that in an untuned oscillator circuit oscillation occurs at the fundamental. When the overtone is desired it is necessary to prevent the unwanted modes by adding a circuit tuned to the desired overtone. The circuit must have only sufficient selectivity to do this, otherwise it will partly control the frequency, resulting in degraded frequency stability.

By contrast in the once popular tritet (and other harmonic oscillators) oscillation occurs at the crystal fundamental, but the circuit operates in class C generating many harmonics One of these is selected with a tuned output circuit, but all the others exist, hence the tritet's reputation for instant TVI! It is of course possible to generate harmonic output from overtone oscillators in the same way and a combined overtone/harmonic oscillator is one way of producing a little VHF energy for a converter.

Parallel or Series Resonant?

Just like the Marconi aerial a crystal is a low resistance device and must be current fed to avoid damping its Q excessively. There are three ways of doing this.

(*a*) The crystal can be fed from an emitter follower, and feed into a common base stage. These configurations give the required low source and load resistances and when cross coupled to complete the circuit result in the Butler oscillator. A valve (or FET) version is equally possible.

(*b*) Transformer(s) may be used to match the low resistance of the crystal to the amplifiers, input and output resistance. A single transformer may be substituted for one of the amplifiers of the Butler circuit, resulting in two versions of the Squier oscillator (see Fig. 3). The more common version of the Squier with feedback to the grid is liable to seriously damp the crystal and for best stability requires an extra transformer (see Fig. 4).

* 43 Raymond Road, Langley, Slough, Bucks.

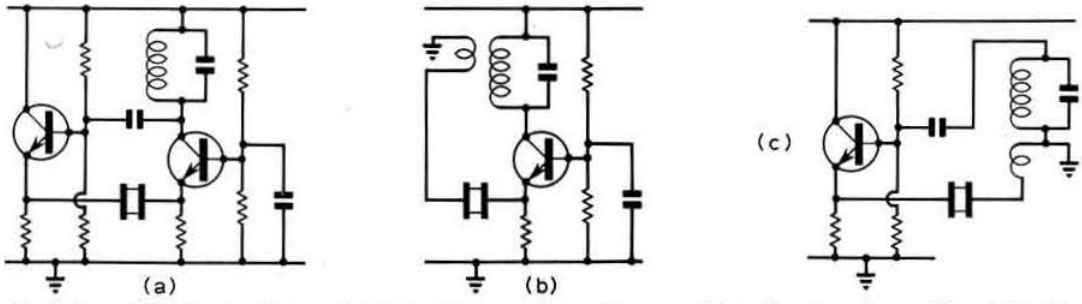


Fig 3. Derivation of Squier circuits from the Butler (a) by replacing either amplifier with a transformer (b) and (c). A tapped coil (autotransformer) is equally possible or capacity tapping. Slug tuning a coil will change the coupling between primary and secondary and so is more difficult to set up initially, but as it can be made more flatly resonant yields better long term stability.

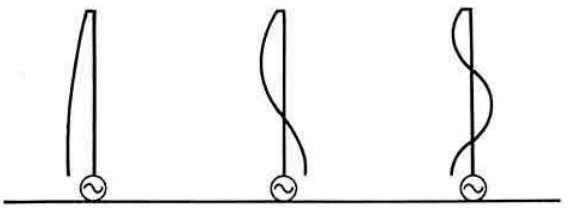


Fig 1. Resonant modes of a Marconi aerial.

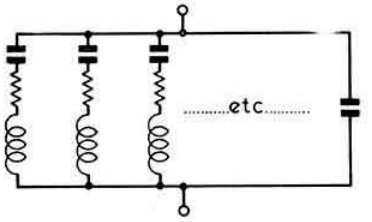


Fig 2. Full equivalent circuit of a crystal.

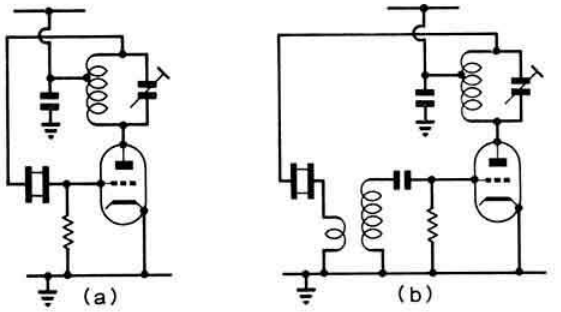
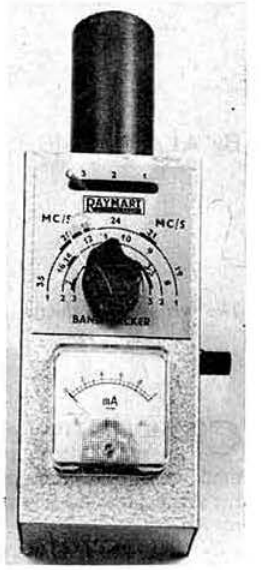


Fig 4. The addition of an impedance matching transformer to the commonly used Squier (a) considerably increases the crystal's loaded *Q*.

(*c*) Capacitors can be used as a transformer, as in the Pi tank, but without a resonating inductance they inevitably add some reactance in series with the crystal. This shifts the frequency of oscillation to slightly above the exact series resonance. The very popular Colpitts oscillator is of this type. It is also known as a parallel resonance oscillator since the equivalent inductance of the crystal unit slightly above series resonance is parallel resonant with the series combination of C1 and C2 at the working frequency. This is an equally valid way of looking at the circuit, but it is important to realise that oscillation does not take place at or even near the parallel resonance of the crystal unit. Crystals are typically calibrated for a circuit capacitance (formed by C1 and C2 in series) of 20 to 50 pF. Realizing that the motional capacitance of the crystal is about 10 mpF, obviously 50 pF in series will only pull the frequency slightly!

New Products

HF Bandchecker



One of the less complicated but nevertheless essential pieces of test equipment for every amateur station is an absorption wavemeter. Basically this is a calibrated tuned circuit which absorbs power from the circuit being measured when the circuits are tuned to the same frequency. The power collected by the wavemeter is used to operate an indicator, which in the case of the *Bandchecker* is a 0–1 mA meter. This unit covers the amateur bands between 3·5 and 30 MHz and it is understood that a slightly more expensive version also covers the 1·8 to 2·0 MHz band. The inductance comprises a switched coil operated by a front panel control and there is also a sensitivity potentiometer catering for the various power levels which may be encountered. The *Bandchecker* is solidly built to withstand normal usage and the calibrated tuning dial is clearly marked and under test was found to be accurate. The price of the unit illustrated is £4 4s. and the version which also covers Top band is £4 10s., both with 3s. postage and packing. The *Bandchecker* is manufactured and sold by Chas. H. Young Ltd., 170–172 Corporation Street, Birmingham, 4.

Ersin Solder Mini-packs

The Ersin Handyman's packs of short lengths of solder are now packaged in an envelope container, easily recognizable with the Ersin device.

Ersin provide about 20 inches of solder for 6d, a useful amount to have around when a whole new roll is not required. The Handyman's packs are available from all electrical, hardware and d-i-y shops.

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A Digital Clock

By ALAN J. GIBBS, G3PHG*

The writer has always had a yen to construct a digital clock, however, time and money have been of paramount importance—and in fact still are.

CONSIDERATION was given to various ways of producing such a device even to the extent of buying a ready made version. Again money was acute, therefore a study of the surplus market was made, with interesting and rewarding results.

The whole problem revolved around the display digital indicators available. One surplus dealer had stocks of KGM indicators which, on sight, were adopted as being ideal for the job. Next in line to be answered were the alternatives of transistors or dc switching techniques.

Solid State

Obviously this is the most up-to-date system to adopt but requires high expenditure and some large degree of development work. The overall physical size of the clock is mainly determined by the size of the indicators used, therefore, using semiconductors, the size cannot be materially reduced. With no disrespect to our digital readers the solid state idea was dropped.

DC Switching

Most junk boxes may in their rather long lifetime, reveal a uniselector and various relays. Coupling this thought with some very cheap surplus synchronous 50 Hz motors, it was decided to go ahead with these latter thoughts.

The following article indicates one idea to which some readers, I am sure, will adopt their own variations.

The Indicators

KGM indicators (of which four would be needed) are available on the surplus market between £1 and £2 each. The system used at G3PHG has 20 0·04A bulbs per indicator (two lamps per digit). However, such items as Nixie tubes and other devices may be used with little modification to the design.

The use of standard miniature lamp indicators provides an alternative system by arranging them into figure shapes or simply by having four vertical columns of lamps suitably labelled in digital form. The latter is by far the cheaper system.

Switching

In order to display the full 12 hour or 24 hour system, two standard GPO types 2 or 3, 4 bank, 25 outlet, 40V coil uniselectors were used. Operation is faultless from +28 volts, provided that the armature springs are slackened. These types of uniselectors are very common on the surplus market between 25s and 30s each. Relays are again generally available and almost any type will do provided each relay has four changeover contacts and they operate reliably from +28 volts.

An accurate pulse at one minute intervals can easily be achieved using a 50 Hz synchronous motor suitably modified to control a microswitch once per revolution. (See Fig. 3).

Now we come to the biggest problem of all and that is to provide a working system.

After the vast consumption of scrap paper, the final version shown in Fig. 1 was produced. To check for authenticity, the whole system was " lashed up " in the shack at G3PHG and proved. As a matter of interest the " lash up " covered some 3 ft × 3 ft of table top, but it worked after several modifications.

Sequence of Operation

Referring to the circuit diagram and switching tables (Fig. 1 and 2) the sequence is as follows:

Assume all relays are unenergized and the two uniselectors are in position 1. This complies with the circuit diagram and the display should be 0000, 24 hour operation.

Minutes

The mains supply feeds the synchronous motor via the INT/EXT switch. In the INT position, the motor cam rotates pulsing the microswitch, M at minute intervals. On each pulse, M provides a +28V pulse via the EXT/INT S3 and HOLD S6 switches to the uniselector drive magnet, R/1. The uniselector steps at each pulse. When RA is in the first position, O is indicated (Mins units) and O on RB (Mins tens) via A2 normal. The first nine pulses successively change the

* 6 Dairyfields, Gossops Green, Crawley, Sussex.

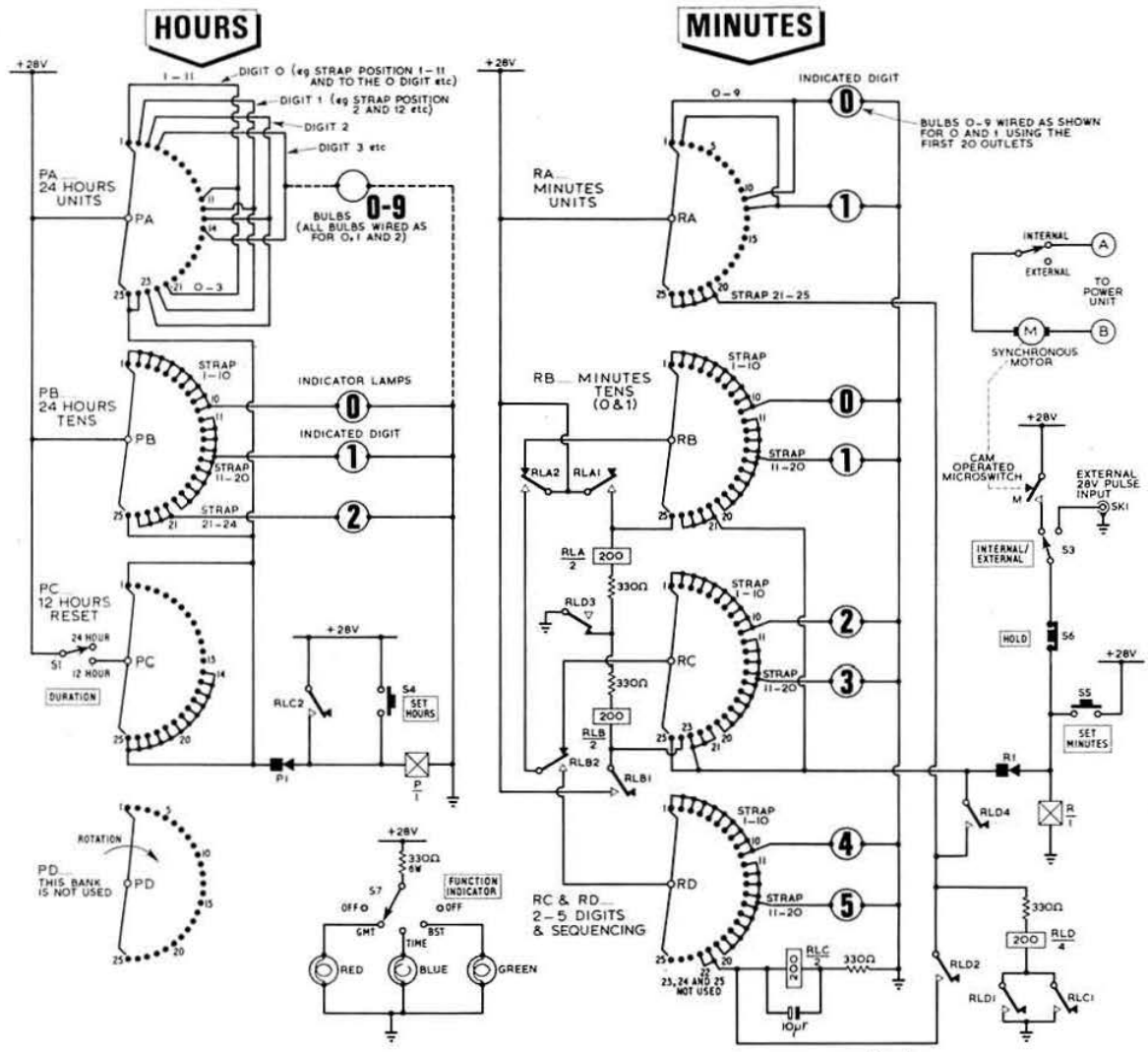

HOURS
MINUTES
+28V
DIGIT 0 (eg STRAP POSITION 1–11 AND TO THE 0 DIGIT etc)
DIGIT 1 (eg STRAP POSITION 2 AND 12 etc)
DIGIT 2
DIGIT 3 etc
PA 24 HOURS UNITS
BULBS 0-9 (ALL BULBS WIRED AS FOR 0, 1 AND 2)
PB 24 HOURS TENS
INDICATOR LAMPS
INDICATED DIGIT
PC 12 HOURS RESET
24 HOUR
12 HOUR
DURATION
S1
S4 SET HOURS
RLC2
P1
ROTATION
PD THIS BANK IS NOT USED
330Ω 6W
S7
FUNCTION INDICATOR
OFF
GMT
BST
TIME
RED
BLUE
GREEN
RA MINUTES UNITS
BULBS 0–9 WIRED AS SHOWN FOR 0 AND 1 USING THE FIRST 20 OUTLETS
STRAP 21–25
RB MINUTES TENS (0&1)
RLA2
RLA1
RLA/2
200
330Ω
RLD3
RC
RLB/2
RLB2
RLB1
RD
RC & RD 2–5 DIGITS & SEQUENCING
23, 24 AND 25 NOT USED
RLC/2
10μF
INTERNAL
EXTERNAL
TO POWER UNIT
SYNCHRONOUS MOTOR
CAM OPERATED MICROSWITCH
EXTERNAL 28V PULSE INPUT
S3
INTERNAL/ EXTERNAL
HOLD
S6
S5
SET MINUTES
R1
RLD4
RLD2
RLD1
RLC1
RLD/4

Fig 1

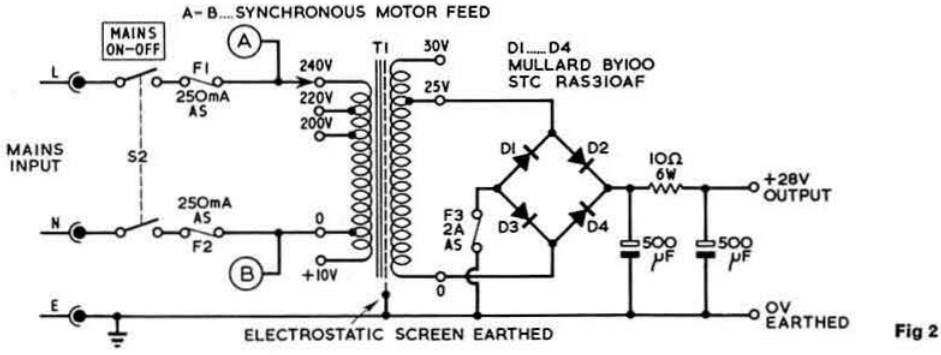
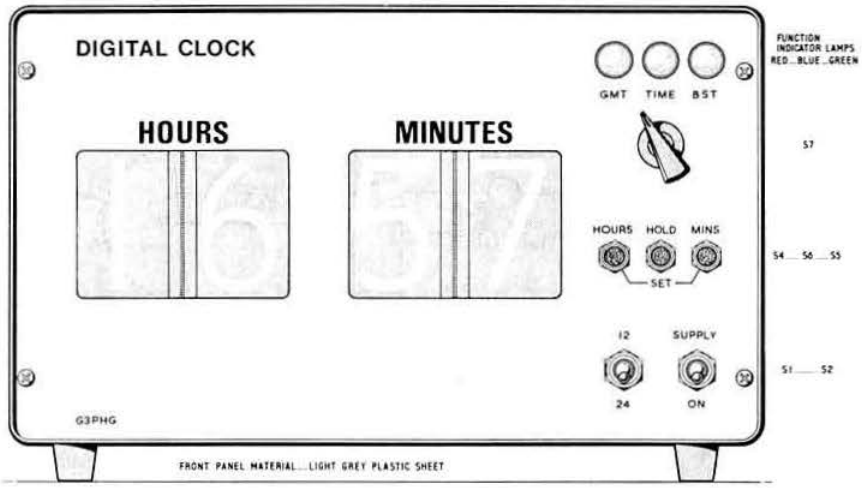

A–B....SYNCHRONOUS MOTOR FEED
MAINS ON–OFF
MAINS INPUT
L
N
E
F1
250mA AS
F2
S2
A
B
T1
240V
220V
200V
+10V
30V
25V
0
D1.....D4
MULLARD BY100
STC RAS310AF
D1
D2
D3
D4
F3 2A AS
10Ω 6W
+28V OUTPUT
500 μF
500 μF
0V EARTHED
ELECTROSTATIC SCREEN EARTHED

Fig 2

Fig. 4



mins units RA from 0 to 9. RB gives a continuous O indication from 0 to 9. At the tenth pulse, RA starts again at O and continues up to 9. RB changes to 1 for these second 9 pulses. Hence, minutes 0 to 19 have been displayed.

At the twentieth pulse, +28 volts is applied via A2, RB and R1 to R/1, stepping the uniselector to the last outlet. The supply energizes A/2 via A2, RB and D3. A/2 is held energized via A1 and D3. A2 changes over applying +28V to RC via B2, thus applying +28V via R1 to R/1. The uniselector returns to position 1.

The sequence for RA repeats; +28V is now fed via A2, B2 to RC, thus the tens change from 0 and 1 to 2 and 3. The count continues to 39.

On the 40th pulse, +28V is fed via A2, B2, RC and R1 to R/1, stepping the uniselector to position 24. +28V now operates B/2 via D3, B/2 is held energized via B1. B2 changes over, applying +28V via A2 to RD and on via R1 to R/1. The minute units continue changing and the minute tens change from 2 and 3 to 4 and 5. The sequence continues to the fifty-ninth pulse.

At the sixtieth pulse, RD provides +28V to operate C/2, C1 operates D/4 via RA. D/4 is held energized via D1 and C/2 is held energized via D2. A/2 and B/2 are now released by D3 operating. C2 applied +28V to P/1 (hours uniselector) stepping the hours once only. D4 applies +28V via RA and R1 to R/1, uniselector stepping to position 1. In doing so, the supply is removed from RA positions 21 to 25, thus releasing relays C/2 and D/4. C/2 is slow to release giving P/1 enough time to operate. One minutes count is now back to zero, 00 with the hours count at 01 and further pulsing repeats the sequence, etc.

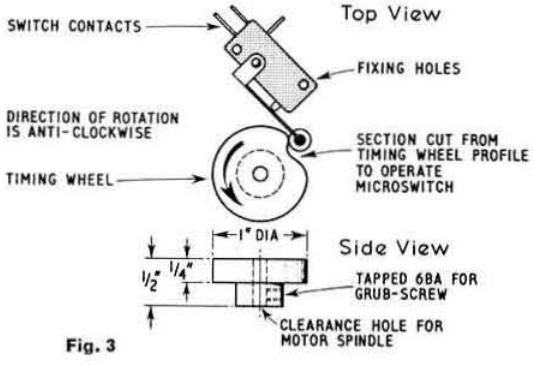


Fig. 3

Hour Operation

In position 1, the uniselector P/1 gives a 00 display. The sixtieth minute pulse closing C2 operating P/1, stepping PA to the next position, i.e. 01. Subsequent pulsing changes the hours, units from 0 to 9, 0 to 9 and 0 to 3 via PA. PB in the first nine pulses indicates zero changing to 1 for the second nine pulses and 2 for the next four pulses. Here the hours display reads from 00 to 23. When PA steps to position 25, +28V is applied via P1 to P/1, resetting the uniselector to position 1.

12 Hour Count

PA operates as before but +28V is now applied via S1 to PC. The display required is 01, thus PA must be self pulsed to its second position. This is achieved by feeding +28V via S1, PC and P1 to P/1, hence stepping once. The display continues to 12. At the fourteenth position, +28V is applied via S1, PC (contacts 14 to 25 and 1) and P1 to P/1, stepping the uniselector to position 1.

Operation should display—00.00 to
23.59 for 24 hours, or
01.00 to
12.59 for 12 hours

If not, the writer would tactfully suggest that the sequence be retraced again after a suitable tea break.

Operating

Special facilities are included as follows:

1. Set MINS—+28V manually pulsed via S5 to R/1 stepping the minutes uniselector to the required time.
2. Set HOURS—+28V manually pulsed via S4 to P/1 stepping hours uniselector to the required time.
3. HOLD—In the event of overstepping the set conditions, +28V pulses from M are broken from R1 by operating S6.
4. GMT/TIME/BST—This is a simple lamp operated by switch, S7, giving an indication to which the time has been set. (Avoids disputes during contests!)

Notes

1. A1 *must* operate before A2. This may be achieved by relay contact adjustments.
2. B1 *must* operate before B2 as for A1.
3. Using KGM 28V indicators, the standing current ON was 0·6A and with BST/TIME/GMT lamps, 0·7A.
4. Lamp ON, set MIN depressed A/2 and B/2 operated, 1·85A. A/2 and B/4 released, 1·2A.
5. Supply current (ac) 0·14A at 35VA.

Construction

The construction is by no means critical but the most important point is the front panel presentation. Arrangement of the indicators and controls must be symmetrical with clear panel markings. The best method is to use engraved plastic sheets, especially made for the job. Numerous engraving companies will, to a suitable drawing, give satisfactory results at a reasonable cost. Fig. 4 shows a typical engraving detail and should cost no more than about 30s. One suggestion is the use of laminated Formica (black/white/black). Here the black surface is " engraved out " leaving the inner white surface showing through.

A nicely finished job that works can conceal the biggest " lash-up " in the world and yet look professional!

Conclusion

The writer would like to acknowledge the help of Martin, G3VWS; without his assistance, the writer would probably have gone out and bought a commercial job after all.

Uniselector Strapping Chart

Posn	Minutes				Hours			
	Units		Tens		Units		Tens	
	RA	RB	RC	RD	PA	PB	PC	PD
1	11 *0*	10 *0*	10 *2*	10 *4*	11 *0*	10 *0*	25	
2	12 *1*	10 *0*	10 *2*	10 *4*	12 *1*	10 *0*	*x*	
3	13 *2*	10 *0*	10 *2*	10 *4*	13 *2*	10 *0*	*x*	
4	14 *3*	10 *0*	10 *2*	10 *4*	14 *3*	10 *0*	*x*	
5	15 *4*	10 *0*	10 *2*	10 *4*	15 *4*	10 *0*	*x*	
6	16 *5*	10 *0*	10 *2*	10 *4*	16 *5*	10 *0*	*x*	
7	17 *6*	10 *0*	10 *2*	10 *4*	17 *6*	10 *0*	*x*	
8	18 *7*	10 *0*	10 *2*	10 *4*	18 *7*	10 *0*	*x*	
9	19 *8*	10 *0*	10 *2*	10 *4*	19 *8*	10 *0*	*x*	
10	10 *9*	10 *0*	10 *2*	10 *4*	20 *9*	10 *0*	*x*	
11	1 *0*	20 *1*	20 *3*	20 *5*	1 *0*	20 *1*	*x*	
12	2 *1*	20 *1*	20 *3*	20 *5*	2 *1*	20 *1*	*x*	
13	3 *2*	20 *1*	20 *3*	20 *5*	3 *2*	20 *1*	*x*	
14	4 *3*	20 *1*	20 *3*	20 *5*	4 *3*	20 *1*	25	
15	5 *4*	20 *1*	20 *3*	20 *5*	5 *4*	20 *1*	25	
16	6 *5*	20 *1*	20 *3*	20 *5*	6 *5*	20 *1*	25	
17	7 *6*	20 *1*	20 *3*	20 *5*	7 *6*	20 *1*	25	
18	8 *7*	20 *1*	20 *3*	20 *5*	8 *7*	20 *1*	25	
19	9 *8*	20 *1*	20 *3*	20 *5*	9 *8*	20 *1*	25	
20	10 *9*	20 *1*	20 *3*	20 *5*	10 *9*	20 *1*	25	
21	25	24	15	22	11 *0*	23 *2*	25	
22	25	24	25	22	12 *1*	23 *2*	25	
23	25	24	25	*x*	13 *2*	23 *1*	25	
24	25	24	B/2	*x*	25	25	25	
25	25	A/2	25	*x*	PI	PI	PI	

Example Uniselector R, Bank RC Strap positions 11 to 20 inc. i.e. 11, 12, 13, 14, 15, 16, 17, 18, 19. The strapped connection is now wired to the minutes, tens, 3 Digit. Finally check this on the circuit diagrams.

Notes
(i) *x* indicates no connection, leave blank
(ii) Figures in italics are the indicated digit on the indicator system used.
(iii) PC is used for 12 hour re-set home.

Parts List

Quantity	Description	Supplier
2	Type 3 or 2 40V uniselectors	G. W. Smith Ltd.
4	Miniature relays. 4 changeovers 24V coil	
4	Digital Indicators	KGM Ltd
2	Switches DPST	
1	Switch DPST	
2	Push-to-Make Switches	Radiospares
1	Push-to-Break Switch	Radiospares
1	Microswitch Roller Arm	Radiospares
1	Synchronous Motor IRPM 240V 50Hz	Surplus Sangamo
1	Coaxial Socket (External Drive)	Belling Lee
1	Mains Plug and Socket	Bulgin
2	Fuseholders	Radiospares
1	Fuse 2A Anti-Surge	Radiospares
2	Fuse 250mA Anti-Surge	Radiospares
3	Lampholders LES	Radiospares
3	Lamps LES 6·5V 1W	Radiospares
1	Rotary Switch 1 pole, 4-way	Radiospares
4	Resistors 330 ohm 3W	Radiospares
1	Resistors 300 ohm 6W	Radiospares
1	Resistor 10 ohm 6W	Radiospares
2	500µF 50V DC Electrolytic	Radiospares
4	Diodes, Silicon RAS31OAF or BY100	Henrys Radio
1	30V Rectifier Transformer	Radiospares
1	Cabinet 12 in × 7½ in × 7 in	Datum Metal Products

Operate and Release Chart

Operate	Via	Release	Via	Function	Display Observed
1 minute pulse MP	M. Int/Ext. Hold	R/I		One	0001
R/I operates 19 times	Step	R/I Selr	Step	Full	0019
MP, R/I	A2, RB, RI			cycle for	
A/2 held via A1	A2, RB, D3	R/I		one	0020
R/I step to home	RI, RC, B2	R/I		hour	0039
MP, R/I operates 19 times		R/I		of	
MP, R/I	A2, B2, RC, RI	R/I		operation	
B/2 held via BI	D3				
R/I step to home	A2, RD, RI				0040
MP, R/I operates 19 times					0059
MP, R/I					
C/2 held via D2 OP	A2, B2, RD	R/I			
D/4 held via DI	CI, RA	A/2, B/2	D/3		
P/I step hour Sel'r	C2				0159
R/I step to home	D4, RA, RI	R/I			0100
		D/2	DI, CI, release		
		C/2, P/I	D2 C2		
Hour operation (24)					
P/I operates 23 times	C2, OP	P/I	C/2 Release	24 hour full cycle	2359
P/I step to home	RI, PI	P/I			0000
Hour operation (12)					
P/I operates 11 times	C2, OP	P/I	C2 Release	23 hour full cycle	1259
P/I step to Outlet 2	PI, PC, SI (SI in 12 hr pos'n)				0100

The above chart provides sufficient information in order to fault find or understand the switching sequence without reference to the text.

A Simple PSU for a BC-221

By W. E. THOMPSON, G3MQT*

QUITE recently I acquired a BC-221-T heterodyne frequency meter through a classified advertisement, but found on examination that the home-built power supply fitted in the lower compartment of the instrument needed some attention, especially as the ht was below 100V, due mainly to a rectifier valve with low emission. The circuit was that of a conventional regulated ht unit using three valves and a neon regulator, which seemed to me somewhat elaborate for its purpose. Rather than revamp it, I decided to design and build a new and simpler psu to replace it. The circuit which was evolved is shown in Fig 1 and it has proved to be entirely successful.

The New Unit

For T1, any small mains transformer capable of delivering secondary outputs of 250-0-250V at about 35 mA for ht and 6·3V at 1A for heaters is suitable, but for preference it should have a screened primary. Two silicon diodes, D1 and D2, rated for about 800 piv and having surge limiting resistors R1 and R2 of 27 ohms provide full-wave rectification. The 4·8 k ohms dropper R3 has to dissipate more than 4W, so to prevent all the heat being developed in one resistor the load is spread over four 1·2 k ohm 5W wire wound resistors connected in series. V1, an OA2 (B7G base) voltage regulator, passes about 20 mA when the BC221 is drawing its normal load and thus sets the regulated voltage at 150V. As this is in excess of the 130V specified for the BC221, a 1·5 k ohm resistor R4 drops the 150V to around 125–130V on the ht rail. Although this tends to degrade the regulation of the psu by increasing its source impedance, it is found in practice that for the three positions of the function switch in the BC221 the ht rail voltage varies by no more than 2V. The electrolytic capacitors are a triple unit in a single can and they are rated at 350V working. The outer unit of the three is used as the reservoir capacitor C1, the other two units being connected in parallel to make the 100μF for C2.

The combination of resistors, voltage regulator and large values of capacitance produces better smoothing than would appear at first sight. The measured ripple voltage on the 130V ht rail is less than 2 mV, so it is virtually inaudible.

Assembly

Construction of the psu is as easy as the circuit implies. A simple chassis, as in Fig 2, can be made with 16 swg sheet aluminium. If a mounting wafer for the electrolytic capacitor unit is not available, it can be satisfactorily clamped to the chassis by bending down the ears of the can instead of twisting them. All the resistors and the two silicon diodes can be mounted on a group tag board, which has a paxolin insulator fitted under it to prevent short-circuits before bolting to the chassis. The chassis can be secured by self-tapping screws inserted from beneath the instrument case.

In the event of the smoothed output voltage being outside tolerable limits some alteration to the value of R4 can be tried, or perhaps to the resistors comprising R3. The values shown in Fig 1 were originally calculated and did not require altering when the unit was built and tested.

Three wires (red for ht, black for earth, and green for heaters) are used for the psu output and are terminated on wiring tags. These tags are clamped under the terminals in the lower compartment originally intended for battery connections. The red wire is connected to terminal B+ at the top of the strip, the black wire to the centre terminal, and the green wire to the lowest one marked A+. The mains input is taken through a double-pole on-off toggle switch and a 300 mA anti-surge fuse in a midget holder wired in the live side. These two items and the grommet for the mains lead are mounted on the left-hand side of the instrument case.

While work was being done on the instrument, opportunity was taken to make a small modification. As battery power does not have to be conserved there is little point in breaking the heater line by the removal of the phone plug. Also, it is seldom that a BC221 is used by a two-headed monster which

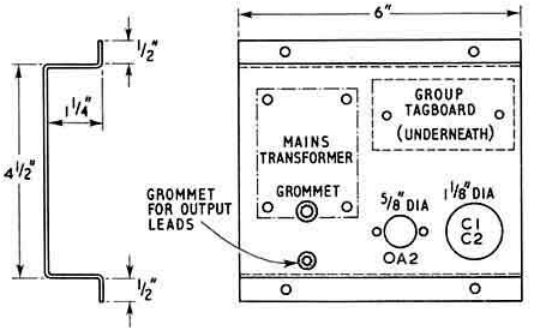


Fig 2. Chassis constructional details.

* "Y Grisiau", 8 Coventry Road, St. Leonards-on-Sea, Sussex.

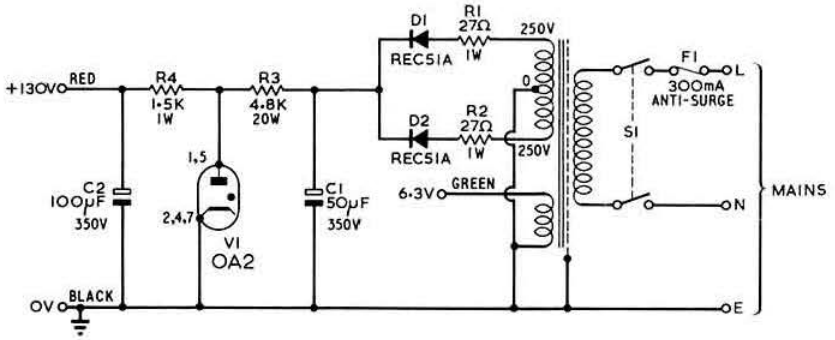


Fig 1. Power supply circuit diagram.

wears two sets of phones, so a duplicate phone jack seems superfluous. As the jacks in the writer's instrument showed signs of old age they were removed, and the loop wiring between them was discarded. A new two-point (tip and sleeve) jack was mounted in the lower position and the red-white wire was soldered to the tip connection. The position vacated by the upper jack was used to mount a 6V 1W lilliput bulb in an LES type pilot lampholder. The white and yellow-white wires which had been connected to the auxiliary springs of the original jack were joined together and wired to one side of the pilot lamp through a 15 ohm 1W resistor to dim the lamp, which would be rather too bright and run hot. The other tag of the pilot lamp and the sleeve connection of the jack were both earthed. The pilot lamp is now across the heater supply and indicates when the mains is switched on.

Conclusion

The use of silicon diodes and generously-rated components in the psu keeps heating to a minimum. After several hours' continual running in its closed compartment the unit gets warm, but not hot. If there should be a tendency to overheating, a few ventilation holes in the base and the left-hand side of the instrument case could overcome it.

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Transistors For Amateurs

By KAY PRIESTLEY G3XIW*

THE Directory of Semiconductors was greeted with enthusiasm by those professional amateurs who were almost drowning in the great oceans of catalogues and data sheets which flow daily into the offices and laboratories of the electronics industry.

Many other amateurs thought this was a good idea, but closer enquiry revealed that

(*a*) No self-respecting amateur ever actually *buys* transistors!

(*b*) As the lists given were of current transistors and so fine for the professionals, the amateurs couldn't find one of their precious half dozen listed.

The sources for this present article are therefore a junk box and the advertisements in a recent *Radio Communication*.

The emphasis this time is on how to use existing transistors (however they were acquired!) and consequently switching transistors are here unashamedly offered as i.f. amplifiers, etc. though much better devices may be obtained for money. In other words, the Directory is still a better buyer's guide and the professionals may turn over to Technical Topics.

The Index

All the type numbers which could in any way be identified from available data have been included in the index though in some cases this amounts only to a mention in an equivalents list so all that can safely be said about them is that they are similar to the "equivalent" mentioned. All such lists must be treated with caution as *X* transistor may be a suitable replacement for *Y in certain circumstances* but this does not mean that it is an identical transistor or that *Y* is a suitable replacement for *X*.

The words "similar to" in the Index indicate that the transistors concerned are mentioned together in one or other of the manufacturers equivalents lists. The word "see" indicates that this transistor will do the same jobs as the other but may require entirely different supply voltages and even have different polarity.

Plastic encapsulation is cheaper but just as good for most amateur purposes though it won't dissipate as much power as a metal can.

Numbering Systems

The commonest is the **JEDEC** system which has the virtue of simplicity.
1N is diode, 2N is transistor, followed by a serial number. This unfortunately offers no clues to the would-be user.

The **Pro-electron** system is more specific.
First letter A is Germanium, B is Silicon.
Second letter A is Diode, C is Audio transistor
D is Audio power type, E is tunnel diode
F is HF transistor, L is HF power type
S is switching, U is switching, power type
Y is power diode or rectifier,
followed by a serial number of three digits for "entertainment" types or a dummy letter and two digits for "communications" types.

Mullards old system was—First letter O is semiconductor Second letter A is diode, C is transistor, followed by a serial number.

Texas instruments sometimes use 2G and 2S followed by a serial number to indicate Ge and Si transistors respectively. GM is also a Texas number, and ones beginning TI are experimental.

Ferranti mostly use ZT instead of 2N and on all the most common transistors the serial number corresponds.
i.e. ZT706 is identical with 2N706.

Motorola number MPS is Motorola Plastic Si. and again the common numbers are the same as JEDEC. MPF is Motorola Plastic FET.

GET were made by General Electric Co. are now made by AES (Mullard)
SB is Surface Barrier, a type now obsolete.
ST are made by Plessey or Fairchild.
2SA and 2SB are Japanese numbers.

The Table

The table is an applications guide showing which transistors may be used for which jobs in different frequency ranges. Each transistor is mentioned several times and by tracing all its appearances in the chart an outline of its uses can be found. A transistor can usually be used at a lower frequency provided the application is not critical.

An indication of the capabilities of a particular transistor can be gained from studying any available data though the range of parameters and characteristics and the ways of expressing them vary considerably. As a general rule the small signal characteristics are given subscripts in small letters and subscripts in capital letters indicate the large signal, d.c. conditions. C, E and B refer to collector, emitter and base, and O indicates that the third electrode is open circuit.

Transistor Beta

One parameter which is found in some form or other on all data sheets is the common emitter current gain, variously known as β, beta, h_{fe} h_{FE}. There are several different betas in use to indicate slightly different things. h_{feo} or β_o is the small signal gain at a low frequency, often 1 kHz measured at a specified dc condition. The large signal beta h_{FE} is the ratio of dc base current to dc collector current and is always somewhat less than h_{fe} at the same point, perhaps 50 per

* 43 Raymond Road, Langley, Slough, Bucks.

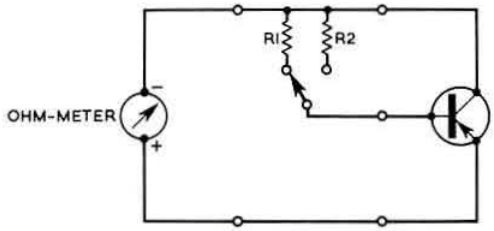

Fig 1. Transistor Tester for pnp transistors. Reverse polarity of ohmmeter to test npn transistors R1 = 10,000 ohms, R2 = 110,000 ohms both ½W composition. Polarity of meter indicates output voltage not terminal.

cent of it. The two can be compared with the speed of a car over a short distance and its average over the total journey.

Generally h_{fe} is only slightly dependant on operating conditions, but sometimes transistors are deliberately made where either V_{ce} or I_c controls h_{fe} so as to give a sort of " variable mu " characteristic for agc purposes. The 2N1742 and AF186 are examples of these types.

The transistor tester described below gives an approximate reading of h_{FE}. Its chief merit is as a very simple good/bad indicator.

Simple Transistor Tester

This gadget has a truly international flavour. It appeared first in June 1966 in an article by V. Babaev in *Radio*, a USSR publication. Gunnar Lind, SM7DZW translated it and it appeared again in April 1967 *QST* in Walter F. Lange, W1YDS's column of Hints and Kinks.

The parts list includes only two resistors, three bits of wire, five terminals or connectors of some sort, a switch and a small chassis or board for mounting. These components are connected together as shown in Fig. 1 and used in conjunction with an ohmmeter.

First determine the polarity of your ohmmeter. Most ohmmeters give out a positive voltage at the negative terminal. Polarity can be determined by connecting any diode of known polarity across the leads. The lowest reading is obtained when the anode is connected to the positive output of the ohmmeter.

With the meter switched to X100 or X1000 range and zeroed, connect any pnp transistor and note the readings of the meter with the switch in both positions. No reading means the transistor is defective. An indication of the beta of the transistor can be found from the formula

$$\beta = \frac{\triangle R_b}{\triangle R_c} = \frac{R_2 - R_1}{R_{ee2} - R_{ee1}}$$

R_1 and R_2 have been carefully chosen so that $R_2 - R_1$ is 100,000. R_{ee1} and R_{ee2} are the two readings obtained on the ohmmeter. For npn transistors the ohmmeter must be connected the opposite way round.

On lower measuring ranges the collector current and therefore the beta tend to grow bigger. If it is intended to use the transistor with a small collector current, it can be tested on a higher range and vice versa. Low power transistors may be destroyed if the ohmmeter is switched to the very lowest ranges as this would cause the collector current to grow very quickly. Some ohmmeters give higher voltage also on the higher ranges which may exceed the voltage rating of low power transistors.

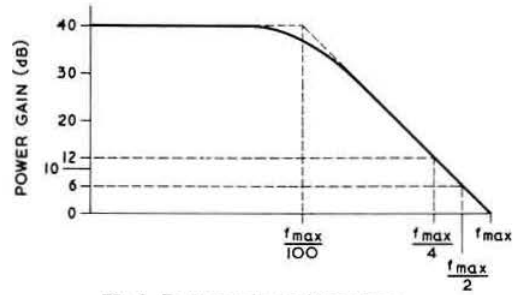

Fig 2. Power gain vs Frequency.

Frequency Specification

One parameter often quoted among amateurs is the gain bandwidth product f_T which is defined as the frequency at which the common emitter forward current gain (h_{fe} or beta) is equal to one. f_T can be used to find the current gain at any frequency and is therefore a useful guide up to a point but *power gain* depends also on voltage gain.

A similar figure of merit for power gain is f_{max} which is the frequency at which the maximum neutralized power gain falls to one (sometimes this is known as f_{ose} since the transistor will not oscillate above this frequency) Fig. 2 shows how power gain varies with frequency for most modern transistors.

The power gain is one at f_{max} and increases at the rate of 6dB per octave (or 20dB per decade) up to about 40dB as the frequency decreases. If f_{max} of a particular transistor is known the power gain at any specified frequency can be estimated using this graph. Alternatively, if the power gain at a given frequency is known, it is a simple matter to estimate f_{max}.

For the benefit of those who prefer the information in the form of a nomogram, Fig. 3 can also be used to relate f_{max} and power gain at any frequency.

In the low frequency range i.e. below $\frac{f_{max}}{100}$ it is common practice to mismatch, sacrificing some gain in order to obtain stability. So 40dB is given as a realistic working figure (Fig. 2) rather than a theoretical maximum.

If the available data gives f_T and $r_b' C_c$ it is possible to find f_{max} approximately by the formula

$$f_{max} \approx \sqrt{\frac{f_T}{8\pi\, r_b' C_c}}$$

where r_b' is base resistance, C_c is collector capacitance, both internal parameters of the transistor.

Circuit Configurations

Common emitter is the most widely used because in the flat region of Fig. 2 this gives the highest current gain. In the slope region the common emitter neutralised amplifier has two advantages, (*a*) stability, because the feedback between collector and base is degenerative and (*b*) reliability, because there is less variation in gain and bandwidth from one transistor to another.

It is possible to operate without neutralization particularly when the neutralized gain of the transistor is more than sufficient. This is complicated because internal feedback in the transistor can either increase or decrease the gain but in both cases reducing the load resistance seen by the

Frequency	Small signal amplifiers		Mixers		Oscillators		Multipliers Class C amps		Linear amplifiers Medium power		Linear amplifiers High power	
0-20 kHz	‡AC107 ASY26-9 OC41-5 OC70, 1, 5	BC107-(9‡) OC200-3 2N2926‡ 2N3819			AC107 OC70, 1, 5	BC107-9 OC200-3 2N2926			ACY17-22 ASY26-9 OC72, 6, 7 OC81, 4	2N3702-6 OC122-3	AD140 AD149 OC22-6, 8 OC35	
465 kHz	AF114-7 AFZ11-2 OC170-1	BC107-9 2N918 2N2926 2N3819	AF114-7 AFZ11-2 OC170-1	2N819 2N2926	AF114-7 AFZ11-2 OC170-1	2N918 2N2926						
1·8-7·5 MHz	AF114-7 AFZ11-2 OC170-1	BC107-9 2N918 2N2926 2N3819	AF114-7 AFZ11-2 OC170-1	2N918 2N3819 2N3826	AF114-7 AFZ11-2 OC170-1 2N3819	2N918 2N706, 8 2N2926 2N3826	AUY10 2N2368, 9, 9A 2N3826	BFY50-1 2S012-3 2SO24-6 2N706, 8		BFY50-2 2N706, 8	AUY10	2S012-3 2S024-6
7·5-30 MHz	AF114-7 AFZ11-2 OC170-1	BC107-9 2N918 ‡ 2N3819	AF114-7 AF178 AFZ11-2 OC170-1	2N918 2N3819 2N3826	AF114-7 AF178 AFZ11-2 OC170-1	2N706, 8 2N918 2N3819 2N3826	AUY10 2N2368, 9, 9A 2N3826	BFY50-2 2S012-3 2S024-6 2N706, 8		BFY50-2 2N706, 8	AUY10	2S012-3 2S024-6
70 MHz	AF114-7 AFZ11-(2‡) OC170-1	2N918 ‡ 2N3819	AF114-7 AF178 AFZ11-2 OC170-1	2N918 2N3819 2N3826	AF114-7 AF178 AFZ11-2 OC170-1	2N706, 8 2N918 2N3826		2N706, 8 2N918 2N2368 2N3826		2N706, 8 2N918		
144 MHz	AFZ12 ‡GM290	2N3819 2N3823 ‡ 2N4416 ‡	AF178 AFZ12 GM290	2N918 2N3819 2N3823 2N4416	AF178 GM290	2N706, 8		2N706, 8 2N2368, 9, 9A		2N918		
435 MHz	‡AF139 ‡AF186 ‡GM290	2N4416 ‡	AF139 AF186 GM290	2N4416	AF139 AF186 GM290							‡ denotes low no ise specification.

AC107	Ge pnp
AC127	Ge npn
AC128	Ge pnp see OC72
AC153	Ge pnp similar to AC128
ACY17-22	Ge pnp
AD140	Ge pnp
AD149	Ge pnp
AD150	Ge pnp similar to OC26
AF27	Ge npn similar to AC127
AF114-7	Ge pnp
AF118	Ge pnp video output, possible for low power Tx.
AF139	Ge pnp
AF142-4	Ge pnp similar to AF181
AF178	Ge pnp
AF181	Ge pnp see AF114-7
AF186	Ge pnp
AF239	Ge pnp see AF139
AFZ11-2	Ge pnp
ASY26-9	Ge pnp
AUY10	Ge pnp power, fT 60 MHz
BC107-9	Si npn
BCY31-4	Si pnp see OC200
BFY50-2	Si npn
BSY26-8	Si npn see BC107-9
GET536	Ge pnp power see ACY19
GET882	Ge pnp see OC41
GM290, A	Ge pnp A indicates different base.
MPF103-5	n channel FET see 2N3819
MPF106-7	n channel FET see 2N4416
OC22-6, 8	Ge pnp
OC35	Ge pnp
OC41-5	Ge pnp
OC70, 1, 5	Ge pnp
OC72, 6, 7	Ge pnp
OC81, 4	Ge pnp
OC122, 3	Ge pnp same group as AF118
OC170, 1	Ge pnp
OC200-3	Si pnp
RF107	Si npn similar to BC107
SB240	Ge pnp obsolete, probably usable to 30 MHz.
ST70	Si npn similar to 2N918
TIS34	n channel FET plastic 2N3823
TIS88	n channel FET plastic 2N4416

ZT708	Si npn identical 2N708
2G101	Ge pnp similar to OC171
2G301-4, 6	Ge pnp similar to OC44, 5
2G381	Ge pnp similar to OC81
2N236A	Ge pnp similar to AD140
2N501	Ge pnp see 2N706
2N706, 8	Si npn
2N918	Si npn
2N960-6	Ge pnp see 2N706
2N1302, 4, 6, 8	Ge npn ⎫ can be used complimentary
2N1303, 5, 7, 9	Ge pnp ⎭ see OC41
2N1742	Ge pnp a.g.c. see AFZ11
2N2368, 9, 9A	Si npn
2N2926	Si npn see note on colour code.
2N3053	Si npn similar to BFY52
2N3702, 3	Si pnp ⎫ plastic
2N3704-6	Si npn ⎭ plastic
2N3819	n channel FET
2N3823	n channel FET
2N3826	Si npn
2N3903, 4	Si npn ⎫
2N3905, 6	Si pnp ⎭ see 2N3702-6
2N4123-6	Si same as 2N3903-6 but lower voltage
2N4416, 7	n channel FET
2S012, 3	Si npn
2S024-6	Si npn
2S301-5	Si pnp see OC200
2SA12	Ge pnp similar to OC45
2SA234	Ge pnp similar to AF186
2SA235	Ge pnp similar to AF178
2SB75	Ge pnp similar to OC71
2SB77	Ge pnp similar to OC81
2SB156A	Ge pnp similar to OC81

2N2926

Colour code	h_{fe} (V_{CE}—10V I_C-2mA, f-1 kHz)
Brown	35 to 70
Red	55 to 110
Orange	90 to 180
Yellow	150 to 300
Green	235 to 470

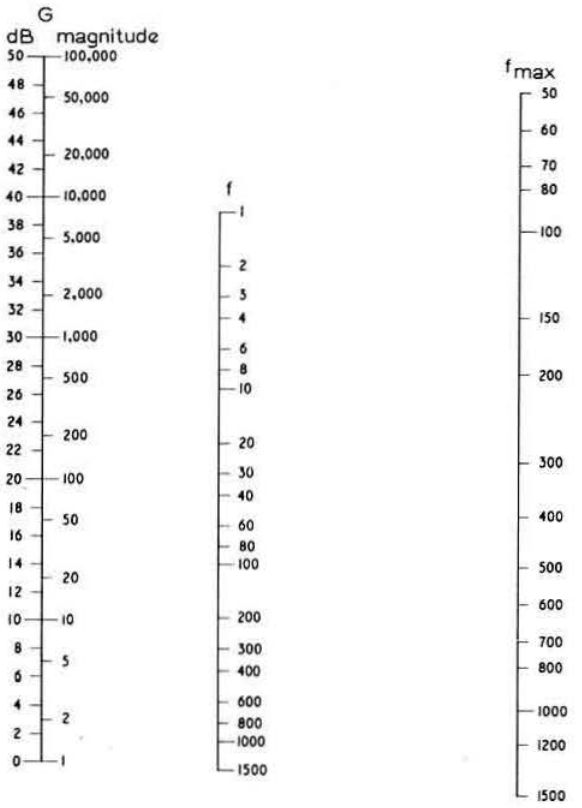

Fig 3. Nomogram relating f_{max} and power gain at a given frequency.

transistor will reduce the effect at the expense of gain. As a general rule the common emitter connection is preferable to common base but at frequencies near f_{max} when the gain is very low the positive feedback in common base may boost it a little without likelihood of oscillation.

The common collector (emitter follower) connection is usually an impedance matching circuit,

$$R_{in} \approx h_{fe} R_L \quad \text{and} \quad R_{out} \approx \frac{R_g}{h_{fe}}$$

where h_{fe} is current gain, R_L is load resistance R_g is source resistance, but at high frequencies with capacitive loads it can have a negative input resistance causing oscillation!

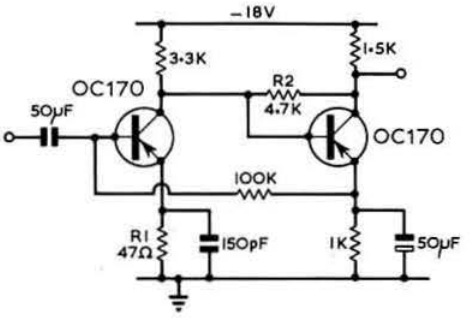

Fig 5. The Cherry amplifier

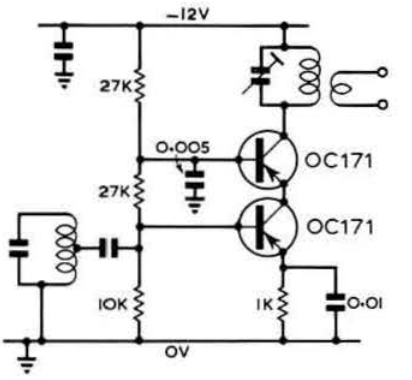

Fig 4. The cascode amplifier.

The problems of internal feedback can be reduced considerably without neutralizing by using transistors in pairs, one to give current amplification only, and the other voltage amplification only. The first such circuit is the cascode (Fig. 4). This has the same input impedance and mutual conductance as an individual common emitter stage but the output resistance is very much higher, so that a large voltage gain is possible. The internal feedback of a pair is about one hundredth of a similar common emitter stage and can generally be forgotten even at 145 MHz.

The second circuit is suitable for audio and video amplifiers (up to 100 MHz) where a flat response and a precise gain are required (see Fig. 5). It is possible to show that the voltage gain of the circuit is simply $\frac{R_2}{R_1}$ up to the frequency where the transistor's own gain is no longer greater than this figure.

Noise Figure

Fig. 6 shows how noise figure varies with frequency (known as a bath tub curve!). The slope of the lf side approximates to 3dB per octave and on the hf side to 6dB per octave. Any transistor which has pretensions to be a low noise device will have certain specifications at lf or hf and the manufacturers data will show the appropriate half of the bath tub. It is rare for a transistor to be good at both ends; if it is then it will have a very high beta. For best results obviously the transistor must be used as nearly as possible to the manufacturers specification of operating conditions and source impedance.

Acknowledgements

Fig. 3 is reproduced by kind permission of Motorola Inc.

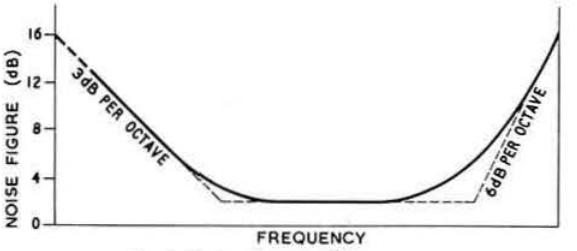

Fig 6. Noise figure vs Frequency.

How Much Harmonic?

By KAY PRIESTLEY, G3XIW*

It all started when John got fed up with the QRM on 80m and decided to give 20m a whirl. His homebrew transmitter only runs 20 watts but it seemed worth trying just to see what he could get. So he tried it . . . and he got . . . TVI! Why? Because his QTH is 30 miles away from the tv transmitter and he didn't have any filter! He wasn't collecting *Bulletins* in the 50s when so much work was done and published on tvi from all angles, and . . . well, no one ever told him.

So, how should one set about deciding how many anti tvi steps to take *before* making the acid test? The first graph (Fig. 1) shows how the strength of the tv signal varies with distance from the tv transmitting station. Obviously the relationship between distance and field strength will be modified by the local terrain and so information on tv aerials has been added, as observation of the types of aerials used in an area gives a further clue to the field strength. In some areas directional tv transmitting aerials are in use. It is suggested that the Engineering Information departments of the BBC and ITA will be willing to supply actual field strength figures for a particular area but even these are subject to considerable modification by local reception conditions. From the field strength the permissible level of harmonic radiation has been estimated and the necessary harmonic suppression is presented in the second curve (Fig. 1).

It is clear that the degree of suppression varies considerably with location. What is all right for Joe in SE23 will cause wipe out for Bill in Chelmsford, although in turn his location is a bed of roses compared with Sam in Much-Wittering-in-the-Sticks. It is essential to have an idea what local conditions are like and design accordingly. Simply pushing in "a low pass filter" is on a par with putting "a valve" in the final amplifier. Fig. 2 gives an estimate of the suppression which can be obtained from various types of filters and atu's. It should be emphasized that the theoretical suppression figures may be modified by the conditions of use which vary considerably as between amateur stations.

The susceptibility of a tv receiver to harmonics depends on the frequency of the harmonic in relation to the vision carrier, varying by as much as 40dB, and also on the type of modulation on the interference. Obviously it is only possible

Continued on page 330

* 43 Raymond Road, Langley, Slough, Bucks.

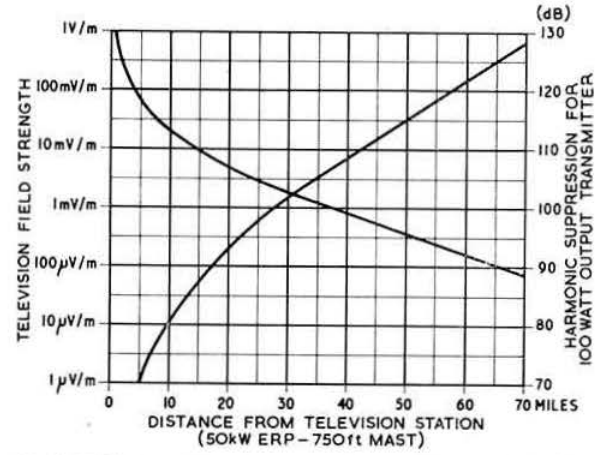

Fig 1. Field strength and suppression vs distance from the tv transmitting station.

1V/m	**Attenuator needed**	**What is tvi?**
100mV/m	**Indoor or simple dipole**	**Harmonic tvi unlikely.**
10mV/m	**Indoor or simple dipole**	**Power supply leads by-passed.**
1mV/m	**H outdoor aerial**	**Power supply leads screened and filtered.**
100μV/m	**Large outdoor aerial and possibly pre-amplifier.**	**Everything screened and filtered, twice over!**

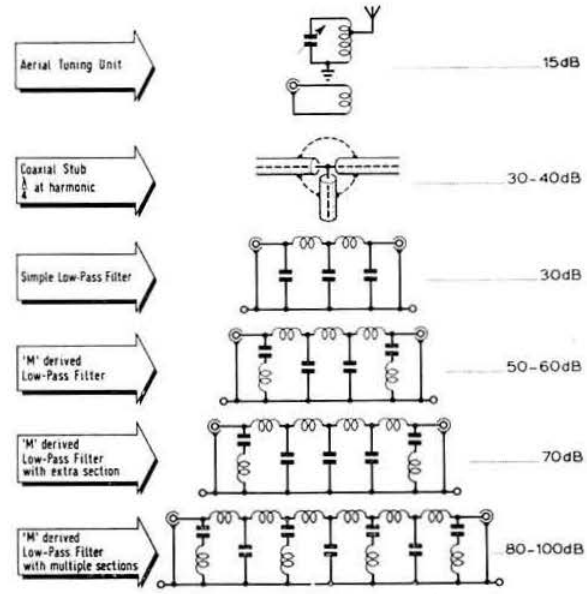

Fig 2. From the information on the various types of filter, devices giving the required amount of suppression can be selected, e.g. at 30 miles 105dB is required. This can be made up from

30dB basic transmitter
15dB atu
70dB m derived filter with extra section

115dB which gives some margin.

A well designed transmitter should possess 30dB of suppression when correctly loaded without additional filtering.

A Roof Rack Fitting Top Band Mobile Whip

By BRYAN HAYES, G3JBU*

HAVING used an 8 ft. centre loaded whip mounted on the rear bumper for Top Band Mobile operation, the writer was considerably disturbed to note the whip and play in such an assembly when travelling at speed along a Motorway. Even at a mere 30 m.p.h., the movement can be appreciable, and must certainly be disturbing for anyone in a following vehicle.

Alternative mounting positions were tried, including those normally occupied by a car radio broadcast aerial, but in every case a loss of radiation was noted, presumably attributable to the proximity of the bodywork of the car. Matters were brought to a head after the purchase of a new car, for, while the writer wished to continue operating mobile, this could not be at the expense of detracting from the resale value of the vehicle owing to the method of mounting the mobile aerial. Eventually it was decided that if the aerial could be mounted in a satisfactory manner on a roof rack, then this would satisfy all counts, for it would permit quick removal while at the same time leaving the loading coil out in the open.

Once the method of mounting had been decided, it became obvious that a centre loaded whip was no longer a practical proposition, and thus experiments were undertaken with the base loaded variety, but with a much shorter overall length than that normally associated with Top Band whips.

Roof Rack Fitting

The entire mechanical strength depends on the manner in which the aerial is secured to the roof rack, and here there can be no room for flimsy construction. The modification to the roof rack to be described, while simple in itself, results in a rigid construction.

Between two of the cross-supports of the roof rack upon which luggage normally rests, is fitted a piece of thick perspex or Tufnol sheet, and this forms the base to which the loading coil is fitted. This sheet should not be less than $\frac{1}{2}$ in. thick, and can be obtained from one of the various sources which advertise in most radio periodicals. The sheet is drilled near each corner—but not too near—and directly over the relative cross-supports. The cross-supports are then marked and drilled with matching holes. These holes should be of sufficient size to pass the 2BA bolts which, with their associated wing nuts, retain the sheet to the frame of the roof rack. The method of fixing is shown in Fig. 1.

Loading Coil Fitting

The centre of the insulating platform, that is the perspex or Tufnol sheet just mentioned, is drilled with a $\frac{1}{4}$ in. diameter hole. Through this passes the 0BA bolt which secures the loading coil to the platform. One small modification might be to drill an additional hole to the side of this to pass a 4BA bolt to mate up with a further hole in the base of the loading coil. This would have the effect of locking the coil to the main bolt, and of preventing any twisting or turning action from possibly causing it to become unscrewed. However, in this connection it is as well to mention that the writer does not use this locking system, and has found the single 0BA retaining screw to be completely satisfactory.

Loading Coil Construction

The loading coil has an external diameter of $1\frac{1}{8}$ in. and an internal diameter of 1 in. which, for its length of 15 inches, is close wound with 26 s.w.g. enamelled wire. To each end of the loading coil is fitted a 1 in. length of brass rod having a nominal diameter of 1 in., the actual diameter being such that it is a force fit into the paxolin tube. One of these "discs" is tapped 0BA centrally—to accommodate the screw which mounts it to the insulated platform—while the other is drilled to take the whip section. In the writer's case the whip is 3 ft. 6 in. long and made from $\frac{1}{4}$ in. diameter dural tubing.

The brass discs are held to the coil former by screws as shown in Fig. 2.

Top Section Construction

As mentioned in the preceding section, the whip in the writer's case is constructed from $\frac{1}{4}$ in. dural tube, and since most of the 'phone operation takes place between 1900 kHz and 1930 kHz, it is cut for about midway between these two frequencies. However, since the efficiency of this aerial, in common with those of a similar type, falls rapidly with changes in frequency from that of the optimum length, if large excursions in frequency are contemplated, provision should be made to allow the length of the top section to be adjusted. This can be achieved by fitting a $\frac{3}{8}$ in. diameter tube to the top disc of the coil, cutting it, sliding in the $\frac{1}{4}$ in. section, and encircling the whole with a circlip fitted with a wing nut. This is illustrated in Fig. 2.

Miscellaneous Construction Notes

The aerial is fed with low impedance co-axial cable from the transmitter. The connection to the aerial is via Pye co-axial plugs and sockets, the socket being mounted on the insulated platform as shown. These sockets are to be preferred since, when mated to the plug and locked into place with the wire clip, a waterproof joint results. The feed cable

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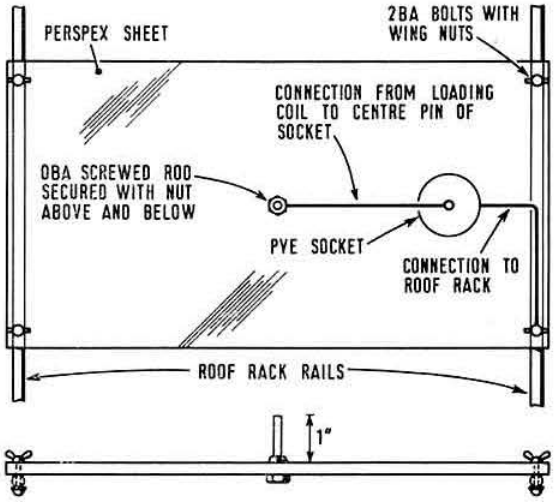


Fig 1. Method employed by G3JBU for mounting the top-band mobile whip. The perspex sheet is attached to the roof rack with four 2BA bolts as described in the text.

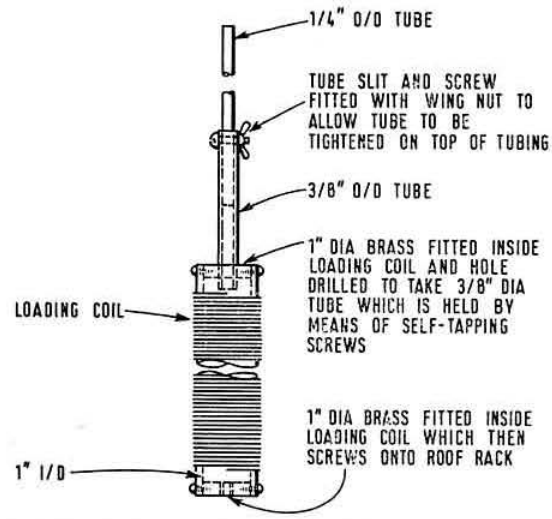


Fig 2. Illustrating constructional details of the loading coil and vertical portion of the aerial.

is fed through the driver's quarterlight, and since most modern motor cars employ a rubber surround, it will be found that the window can still be closed without damage to the cable.

Once the coil has been completed and pruned to the correct number of turns, it should be given a coat of *Holts* " Damp Start " to avoid the ingress of moisture affecting its resonant frequency.

Loading Coil Adjustments

Final tuning to the desired resonant frequency is undertaken with a grid dip meter in the usual manner, turns being removed from the loading coil as required. As the calibration of a g.d.o. is not usually sufficiently accurate, and since its frequency is more than likely to vary as it is loaded by the aerial, the frequency of the g.d.o. should be cross-checked against the station receiver during adjustments to the loading coil.

Results

This aerial has proved entirely satisfactory both from a mechanical and an electrical point of view. Mechanically it has the advantage that it can be quickly removed from the car at anytime. As a radiator, contacts over distances of 30 miles, and with a transmitter running just 4 watts input, are not uncommon.

How Much Harmonic?

continued from page 328

to take all these factors into account in a particular case. For this reason the figures should only be treated as a guide, bearing in mind that it is as well to have a bit in hand.

Fig. 3 shows the harmonic relationship between the hf amateur bands and the tv channels in Band 1. It is clear that in channel 2 areas, the 20, 15 and 10m bands cannot cause trouble provided no harmonics are produced by the exciter. A completely successful technique is to run the vfo at 14 or 21 MHz. Similarly in channel 1 areas, a 28 (or 9·3) MHz vfo can be used for the 10m band.

When harmonics have been suppressed to a negligible level at the nearest tv receiver any remaining tvi should respond to a suitable high pass filter, but it is futile to attempt this until the amateur transmitter is harmonic free.

Per ardua ad bonum visum.
(with acknowledgments to G5RV)

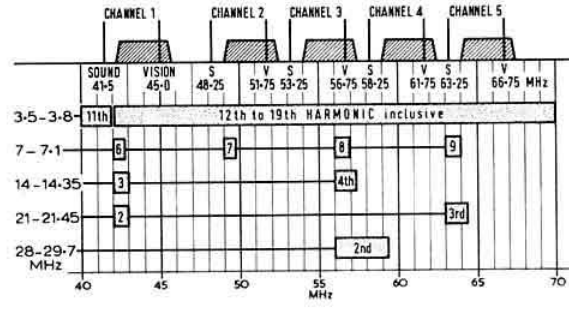
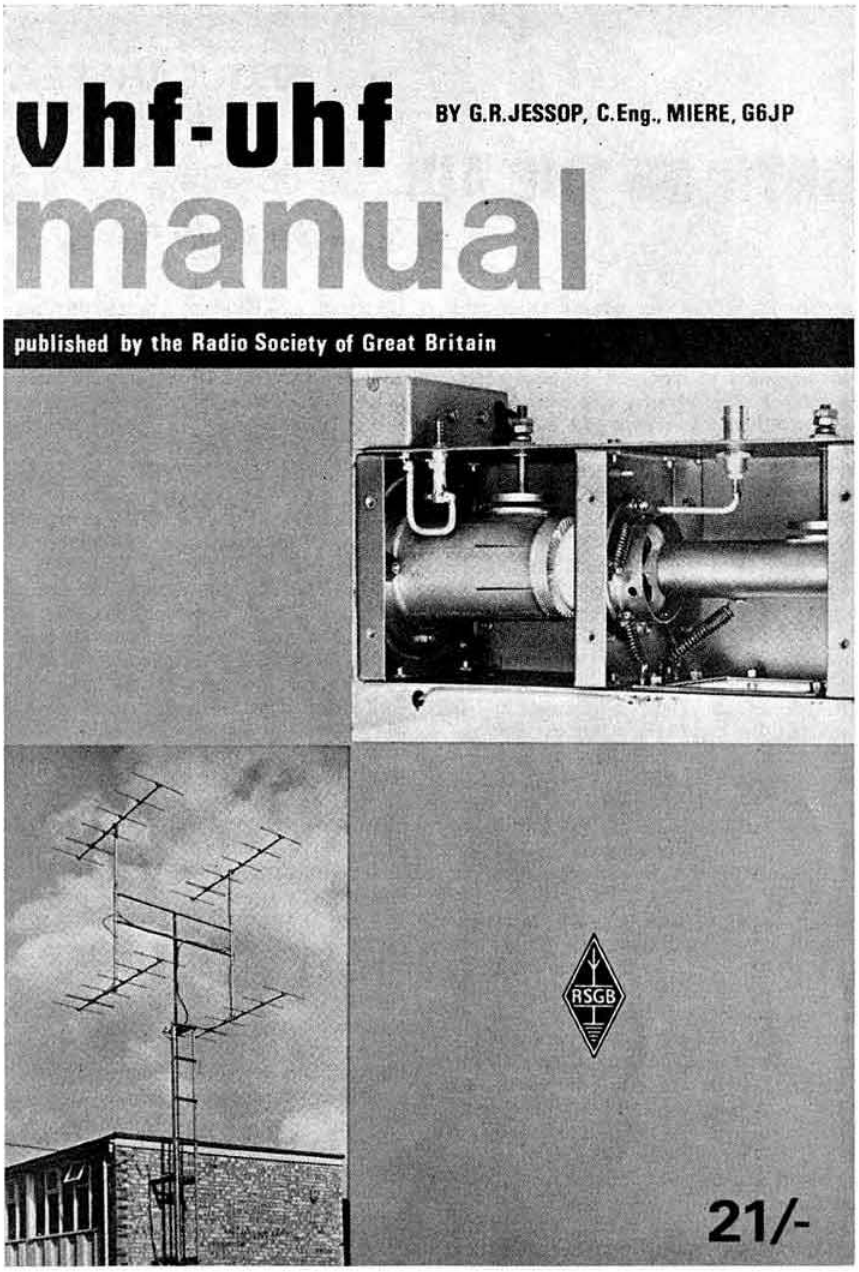


Fig 3. Harmonic relationship between the amateur bands and tv channels in Band 1.



If you have any interest in the frequencies above 30 MHz then you need this book. It is the first complete manual for the metre and decimetre bands ever published outside of North America. It is probably the most comprehensive work of its kind ever produced, ranging from advanced material to simple circuits for the rank beginner to vhf. Like all of RSGB's technical books, it is British produced and thus all parts are available in this country. In common with other recent RSGB Publications, many circuits also show equivalent American component values. An attractive layout and clear style make the *VHF|UHF Manual* equally suitable for construction or just reading.

The VHF/UHF Manual is obtainable from RSGB Publications, 35 Doughty Street, London, WC1 at 22s. 6d. including post or 21s. over the counter.

THE MONTH ON THE AIR

By JOHN ALLAWAY, G3FKM*

THE remarks in March *MOTA* concerning QSL card inaccuracies have caused another point to be raised relevant to the same subject. GW6YQ has produced a bundle of cards, all supposed to represent contacts which their senders apparently think they have had with him. A large number show no QSO date and a few contain no details whatsoever of the supposed contact. The limit of stupidity is a card which does not even bear the call-sign of the sender! George points out that in 17 years with a G call he never had a dubious QSL application and that all his collection of doubtful cards has been acquired since he became one of the much rarer GW6 licence holders. It would be interesting to know whether other rare call holders are subjected to similar pressure for confirmations for non-existent contacts.

Apologies to those who followed the suggestion in February *MOTA* by sending along stamps to Ferne Hughes, wife of WA6AHF. The address given is incorrect and it would appear that part of WB6AHE's address became mixed with the correct one which should have been: 17494 Via Alamitos, Sam Lorenzo, California, 94580, USA. Readers will recall that Ferne is incapacitated due to a severe spinal injury and that her hours are spent with her stamp collection when she has finished dealing with the large number of QSL cards for the stations for which her husband acts as QSL manager.

UB5WE pointed out during a recent contact that many Russian amateurs find it difficult to obtain some of the rarer QSL cards from DX stations because of the difficulty of obtaining IRC's in the USSR. It might be a friendly gesture if those of us who are more fortunately placed were to enclose the occasional extra IRC when applying for cards of this nature, with a request that the coupon be used for paying postage on cards due to be sent to Box 88. Victor also said that many of his countrymen seem to have difficulty in converting their own local time to GMT, and that he thought that adding the time of the QSO in MSK (Moscow Time = GMT + 3 hours) might assist in obtaining a higher percentage of confirmations.

The *MOTA* gremlin which insists on making a final table of the 1969 Countries Table at regular intervals has struck again. Will readers please note that the final listing will not appear until February 1970 *MOTA*, regardless of the table's heading.

Top Band News

W1BB's 22 March News gives the story behind the 160m operation by the expeditioners to Malpelo Is. This was organized by W0DX (President of ARRL) and HK3RQ (President of LCRA) and apparently met with considerable success. Two aerials were used, one was 700 ft long, the other 185 ft—the second being more effective. The first contact was with K1PBW/8 and a total of 28 QSO's were made. W0DX stopped off at HK5EV on his return journey to the US and was able to work a number of US stations from there also.

Herb, KV4FZ (ex-W0VXO), spent a few hours on St Kitts during 13-14 March and made 52 160m contacts. As mentioned in previous *MOTA*'s he expects to operate from a number of locations in the Caribbean area in the coming months.

Gus, W4BPD, was reported as heard in the UK when using his ZD3A call from Gambia. No information is available concerning contacts having been made but according to W1BB, G2CFV copied him at RST 579.

Conditions in general on the band have been quite poor, with rising static levels as is to be expected at this time of the year.

W1BB reports that the visit by W4BPD and VQ8CC to Rodriguez Is. resulted in one top band QSO—with G3XAQ at 23.21 on 25 March. KV4FZ and W1BB were also heard but no contact made. More direct news of 160m DX worked from the UK would be appreciated by your scribe who finds it somewhat strange that practically all news of 160m UK DX contacts comes via W1BB!

News from Overseas

David Appleton, G3NRA, is now resident on Betio Island, Gilbert Islands. If all went according to plan and his equipment arrived on schedule, David hoped to get on the air with his VR1O call-sign during the first week in March. He is currently in charge of VR1 licensing, and has re-written the amateur licence as this was originally drawn up by VR1A many years ago and contained no mention of the A3j mode. It seems that although Charles Adams left some years ago a number of QSL's are still arriving for an assortment of VR1 call-signs c/o VR1A. A certain amount of confusion has occurred in the past owing to the fact that some calls were re-issued after their original holders had left. This practice has now ceased and future call-signs will be VR1Q, VR1R, etc, and then VR1AA, AB, etc. There has only been one two-letter call-sign issued—VR1RO, which was used by G2RO during his visit there some years ago. Some pirate calls which have been used include VR1's EE, FF, FT, BA, AK, NUR, and ZB. Licences covering Christmas Is (VR3) are issued from VR1 and it seems that VR3AM does not appear in official records either. David confirms the legality of VR1L and VR1P and also VR3DY. VR1O's operating times will normally be between 01.00 and 02.00 and 04.30 and 11.00 weekdays, between 01.00 and 11.00

* 10 Knightlow Road, Birmingham 17. Closing date date for the June issue is 12 May, for the July issue 10 June and for the August issue 15 July.

Wednesdays, and any time at weekends. Plans are under way for a folded rhombic antenna, and also a 21 MHz beam at about 70 ft so that there should be no difficulty in working the UK.

G3VDO is now operating /MM from the 36,000 tons oil tanker *London Independence* and has recently visited Japan. He informs us that when the current Japanese JA1 and JH1 prefixes are exhausted the JR1 series will be used, and also that when the Bonin and Marcus Is groups are returned to Japan the JD1 prefix will be used in both places. Ian puts in a special plea for all stations to listen to a *whole* call-sign before deciding not to answer its owner! He finds that many hear only the G3VDO part of his call and ignore him because they think he is in England. It seems that according to an Admiralty publication Humber Radio (GKZ) has recently been licensed for 3528 kHz and 3525 kHz—more trouble for 80m enthusiasts!

Les Hickinbottom, G3HZG, is now working in Fiji and has received his VR2FT call-sign. He found it extremely easy to get his licence and received it within 24 hours of the authorities inspecting his G licence. With his tri-band vertical and KW2000A transceiver Les has been enjoying the novel experience of fighting his way through the KJ6 and 5W1 QRM! A rotary beam is on order and should result in more satisfactory contacts. At the time of writing VR2FT had not worked any UK stations and had only heard one G station on the South Pacific Net.

VP8JH, recently active from the South Orkneys has now returned to the Falkland Islands and will be active from about mid-April when he expects to receive his equipment from the south. It is imperative that contacted stations QSL as follows—UK stations only should send sae to G3NMH, and all others to BRS26222 c/o RSGB. Both these managers are extremely efficient and QSL's will be returned as soon as possible. All short wave listener reports should be sent direct to Buck Taylor, VP8JH, Port Stanley, Falkland Is and Buck promises 100 per cent replies. Buck has no QSL's except for confirming listener reports, and stresses the importance of sending sae's to his QSL managers.

Fred Sawyer, 5Z4KO, will be leaving Kenya by sea on 10 May and should arrive back in the UK on 2 June. He will be back at G3SLN for two or three months before taking on another overseas assignment, the exact QTH of which is not yet known but it is hoped that it will be in a good DX spot! All QSL's for 5Z4KO sent after 1 May (except from W's and VE's) should go via G3SLN.

5N2AAF (on left) and 5N2ABG (on right) talk things over at ABG's shack in Kaduna, Nigeria. AAF is Secretary and QSL manager, and ABG is President of NARS

A group of well known Zambian amateurs taken at a recent meeting of the Radio Society of Zambia at Kitwe. Back row (L to R) 9J2's RA, WR, KW, VX, RQ. Middle row: 9J2's LK, HE, BC. Front row: 9J2MG, CL

Eric Lomax (see picture) writes to say that he feels that he is too old to go in for the new 5 band DXCC so is having a lot of fun doing the " Five card trick "—i.e. working one station on five bands. At the time of writing he had done this with 5 UK stations and a DL. Four of the five G's are old timers (G2NH, G3KS, G3WW, and G6VQ) and the quickest yet was done by G3WW who managed the 5 contacts in just over 24 hours. Eric has a KW2000 with atu and low pass filter (because TVI rears its ugly head even in Kaduna) and his aerials consist of a two-element Yagi for 28 MHz, 3-element Yagi for 21 MHz, a ground plane for 14 MHz, and a horizontal vee with 270 ft legs running N/S for the LF bands.

G3NMH points out that the information given by VP8KO on page 260 of April *MOTA* concerning his QSL managers is in fact the wrong way round. All cards from UK stations should be sent to G3NMH, and those from the rest of the world to BRS26222.

Mike Matthews, G3JFF (ex-ZB2AM, etc) will shortly be joining the Far East fleet and is hoping to resurrect his old 9V1HU and 9M2MA calls whilst out in that area. His tour will last 18 months, starting in August, and he will also be visiting VS6, JA, VK, ZL, and 5Z4. Some /MM operation is anticipated.

An additional Ex-G Radio Club Net is now in operation. This is primarily for members in the Pacific area, but all callers are very welcome. It is held at 06.00 every Sunday on 14290 kHz, and net control stations are WA6GLF or WA0UJO. This is of course in addition to the regular Ex-G net which meets at 19.00 every Sunday on 14346 kHz at 19.00 (1st and 3rd Sundays only during June, July and August).

BRS31164 reports that Derek, MP4TAF, has been busily recruiting and has encouraged a number of new MP4T call holders to become active, including TCR, TCV, TCM,

and TCQ. MP4TAF is to be found most days on 21,380 kHz at 12.00 looking for contacts with UK stations. A query is raised over the use of the call MP4TJK by DL7JK since all authentic licences are being issued in strict alphabetical sequence. This course of using one's own call-sign following the MP4T was also followed recently by another DL who was using MP4TWU but was told that this was incorrect and advised to use his home call /MP4T. Licensing conditions in Trucial are exactly the same as in the UK and only the references to the UK have been removed from the licences.

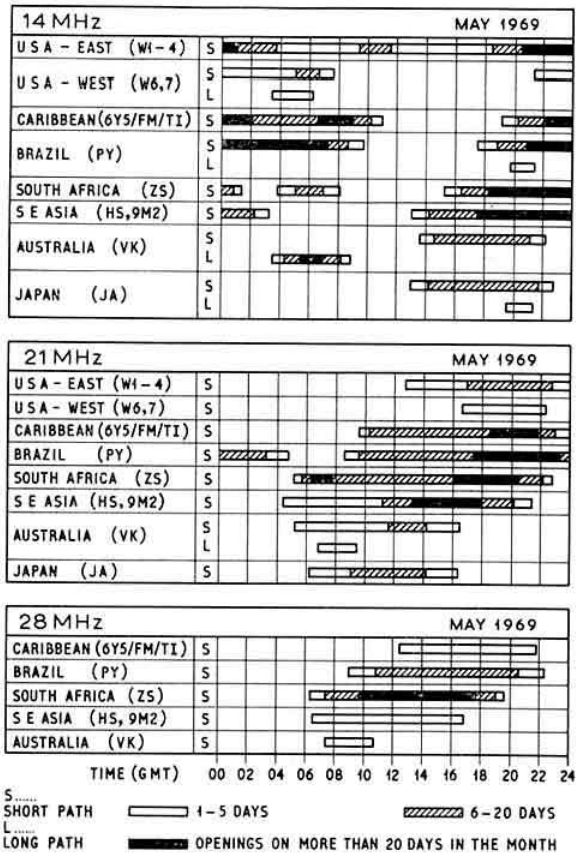
In a letter to G3FKM, John Macintyre, YJ8JM, says that he has now managed to get on the air with his crystal controlled transmitter. So far he has found Europe a tough proposition owing to the barrage of W QRM, and no UK stations have been heard. John is particularly on the look out for these, and suggests that 07.00 and 20.00 might be the best time to look for him on his 14,040 kHz frequency. Signals from the BBC are being received well on 15 MHz at these times. The aerial being used is a G5RV and receiver an Eddystone 840C. More crystals are on order and may be in use by the time this is being read, frequencies will then be 7010, 7020, 14,020, and 14,040 kHz. QSL cards are on order and all QSO's will be confirmed if applicants enclose return postage, but patience is requested and a QSL manager may be appointed soon to deal with W/VE cards.

MP4MBJ (ex-VS1LQ, G3POA, 9M4LQ, etc) operates from the desolate island of Masirah in the Arabian Gulf. He says that there are 60 miles of golden beaches on the 5 miles by 40 miles island and that it last rained 2½ years ago. The sun shines 14 hours every day and it was 107°F at the time he wrote his letter! He is one of 100 RAF lads on the island and will be returning to the UK in six months' time.

In future all QSL cards for ZC4's AK and TK will be dealt with by WA2CMV (see *QTH Corner*). It is hoped that the confusion which has been caused by constant changes in membership of the club station ZC4AK will be overcome by this move.

QRP News

Two correspondents have sent in details of QRPP contacts with reference to 9H1AX's 7500 miles per watt QSO on 28 MHz. G3KGM reports that W0GWT is Secretary of the QRP Amateur Radio Club, and that this club issues a "1000 miles per watt" certificate to any person who submits proof of such an achievement. The all world QRP record appears



PROPAGATION PREDICTIONS

Conditions of the Ionosphere classify May as a typical summer month. In the northern hemisphere the F2 muf's are relatively low during daytime but do not fall as far during the night as in winter.

On **28 MHz** the falling F2 muf's will lead to a worsening of DX conditions, and only passable traffic conditions to Africa and South America should be expected. The almost certain possibility of making contact with North America in winter becomes less and is limited to a few days only. Short skip conditions will give some compensation for poor DX conditions on this band for distances of about 500-2000 km. These short skip conditions are possible on relative high frequencies because of a Sporadic *E*-layer of high frequencies.

On **21 MHz** the summer conditions will also lead to a further worsening of DX conditions. The band will stay open longer in the evenings as the days lengthen, but traffic with Western North America will be only occasional. The peak time for this will be late afternoon and early evening.

14 MHz will remain open throughout the night especially for traffic to South America and parts of Central and North America. Short skip conditions will lead to rise of the QRM on this band especially in the afternoon and early evening. DX traffic free from interference will therefore be possible during night time and early morning. Under especially good conditions traffic toWestern North America, South America and Japan will be possible via the long path. In the morning Australia should be workable via the long path.

DX conditions on **7** and **3·5 MHz** will worsen because of shorter nights, atmospheric disturbances and QRM. Basically DX conditions will only be possible when the path lies in darkness. This applies especially to 3·5 MHz. There will be good opportunities for local traffic without disturbance by the dead zone.

The provisional sunspot number for March 1969 from the Swiss Federal Observatory was 138·5 with the period of greatest activity occurring during the second half of the month. On three days the number exceeded 200. The predicted smoothed sunspot numbers for July, August and September are 96, 95 and 93 respectively.

to be held by W6TYP who worked WA6JPR (who was 354 miles distant) using a power of 354 micro-watts on 7 MHz. This represents 1,000,000 miles per watt! Don says that the transmitter used a transistor and the aerial was a Joystick with about 20 ft of feeder. G3UML tried an experiment with his 28,555 kHz walkie talkie whilst already in contact with WA2SFP in the winter of 1967. He sent some cw with the PTT switch of the transceiver using the 50-in long built-in antenna and was copied by a K1 station who was listening. The power input in this instance was about 80 milli-watts.

Special Stations

The Pudsey and District Amateur Radio Club will be organizing a visit to the Norfolk Broads between 17 and 24 May, and will be on the air using the call-sign GB3NB. They will have an HW100 with them, and hope to operate on ssb on all bands 10 to 80m. Operators will be G3's WGW and WIX.

QTH Corner

CR8AI Luiz A. Rodrigues Fernandes, Dili, Portuguese Timor.
DL7FT F. Turek, Petunienweg 99, 1 Berlin 47, Germany.
G3VDO/MM I. Hacking (Radio Officer), mt *London Independence*, c/o London & Overseas Freighters Ltd, 8 Balfour Place, London, W1.
GC3UML via G3UML, 95 Collinwood Gardens, Clayhall, Ilford, Essex.
PX1FD ON5FD, PO Box 72, Brussels 8, Belgium.
SK9WL via SM7CRW, PO Box 24 560 12 Waggeryd, Sweden.
SV0WMM via K6JAJ, Gary E. Haugen, 4645 Oakwood Place, Riverside, Calif, USA, 92506.
VK9KY S. E. Molen, 13 Pendle Way, Pendle Hill, NSW 2145, Australia.
VK9XI via VK6RU, J. Rumble, 43 Pandora Drive, City Beach, Perth, WA, Australia.
VP2LA via VE3EUU, 67 Tavistock Road, Downsview, Ontario, Canada.
WB2NCS/VP9 via WA5GFS, 1404 S Cliff Street, Decateur, Texas, USA.
VR1L now via W6NJU, 8114 Irondale Avenue, Canoga Park, Calif, USA.
VR1Q via ZL2AFZ, George Studd, 48 Nuffield Avenue, Napier, New Zealand.
VR2FT Les Hickinbottom, PO Box 3722, Samabula, Fiji.
YJ8JM J. Macintyre, Dept of Radio Telecoms, Santo, New Hebrides, W Pacific.
YB0AB PO Box 2127, Djakarta, Indonesia.
ZB2BS C. J. Thomas, GW3PSM, 59 Maendy Way, W Pontnewydd, Cwmbran, Mon.
ZC4AK, ZC4TK via WA2CMV, B. Ornstein, 47 Deer Park Road, Kings Point, NY, USA, 11024.
ZD8AR (WPX Contest QSO's) via W2GHK, Box 7388, Newark, NJ, USA, 07107.
ZF1CW WA8HEN, PO Box 62, Rochester, Mich, USA.
ZF1KV WA0QOI, Gregory Glazier, 437 Gabriel Drive, Kirkwood, Mo, USA.
G5LC/ZS Leslie Cooper, Telephone Manufacturers SA (Pty) Ltd, PO Box 906, Springs, Tvl, Rep of S Africa.
3A0CU via DL7FT (see above).
3A0EJ via DK1KH, Klaus Hager, Tuerkenstr 23, 8 Muenchen 13, Germany.
4W3BS Freddy Koller, Bremgatanstr 70, Dietiekon, Switzerland.
5W1AD Don Swift, PO Box 63, Apia, W Samoa.
9H1BN via W2CTN, 159 Ketcham Avenue, Amityville, NY, USA, 11701.
9Y4RP via WA5MYR, 1704 Glenn Drive, Fort Worth, Texas, USA.

RSGB QSL Bureau, G2MI, Bromley, Kent.

On 28 May HRH the Duchess of Gloucester will be opening the New Sports Club (Civil Service) at Chiswick. She is expected to tour the various special exhibits on show for the event, including a demonstration radio station G3CSR, and a selection of home-built equipment. Anyone wishing to make a sked for a contact with W4 for the WALT Award is invited to write to G3KGM, 52 Pinewood Avenue, Sidcup, Kent.

Awards

Now that the postal strike has finished in the USA readers may like to be reminded that the award hunter's "bible"—The **Directory of Certificates and Awards**—is available from G2BVN at a total cost (including direct postage from the USA) of 21s 3d. This publication is produced by K6BX and contains a wealth of information concerning some 600 operating awards. It is produced quarterly and in order to make certain that only the latest edition is supplied no stocks are held in the UK, all copies being mailed direct from California. Present delivery time is about 6 weeks from date of order.

The fee for the Japanese HAC certificate (page 187, March *MOTA*) should have been given as 5 IRC's.

DX News

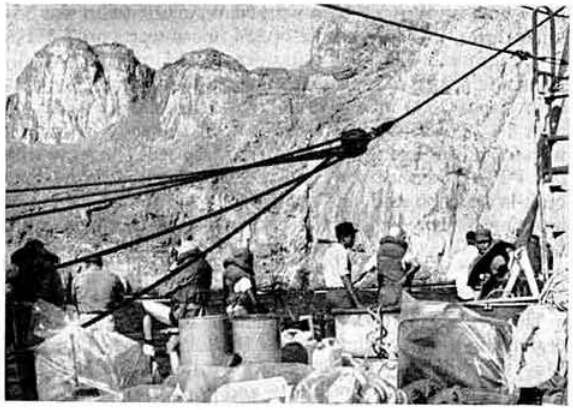
SK9WL was the call-sign of a special station on the air during the CQ WW WPX contest from the "free state of Morokulia." This is the tiny artificial "state" created by the broadcasting companies of Norway and Sweden as a symbol for a series of charity programmes. The station will continue

1969 COUNTRIES TABLE

	1·8 MHz	3·5 MHz	7 MHz	14 MHz	21 MHz	28 MHz	Total
G3HDA	—	93	97	120	125	122	557
G3LNS	—	78	109	154	121	116	578
G3TZU	1	22	21	41	72	134	291
G3HCT	—	76	70	41	60	111	358
G3XYP	—	—	34	124	58	53	269
G3VUM	4	4	8	70	51	57	194
G3KS	1	15	8	46	40	41	151
G8VG	2	23	25	23	37	39	149
G4RS	4	18	5	48	51	16	142
G3PEJ	—	2	12	20	32	29	95
G3IAR	2	23	21	25	23	26	120
G3VPS	3	15	15	51	25	18	147
G3UML	—	63	22	101	23	18	227
G3VJG	—	—	9	—	4	29	42
G3XBY	1	18	23	19	20	6	87
G3WPO	17	10	37	31	1	23	109
G3JVJ	12	43	9	41	12	2	119
G3VLM	1	7	6	25	—	12	51
A5390	9	30	47	144	117	98	445
A5662	18	28	27	102	97	85	357
A6254	6	18	14	110	118	63	329
A5154	2	35	16	103	73	62	291
A6003	5	22	13	24	78	51	193
BRS25429	4	48	63	140	69	56	380
BRS31164	1	41	35	98	59	56	289
BRS27806	6	35	20	67	64	44	236
BRS30694	7	21	20	43	53	41	185
A6148	7	46	41	82	22	61	259
A5489	—	18	8	57	55	25	143
A6248	1	15	11	55	28	1	111
A5466	3	17	19	33	13	9	94
A4253	1	4	2	12	14	8	41
BRS28198	2	27	32	1	—	20	82
A6498	4	14	1	16	1	9	45
A6179	1	1	7	12	2	3	24
A6201	—	30	10	38	—	—	78
A6098	4	5	8	14	—	—	31

(This month's table is in order of 21 plus 28 MHz totals.)

The gang left a plaque on the island which reads: "Republic of Colombia. Liga Colombians de Radioaficionados DXpedition Malpelo 1969. Commemorating 150 years of Independence." The operators were (Front row L to R) Don, K6JGS/KH3. Rafael, HK3BSW. Enrique, HK5ASF. Dale, W4DQS, and a marine. (Back row) Carlos Valencia Jr, Carlos, HK3VA. Enos, W4VPD. Carlos, HK5EV. Another marine. Bob, W0DX (President of ARRL), and Pacho, HK3BAS



A view of the protected side of Malpelo Is. seen from the Colombian Naval Destroyer "Almirante Dadilla" used by the recent HK/TU expeditioners to get them to the island

in operation after the contest to support the SM5WL memorial fund. QSL cards will be handled by SM7CRW (see *QTH Corner*) and there will be a fee of 3 IRC's for each card which will go entirely to the charity fund. Those who send 3 IRC's will receive a card via the bureau, 4 IRC's will produce a card by surface mail, and 5 IRC's will produce an air mail reply. Letters from Morokulia will bear a special postmark. SM7CRW says "We don't think Morokulia will count as a separate country for DXCC but we hope that you will enjoy working us anyway."

DOTM announces that cards for CX2CO will be dealt with as from 1 January this year, and that they have also taken on the same duties for PY2PA and PY2PE. QSL's for contacts with ZD8AR during the CQ WW WPX contest should also be sent to them. All PJ0MM direct cards are now sent off and those being sent via the bureaux will shortly be on their way.

As from 19 March US amateurs were permitted to work American operators in Thailand using their home call-signs followed by /HS. Contacts with other HS stations are still forbidden as the Thai government has not yet notified ITU that its amateurs may communicate with others outside Thailand. This means that contacts with stations signing W (or K)/HS will henceforth count for DXCC. WA4PUC/HS has already been reported active on 14 MHz.

VS5TJ is to be found on alternate Saturdays (starting 15 March) on 14 MHz ssb between 11.00 and 16.00. He often joins the SE Asia Net on 14320 kHz at 12.00 on weekdays and then QSY's to 14240-14250 kHz before closing down at 13.30.

The Pacific DX Net is now meeting regularly after a brief delay caused by KH6GLU's recent FW8DY trip. It takes place on Fridays at 07.00 on 14,240 kHz, and KH6GLU is net control station. Standbys are taken for stations outside the Pacific area wishing to join in.

A number of Brazilian amateurs were heard using the prefixes PQ, PR, PS, PT, and PU during the CQ WPX Contest.

Those fortunate enough to contact VK9RJ (Nauru) should note that he now requests direct QSL's to R. J. Wirth, c/o OTC, Nauru Is, Central Pacific and *not* via K6UJW.

DL7FT (see *QTH Corner*) is now acting as QSL manager for EA6AR, EA6BG, EA6BH, HB0LL, HS3RD, KL7EBK, KR6JT, TU2AY, TU2AZ, W7UAF/KH6, XE2YP, 3A2CN, 3A0CU, and 3V8BZ. Please mark all times in GMT and enclose sae plus return postage.

It is reported that KH6EDY is active again from Kure Is and has been heard in the USA on 14,245 kHz.

WB4BDO has received a letter from the US Coast Guard Chief of Staff responsible for the Navassa Is (KC4) area telling him that due to the dangers of landing, the complete lack of facilities or means of sustenance on the island and the political situation in the area it is considered to be in the best interests of all to continue to deny permission to private individuals to visit Navassa Is.

VK9KY is said to be on the air from Cocos Keeling Is and his operating frequencies are given as 7050, 14,050, 14,195, 21,050, and 21,350 kHz. VK2BRJ has decided to cancel his plans to visit this island and Nauru, and has returned to the USA.

A special station will be on the air from the Philippines National Scout Jamboree, using the call-sign DU2NSJ, and active 24 hours a day on all bands from 10 to 18 May.

DXpeditions

The recent highly successful expedition to Malpelo Is (HK0TU) was not achieved without cost. Readers will be sorry to hear that HK3RQ (President of LCRA) and HK3HY were quite severely injured during the first landing attempt. It seems that they were climbing a rope which gave way and threw them into the sea where they were thrown around by large waves for ten minutes before being rescued. HK3RQ sustained a broken leg and some broken ribs, and HK3HY some severe leg injuries. The remaining expedition members did a magnificent job of making some 8000 contacts in the three days operation from two stations (one on phone the other on cw), a total of 110 countries were worked and all bands 1·8 to 28 MHz were activated. An equally excellent job appears to have been made of the QSL chores, many cards having already been received for contacts with the expedition. It will probably be many years before there is a further visit to Malpelo.

It seems that the plans originally released concerning the

W4BPD/VQ8CC Indian Ocean Expedition have undergone considerable modification. The first operation took place from VQ8CCR/CPR (Rodrigues Is) following an exceedingly rough trip through a near-hurricane from Mauritius. The visit to the island was brief and at the time of writing Gus had returned for a second spell of activity from VQ8CPR. Steve is reported to have left Mauritius on 6 April for his vacation in Europe. Exact details of Gus's further movements are not available, but he has been heard to say that he should be in the Seychelles Is by 25 April preparatory to travelling in a small boat to Agalega Is (call-sign presumably VQ8CPA—counts for awards the same as St Brandon). Just what will happen then may depend on a number of factors, but an attempt at Blenheim Reef and one or two other rare spots is intended if funds prove to be sufficient. In the DXer's Magazine Gus says that it is now or never as far as he is concerned and that more contributions are a "must" if he is to do much more travelling. Contributions from UK donors may be arranged through a bank, and should be made out to the Worldwide Radio Propagation Study Association, 3103 4th Avenue S, Birmingham, Alabama, USA 35233. It should be noted that there have been two frequency changes—in future a calling frequency of 21,248 kHz ssb (listening 21,300 kHz up) may be used, and the 7 MHz calling frequency may be any suitable spot between 7015 and 7025 kHz.

The Venezuelan destroyer *Aragua* carrying the 12 operators on the projected YV0AA expedition was forced to turn back from Aves Is by the high seas. The expedition will be attempted again soon.

Contests

Apologies to the winner of the **1968 Helvetia XXII Contest** —**G3IAR**—whose call was inadvertently given as G3IOR in last month's *MOTA*.

The Georgia QSO Party.

21.00 10 May to 03.00 12 May.

All bands 1·8 to 28 MHz. Especially around 3590, 3725, 7060, 14,060, 14,290, 21,060, 21,110, 21,410, 28,060, and 28,600 kHz. The same station may be worked on each band and mode for points.

Exchanges consist of QSO number, report, and QTH (county). Each QSO counts 2 points, total QSO points should be multiplied by the number of different Ga countries worked (maximum 159). Include summary sheet with log and also formal declaration of having obeyed all rules and send to Columbus ARC, Att J. T. Laney, 3500 14th Avenue, Columbus, Ga, 31904, USA before 4 June.

The YL International SSB'ers QSO Party.

00.00 24 May to 24.00 25 May.

Rules for this contest are somewhat complicated and it is suggested that intending participants write to Woody Bennett, W0GNX, 8939 E 31st Street, Kansas City, Mo, 64129 USA, sending a large sae and IRC's with a request for a copy of the rules and an application form and log summary sheet.

The 1969 CHC/FHC/HTH Annual QSO Party.

23.00 6 June to 06.00 9 June.

All modes, all bands. Stations may be worked on different bands/modes for points.

Exchanges consist of QSO number, report, name, CHC or FHC number (if any), and state (county, laan, DOK province, etc). QSO's between CHC members count 1 point, between CHC'ers and non-members (HTH'ers) 2 points. For all HTH'ers contacts with CHC members count 3 points. Frequencies to watch are 3575, 3775, 7070, 7090, 14,075, 14,320, 21,075, 21,090, 21,140, 21,360, 21,440, 28,090, 28,620, and 28,690 kHz. Participant and application forms may be available from G3FKM. This contest may be of use to those looking for US counties, or for other states or provinces in other countries for various awards.

The 1969 Bergamo Cup.

Awarded by the Bergamo section of ARI (Italy), to the amateur who contacts the most stations in the city and province of Bergamo during the period 00.00 1 May to 24.00 31 May. A station may be worked only once per band during the period. Each contact counts 1 point, and a minimum report of RST 338 or RS 3x3 must be exchanged for a QSO to count. Logs must be sent to ARI, PO Box 65, Bergamo, Italy, no later than 30 June, and should contain a detailed list of stations worked, date, time, band, mode and reports. Stations known to be in Bergamo include II's BBB, BBC, BCU, BOX, BOK, BSB, BDY, BVG, ATI, AGR, CVD, CEI, CVP, CU, DPG, DLM, GES, JL, MOE, MBI, NX, PRI, PEI, TR, ZAD, ZAE, and SBE.

The Michigan QSO Party.

21.00 17 May to 21.00 18 May.

All bands—especially around 3560, 7060, 14,060, 14,240, 21,060, 21,310, 28,060 and 28,650 kHz. The same station may be worked on each band and mode for points. The usual QSO Party exchange should be effected, and the multiplier is the number of different Mich counties worked. Entries should be posted before 30 June to: Central Michigan ARC, PO Box 73, Lansing, Mich, USA, 48901.

The Michigan Week QSO Party

05.00 18 May to 05.00 25 May. Each station may only be worked once unless operating mobile when further QSO's count as counties only. Exchanges consist of RS/T, county, and CHC number (if appropriate). Score is 1 point for each county, 1 point for each Mich CHC'er worked, and 2 points for contacts with CHC Chapter 13 members. Logs should reach W8LZV, 20114 Houghton Avenue, Detroit, Mich, USA, 48219, no later than 30 June.

The results of the **1968 SP DX Contest** have been received. The overall winner was UB5LS (22,770 points). The three UK entrants were **G3SWV** (2814 points), G3WJS (2544 points), and G3NSY (2133 points).

Due to the US mail strike the full results of the **1968 CQ WW WPX SSB Contest** have only just been received. UK scores were as follows:

		Points			Points
G3NMH	**(All band)**	**807,275**	**G4JZ**	**14 MHz**	**250,074**
G3UML	,,	205,119	**GM3SSB**	,,	**27,664**
GM5AHS	,,	**104,496**	G3MWZ	,,	12,859
G3IAR	,,	79,288	G3PQF	,,	8905
GM3RFR	,,	36,024	**G3SME**	**21 MHz**	**153,408**
G2AJB	,,	14,288	**GM3JDR**	,,	**24,153**
G3SZG	**3·5 MHz**	**28,090**	G5AGA	,,	3456
GM3VTB	,,	**14,784**	**G3KMA**	**28 MHz**	**40,120**

As mentioned in an earlier *MOTA* **G3NMH** was world 8th in the all-band section, and **G3SZG** world second in the 3·5 MHz single band category. Congratulations to these and to all the other certificate winners (listed in heavy type).

Band Reports

Conditions on all bands appear to have been reasonably good with the expected falling off of 28 MHz and the

increase of static on the LF bands. However, the calls listed on 3·5 and 7 MHz still represent very excellent DX! Many thanks to the following for sending in information used in compiling this section: G2BW, G2BOZ, G2CDT, G2HKU, GW3AX, G3HB, G3AAE, G3HCT, G3HDA, G3LNS, G3LUI, G3TZU, G3UAA, G3URX, G3USA, G3VPS, G3VRZ, G3WPO, G3XBY, G3XYP, G3YHB, G8AZP, G8VG, BRS25429, BRS28198, BRS30694, BRS31164, A5182, A5390, A5437, A5643, A5662, A5812, A6098, A6132, A6148, A6248, and A6444.

Calls listed are all ssb except those in italics which are cw.

1·8 MHz 02.00 KP4AST, *VE1ZZ*. **23.00** *ZB2AY*.

3·5 MHz 00.00 EP2BA, *VU2OLK*, *6Y5SR*. **01.00** PJ2CC, *UD6BW*, *UL7GW*. **02.00** 5R8AO, 9E3USA. **03.00** XE3L. **04.00** FG7XX, *VP9BK*. **05.00** KV4FZ, OA8V, PJ7JC, ZL3RB. **06.00** HK3BAS, TI2NA, 9Y4KK. **07.00** HI7JR, OX3WX, TG9EP. **17.00** ZC4TK. **19.00** AP2MR, ZS3AW, 7P8AR. **21.00** HV3SJ, 5A1TN, 5Z4LW, 9M2DW. **22.00** MP4's, BEU, BGX, TAF, *UH8CQ*, UW9AF, VP8KO, 3A0CU, 4X4UF, 9G1BF, 9K2BV, 9U5CR. **23.00** EA8EX, ZB2BS.

7 MHz 02.00 *FG7XX*, VP2KF, 9Y4KR. **06.00** HP1JC, TI3FAV, *9G1HM*. **07.00** CP5EN, HC0BY/HR1, *VP8KF*, *VR2DK*, YN2RAC, *YV5CVE*. **08.00** HC1CM, HK3BMM, TG9GF, *W7SFA*, *9Y4DS*. **18.00** KR6KN, VS6DR. **20.00** CR6IS, FL8DG, *ZS3AW*. **21.00** *CR6AI*, JA6YB, VU2OLK, *5Z4KL*, *6W8XX*, *9J2MX*, *9Q5AF*. **22.00** *VU2OLK*.

14 MHz 00.00 *CE2QD*, *JT1KAA*, *ZF1's AF*, *CW*, *GC*, *4S7EA*. **01.00** YS1O, 9N1MM. **03.00** YA1HD. **05.00** *5Z4's KL*, *KO*, *LS*, *SS*. **06.00** VR4EL. **07.00** KG4DO, KH6GLU, VR6TC. **08.00** CE8AE, VK9OM (TNG). **10.00** *VK0WS*, YK1AA. **13.00** CR8AI, CT3AH, VS5PH. **16.00** AP2MR, TY1NX(?), *UA0YT* (Zone 23), 9K2BV. **17.00** AP5HQ, CT3AW. **18.00** FH8CF, FR7ZG. **19.00** HL9UU, WA4PUC/HS, KX6FA, MP4's TCE, TCR, SU1MA, *VK9BRJ/9*, VQ8CCR, VQ9L, VR2DI, 9X5AA. **20.00** *ZD9BK*, 9U5HI. **21.00** KX6GR, PJ9VR. **22.00** FY7YR, *PY0EP*, TA0AF, VP2GV (G3NBB), VP2LA. **23.00** *SU1IM*, TU2AZ, VP2KM, *6Y5SR*.

21 MHz 07.00 *TA2E*. **08.00** KL7GHF, *VR2EK*, 5W1AR. **10.00** VQ9GA. **11.00** *FG7TG*, HL9KQ, VK9RY (Papua). **12.00** KG6AAY, KW6EG. **13.00** K9IMC/KG6, VK9WD, 3V8AC. **14.00** *KR8DK*, VK9XI, XW8AX. **15.00** CR3KD, DU1FX, MP4MAY, VS5PH, VS6AL, *9V1's NR*, *PF*. **17.00** DU1ZAG, *TJ1QQ*, 5H3LV, 7Q7WW. **18.00** *VQ8CPR*, VQ9GA, YB0's AAC, AB, AR, ZD5R, ZF1RD, 9G1GB. **19.00** KH6GPZ, VP8KO, *VQ8CC*, *VQ9B*, YS3FH, ZD9BE. **20.00** CP3CV, HK0AI, 4S7PB, 5U7AK, 7P8AB. **22.00** CP1HV, ZL's 3BJ, 4LM, 4LZ. **23.00** HK0AI.

28 MHz 07.00 *TA2FM*, *VU2VZ*. **09.00** *HL9KQ*, *MP4BEU*, *ZL3IS*, 9K2CF. **10.00** AP2MR, HL9UU, KW6EG, *VU2OLK*, *XW8BP*, *YB0AB*. **11.00** HS3DR, *KR8EI*, MP4TAF, *TJ1AJ*, 4S7PB, 9M2DQ. **12.00** *HM1DH*, KG6ARV, KG6SM, SV0WN (Rhodes), TJ1AU, VK9BB, VP8HJ, VU2GGB, *XE2KS*. **13.00** CE3RR, CR8AI, VK9WD, VP8JT (Argentine Is). **14.00** CX7BF, HS3DR, KV4FZ, VS5PH, 9Y4AU. **15.00** CE6CA, VP2GBL, VQ8CG, 7P8AR. **16.00** *CO6PH*, *CT3AS*, FS7RT, HI8XMT, **17.00** HC7RU, OA4PF, *OX3LP*, VP8KD, VQ8CP, VQ9EP. **18.00** EA6AR, PZ1DF, VP2MQ, VQ8CG, ZD8Z, ZF1KV, ZP9AC, *9Y4RP*. **19.00** CP5ED, FP8CS, HK0BKX, HR3AC, *VQ8CPR*, ZD9BE, 9Y4DX (ex-ZD8DX). **20.00** CE6EZ.

Many thanks to all correspondents, and particularly to the following for permission to reproduce information from their publications: the **DX'er** (*K6CQF*), **DX News Sheet** (*Geoff Watts*), the **Ex-G Radio Club Bulletin** (*W3HQO*), the **DX'ers Magazine** (*W4BPD*), the **Florida DX Report** (*W4BRS*), **CQ DX** (*ARI*), **NARS Newsletter** (*5N2AAU*), **Long Skip** (*VE3HJ*), and **QUAX** (*SM4DXL*).

Please send all correspondence **to reach G3FKM** no later than **12 May** for **June** issue, **10 June** for **July issue**, and **15 July** for **August** issue.

FOUR METRES AND DOWN

By JACK HUM, G5UM*

Midlands " Third "

As the euphoria of the Whitton VHF/UHF Convention recedes (report in pictures next month) it is time to look ahead to the Third Midlands VHF/UHF Convention and Dinner dated for Saturday 14 June at Wolverhampton.

The new Dunstall Suite on Wolverhampton Racecourse is the Convention venue—and getting to it is dead easy: it is marked on most road maps and is well signposted in and around the town. If you get lost or don't carry a 2m mobile rig with which to converse with the talk-in station, then *in extremis* telephone the racecourse on 021-643 6884 and tell them where you are.

Chairman for the day, Mike Dormer, G3DAH, conductor of " VHF Bands " for *Short Wave Magazine*, will welcome visitors at 2.20 pm. At 2.30 pm comes the G3NNG lecture " A New Approach to VHF/UHF Receiver Design." As this is likely to provoke a lively discussion visitors will be pleased to know that half an hour has been set aside for this, which will take the proceedings up to afternoon-tea-time at 4 o'clock. One of the features of the Convention indeed is the slotting in of plenty of opportunities for discussion so that the social aspect may be developed to the full (okay, let's call it ragchewing: learners and learned alike profit from it, Conventions would be conventional without it). Here, then, is the timetable for the day:

12 noon to 2 pm	Assemble, and Reception.
2.20 pm	Short address of welcome by G3DAH
2.30 pm	The G3NNG Lecture.
3.30 pm	Post-lecture discussion period.
4 pm	Afternoon tea.
4.30 to 7.15 pm	Open Forum.
7.15 pm	Assemble for Dinner.

Capacious though the Dunstall Suite may be, there is as always a limit to the number of last ditchers it will be able to accommodate, the more so as applications for tickets are beginning to roll in already. This is because everybody who has attended a previous Midlands Convention or Dinner has been circularized with details of this year's; in addition to this, people took note of the big panel here last month and decided to get their applications in well ahead.

For direct application for tickets write to G8AEV, J. R. Hartley, treasurer, 30a Salop Street, Bridgnorth, Shropshire, sending cash with order as follows: full day, tea and dinner, £2; evening session including dinner, 30s; day ticket including tea 10s. The 30s ticket has been introduced for the ladies attending the Convention for dinner only (and may there be plenty of them).

To obtain a copy of the programme, including a ticket application form, apply to S. W. Wright, programme secretary, 20 James Road, Kidderminster, Worcs. In either case, don't forget to send a stamped addressed envelope.

For overnight hotel accommodation apply to G6UJ, W. T. Bassage, joint convention sec, 14 Ryecroft Avenue, Penn, Wolverhampton.

Do it now. The event's only five weeks away.

Brussels Conference

Right now as this number of *Radio Communication* reaches members, the Brussels IARU Conference is in session. Delegates from most of the radio amateur societies in the IARU's Region 1 area have been tackling a crowded agenda, much of it vhf orientated, during the present week of 5–9 May.

A strong RSGB delegation went over, consisting of G3FZL, the Society's VHF Manager, in company with G3BVG, GM6IZ and G6NZ, all of them vhf men; Roy Stevens, G2BVN, in his capacity as Vice Chairman of IARU Region 1, possessor of immense knowledge of

The Metre-wave Man's Code

When operating his station the vhf and uhf metre-wave man:

1. Before transmitting, senses the band for conditions, level of activity and occupancy of his intended channel;
2. When sending CQ announces his location (if he is a newcomer his callsign may not be in the book, if he is an old hand he will not be egotistical enough to assume everyone knows where he is). He will also state beam-heading and intended direction of tuning for CW, using the accepted abbreviations (QLH, QML, QLF, and so on);
3. When engaging in a QSO will give the other man's callsign first followed by his own; in net operation will call stations in "Callbook order";
4. Will keep within his geographic-frequency area unless calling a station on the latter's own frequency;
5. Remembers never to use phone in CW areas, though resorts to CW in any area when communication is difficult;
6. Observes gentlemanly microphone manners by avoiding irrelevant back-chat; refusing to allow " funny men " near the microphone (especially during contests), and abjuring all facetious callsign phonetics, having noted the recommendations written into the Licence;
7. Avoids the pitfalls of duplex operation by announcing his and his correspondent's callsigns often, together with frequencies in use, not allowing the intimacy of the mode to tempt him to transgress Code 6 above;
8. At all times is considerate of others especially the man in the next street or town by avoiding over-modulation, key-clicks or single sideband overspill;
9. At the end of a QSO always pronounces his callsign distinctly for the benefit of distant listeners; and
10. Takes a last look round before closing lest others may be calling. If they are and time is short he suggests times for subsequent meetings.

* Houghton-on-the-Hill, Leicester LE7 9JJ. Send reports for the June issue by 12 May, and for the July issue by 16 June.

international radio conferences and particularly of the regulations to which they give birth (after much travail in some instances); and of course Fred Lambeth, G2AIW, has been there as the Region 1 secretary of many years' sitting.

In the vhf context something like 20 papers have been submitted by various IARU member-societies on a multiplicity of topics, from beacons to bandplans, modes to meteor scatter, not forgetting plenty about QRA fixing systems.

Papers submitted by the RSGB cover such subjects as Television in the Amateur Bands, and Single Sideband at VHF, with a recommendation to internationalize 433·41 MHz as the 70cm ssb calling frequency (to align it with the 145·41 calling frequency on "Two").

The Metre Wave Man's Code, which was published here in January, is being submitted by RSGB as something worth adoption as standard practice—and in case its basic tenets for good operating may not be recalled since their appearance five months ago, we reproduce The Code once again this month.

What happens at Brussels will no doubt be reported fully and officially in *Radio Communication* in due course. All we need remark at the moment is that by holding these international conferences triennially, the last being in Opatija, Yugoslavia, in 1966, the IARU helps to gather together thought processes on developments which have taken place over the previous three years and to fashion them into guidelines for the future. Certainly Brussels 1969 should prove to have well justified the expenditure the various member-societies have earmarked for it, and the sacrifice of their normal holiday arrangements which most of the delegates have had to make in order to attend it.

The March Aurora

The bread falls on the carpet jam side down. The trusted power pack, years reliable, decides to incinerate itself when its owner is out of the room for five minutes. And a "super auroral" manifestation shows up two days after "Four Metres and Down" has closed for press. Ah well, the news of what happened over the period 23–24 March remains exciting even though over a month old.

What *did* happen was this. On Saturday, 22 March indications on the hf bands suggested there might be a vhf-influencing aurora within 24 hours. Quickly, many operators were alerted by landline. Others picked up the forecast on the 2m air. An hour before midnight on Sunday, 23 March almost dead on cue the vhf bands opened up to the (literally) unearthly sound of Tone A telegraphy providing just the DX many had awaited for a long time.

By half past midnight the believed-first EI/SP contact on "Two" had materialised when EI6AS exchanged 57A reports with SP2RO—and for good measure pulled SP1JX into the bag at 0052GMT on 24 March. By the time he fell into bed at 4 am Albert Latham (signing himself "Tone 'A'lbert" in his report to "Four Metres and Down") had had 24 auroral contacts with eight countries (". . so much activity I thought we should be exchanging serial numbers!"). He being just about the most westerly 2m station around was good DX to all who worked him. His beam heading was ENE/NNE throughout.

To another noted DX man outside the UK, the redoubtable Marc Tonna, F9FT, of Rheims, the aurora brought his first-ever GM on "Two" in the shape of GM2DRD. Typically with "Tone A" the signal spread over 30kHz: you can't zero beat a signal which sounds to have no sidebands, as auroral signals always do (if you hear what sounds like a spark transmission, then there's an aurora on).

Herein lies the value of being able to read cw: the stuff has spaces several milliseconds long between bursts, so that there is time for it to travel to the auroral curtain and return as a multipath reflection. Because single sideband telephony possesses some of the characteristics of cw by being "bouncable," it will in some circumstances remain intelligible under auroral conditions. When F9FT tried his ssb on OZ9OR an exchange was possible even though, as Marc says: ". . . the modulation sounded as if we had a terrific throatache!".

A characteristic of the 23 March manifestation was the "moving aurora" effect reported on previous occasions. At F9FT the required beam heading was 030 degrees at 2230GMT and 335 degrees by 0040GMT on the Monday morning. These times suggest, too, that the opening began earlier and finished earlier at Rheims than farther north.

* * *

At Chelmsford G3LTF heard no fewer than 51 stations from 11 countries and worked a fair old clutch of them. Most required a beam heading of 040 degrees irrespective of their QTH. Peter Blair's first intimation that something was afoot was when the Meldrum television transmitter in N.E. Scotland went auroral as early as 2015GMT on 23 March. By 2150 this signal shot up to 15dB over noise: in another 15 minutes 2m had burst into auroral activity ". . very strongly and suddenly, as if switched on."

High above the city centre of Bristol, 100 feet above ground level in fact, is this vhf operating centre of G3KAC, belonging to the Bristol University Amateur Radio Society. Adjusting the 23cm trough reflector is G8ADP. Above him is the 14-element aerial used on 70cm, and above that again, out of sight in our picture, is the 8-over-8 which gives G3KAC such a good performance on 2m. The Society owns a TW2 for the 144 MHz band. Frequently this does duty as a drive source for the G8ADP varactor multiplier for 70cm and the 3CX100A5 for 23cm.

BEACON STATIONS

Call-sign	Location	Nominal Frequency	Emission	Aerial Direction
GB3ANG	Craigowl Hill, Dundee	145·950 MHz	A1	S
GB3CTC	Redruth, Cornwall	144·13 MHz	A1	NE
GB3GW	Swansea	144·250 MHz	A1	ENE
GB3GM	Thurso	144·995 MHz	A1	N/S
GB3GM	Thurso	70·305 MHz	A1	N/S
GB3GM	Thurso*	29·005 MHz	A1	Omni
GB3GEC	W. London	434·000 MHz	F1	N/W
G3SUT	Sutton Coldfield	433·8 MHz	A1	N/SE
GB3SX	Crowborough,Sussex*	28·185 MHz	A1	E/Omni
GB3VHF	Wrotham, Kent	144·500 MHz	F1	North-West

* Not operational

GB3VHF

The Society's vhf beacon transmitter frequency at Wrotham, Kent, measured by the BBC Frequency Checking Station (nominal frequency 144·50 MHz):

Date	Time	Error
9 April	1546 GMT	6360 Hz low
17 April	1004 GMT	5720 Hz low
24 April	1620 GMT	5700 Hz low

To GM3TFY, whom we have noted before as possessing what seems to be an auroral intuition, it was a late night check of the 2m band which he makes through force of habit that kept him out of bed for the next four hours. His observations after working nine countries during that period are worth quoting in extenso. He says: " With half the population vfo controlled and the other half fixed, QLH and similar indications are still very common. This, coupled with the increasing popularity of the cw zone on 2m, means that many people edge down towards the bottom extreme of the band in order to be the first station heard. During this aurora especially QRM was at times rife in the bottom 10–20kHz. I for one found it less troublesome to work the stations who had the sense to spread out over the cw zone."

So far this year 'TFY has noted from Edinburgh the following aurorae: 15 January, 24 January, 27 February, 23–24 March, 1 April and 2 April. That's probably a larger number than many operators imagined, and emphasizes once again the value of checking 2m at what might otherwise appear to be unpromising times, and especially to keep plenty of cw on the go in the bottom 100kHz.

* * *

On the 70 MHz band the Thurso beacon again proved its value as an alerting medium for anomalous propagation. With G3JVL far south in Hampshire it went auroral at 2020GMT on 23 March, RST54A, closely followed by GM3UAG of Banff at 55A. A string of G3JVL-to-GI contacts followed. It seems that Ar quitted " Four " by 0300GMT on the Monday—unless activity's ebb made it seem so. During the build-up it " came and went in little bursts from 2030 to 2208 GMT," observers G3JVL (compare comment by G3LTF above).

Both G3JVL and G3WBQ took chart recordings that showed up aurora, meteor pings and a spot of Es, all unrelated. At 'JVL the af output is rectified, agc off, to actuate the recorder: at 'WBQ the agc voltage controls the pen current.

To Work ZB2 . . .

Now that the season of UK-to-Gibraltar contacts on " Four " is well and truly with us a few words from ZB2BO about operating techniques come at an apt moment.

Remember the advice to pop out a quick call on the 70·26 national calling frequency if the band looks like opening? Well, continue to do this, but—says ZB2BO—get off it if the band shows signs of opening up good and proper. " It can be a regular QRM alley " he says.

Procedure at ZB2BO under band-open conditions this season will be as last year. First, he will announce that he is tuning low frequency end up, followed by " From 70·2 up," and then " From 70·4 up," thus giving everyone a chance to work him, wherever in the band their crystals may be.

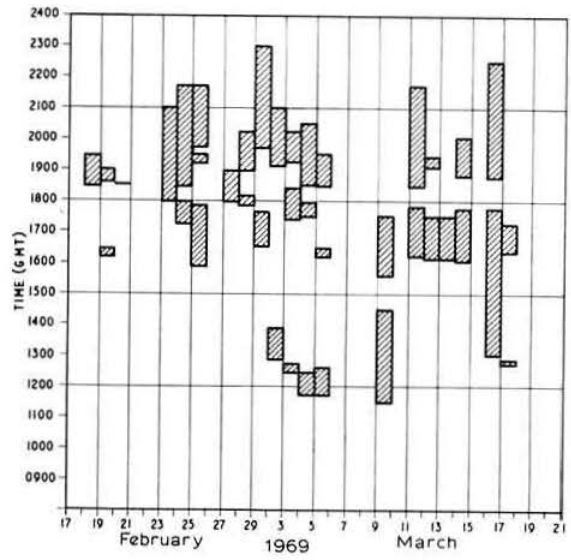
And here is an experience which ZB2BO relates as a cautionary tale (we'd certainly allot it a place in the " Don'ts " of operating): " Twice last year," he says, " I heard a station near London put out a long CQ on 4m, a full five minutes worth, and he was still calling when the band went out. Moral: keep your CQs and overs short, especially in the early part of the season."

For the record, the primary frequency at ZB2BO is 70·198MHz with alternates 70·258 and 70·47MHz.

. . . and Beyond

Projecting the propagation path beyond ZB2 is to open up the possibility of at least hearing some of the southern African stations on 6m even if we can't work them because we don't have the band. As early as mid-March G3JVL on the South Coast had heard the Rhodesia beacon twice via trans-Equatorial propagation, plus ZS3B via F2. Then on 4 April 'JVL logged ZS3B 599 early afternoon on 50·053, and even a snatch of his ssb.

In Gibraltar—which is that much nearer to those signal sources—ZB2BC reported at the beginning of April that the



A histogram compiled by ZB2BC of Gibraltar of reception of the Rhodesia beacon ZE1AZC on 50·046 MHz over a trans-equatorial path. The ZE beacon has a power of 60 watts and the aerial is a 6m ground plane.

Four Metres and Down Certificates

70 MHz Transmitting Section

1 G3EHY
2 G3PJK
3 G2AIH
4 G3OHH
5 G3KEU/P
6 G3NUE
7 G3IUD
8 G6NB
9 G8PD/A
10 G5FK
11 G3NDF
12 G3IMV
13 GI3HXV/P
14 G3SKR
15 G3OUF
16 G3BNL
17 G3PMJ
18 G3PHG
19 GC3OBM
20 G3TLA/P
21 GI3HXV
22 G5UM
23 G3OJE
24 G3SEK
25 G3RWM/P
26 G3FDW
27 G3PPG
28 G3FIJ
29 G3GGL
30 G3RDO
31 G3NJF/P
32 G3RWN/P
33 G3NUE/P
34 G3AZI
35 G3FWD
36 GI3HCG
37 G3LAS
38 G3HRH
39 GM2UU
40 GI3PGG
41 G3VPK
42 G3RLE
43 G3UFS
44 ZB2VHF
45 G3OUL
46 G3UUT
47 G5NU
48 G3OZJ
49 GI3HCG/P
50 GI3PGG/P
51 G3UBX
52 G3VSA
53 G3NKL
54 G3JHQ/P
55 G3JHM/A
56 GI3VJS/P
57 G3EKP
58 G3JHM
59 G3VOF
60 ZB2BO
61 G3JHM/P
62 G3NNO

70 MHz Senior Transmitting Section

1 G3SKR
2 G3RWM/P
3 G3FDW

70 MHz Receiving Section

1 BRS15744

144 MHz Transmitting Section

1 G3HBW
2 G3BLP
3 G3MTI
4 G5YV
5 G3BNL
6 G3MCS
7 G3LAR
8 G3CO
9 G3BA
10 GW3MFY
11 G3DFL
12 G3NAQ
13 G3NNG
14 G3OJY
15 G3KPT
16 G3JYP
17 G3KMT
18 G3OHD
19 G3BBR/A
20 G3HRH
21 GM3EGW
22 GI3OFT
23 G3OBD/P
24 G2HIF
25 G3JDN
26 G8VZ
27 G2AXI
28 G3JYT
29 G5UM
30 G3EJO
31 G3PBV
32 G3FDG
33 G3OSA
34 G3JLA
35 GC2FZC
36 G3BOC
37 G3MTI/M
38 G3OJY (new QTH)
39 G3JWQ
40 G3NOH
41 G3PSL
42 G3LBA
43 G3FUR
44 G2BJY
45 G3MRA
46 G3AGN
47 G3MDH/P
48 G3GMY
49 G3GGK
50 G3MDH
51 G3NLR
52 GM3LDU
53 G3CKQ
54 G5HZ
55 G3NNK
56 G6GN
57 G5ZT
58 G2PL
59 G3FZL
60 G3SAR
61 G3NUE
62 PA0EZ
63 G3AHB
64 G3PTM
65 G3LAS
66 G3RMJ
67 G2CDX
68 G3ORL
69 G2DHV/P
70 G3FIJ
71 G3CXM
72 G3HRH/P
73 G3BDS
74 G3FNM
75 G3IMV
76 G2BQ
77 G3KHA
78 G3OHC
79 G3SHZ
80 G3PKT
81 G3UFA
82 G3RST
83 G5NU
84 G2BHN
85 G3OZP
86 GW3KYT
87 G3ICO
88 G3ETH
89 G2WS
90 G3NJF/P
91 GW3CBY
92 G3TLA/P
93 G3JFO
94 G3TDR
95 G5UM/P
96 GM2UU
97 G3UUT
98 G3BNC
99 G3SZX
100 G3UKV
101 GC3OBM
102 G3FVC
103 G3BJD
104 G3PWJ
105 G2ATM
106 G3ISX
107 G3USF
108 G3OUL
109 G3UIK
110 G3GZJ
111 G3EJA
112 G3JHM/A
113 G8AAZ
114 G3EHR
115 G8ATK
116 G3WW
117 G8APZ
118 G3TR
119 G3WZT
120 G2WS/P
121 G3EHM
122 G3WSM
123 G3RZK

144 MHz Senior Transmitting Section

1 G3CCH
2 G3FAN
3 G5MA
4 G3BLP
5 G3CO
6 G3BA
7 G6NB
8 G3EDD
9 G3HRH
10 G8GP
11 G3LAS
12 G3IMV
13 G3PTM
14 G5NU
15 G6GN
16 G8KHA
17 G3AOS
18 G3MRA
19 G3BHW
20 GW3MFY

144 MHz Receiving Section

1 BRS22550
2 BRS22322
3 BRS15822
4 BRS15744
5 NL687
6 BRS20108
7 A3470
8 A4048
9 BRS21667
10 A4871
11 BRS23140
12 BRS7323
13 A3942/P
14 A3942
15 BRS24550
16 BRS30352
17 A5032

144 MHz Senior Receiving Section

1 BRS15744

432 MHz Transmitting Section

1 G3NNG
2 G3KPT
3 G3LHA
4 G3BNL
5 G3MCS
6 G8AAZ
7 G8ABP
8 G3AHS
9 G5UM
10 G8ACQ
11 GW8ACG
12 GW8ACG/P
13 G8AHQ
14 G8AEJ
15 G8AGG
16 G8AGU/P
17 G3PTM
18 G8AAY/A
19 G8AGQ/A
20 G3HRH
21 G8AJU
22 G8ARM
23 G8ADP/P
24 G8AUE
25 G6GN
26 G8AQA
27 G8AWO
28 G8AXP
29 G8AHE/P
30 G8AOD
31 G8AWW
32 G8AKT
33 G8ANS
34 G8ARD
35 G8AIE
36 G3PKT
37 G8ATK
38 G8ACP
39 G8AQZ
40 G8ARC
41 G8AVL
42 G8ART
43 G5NU
44 G3FIJ
45 G3XEB
46 GW8AHI
47 G8AVX
48 G8AKQ/P
49 G8ABB

432 MHz Receiving Section

1 BRS15744

432 MHz Senior Transmitting Section

1 G3MCS

1296 MHz Transmitting Section

1 G3MCS

TE and F2 season was developing nicely where 50MHz was concerned " . . . regular contacts with ZS3B and the ZE beacon appearing daily " to one or other of the Gibraltar members equipped for " Six." The times of these appearances are worth noting by UK operators on a " just in case " basis: approximately 1230 to 1800GMT for F2, and 1900 to midnight for trans-Equatorial.

And as if to demonstrate the potentialities of " Six " there is news that ZE7JX was heard by ZB2BC when sending by auto-keyer (no QSO, unfortunately), and that SV1AB, way out at the other end of the Med, heard ZB2BC working ZS3B— and this at right angles to the Gibraltar station's line-of-shoot.

In the light of these results, and especially noting the regularity with which the ZE1AZC beacon has been pounding through in ZB2, the possibility of a 4m contact between Rhodesia and the UK cannot be wholly discounted. It is known that ZE1AN is operational on 69·998MHz, which suggests that a check 27kHz below our own 4m allocation might by a long shot produce a record making QSO.

Those equipped for 21MHz will like to know that the Rhodesians monitor 21360kHz daily in the hope of cross-band contacts. Got a 6m converter ready?

Technical Developments on " 13 " . . .

Prompted by the G2WS remark that more interchange of information about 13cm equipment would assist the state of the art on this band, G3EEZ of Wolverhampton, well known as one of " Thirteen's " most persistent and consistent exponents, comes up with some.

His transmitter, adapted from a design in the American *VHF Manual*, operates in the pulse mode, and in its time has used 2C42, 2C43 and GL6442 valves to good effect. The pulse transformer was wound on a television line output core.

On the receive side small modifications from the original include a television i.f. strip suitably padded down in place of the 6AK5 valves originally specified.

Equipment is mains or battery operated for use at home or away—and as will be known, has done very good service

under portable conditions especially during the long distance tests with G3BNL/P.

Thanks, G3EEZ. Now will others please pool equipment information for the general benefit of users of "Thirteen"? It can do nothing but good in helping to develop the band further.

. . . and with E-M-E

In readiness for the next earth-moon-earth opportunities on 23cm G3LTF and WB6IOM have been effecting detail improvements to their equipment.

At Chelmsford, Peter Blair now has his water-cooled transmitter operational, and a better noise factor squeezed out of the parametric amplifier. Feeder losses, too, have been further reduced.

At the Californian end there is now a 16 foot solid surface dish the construction of which, G3LTF estimates, should hoist the WB6IOM signal up to about 12dB above noise in a 100Hz bandwidth when the next E-M-E opportunity presents itself.

L'entente Video

When members of the British Amateur Television Club went across the Channel last month to lend support to the Amateur International Television Congress, they discovered that there really *was* a mademoiselle from Armentieres. For it was in "Armentiers" that the Congress was held; and one of its highlights was the election of a "Miss Television" from a bevy of "QRPPettes de 16 à 25 ans."

More seriously, the visit by 15 BATC members was welcomed by the French as a demonstration of what in other areas of activity might be called international solidarity. The G-men did not just leave it at a visit and no more: their practical participation in the Congress proceedings took the form of technical talks given by G6LEE/T on "A Solid State Camera Channel"; by GW6FDZ/T on A 405/625 i/c sync generator and by G6KKD/T, who outlined current amateur TV activity in the UK. A 70cm vision and sound combining unit was also prepared for showing to the F-men.

* * *

This level of interest in international amateur television suggests that across-channel QSOs by video will become more the rule than the exception which they are now. It needs but a modest increase in the number of "Stroke T" type stations established on both sides of the water for this to become possible.

The sort of thing which can be done was shown during the March opening on 70cm when F9NJ was heard offering video to a Midlands operator—and only if an A3 signal hits saturation level is it worth attempting pictures.

Rather nearer to Continental video sources, G8AJC of Canterbury accepted outstanding signals from ON5LM/T on 8 March, the Belgian station running no more than 20 watts to a varactor tripler, with 625 line video, negatively modulated on 437·6MHz. At G8AJC a BF180 preamp heads a 70cm converter which feeds into the domestic KB television receiver, helped by two 18-element Parabeams at 36 feet.

A movie for the Group Meeting

To say that if you are stuck for a subject for the next meeting of the local VHF Group or club, then lay on a film show seems to us to put technical film shows into a second-best category. Which is where they shouldn't be. There are now so many good films around of amateur radio interest that a showing ought to be organized at least two or three times a year simply to keep members up to date with what's available.

For a start, it is a good plan to obtain from the Mullard Film Library, Torrington Place, London WC1, a copy of "Mullard Films for Industry and Education." Another source of information about new releases of tech-films is the magazine *Film User*, which reviews them. It costs 30s a year from PO Box 109, Croydon CR9 1QH, or may be seen at the local library.

Coming nearer home, the Society's own "Radio News of 1968," with its extended sequences of vhf interest, including interviews with Ron Ham and G3LTF, is a must. It runs for 29 minutes, is most competently and professionally produced and can be hired for only 25s a day from G3NDF, Ralph Cathles, G3NDF, 4 Dawnay Road, Great Bookham, Leatherhead, Surrey.

A good financial return from the hire of "Radio News" will assist the promotion of further films, of which a moon-bounce one featuring G3LTF, K6MYC and WB6IOM is likely to have a special interest to readers of this page. Any such film costs several hundred pounds to make, so the more often the existing ones are hired out the more cash becomes available for new ones.

Big Signal from Hill Village

. . . . and in case you don't know where Hill Village is we'll tell you it's the suburb of Sutton Coldfield where the BBC television transmitter is situated. It's also the site of the new 70cm beacon which has been radiating on 433·81 MHz this last month or so, and leading many people to remark that now there is a permanent signal to hear on the band they are going to get equipment ready to operate there.

G3BA, without whose representations made in the right places it might have been impossible to put the beacon on the TV site, tells us that the aerial system in use consists of two J-Beam ruggedized 8-over-8 slot systems at the 300 foot level on the big tower. One of these aerials points true north, the other south east. The feeder loss up to them is only 4dB, which means that a fair amount of the 5 watts that leaves the transmitter does useful work up top. There are plans for upping this rf level later.

So far, plain carrier has been emitted. When a keyer is obtained the callsign G3SUT will be radiated in the first instance.

Since the beacon began its tests for the checking of local interference, reports have been received from a very wide area of the UK that it is doing fine. One operator in Hertfordshire told us that it was almost *too* strong and not marginal enough to give an idea of the wax and wane of conditions. A good point; but it's the people in the poorer locations seeking if possible a 70cm signal all the time who are really going to feel the benefit of its increase in power when this comes about.

Skeds and Nets

Sunday morning's 4m net in the Scottish Lowlands now operates from 11 am until 1 pm clock time. "All are welcome," says Alan Williams, GM3KSU, of Edinburgh. And on 2m a big Glasgow net forms nightly from 8–11 pm 145·8–145·9, all taking pauses for calls from farther south.

Look out for GW8ACG/P between 8 pm and midnight every Thursday when he operates from a high spot near Rhyl. Schedules by appointment will be most welcome on 2m, 70cm and—wait for it—23cm. This *could* lead to some useful long haul contacts on 1296MHz. Letters to 1 Bryn Coed Park, Rhyl, Flintshire.

G8ALO, one of the sponsors of the Midland Scout Net on 2m, has moved rather farther north from the Sutton Coldfield QTH. He is back on the air from Danesford School, Congleton, Cheshire.

Expeditionaries

From G8BNR, 279 Hatfield Road, St Albans, Herts, come details of the expedition to Wales to be mounted by the Verulam Radio Club under the callsign of GW3VER. First of all, the dates: Saturday 2 August, Flint; 3 August, Carnarvon, 4 August, Denbigh, Tuesday the 5th in Merioneth, and Wednesday the 6th, Montgomeryshire; 7 August, Cardigan; 8 August, Pembroke, and 9 August, Carmarthen.

Operation will be from 8 pm clock time and schedules are being arranged at five minute intervals during the last 15 minutes of each hour, when it will be free for all. Requests for schedules should go, with sae, to G8BNR, as above. But on 4 August the station will be entered in the ssb contest; that day skeds will start half an hour afterwards.

GW3VER will transmit single sideband on 145·42 and cw on 144·098MHz, and will receive on any 2m frequency.

Each day between 7 and 8 am there will be a schedule with OE6AP with the hope of a tropospheric contact, helped in some measure by the Austrian station's elevated site of 3206 metres asl.

* * *

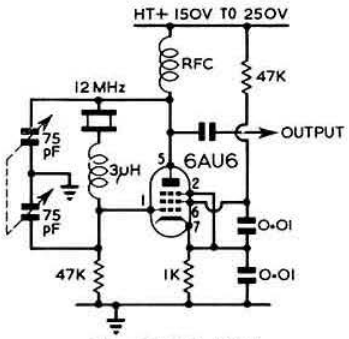
This is positively the last reminder about the G3BA–G3BHT trip to GM, when the two Sutton Coldfielders will be operating for eight days from eight counties as from 24 May. Those who are interested in making skeds, which as Tom Douglas says " gives them a good chance of a QSO compared to hoping for the best," should write to him now stating preferred times and modes. Obviously cw and ssb will be the easiest to copy at a distance. Split frequency operation will be on 145·9 and 2-way ssb on 145·41 every hour on the hour. Co-ordinators will be G6CW and G3OZP, and there will be an " admin " session between 1830 and 1900 hours daily on 3,652 kHz. See page 195, March, for full details.

Tech Corner

From G3UCM (Steve Gall, Coulsdon, Surrey):

The accompanying circuit diagram shows a VXO which can be used as a drive source for a 2m transmitter. Using a 12 MHz crystal the coverage was measured as 150 kHz when multiplied up to 2m. An 8 MHz crystal could be used, although the frequency excursion available at 2m would be less, depending of course on the value of the variable capacitor used. As will be seen, a 75 plus 75 pF is specified together with a 3μH inductor. The value of the inductor will need to be increased somewhat for 8 MHz, but for indifferent crystals it might have to be reduced.

Output of the VXO was measured as 7 volts rms when operated into a 47 Kohm load. In the prototype a 6AU6 was employed, though many other pentodes of the type in common use will be perfectly adequate. It is most desirable that the anode supply should be well smoothed and stabilized.



The G3UCM VXO

From G8ARM (B. G. Pickrell, London SE3):

A rebuild of the 70cm and 23cm transmitters at G8ARM was undertaken to overcome TVI and BCI problems with very local receivers. The new design, adapting parts of the well known Mullard all-transistor exciter, employs semiconductors up to the 216 MHz stage, followed by an EC88 doubler and driver to the DET24 output stage on 70 cm.

The major reduction in TVI has been attributed to running the third overtone 24 MHz crystals on their ninth overtone of 72 MHz. It is worth remembering that most HC6U crystals will operate on their fifth, ninth or even eleventh overtones, though even harmonics are difficult to start and keep stable. (With acknowledgements to the North Kent Society's newsletter).

Here and There

" Re overmodulation in contests in order to ' blast through,' why lower technical standards just because it's a contest? "—G3MNQ.

* * *

" Sometimes an operator's postal address differs from the county he is actually in. Where this occurs could his county be shown in *The Callbook* as well as his actual postal location?"—G3REH.

* * *

" Despite G2WS—his point made in February means ' No contests on Sundays '—I still think a 4m Cumulative Activity contest on Sunday mornings would be A Good Thing "—G5NU.

* * *

" Of course G2WS is right: there is nothing more infuriating than to listen to a QSO in which overs are given without callsign identification. In my part of the country some of the older 2-letter calls are bad offenders. But listen on 80m! Some of the sideband crowd's QSOs are shocking, regulation-wise "—G8ANQ.

* * *

" Who can imagine cw dying as long as there are aurorae on 2m? "—GM3TFY.

* * *

With effect from 1 May Gordon Sharpley, G6LEE/T, of Manchester, takes over from Ian Waters, G6KKD/T, of Ely, as chairman of the British Amateur Television Club.

* * *

" I send out a slow morse transmission on Tuesdays at 8 pm on 144·045 MHz finishing around 8.30 pm. I would be most grateful if anyone would call after this on cw as I hear very few signals on 2m "—GM3UWX.

SOCIETY AFFAIRS AND NEWS SUPPLEMENT

General Manager, Eric Dowdeswell, G4AR, David Marks, W2APF and Laurie Margolis, G3UML, pictured here in the reception area at Headquarters. David was in the UK for a short vacation prior to his departure home.

A brief report of the RSGB Council Meeting held on Monday, 17 March, 1969.

Present: The President (Mr J. W. Swinnerton) in the Chair, Messrs B. Armstrong, N. Caws, J. C. Graham, A. F. Hunter, E. G. Ingram, G. R. Jessop, H. E. McNally, L. E. Newnham, J. Petty, R F. Stevens, G. M. C. Stone, G. Twist, F. C. Ward, E. W. Yeomanson (Members of Council), A. E. Dowdeswell (General Manager) and J. Adey (Editorial Staff).

Apologies for absence were received from Messrs R. J. Hughes. J. Etherington and D. M. Thomas.

The President and Council observed one minute's silence as a mark of respect for the late John Clarricoats.

Membership and Affiliation

Council resolved:

(i) to elect 119 Corporate members and 36 Associate members.

(ii) to grant Corporate membership to 19 Associate members.

Council agreed to waive the subscription of three members owing to blindness or other disability.

Council approved applications from eight Societies for affiliation to RSGB. The Societies together with the names and addresses of their Secretaries are shown in this issue of *Radio Communication* page 303.

The late John Clarricoats, OBE, G6CL

It was reported that the funeral of John Clarricoats was attended by the President, a number of Council members, the General Manager and many members of the Society.

The President read a representative selection of the many letters of condolence which had been received at Society Headquarters.

Mr Stevens suggested that a form of memorial be instituted in memory of the late John Clarricoats and this, together with a suggestion from the Bristol RSGB Group that a fund be set up, was discussed by Council. (A notice appeared in the April issue, page 272).

Regional and Area Representatives

Council approved nominations of the following as RR's:

Mr I. W. Sheffield, GM3VEI—Region 13

Mr T. Darn, G3FGY—Region 4.

Council was also pleased to accept offers from the following RR's to continue in office for a further term of three years:

Mr S. Granfield, G5BQ, Region 5

Mr M. Williams, GW3LCQ, Region 11

Mr N. E. Cox, GM3MUY, Region 14.

Council approved the following nominations for Area Representatives:

Mr H. M. Davison, G3TVW, Cheltenham

Mr A. B. Langfield, G3IOA, Greater Manchester (North)

Mr T. J. Knappett, G3XFT, Norwood and S London RSGB Group

Mr D. Byrne, G3KPO, Peterborough.

Cristoforo Colombo Award 1969

After discussion, it was agreed that no nominations be made this year for this award.

VHF-UHF Manual

Mr Stevens stated that the new VHF-UHF Manual would be ready for the forthcoming VHF Convention. Council thanked Mr G. R. Jessop and Mr Stevens for their work in producing the new Manual.

ORM Region 14

Mr A. F. Hunter outlined the discussions with Mr Cox and the date now proposed for the Official Regional Meeting was 10 May and this was approved by Council.

Northern Radio Societies Association

The President read a letter from the Association requesting a Council Representative to attend their Convention on 27 April 1969. After discussion it was agreed that Mr Graham would attend.

Minutes of Committee Meetings

Council accepted the following Committee Minutes: RAEN Committee (25.1.69); M & R Committee (17.2.69); IARU Working Group (18.2.69); VHF Contests Committee (25.2.69); VHF Committee (26.2.69); Technical Committee (3.3.69).

Council was in session for 4½ hours.

Obituaries

Ernest Shackleton MBE G6SN

It is with the deepest sorrow that we report the death of Ernest Shackleton G6SN at his home in Harrogate on the morning of 11 April. His sudden and totally unexpected passing at the age of 67 came as a great shock to his very many friends.

" Shack " as he was affectionately known to most of us in Amateur Radio Circles was educated at Dollar Academy. He entered Leeds University where he studied Mechanical and Electrical Engineering, followed by an apprenticeship with the General Electrical Company.

His interest in Radio began in the days of the spark transmitter and coherer detector and many of his early experiments were carried out in company with his great friend the late G5US.

In the early 1930's Shack was engaged in the development of Mobile Communications for the Police in Stockport, Manchester and Edinburgh. He obtained his licence in 1935 and operated from the family home in Ben Rhydding, Ilkley, Yorkshire. His attention soon turned to the higher frequencies, particularly 5 metres. He was an enthusiastic portable operator on this band and some may still recall his expeditions to the top of Beamsley Beacon, where a single QSO was considered by him to be a fit reward for the man handling of all the equipment some 1500 ft up a mountainside.

He held a commission in the Territorial Army and at the outbreak of war in 1939 he was called to the Colours with the Royal Corps of Signals in the rank of Captain. In 1940 he was wounded and taken prisoner and remained in captivity for the duration. Nevertheless he managed to be active as is revealed in the citation to his award of the MBE.

After recovering from wounds received prior to his capture at St Valerie on June 12th 1940 Captain Shackleton was imprisoned in various camps in Germany.

From April 1941 until his release in April, 1945 he devoted his time and energy to building and operating secret wireless sets. This work, voluntarily undertaken, was of inestimable benefit to all his fellow prisoners and has earned him the high commendation of three senior officers.

After his repatriation Captain Shackleton sought and obtained permission to return to Oflag 9 A/Z to retrieve the radio apparatus locally constructed and certain other secret equipment which in the interests of future security it was desirable should not be allowed to remain there.

One of these receivers is now on permanent exhibition in the Imperial War Museum and bears tribute to the scheming ingenuity involved in its production from literally nothing.

On his release from his regiment he rejoined his old firm GEC at Birmingham and settled in the Handsworth area where he made many friends. From here he operated chiefly on 80 metres SSB and the 2 metre band including mobile. He was a regular visitor to the various Mobile Rallies throughout the country.

Shack's greatest pleasure was derived from the design and construction of his own equipment. Meticulous to a degree, his work had the hallmark of a craftsman and his well equipped workshop was always a model of planned tidiness. He was a regular contributor to the " Bulletin " and will be well remembered for his series of articles on Workshop Practice. At the time of his death he was indeed working on a compact filter type 9 Mc/s ssb generator details of which were intended for publication at a future date.

Shack was the true Amateur, ready at all times to offer assistance particularly to the newcomer. His enthusiasm, even in later years was infectious. His massive physique was matched by a great heart and a generosity, the full extent of which will never be known.

He was a member of the Midland Amateur Radio Society and the Radio Amateurs Old Timers Association (RAOTA).

His cremation took place at Lawnswood Crematorium, Leeds on Wednesday, 16 April. The RSGB was represented by the President, John Swinnerton, G2YS and Council Member Jack Petty, G4JW together with many of " Shacks " amateur radio friends.

Shack leaves a widow Editha to whom we extend our very deepest sympathy.

Dan Connor, GM3OCV

It is with deep regret that we report the death of Dan Connor, GM3OCV on 24 February, 1969.

Dan was a very keen DX operator particularly on 15m, and although in great pain during the last few months of his life, he continued to make QSOs with his usual friendliness and good humour.

Dan's passing will be a great loss to all of us who enjoy amateur radio.

From his very close friends in Scotland, and from his wider circle of friends throughout the world our deepest sympathy goes to his wife Sadie and son Chris, PA0KRQ.

J.A.S.

Norman Davis, G6TV

Many members will be sorry to hear that Norman Davis, G6TV, passed away on 11 March 1969, the culmination of the long illness he had suffered since his serious road accident at RAF Sealand.

G6TV joined us at the Electrical and Wireless School, RAF Cranwell in 1935 as a civilian radio instructor. He had a wonderful grasp of aerial theory and he soon developed a unique laboratory of miniature aerials and arrays where polar diagrams came to life through the flash of pea lamps. He became a guiding light in the Cranwell Amateur Radio Transmitters' Society and was the first Secretary of the RAF Amateur Radio Society which he helped to found in 1938.

He inspired the close links which have always existed between RAFARS and the RSGB by organising combined Hamfests at Cranwell before and after the war. The peak of this co-operation was reached in the huge gathering at Cranwell in April, 1950, graced by G6CL, for whom the Air Ministry provided an Anson aircraft for the trip.

Of the thousands of apprentices who passed through Norman's aerial laboratory there are many who discovered the attractions of amateur radio through his example and encouragement.

His friendly kindly manner typified the true radio amateur. His memory will remain as an example to all his many friends To his wife Grace and daughter Isobel we tender our heartfelt sympathy.

W.E.D.

Eustace Keevil, G3RAJ

It is with deep regret that we have to record the passing of Eustace Keevil, in his 77th year on 10 April 1969. Although totally blind, Eustace took up amateur radio in 1962 and was in daily contact with his many friends on 80 metres. He was well known in local Freemasonry circles and was an active Methodist lay preacher, having started in 1912.

At his funeral on 15 April the RSGB, BARC and RAIBC were represented by G5UH, G3BJJ, G3VVI, G3TTZ, G3ULJ, G3TZN and G4UZ. To his wife, Nella and daughter we send our deepest sympathies. He will be greatly missed.

H.W.L.

R. H. Farr, G8IJ

It is with deep sorrow that we have to record the passing of Reg Farr after a heart attack on 17 March, 1969.

Reg was active on the DX bands on cw which was his main mode. On Sundays he was to be heard on am in the local 80m Bridgnorth net, the members of which will miss his cheery voice.

His QSLs show that he was also a member of FOC, TOPS and RAOTA (1936) and he was at one time identified with the intruder watch.

G3JZG and G2BDR attended the service at Stourbridge Crematorium to represent the local amateur fraternity and old colleagues. Our deepest sympathy is extended to his wife Kathy and to his married daughter and family in the Far East.

L.J.

Stewart Perry, G8CCT

Members of the Chippenham and District Amateur Radio Club were shocked to learn of the untimely death of Stewart after a fortnight's illness. He was only seventeen and was so happy with his recent callsign and his 2m rig with which he made his first contact only days before he fell ill. His enthusiasm and cheerful smile will be much missed.

A number of his friends from the Club attended the service at Chippenham on 20 March, and all members will wish to convey sincere sympathy to his parents in the loss of their only child.

P.A.S.

Special Events Stations

Mooseheart
On 29 June, 1969, the Loyal Order of Moose, Mooseheart, Illinois, are holding their annual convention. On this date British Mooseheart, at Winscombe, Somerset, will endeavour to link up with Mooseheart, Ill, who will have the call K9VWJ/9. The British station will sign GB2MHW and the loan of any ssb equipment for the event will be appreciated. Any interested licensed brothers should contact G3PFD on Bristol 659515.

Crawley
GB3CC will be operated in co-operation with the training ship *Superb* of the Nautical Training Corps on Wednesday, 28 May, 1969, to coincide with the Crawley carnival. Further details from G3IDF.

Stratford-upon-Avon
On 11, 12 and 13 July, GB3SUA will be operational for the 700th Anniversary celebrations of the formation of the Guild of the Holy Cross in Stratford-upon-Avon. This guild was the forerunner of the present borough which was granted its charter in 1553. The station is being organized by the Stratford-upon-Avon Radio Club at the invitation and with the assistance of the borough council. Other attractions include a river carnival, boat rally and public dancing in the streets. Operation is to be on 80m, 20m, 15m and 10m using ssb, am and cw. A special QSL card will be issued. Information from M. Webb, G3OOQ, 14 Townsend Road, Tiddington, Stratford-upon-Avon, Warks.

Clifton
Over the Whitsun weekend, the Clifton ARS will be under canvas at the Deptford District Scout Camp, operating as GB3DDS. Cw will be used on 3·5, 7 and 14 MHz and phone on 70, 144 and 432 MHz. The station will be located at Westerham Hill, Kent. Further information from G3JKY.

Enniskillen
The first Annual Fermanagh Festival Fortnight will be represented on the air by GB3FRE from 27 May to 7 June. It is hoped to publicize Fermanagh as a tourist resort and to make its name known world wide. Operation will be on 10m and 80m with 160m and 2m a possibility as well. Operators will be GI3RNO and GI8AWF and a special QSL card will be issued.

Mobile Rallies

Norfolk and NE Suffolk Raynet Group
This group will hold a social rally for RAEN members and friends on Sunday, 22 June commencing 1400 hours at the Deer Park, Thetford Chase, on the A134 6½ miles NW of Thetford, NGR TL814918 by kind permission of the Forestry Commission.

There will be talk-in station on 160m and 2m, games and prizes for junior operators, raffles, surplus equipment sales, ice cream, etc. All are welcome and bring picnic teas. Further details from G3HRK.

ARMS Rally
The second of three ARMS rallies will be held at The Aerodrome, Old Warden, Biggleswade, Bedfordshire, on 1 June. This is the home of the Shuttleworth Collection of vintage aircraft, cars and other powered machines. Talk-in will be G3NMS on the usual bands.

Cardiff Rally
A mobile picnic will be held by the Cardiff RSGB Group on Sunday, 18 May. The location is Porthkerry Park, near Barry, Glamorgan. The event will open at 1100 am and there will be talk-in stations on 1980 kHz and on 144·35 MHz (RAEN) frequencies. A df hunt will be held at 1500 hours BST and it is hoped that as many people as possible will take part.

Thanet Rally
This will take place at the King George V Memorial Park in Ramsgate on 18 May. In addition to the usual attractions there will be the SRN4 Hovercraft at Pegwell Bay. Talk-in stations will be on 160m and 2m using the call G3DOE.

RADIO AMATEUR EMERGENCY NETWORK

By S. W. LAW, G3PAZ

After the spate of floods, our early hot spell of weather has given the unfortunate victims a little chance at last to rid themselves in some measure of a certain amount of the all-pervading dampness which is so persistent. We too should not allow the good conditions to be wasted, but get down to some of those outside jobs whilst we have the chance. Aerials are a prime consideration, especially where these are installed at User Service premises. No need to enlarge on this theme. That /P equipment also can be given a check-up (possibly if only for Field Day? An excellent excuse!). Anyway, give it an airing, you never know when it may be needed in a hurry.

Registrations Secretary
Ron Ledgerton has done a grand job for a long time, and during his term of office has coped in a highly efficient manner with the increasing flow of registrations. Even when handicapped by an unfortunate accident some time ago the flow of cards was very little delayed. Now, however, a long-standing eye trouble has forced Ron to ask if he might be relieved of the arduous voluntary job which we have taken so much for granted. We are fortunate in having another able volunteer in Jane Balestrini, XYL of our RAEN Committee Chairman G3BPT. All registrations will therefore be dealt with at the address given in the panel. Mrs Balestrini will also now deal with enquiries for the RAEN Manual, the charge for which is 3s 6d including post.

Still Growing
When we get an enquiry from GC-land we really feel that we are getting somewhere! It will be most interesting to see how things develop—we can feel some special problems in this case and we look forward to hearing more from this quarter. Bristol is under way under G3ULJ. Others are W. Glamorgan/E. Carmarthen (GW5ZL); SE Essex (G3MVV); and in N Ireland groups under GI3KVD and GI3PLL. There are also signs of activity in Cumberland area and in Shrewsbury. Also we believe that something is stirring in Liverpool. Things are so fast and furious in the Anglia area that the load looks as though it will have to be spread, as has been done in Sussex. Those in the S London area will certainly have heard the Kent Group under G3ODB, really swinging on 4m. Soon the Gravesend Group (G3ORC) will also be in evidence. Listen round too for the SE GLC Group (G3FZL).

Around the Groups
The idea of a social get-together is not to be despised and a number of Groups are looking to the better weather for an opportunity for an outing or picnic for the benefit of the YL and XYL side. Needless to say, the rigs will not be switched off all the time! There is always something to be learnt of /M or /P work even on these occasions. The Anglia boys had one fixed for April and Surrey have had some very successful events. Naturally one should make suitable arrangements in case of a call-out, but this need not interfere with the fun if done with foresight. Another point about contact within Groups is the circulation of some sort of regular contact through the post if the Group funds permit. We are glad to acknowledge the receipt of several newsletters from various Controllers. These make very interesting reading and are very informative. Some Groups may care to emulate the example of Surrey, whose matter is printed on standard small sheets file-punched to fit folders supplied to members and using coloured paper to denote the category of the information e.g. exercises in yellow, directory in white, news in green and so on.

Honorary Registrations Secretary:
Mrs. Jane Balestrini, "Merrivale", Willow Walk, Culverstone, Gravesend, Kent.
Honorary Secretary, RAEN Committee:
Mr. E. R. L. Bassett, BRS 16075, 57 Upper St. Helens Road, Hedge End, Southampton, SO3 4LG.

YOUR OPINION

Base-Connections of Field Effect Transistors

From: T. W. Lloyd, G3SL, Hounslow West, Middlesex

It has come to my notice that various suppliers of Field Effect Transistors are publishing misleading information in their catalogues regarding the arrangement of the lead connections of these devices. The compilers of these catalogues have assumed that the manufacturers have followed the logical arrangement of:

Collector = Drain | Base = Gate | Emitter = Source

Unfortunately this is not so—even particular makes vary. The following examples from the Motorola range illustrate the point:

MPF 102	Gate Source Drain	MPF 151	Gate Drain Source
MPF 103		MPF 152	
MPF 104		MPF 153	
MPF 105		MPF 154	
MPF 106		MPF 155	
MPF 107		MPF 156	

Several colleagues and I have spent many hours attempting to get MPF 102's to function—following the connections given in the retailer's catalogue, only to find that this information was wrong and that the devices had probably "gone down the drain!"

If nothing can be done by the makers to identify the leads, either on the device or in the packet, would you please give this letter the widest publicity as we feel sure that other users are being also mislead. It is hoped that, as a result of this letter, the offending catalogues will be corrected in the next editions.

Operating Manners

From: Gerald R. Kennedy, G3OGK, 23 Hollytree Close, Holton, Leics.

I should like to disagree with the letter of G2WS in the March *Radio Communication*. He—quite properly—deplores the abbreviation and omission of callsigns during QSO's. He suggests that this is confined to those newly licensed. I have been on the air for nine years, so I am neither newly licensed nor an old timer. Perhaps G2WS works different bands from the 80 to 10m that I work, but I have rarely heard these newly licensed miscreants to which he refers. However, I do hear a lot of poor operating, *particularly* perpetrated by those with G2 (and sometimes G4, G5, G8) callsigns, who really by now ought to know better. The main offenders as far as I am concerned amongst those using abbreviated callsigns seem to be some G2's, who can be heard during overs signing '2XYZ, etc. Moreover, the main "hoggers" of the DX stations seem to be the older gentlemen. I am particularly aware of this, as I only operate mobile. Very often I am denied a QSO with a DX station by an old timer rabbiting on so that my battery is flat betime he has finished, or, and this happens to me frequently, the aforesaid old gent turns his (usually enormous) beam on the DX station and comes up —I am in QSO—and takes over. To their credit some of the DX boys refuse to work such ill mannered people.

I realize that I am probably overstating the case, and that in any event, one cannot generalize, but I would like it brought to attention that it is not only those with calls in the G3V . . . onwards series that are at times lacking in good techniques and that seem to get carried away "in the excitement of the moment."

The MOSVED and the Direct Generation of SSB

From : B. M. Johnson, G3LOX, BBC TV, Wood Lane, Belle Bas-Ville, Shepherds Bush, London, W12.

I found the article "The MOSVED and the Direct Generation of SSB" (*Radio Communication*, April), to say the least, very interesting. The basic principle is not, however, new; one applauds the freshness of the approach nevertheless.

BBC 2 is of course familiar with the work both of your correspondent, H. Gibson (K5MMW/6) and B. P. Chislenkjo (ex-B1PPY), now with NBC Research, California. BBC Research is continuing to try to develop an English equivalent to the MOSVED; but a recent example showed a disappointingly low "Q" (5). One snag is the difficulty of finding the Goldy material for the Dum Matrix; however, we can take some comfort from the fact that the original MOSVED was not entirely American: the drawing you publish shows what looks remarkably like an English socket to me.

Along with a small, though growing, number of aficionados, I have had the good fortune to have heard the results of your correspondent, H. Gibson's and B. P. Chislenkjo's work on UHF. A friend in the shack, turning on a transmission muttered "How does that grab you, KW lovers?" How indeed! May the MOSVED succeed in the revolution of downtown communication.

From: W. Blanchard, G3JKV, East Grinstead, Sussex

Re MOSVED; very interesting, but couldn't we have had some readers' letters instead?

Amazing what the NBC studios in beautiful downtown Burbank are churning out these days—but perhaps they'd be better left to their own devices!

RSGB Slow Morse Practice Transmissions

From: P. Weller, G3XOQ, Redhill ,Surrey.

I wish to thank the operators and organizers of the RSGB Slow morse transmissions for their extremely valuable training sessions. Using these transmissions, only four months were taken, from scratch, for the CW test pass slip to be acquired. At my QTH many top band stations were heard consistently including G4RS at 589, G3SAZ at 589 and G3EFS at 599.

Thank you gentlemen, for a very worth while service.

What has happened to all DX G's on the HF Bands

From: R. F. G. Thurlow, G3WW, Wimblington, March, Cambs.

Current DX News Sheets referred to by your DX columnists show that not only did the London DXers G3BXI, KZI, NMR and schoolboy-son G3UML have 14-21-28 M/cs QSOs with HK0TU, but that G3FKM, HCT, HDA had *five* band QSOs, only beaten by the "local boy" W4BRB with all six bands QSO including all crabs and ants.

All RSGB members including those DXers who in semi-retirement can operate after the above named prominent DXers have declared they must QRT to go to work, are most interested in the aerial systems used and employed by our "DX Elder Brethren" at the present time—180w to 2kw PEP being of no interest.

Can no one be persuaded to "give" such information to their "teeth gnashing" envious rivals?

It pays to Advertise

From: John M. Allsop, BRS 28273, 15 Woodland Grove, Mansfield Woodhouse, Notts.

May I, through the columns of *Radio Communication*, thank the anonymous member who sent me a crystal in answer to my wanted advert in the April issue of the magazine. So quick off the mark was he in mailing it, both *Radio Communication* and crystal arrived by the same post.

CONTEST NEWS

3rd 144 MHz Open Contest

This event has always been one of the most popular contests in the VHF calendar, and this year was no exception, with over 300 stations active and no less than 84 submitting entries.

The winner of Section A was G8BBB, closely followed by G3REH, while in the multi-operator category, G3NGZ from RAF Little Rissington, Glos., were chased home by the ever active Albright and Wilson Club of Dudley,Worcs., who made the highest total of QSO's

The overall winners as expected, were in the portable section, and this year a two-man team of G3TXR and G8BHY, operating as GW3TXR/P from Montgomeryshire, carried off the Mitchell-Milling trophy, subject to ratification by Council.

Conditions were certainly not above average but nevertheless, the longest distance worked was a very creditable 518 km, between G2WS in Weston-super-Mare, and PA0HVA. Comments were few, being generally non-committal about conditions and approving of this year's scoring system.

Check logs are acknowledged from: G8ANY/P, G8AVE, G8CBZ, G8CEM, G8CEQ/P, G8CFF, A5032, A5662, A6078, BRS28005, BRS30506.

Section B Multi-operator and /A

	Posn	Pnts	QSOs	Cnty	Best QSO	Dist	Power
G3NGZ	1	874	179	GR	G3GJY	274	50
G3OXD/A	2	815	198	WR	G8AJC/P	176	35
G3SLJ/A	*	782	182	EX	PA0EZ	310	25
G3RSO	3	560	154	EX	PA0EZ	339	45
G3WSC	4	515	148	SX	PA0EZ	390	75
G3WGC/A	5	482	155	HF	F1AKQ/P	288	50
G3UCU	6	368	141	LD	F1AKQ/P	290	25
G8AYN/A	7	359	98	HE	G3REH	230	70
G8BAK	8	295	114	BD	GW3TXR/P	205	18
G8BLC	9	287	69	YS	G2JF	320	45
G8ADP/A	10	120	30	GR	G3GJY	310	15
G8AWV	11	87	58	LD	G8AWN/A	120	30
GW8BXN/A	12	45	11	PK	G8AFA	177	10
G3VEA	13	35	25	EX	G8APV/P	80	6

* disqualified (Rule 17)

Section C Portable

GW3TXR	1	1108	190	MG	GC2FZC	360	50
G3GBU	2	461	147	SD	G2JF	320	12
G8APV	†	348	89	SX	—		25
G8BIS	3	324	154	KT	GW3TXR/P	263	30
G8AAY	4	312	71	DT	G8AJC/P	245	24
G3WCB	5	292	131	SY	G8AUE	224	25
GW3VXC	6	291	64	MH	G8AJC/P	300	5
G3VPF	7	266	68	DT	G3GBU/P	260	12
GW3UCB	8	230	53	CV	G3PEJ/P	249	30
G3TQZ	9	212	54	WR	—		25
G8AWN	10	168	54	YS	G3SLJ/A	282	12
G8BTC	11	161	61	SY	G8AUE	221	15
G8AJC	12	150	56	KT	GW3VXC/P	305	25
GW3NUE	13	134	28	BR	—		50
GW3RNH	14	126	43	MH	G3REH	233	25

† disqualified (Rule 17)

Section A Fixed Station, Single Operator

	Posn	Pnts	QSOs	Cnty	Best QSO	Dist	Power
G3LAS	*	714	165	HF	G3GZJ	404	100
G8BBB	1	679	143	CE	PA0ACG	340	130
G3REH	2	654	130	LN	G2WS	262	50
G3GJY	3	637	102	YS	G2JF	367	18
G3UUT	4	537	104	YS	PA0HVA	410	80
G3PWJ	5	524	132	SD	G3DAH	260	150
G3USB	6	442	94	CE	G3GZJ	430	110
G3EHM	7	432	105	SD	—		80
G2WS	8	429	88	ST	PA0HVA	518	72
G3NEO	9	415	72	YS	G3GZJ	435	150
G8AKQ	10	328	89	YS	G2JF	312	90
G3GHI	11	325	133	SY	G3LLE	330	90
G3OZF	12	316	85	EX	PA0PRY/P	330	40
G3GZJ	13	310	30	CL	G3CCH	485	150
G8ADC	14	275	89	BD	G3UUT	240	32
G8BXT	15	274	79	SD	G3WSC	250	12
G3WHK	16	256	124	SY	G3DGI	235	12
G2AXI	17	252	86	HE	F0CK/M	213	100
G8AUN	18	233	50	NK	GW3TXR/P	295	40
G2AMV	19	226	64	CH	G3WGC/A	260	25
G8BQA	20	223	92	KT	G8BMD	255	11
G5UM	21	221	51	LR	G2BHN	204	18
G3ILO	22	214	72	GR	G3GJY	300	12
G3VJK	23	196	47	NK	GW3TXR/P	235	15
G3WDG	24	174	54	HE	G3GZJ	283	25
G8AFA	25	165	51	ST	G3GBU/P	230	140
G3WUI	26	157	57	WR	G3GJY	247	11
G8APJ	26	157	98	LD	G3OBD	176	18
G8AVG	28	156	48	WE	G2JF	198	15
G8BJG	29	151	72	KT	G3THX	200	18
G8ART	29	151	65	HF	—		66
G8ABH	31	150	63	SY	GW3TXR/P	250	30
GC2FZC	32	148	30	GY	GW3TXR/P	350	60
G8ATM	32	148	37	NM	G2JF	240	25
G8ADH	34	145	41	HE	GW3TXR/P	225	80
G2DCI	35	141	46	WK	G8AUN	214	32
G3VPR	36	97	32	LN	G2JF	205	15
G8ALM	36	97	61	LD	—		50
G8AZU	38	81	63	MX	G3NGZ	106	0·5
G8CEH	38	81	34	HE	F1AKQ/P	225	21
G3OHW	40	80	42	BD	G3WSC	94	10
G8BIJ	41	74	52	MX	GW3NUE/P	134	10
G8BHL	42	71	41	LD	G8BQT	136	15
G8CIT	43	66	50	MX	G3NGZ	109	0·5
G3MMS	44	65	23	LN	G2JF	204	15
G8BUJ	45	61	31	HE	—	—	15
G3JKY	46	59	33	KT	G2WS	200	30
G2FQR	47	54	29	BE	G2JF	158	12
G3THX	48	53	12	LN	GW3TXR/P	232	5
G3WQP	49	50	24	LE	G3FPI	162	18
G8BKR	50	45	31	GR	G8AAY/P	75	5
G3XFW	51	39	17	ST	GC2FZC	162	15
GC8BNV	52	18	8	GY	G8AAY/P	155	12
GC8BMO	53	17	8	GY	G3GZJ	210	12
G8BYK	54	9	9	LD	G3GHI	29	6

* Adjudicator

Third 70 MHz (Portable) Contest 1969

1 **Date and Time:** From 09.00 GMT to 17.00 GMT on 22 June.

2 **Entries** and check logs must be sent to the Adjudicator at: VHF Contests Committee, Angle End, Great Wilbraham, Cambridgeshire.

In addition, the following **General Rules** as published in the January issue of *Radio Communication* will apply: 3b, 4a, 5a, 6a, 7c, 8a, 9b, 10a, 11-19, 25, 27 and 28.

First 432 MHz (Open) Contest 1969

1 **Date and Time:** From 17·00 GMT on 24 May to 11.00 GMT on 25 May.

2 **Entries** and check logs must be sent to the Adjudicator at: VHF Contests Committee, 20 Harcourt Road, Charlton House Estate, Wantage, Berkshire.

In addition, the following **General Rules** as published in the January issue of *Radio Communication* will apply: 3a, 4a, 5a, 6a, 7a, 8a, 9a, 10a and 11–28.

Rules for the RSGB 28 MHz Telephony Contest — 11-12 October, 1969

Radio Amateurs throughout the world are again invited to take part in the annual RSGB 28 MHz Contest for single operator stations.

1. The **General Rules** for RSGB HF Contests, published in the January 1969 issue of *Radio Communication* will apply.

2. When: 0700 GMT on Saturday, 11 October, to 1900 GMT on Sunday, 12 October 1969.

3. Eligible Entrants:

Home Section: RSGB Members resident in the British Isles.

Overseas Section: Licensed amateurs in all parts of the world except the British Isles.

4. Contacts: may be made using any telephony system for which the entrant is licensed, on the 28 MHz band.

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

British Isles stations: each completed contact will score 5 points. In addition, a bonus of 50 points may be claimed for the first contact with each new country. 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 a separate country.

Overseas stations: each completed contact with a British Isles station will score 5 points. In addition, 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, 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. Contacts with GB stations will score 5 points only.

6. Entries: must be addressed to the RSGB HF Contest Committee, c/o M. Harrington, 123 Clensham Lane, Sutton, Surrey, England.

7. Trophies: the Whitworth Trophy will be awarded to the leading Home Section entrant.

IARU REGION 1—Contest 1968

Here are the results of the IARU Region 1 Contest held on 7-8 September, 1968. The full figures cannot be given here, but SP2DX, who sent them, promises that they are being printed and will be sent to all competitors as soon as possible.

Section I—144 MHz fixed. Logs submitted 464

1. G2JF 89043 points
2. PA0HVA 54897
3. F9FT 52296
4. DL0PT 51474
5. DJ6BYA 48510

Section II—144 MHz Portable. Logs 256

1. SM7BZX/7 67438 points
2. DL2QV/P 59000
3. OZ6OL/P 57665
4. F9BP/P 52605
5. DL8NP/P 51430

Section III—432 MHz fixed. Logs 41

1. ON4ZK 6149 points
2. PA0JMS 6090
3. PA0EZ 4943
4. G3FIJ 3443
5. DL9OI 2977

Section IV—432 MHz fixed. Logs 32

1. G3LTF/P 12362 points
2. G3NNG/P 11111
3. G3MAR/P 8372
4. G8AKQ/P 8200
5. G3STA/P 8181

Section V—1296 MHz. Logs 3

1. DL6LM 212 points
2. DL8AQA 197
3. DL2DO 167

Section VI—1296 portable. Logs 14

1. G3LTF/P 2659 points
   G3NNG/P 2659
3. G2RD/P 2610
4. G3MAR/P 2157

Although the rules call for only the above six sections, PZK reports with pleasure that G3WZR/P worked one station at 2·4 km distance on 3cm. The call-sign of the other station was not given but presumably this station also deserves congratulations. G3WZR says that "the band was very quiet!"

First 1296 MHz (Open) Contest 1969

First 1296 MHz (open) Contest 1969 — —

1 Date and Time: From 12.00 GMT to 16.00 GMT on 25 May.

2 Entries and check logs must be sent to the Adjudicator at: VHF Contests Committee, 20 Harcourt Road, Chairton House Estate, Wantage, Berkshire.

In addition, the following **General Rules** as published in the January issue of *Radio Communication* will apply: 3a, 4b, 5b, 6b, 7a, 8a, 9a, 10a and 11-28.

Rules for the RSGB 28 MHz Telephony Receiving Contest — 11-12 October, 1969

1. 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.

2. Duration: The contest will start at 07.00 GMT on Saturday, 11 October and end at 19.00 GMT on Sunday, 12 October 1969. The RSGB 28 MHz Telephony Contest for transmitting amateurs will take place during the same period.

3. Entries: (*a*) To count for points, logs must show, in columns: (i) Date/Time GMT; (ii) Callsign of station heard; (iii) Report and serial number sent by station heard (iv) Callsign of the station being worked; (v) Bonus points claimed; (vi) Total points claimed.

(*b*) Entries should be set out on *one side only* of foolscap or International A4 size paper, must be postmarked not later than 28 October 1969 and must be addressed to RSGB HF Contests Committee, c/o M. Harrington, Esq., 123 Clensham Lane, Sutton, Surrey, England. The name of the contest must be shown clearly at the top left hand corner of the envelope. Log sheets are available from RSGB Headquarters.

(*c*) 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 Council of the RSGB shall be final in all cases of dispute. I do not hold an amateur transmitting licence.

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

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 purposes of scoring. CQ or test calls will not count for points.

British Isles entrants: Each complete log entry will score 5 points. In addition a bonus of 50 points may be claimed for the first station logged in each new country. For the purposes of scoring the RSGB countries list will be used, with the exception that VE, VK, W/K, ZL and ZS call areas will each count as separate countries.

Overseas Entrants: Each complete log entry relating to a British Isles station heard will score five points. In addition a bonus of 50 points may be claimed for the first station heard in each British Isles country-numeral prefix, i.e. G2, G3, GM4 etc. as listed in Rule 5 for the transmitting contest.

5. Awards: The Metcalfe Trophy and a certificate will be awarded to the leading British Isles entrant. In addition, certificates will be awarded to the British Isles runners-up and to the 1st, 2nd and 3rd overseas entry.

6. The Council of the RSGB reserves the right, on the recommendation of the Contests Committee, to reject any entry that is consistently inaccurate.

Summer Top Band Contest

1 The **General Rules** for RSGB HF Contests, published in January 1969 issue of *Radio Communication*, will apply.

2 When: 21·00 GMT on Saturday, 5 July to 02·00 GMT on Sunday, 6 July.

3 Eligible Entrants: The Contest is open to licensed Amateurs in all parts of the world. Multiple operator entries will be accepted. There will be two sections for:

(a) British Isles stations

(b) Overseas stations.

4 Contacts: CW (A1) only in the 1·8–2·0 MHz band. County code letters, as published on page 58 of the January 1969 edition of *Radio Communication*, must be sent after the report-serial number group by all UK stations, e.g. for a contact from Sussex 599001SX.

5 Scoring:

(a) **UK Section**—Three points for each completed contact plus a bonus of five points for each new county within the British Isles, and a bonus of five points for each new country outside the British Isles.

(b) **Overseas section**—Overseas stations may only claim points for contacts with British Isles stations, and will score 3 points for each contact plus a bonus of five points for each new British Isles county worked.

6 Logs: Column (5) must be headed "County code letters received." The county code letters as sent must be entered at the top of each log sheet. Entries must be addressed to RSGB HF Contests Committee, c/o J. C. Graham, G3TR, "The Willows," Church Road, Lowfield Heath, Nr Crawley, Sussex, and **not** to RSGB Headquarters.

First 1·8 MHz Contest 1969

Results

Posn	Call-sign	County	Total Contacts	3 point Contacts	Points
1	G3IGW	YS	130	20	706
2	G3KMI (Op G3XBX)	HE	121	19	645
3	G3SVW	LE	110	15	613
4	GM3FXM/A	FE	110	13	611
5	G3OLB	GR	116	13	605
6	G3TKF	ST	106	9	593
7	G3JEQ	SY	105	13	596
8	G6BQ	KT	104	11	573
*	G3TSL	LE	97	10	552
9	G4AR	SY	97	11	543
10	G3TEL	BE	93	8	532
11	G3TIR	SX	94	7	528
12	G3TR	SY	93	11	525
13	G3LUU/A (Op G3VTY)	YS	95	12	510
14	G3TAA	LD	88	15	483
15	G3WPO	SX	83	6	474
†	G3RSD	LN	82	8	464
16	GM3KMR	MN	81	8	462
17	G8AB	EX	73	4	426
18	G3SQX	WK	69	6	396
19	G3TZU/A	YS	65	5	369
20	G3XOQ	SY	60	6	342
†	GI3XRQ	DW	61	8	342
21	G3XTL	NM	54	0	324
22	G3WSN	EX	55	4	308
23	G3WJS	EX	50	0	296
24	G3TWR	SY	50	4	288
25	G3TKX	YS	48	4	276
26	GM3VTB/A	DU	44	4	252
27	G3XRY	KT	42	1	249
28	G8RZ	CD	40	0	240
29	G3MSB/P	LN	41	2	237
30	G3FVW	YS	43	5	235
31	G3XRX	LD	41	4	232
32	G2XP	SY	42	7	229
33	G3UFW	WE	36	0	216
	GM4QK	LK	37	2	216
35	G3VLX	KT	36	3	201
36	G3VDF	NM	33	0	180
37	G3TPJ	EX	30	0	174
38	G3UNV	MX	26	1	151
39	G8QZ	DY	25	0	150
40	G3GOZ	MX	22	0	126

* Late entry

† Multi-operator stations.

The First 1·8 MHz Contest of 1969, held on 15–16 February, produced entries from 40 contestants and logs from two multi-operator stations. Conditions appear to have been good during the five hours of the contest with a high rate of scoring for the first three hours. Thereafter the rate slowed as operators had to hunt for those that had not been worked.

The Victor Desmond Trophy, subject to the approval of Council, has been won by M. Whitaker, G3IGW, with a score of 706 points from 130 contacts. The runner-up, 61 points behind, was the Southampton University Club Station, G3KMI, operated this year by D. W. Harris, G3XBX, while R. Smith, G3SVW, just managed to take third place from J. Christie, GM3FXM/A, with a total of 613 points.

The first three stations did not compete in the corresponding contest last year but G3KMI (operated by G3SQX) was the winner in 1967.

The Maitland Trophy, which goes to the Scottish contestant with the highest aggregate of points in this contest and the second 1·8 MHz Contest 1968, has been retained by J. Christie, GM3FXM/A, with a total of 1292 points. The only other Scottish contestant to submit an entry for both contests was **T.** Heslop, GM3KMR, who, with a total score of 1002 points, will receive a certificate of merit.

Once again it is difficult to describe the equipment used other than to say transmitters were usually home-brew (one entrant in the top 10 called his " Home-made rubbish "), receivers were usually commercial and all the leading contestants used half-wave aerials.

Comments were few and far between and the only real moan was the fact that the contest clashed with one organized by ARRL. This has been duly noted by the HF Contests Committee. In reply to the kind enquiries about the health of G3MSB/P, he appears to have survived as an entry was received from him.

As usual, the logs reached a very high standard and the job of checking them thereby made easier. However, there is still a certain amount of trouble with duplicate contacts when it is logged by only one station. Also the HF Contests Committee would hate to have to rely on some of the clocks used by contestants.

Looking through the logs of the leading competitors it was found that just over 190 G's were on the air together with seven overseas stations during the contest. It was also noted that one station was giving a serial number of over 170 at 01·55 hours but no entry was received from him. Perhaps he sent it to ARRL!

The Contests Committee acknowledge with thanks the check logs received from G3AAQ, G3UUP, G3XZU and OK1ATP.

Maitland Trophy

Posn	Call-sign	Score Second 1·8 MHz 1968	First 1·8 MHz 1969	Total
1	GM3FXM/A	681	611	1292
2	GM3KMR	540	462	1002
3	GM3UKG	627	—	627
4	GM3KHH	615	—	615

CLUB NEWS

Please send all information direct to Regional Representatives, giving full details of future meetings, and any snippets of activities which would be interesting in print. When listing meetings, please be sure to include the date and time, the meeting place, the lecturer's full name and the call-sign to whom prospective members can refer. The last day on which Regional Representatives can accept letters for inclusion is the first of the previous month.

Region 1 RR B. O'Brien, G2AMV.

Merseyside Luncheon Club—Meets on the first Monday in every month. HMS Landfall. 12.30 for 12.45 meal. If you wish to attend please advise G3VQT or G2AMV beforehand.

Ainsdale (ARC)—14 and 28 May, 4 June, 8 pm, " Morris Dancers " Scarisbrook.

Allerton (Liverpool) Scout Amateur Radio Society, North West Region. First and third Thursdays each month, 8 pm, Liverpool County Scout Headquarters, Richmond Street, Liverpool.

Blackburn—East Lancashire Amateur Radio Club—1 May (Quiz East Lancs. ARC v. Preston ARS), 5 June (Demonstration—Video Tape Recording by John Will, G3OTA), 7.30 pm Edinburgh House, Shearbank Road, Blackburn. Further details from G4JS.

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

Bury (B & RRS)—The Secretary is still having difficulty in getting commercial organizations to fix specific dates for their representatives to visit us, and as such the club has been unable to print this year's programme. However, one thing is certain and that is that the next meeting which takes place on 13 May will be the Annual " Nosh-Up " and this is expected to take the form of a potato pie evening. Last year's event proved to be very popular with entertainment being provided by G2BTO & XYL who showed a selection of cine films. Gerald has been approached to come along again this year but as yet is uncertain whether he will be able to make it or not. Members wishing to come to the dinner should make positive arrangements with the Secretary as the club cannot be expected to pay for absent friends yet again. Secretary A. Cooper, 411 Holcombe Road, Greenmount, Bury.

Cheshire (Mid Cheshire ARC)—Club nights every Wednesday 7 pm to 9.30 pm. Instruction nights every Thursday 7 pm to 9.00 pm. The latter includes theoretical work for the RAE exam, practical construction and morse practice. Further details from G3JWK. Technical Activities Centre, Winsford Verdin Grammar School, Winsford, Cheshire.

Chester (C & DARS)—Tuesdays, 8 pm, YMCA, 23 May Annual Dinner at the Oaklands Hotel.

Crewe & District—No meetings will be held for the time being as no accommodation is available. However, the Area Representative Mr R. Owen of 10 Circle Avenue, Willaston, Nantwich, will welcome visitors at his home.

Douglas (D & DARS)—2nd and 4th Wednesday each month, 7.00 pm, 19 Rosemount, Douglas. 7 May (Constructional Evening), 28 May (Radio Quiz). Please note change of sequence during May. Further information from W. T. McEvoy, 19 Rosemount, Douglas. Tel.: Douglas 6146.

Eccles (E & DRC)—Tuesdays 8 pm. Please note new address which is Bridgewater School, Worsley, Lancs. Every Thursday Club Top Band net 20.30 hours.

Leyland Hundred Amateur Radio Group—The Thursday night net at 20.00 hours GMT on 1·915 MHz.

Liverpool (L & DARS)—Tuesdays 8 pm, Conservative Association Rooms, Church Road, Wavertree. Last month the details of Secretary were given in error. The current holder of that office is H. James, G3MCN, 448 East Prescot Road, Knotty Ash, Liverpool 14.

Liverpool (NLRC)—9 and 23 May, 6 June, 8 pm. Lansbury House, 13 Crosby Road South, Liverpool 22. Secretary R. Simmons, G3PNS, 62 Daneville Road, Liverpool L4 2RG.

Liverpool (University of Liverpool Amateur Radio Society)—This group held a very successful Dinner at the Shaftesbury Hotel on Saturday, 15 March. The Regional Representative congratulated the organizers and thanked them for inviting him and his wife as guests. A very successful raffle followed the meal. Those present included G2AMV, G3's PSH, POI, WZN, VXK, WDD, XMG, SHK, MED, XBY, VZJ, WMS, WIO, SKT, TPF, WNP, G8's AVS, BBF, BBZ, CJY, and GW8CGN.

Macclesfield (M & DRS)—6 and 20 May, 3 June 8 pm. The George Hotel, Jordangate.

Manchester (M & DARS)—Wednesdays 7.30 pm, 203 Droylsden Road, Newton Heath, Manchester 10. Hon. Secretary, G. Tillson. G3TJX, 95 Kelverlow Street, Oldham, Lancs.

Manchester (SMRC)—Fridays 8 pm, Conservative Association Divisional Office, 449 Palatine Road, Northenden, Manchester 22.

North West VHF Group—Due to the move into new Headquarters being delayed by structural alterations members should keep in touch with the Club Secretary G3FNM, 141 Norris Road, Sale. Tel 061-973 1472.

Preston (PARS)—1, 15 and 29 May 7.30 pm, (Private room) "Windsor Castle" St Paul's Square.

St. Helens (SES)—Meetings temporarily discontinued. Local enthusiasts should keep in touch with B. Hardy, 198 Knowsley Road, St. Helens, Lancs.

Salford (Dial House Radio Society)—The club will still be buzzing with talk of the recent expedition to GM land in April well into this month and no doubt will have learnt many lessons from their trip. Constructional work is still high on the programme for this month and every Wednesday evening in May will see the bench littered with soldering irons and chassis galore. After a re-shuffle at the recent AGM the club secretary is now Bill Allen, SWL QTH, c/o 1st Floor, Dial House, Chapel St., Salford 3.

Southport (SRS)—Wednesday 8 pm and Sundays 2.30 pm. The Esplanade. Secretary S. Miller, 72 Station Road, Banks, Southport.

Southport (73 SSB Society)—Thursdays at 8 pm. (All commencing with a talk on part of RAE Syllabus), 73 Avondale Road North, Southport.

Stockport (SRS)—14 May " Components " by Mr Cunningham of Associated Semiconductors), 28 May (Mystery Evening, contact secretary for details). Note new venue at Brookfield Hotel, Wellington Road South, Stockport. *G3LSL.*

Warrington, Culcheth (CARC)—Fridays, 7.30 pm. Chat Moss Hotel, Glazebury. All visitors will be welcome. Secretary—K. Bulgess, 32 Hendon Street, Leigh.

Westmorland—AGM was held on Friday, 21 March when all club officers were returned. Meetings will continue to be held at our clubroom: 24 Park Road, Milnthorpe, at 7.30 pm each Friday. They are holding the first of a number of Field Days on Sunday 4 May, at the village of Burton in Kendal, 2m, 160m, 80m, and 20m stations will be operative from 11.00 am. Skeds welcome. Club Hon. Sec. is Norrie Stanley, G3UEC, 9 Castle View, Sedgwick, Kendal, Westmorland.

Wirral (WARS)—First and third Wednesdays each month, 8 pm, at former Civil Defence HQ Upton Road Bidston, Birkenhead. Visitors always welcome. 7 May (Radio Mathematics by Len Roberts, G3EGX), 11 May (Region 1, Field Day), 21 May (Frequency Synthesis by Dave Mercer G3YHQ). On 5 March Don Birch G3AOO gave a very interesting talk on SSB for Amateur Communication. On 19 March GW3DZJ came along to show us his famous helical whips which are commercially available under the name " G Whip." Some members have recently bought them and are very pleased with signal reports. Our morse class has now ended and we have four new licensees, G3YFZ Jim Shelley, G3YGL, Frank Smith, G3YHQ Dave Mercer, G3YHR Clive Briscoe. Public Relations Officer, G3WZD, 34 Glenmore Rd, Oxton, Birkenhead.

Region 1 Field Day—11 May, Details may be obtained by sending sae to the R.R. B O'Brien, 1 Waterpark Rd, Prenton, Birkenhead.

Region 2 RR K. Skethaway BRS20185.

Barnsley (B & DARC)—9 May ("The VVM in the Amateur Station" by H. Eyre, G5KM), 23 May (NFD Final Arrangements), 7.30 pm, King George Hotel, Peel Street, Barnsley. *G3LRP.*

Bradford (BRS)—6 May (" Life in Malawi " by Andrew M. Pomfret, 7Q7LZ). Andrew, 7Q7LZ was a member of Bradford Radio Society before going to Malawi and has maintained contact on 15 and 20m during his stay there, with Club members. We are very much looking forward to seeing him again, 7.30 pm, Bradford Technical College, Great Horton Road, Bradford 7. 20 May (Visit to Home Office Communications Division, Kippax).

The AGM in March resulted in a new Secretary, R. J. Cockerham, G3WTF. Our thanks to P. Dewhirst, G3VFR and good luck with the forthcoming " A " levels. *G3HJP.*

Fulford (FARS)—Meetings, 7.30 pm, Tuesdays, Social Hall, School Lane, Fulford, York. At the AGM the officers were, Chairman G3JME; Secretary, G5KC; Treasurer, G3YHA. The Club will be operating their station, G3XLH/A at the giant Scout Camp at Strenshall, near York, May 24/26. Mobiles welcome. *G5KC.*

Hull (H & DARS)—2 May (" Lasers "—discussion by G3WWD), 9 May (Forum conducted by G3LNH), 16 May (Inter-club Radio Quiz), 23 May (" Single sideband on Two " by G6NB), 30 May (" Receiving RTTY "—practical demonstration by Peter Hall), 7.15 pm, Unity Hall, 592 Hessle Road, Hull. *G3LNH.*

Middlesbrough (TARS)—First and third Fridays each month, 8 pm, Settlement House, 132 Newport Road, Middlesbrough. *G3JMO.*

Northern Heights—21 May (" Aerials " by A. Bailey, G3IBN), 4 June (" The GB2NI DX'pedition " by G3UBI and G3UGF), 7.45 pm. Sportsman Inn, Ogden, Near Halifax. *G3MDW.*

Scarborough (SARS)—7.30 pm, Thursdays, c/o RAF Association, Fulbeck House, 3 Westover Road, Scarborough.

South Shields (SS & DARC)—Meetings Fridays, 8 pm, Trinity House Social Centre, Laygate, South Shields. The constructional competition was judged on 14 March by G3PDM of Durham and the Glenwright Shield went, for the third year in succession, to G3SFL, and the second prize went to new member G3RB. On 18 April the Rutherford College Radio Society paid a visit to describe construction of and demonstrate HW100 transceiver. *G3SFL.*

Spen Valley (SVARS)—15 May (" Antenna Systems " by I. Lamb, G6LD), 22 May (Open Meeting), 7.30 pm, The Grammar School, Heckmondwike. 8 May (Visit to Yorkshire Television Studios). *G8BSC.*

Teeside—Second Saturday every month, Social Evening, 8 pm, The Crown Hotel, Yarm, Yorks. *G3JMO.*

Region 3 RR R. W. Fisher, G3PWJ.

Birmingham (MARS)—6 May Open Meeting (Hi-Fi Demonstration by Heathkit), 20 May (" BCI/TVI " by K. Lord, G3JID), 7.45 pm, Midland Institute, Margaret Street, Birmingham 3.

(South)—7 May (" Demonstration of KW Electronics TVI prevention Equipment), 8 pm, The Scout Hut, Pershore Road, Selly Park, B'ham 29.

Bromsgrove (B & DARC)—9 May (" Demonstration by Vero Board and G2CLN on 2m Converters "), 8 pm, Co-op Hall. At the AGM held 11 April the following were elected as Officers and Committee: J. Gwynne, G2CLN, Chairman; J. Dufrane, Secretary; J. Harvey, Treasurer; I. Elvins, G3WUG, B. Skan, R. Young.

Dudley (DARC)—6 May (Visit to see TV tubes being rebuilt) 20 May, 8 pm. Central Library, St. James's Road. *G3PWJ.*

Hereford (HARS)—2, 16, and possibly 30 May. The AGM held last month elected the following officers: Chairman, I. Astley; Secretary, S. Jesson; Treasurer, S. Powell, G3WRA; Committee, B. Edwards, G3RJB, W. Wells, G3HVX, I. Cooper, G3WTK, R. Beekar, G3WY and R. Lowe (Junior rep.). *G3RJB.*

Leamington Spa (MWARS)—5 May (Films including " Radio News of 1968), 12 May (" Pressurized Underground Cables " by Mr A. Czunyi), 19 May (Open Meeting), 26 May, Whit Monday, no meeting. 8 pm, 28 Hamilton Terrace, Leamington Spa.

Lichfield (LARS)—The First Monday and third Tuesday of each month. 8 pm, The Swan Hotel, Bird Street, Lichfield. *G3NAS.*

Redditch (EWARG)—8 May (" Talk and Tapes, Contest Operating, T. Cashmore, G3BMY ") 8 pm. Old People's Centre, Park Road, Redditch. *G3EVT.*

Shrewsbury (SARS)—8 May (Visit ITA Lichfield), 15 May (Club Activities), 22 May (Visit to Civil Defence, Police and Fire Service Stations Shrewsbury), 29 May (Club Station). 7.30 pm, Shrewsbury School Signals Hut. *G3WNI.*

Solihull (SARS)—20 May (Discussion on portable operation with a view to going into Oxfordshire during June or July to set up a station for one day). Meetings Third Tuesday each month, The Old Manor House, 126 High Street, Solihull. Visitors always welcome. *G3VXV.*

Stourbridge (STARS)—6 May (" VHF ?—Well, why not?—How to do it! " by Tom Douglas, G3BA), 8 pm, Longlands School. At the AGM held 4 March the following officers were elected: President, E. Brickstock, G3IVQ; V. President, R. MacIntosh, G3XKM; Secretary, B. Kennedy ; Treasurer, R. Wright ; Committee, D. Barlow, G3HGI, M. Clift, G3VDM and M. Palmer G8BOP.

Wolverhampton (WARS)—5 May (Annual Constructional Competition), 12 May (Natternite), 19 May (Committee Meeting), 26 May (Annual Dinner, and presentation of trophies, the Black Horse Hotel), 8 pm. Neachells Cottage, Stockell Road, Tettenhall. *G3UBX.*

Worcester (W & DARC)—Wednesday and Saturday, 7.45 pm. 35 Perdiswell Park, Droitwich Road, Worcester. *G3TQD.*

Region 4 RR T. Darn, G3FGY.

Burton upon Trent (B-O-T ARS)—Wednesdays, 7.30 pm, Club Rooms, Stepenhill Institute, Burton on Trent. *G3ACR.*

Derby (D & DARS)—7 May (Surplus Sale), 14 May (4m and the TVI Problem, lecture by Mike Gibbings, G3FDW), 17 May (Demonstration at Morley School), 18 May (Northern Mobile Rally), 21 May (2nd DF Practice Night), 28 May (Further Developments at Oaklands Observatory), 7.30 pm, Room 4, 119 Green Lane, Derby. *G2CVV.*

Derby (NHCAARG)—Fridays 7.30 pm, Club Room, Nunsfield House, Boulton Lane, Alvaston, Derby. *G3LCV.*

Grimsby (GARS)—Thursdays, 8 pm, North Lincs Photographic Society's Rooms, back of 50 Welholme Road, Grimsby. *G3RSD.*

Heanor (TSEDRS)—Tuesdays, 7.30 pm, The South East Derbyshire College of Further Education, Ilkeston Road, Heanor, Derbys. *G3LGX.*

Leicester (LRS)—Mondays, 7.30 pm, Sundays 10.30 am, Club Room Gilroes Estate Cottage, Groby Road, Leicester. *G3UQK.*

Loughborough (LARC)—Club Room, Old Bleach Yard, Wards End, Loughborough. *G3RAL.*

Lincoln (LSWC)—Tuesdays 7.30 pm, No. 2 Guardroom, Sobroan, Barracks, Breedon Drive, Lincoln. *G8BSS.*

Mansfield (MARS)—First Friday in each month, 7.45 pm, New Inn, Westgate, Mansfield. *G8HX.*

Newark (NSWC)—Mondays, Thursdays. 7.30 pm, Guildhall, Guildhall Street, Newark. *G3TWV.*

Nottingham (ARCN)—Tuesdays, Thursdays, 7.30 pm, Room No 3, Sherwood Community Centre, Mansfield Road, Sherwood, Nottingham. *G3SRX.*

Worksop (NNARS)—Tuesdays, Thursdays, 7.30 pm, Club Room, 13 Gateford Road, Worksop, Notts. *G8ON.*

Region 5 RR S. Granfield, G5BQ.

Bedford (BDARC)—8 May (Informal), 15 May (Radio Control by K6ALP), 22 May (36 years in Amateur Radio by G5LF), 29 May (NFD Planning), Clubroom, The Dolphin, The Broadway, Bedford. The club has its own meeting room off of licensed premises and thus any young radio enthusiasts are very welcome.

Bishops Stortford (BS & DARC)—19 May (Recently Reviewed Equipment by G3GGK and G3EDD, RSGB reviewers), 8 pm, British Legion Club, Windhill, Bishops Stortford. Visitors and friends are welcome. *G3RGA.*

Peterborough (PRES)—Lectures held in Electronics Dept of Peterborough Technical College on the first Friday in each month term time, commence 7.30 p.m. Otherwise meet at Club HQ and Shack in the Old Windmill behind the Peacock Inn, London Road, commence 8 pm. Sundays, at the riverside hideaway at Alwalton. *G3KPO.*

Shefford (S & DARS)—8 May (Some recent developments in industrial electronics by Dr Williams), 15 May (NFD Preparations), 22 May (Demonstration and night on the air with KW2000A), 29 May (DF Techniques by Ross Baldwin), 5 June (NFD Final Preparations), Morse Class 7.45 pm, club Thursdays 8 pm, Church Hall, High St. *G3WKR.*

Region 6 RR L. W. Lewis, G8ML.

Cheltenham (RSGB Group)—First Thursday, 8 pm, Great Western Hotel, Clarence Street, Cheltenham.

Gloucester (GRC)—Second and Fourth Thursdays, 7.30 pm, Lamb Inn, Market Parade, Gloucester.

Region 7 RR P. A. Thorogood, G4KD

Acton, Brentford & Chiswick (ABCRC)—20 May (1969 NFD Discussion) 7.30 pm, Chiswick Trades and Social Club, 66 High Road, Chiswick.
Addiscombe (AARC)—Second and fourth Tuesdays, 7.30 pm, 158 Lower Addiscombe Road (Toc H Hall).
Ashford, Echelford (ARS)—29 May (Returning to Amateur Radio), 7.30 pm. The last lecture and demonstration on Hi-Fi by N. Smilie of RCA was enjoyed by all 41 RSGB members and guests of club. St Martins Court, Kingston Crescent, Ashford, Middlesex.
Barking (B & DREC)—Tuesdays and Thursdays, 7.30 pm, Gascoigne Recreation Centre, Gascoigne School, Morley Road, Barking.
Bexleyheath (NKRS)—8 May (AGM), 22 May (NFD Arrangements). At the last meeting 28 RSGB members and 4 non-members were present to hear Cliff Leal, G3ISX, talk about antennas for the amateur. 7.30 pm, Congregational Church Hall, Chapel Road, Bexleyheath.
Chingford (RSGB Group)—Fridays. Tel 01-524 0308.
Chingford (SRC)—Fridays, 8 pm, Friday Hill House, Simmons Lane, Chingford, E4.
Civil Service (CSRS)—27 May (Setting up club rig and dummy run), 28 May (Amateur Radio station in operation. Friday net for country members continues from exhibition station opening 28 May at New Pavilion, Chiswick by HRH Duchess of Gloucester. Civil Service Recreation Centre Monck Street, Westminster.
Croydon (SRCC)—Third Tuesday in month (Club construction contest), Swan and Sugarloaf, South Croydon.
Crystal Palace (CP & DRC)—17 May (Colour TV by Graham Roe, G3NGS). At the last meeting 17 RSGB members and 12 non-members heard a discussion on RAEN by G3IIR, G3FZL, G3BPT and others. G3XCB and G3OOU gave a talk on frequency synthesizers. Emmanuel Church Hall, Barry Road, SE22.
Dorking (DR & DRS)—13 May (Informal), 8 pm, Wheatsheaf, 27 May (Junk Sale), 8 pm, Surrey Yeoman, non-members welcome. On 25 March a film show by Ralph Cathles, RSGB Film Library Curator, G3NDF, drew 20 RSGB members and 5 ladies. Star and Garter, Dorking.
Ealing (E & DRS)—Tuesdays, 7.30 pm. Northfields Community Centre, Northcroft Road, W13.
East London—Wanstead House, The Green, E11.
Edgware & Hendon (E & DRS)—10 May (Demonstration Station to Scouts at Camrose Ave, NFD try-out), 12 May (Constructors Contest, all entries welcome), 26 May (No meeting, holiday), St Georges School, Flower Lane, Mill Hill, NW7.
Gravesend (GRS)—Mondays, 8 pm. Last meeting was a discussion on the club building project by G3NZR on club receiver with band spread on 80 metres only with crystal converters for the h.f bands. Community Centre, Cedar Ave, Kings Farm Estate.
Guildford (G & DRS)—6 May (144 MHz portable at Surrey University), 23 May (Stoke Park).
Hampton Court (TVARTS)—First Wednesday, 7.30 pm. 17 May (Speaker Ron Vaughan, G3FRV). A full house for the first meeting at the new venue was very encouraging. G4KD gave a talk on RSGB organization and Regional matters. Three Pigeons Public House, Portsmouth Rd. Surbiton.
Harlow (DRS)—Every Tuesday (Senior), Fridays (Junior), 7.30 pm. Last meeting G3VTR, Tony Davis, gave a lecture on the amateur use of the oscilloscope. Mark Hall Barn, First Avenue.
Harrow (RSH)—16 May (Construction Contest and home constructed equipment show), 8 pm. Roxeth Manor School, Eastcote Lane, Harrow.
Havering (H & DARC)—5, 19 May, 8 pm, British Legion.
Hemel Hempstead (HH & DARS)—First and third Friday in month 8 pm, Rucklers Lane Hall, Kings Langley.
Holloway (GRS)—Mondays (RAE), 7 pm, Wednesdays (Morse), 7.30 pm, Fridays (Club), 7.30 pm, Monten School, Hornsey Road.
Ilford—Thursdays, 8 pm, 50 Mortlake Road (off Ilford Lane), Ilford.
Kingston (K & DARS)—Second Wednesday, 8 pm, Penguin Lounge, 37 Brighton Road, Surbition.
Leyton & Walthamstow—Tuesdays, 7.30 pm, Leyton Senior Institute, Essex Road, E10.
London (UHF Group)—First Thursday, (new RSGB VHF Handbook Discussion), 7.30 pm, Whitehall Hotel, Bloomsbury Square, Holborn, WC1.
Loughton—Fridays, 9, 23, May, fortnightly, Loughton Hall (near Debden Station).
Maidenhead (N & DARC)—First Tuesday, 7.30 pm, Victoria Hall, Cox Green, Maidenhead.
New Cross (CARS)—Second and fourth Fridays, 225 New Cross Road, SE14.
Paddington (P & DARS)—Thursdays, 7.30 pm. Beauchamp Lodge, 2 Warwick Crescent, W2.
Purley (P & DRS)—First and third Fridays, 8 pm. Railwaymen's Hall, Side Entrance, 58 Whytecliffe Road, Purley.
Reigate (RATS)—First Wednesday, 7.45 pm, 21 May (Informal Meeting), George and Dragon, Cromwell Road, Redhill.
Romford (R & DRS)—Tuesdays, 8.15 pm, RAFTA House, 18 Carlton Road.
Scouts (ARS)—15 May 7.30 pm, Baden Powell House, Queensgate, South Kensington, SW7.
Sidcup (CVRS)—15 May (Natter Night), 1 June (Some Aspects of Transistors by Mr C. Jones). At last meeting 38 heard Peter Blair, G3LTF's Moonbounce Lecture and slides. Congregational Church Hall, Court Road, SE9.
Southgate (SRC)—second Thursdays, 8 pm, Civil Defence huts, Bowes Rd, N11. Alexander Tower School, Bounds Green Road, N22 (near Bounds Green station).
St Albans (Verulam ARC)—7 May (Satellite FAX talk and demonstration of Weather Picture by J. Portune, G5AJH), 21 May, (Film Show and NFD Briefing), 7.30 pm. Cavalier Hall, Watford Road, St Albans.
Sutton and Cheam (SCRS)—The Harrow Inn, High St, Cheam.
Welwyn (Mid Herts ARS)—8 May (Lecture by Veroboard Representative), 17 May (Exhibition of Club exhibits of home-made gear), 18 May (DF Hunt, on foot, at Codicote, Welwyn. Welwyn Civic Centre, Welwyn.
Wimbledon (W & DRS)—St. John Hall, 124 Kensington Road, South Wimbledon, SW19.
Wembley (GECARS)—Thursdays, 7 pm. Sports Club, St. Augustin Avenue, North Wembley. This club is open to non GEC employees by invitation. Telephone ARN 1262 for details.

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

Canterbury (EKRS)—Details of future meetings from Hon. Sec. D. N. T. Williams G3MDO. QTHR.
Crawley (CARC)—28 May (" Ancient Radio by an Ancient Amateur " by Len Newnham, G6NZ), 8 pm, Trinity Congregational Church, Ifield, Crawley. Tickets for annual dinner on 9 May from Hon. Sec. or G3FRV.
Eastbourne (SARS)—5 May (" Receiver alignment " by G. Ellis G3LFS and/or A. Whitford, G3MME). Meetings held at Victoria Hotel, Latimer Road, Eastbourne.
Maidstone (M.YMCA.ARS)—30 May to 6 June (GB3YMC/A) on the air at " Y " centre open week, 125 anniversary, talk in on 160 and 2 metres AM/CW/SSB), 1 June (Mobile Rally). Meetings held Tuesday and Friday at 8 pm, " Y " Sports Centre, Melrose Close, Loose, Maidstone.
Mid-Sussex (Mid-SARS)—8 May (Informal), 22 May (Judging of Constructional Contest). Meetings held at Marie Place Further Educational Centre, Leylands Road, Burgess Hill. Mobile evening on 19 June, all neighbouring clubs and visitors very welcome.
Thanet (TRS)—2 May (RAE Open Session). 9 May (Visit to Wye College VHF Meeting). 16 May (Discussion on Mobile Rally). 18 May (Mobile Rally at King George V Memorial Park Ramsgate), 25 May (Talks by Members). 30 May (Bring and Buy Sale). Hilderstone House, Broadstairs.
Worthing (W & DARC)—Meetings held every Tuesday at Rose Wilmot Youth Centre, Littlehampton Road, Worthing 8 pm.

Region 9 RR J. Thorne, G3PQE

Bristol (BARS)—Every Monday and Thursday, 7.30 pm, Club HQ (G3TAD), University Settlement, 41 Ducie Road, Barton Hill, Bristol 5. 9 May (" Amateur Radio on the High Seas " by G3SWH). 15 May (" Transmitter Design and TVI " by G3BTM). *G3WLZ.*
(RSGB Group)—19 May (" The GPO and the Radio Amateur" by Mr J. Wallis GPO) 7.30 pm. Becket Hall, St Thomas Street, near Bristol Bridge, 1. Bring along that piece of unwanted gear and leave with that component that you have been searching for, but do come early if you want a good comfortable seat as each month the attendance is rising. *G3ULJ.*
Burnham-on-Sea (BOS ARS)—Meet second Tuesday in each month at the Crown Hotel, Burnham on Sea. Somerset. *G3GIW.*
Cornish (CRAC)—1 May (" The Post Office Radio Service "), South Western Electricity Board Social Centre, Pool, Camborne. *G3NKE.*
(VHF Group)—Third Thursday in each month, 7.30 pm, The Peoples Palace, Pyder Street, Truro. *G3XC.*
(Falmouth Group)—Meet fortnightly on Tuesdays, Laburnham Drive Mission Hall, *G3OJN.*

Newquay Group—Meet fortnightly on Wednesdays, Treviglas School. *G3THT*.
Exeter (EARS)—First Tuesday in each month. *For May only*, the venue is changed, listen to the Sunday previous for the venue to be announced over the RSGB Broadcast. *G3HMY*.
Plymouth (PRC)—First and third Tuesday in each month, 7.30 pm, Virginia House, Bretonside Plymouth. *G3SCW*.
Saltash (S & DARC)—Alternate Fridays, Burraton Toc H Hall, Warraton Road, Saltash. *G3UBY*.
South Dorset (SD ARS)—First Friday in each month, 7.30 pm, Labour Rooms, West Walk, Dorchester. *G3BKV*.
Taunton (TARS)—Every Friday, 7.30 pm, SEVO HQ, Taunton Barracks, The Mount. On the left as one enters barracks. RAE classes here also on Thursdays, Morse and Theory. *G3DTB*.
Torquay (TARS)—Every Tuesday and Friday Club nights. Last Saturday, business meeting. 7.30 pm, Club HQ, (G3NJA), Rear of 94 Belgrave Road, Torquay, entrance in Bath Lane. On 29 March, 25 members enjoyed the screening of the RSGB 1968 Newscast Film which dealt with several aspects of Amateur Radio,and showed the achievements obtained by several members in specialized fields in that year. Also shown were two Mullard Films on the manufacture of Radio Valves. Sincere good wishes are sent for the speedy recovery in Torbay Hospital of F. Bolton. *G3VTQ*.
Wells (WARS)—Mondays, EMIE Social Club, Chamberlain Street, Wells. *G3MQQ*.
Weston-super-Mare (WSMARS)—First Friday in each month, 2 May, 7.30 pm, Westhaven School, Ellesmere Road, Uphill, Weston Super-Mare. *G3GNS*.
Yeovil (YARS)—Wednesdays, 7.30 pm, Park Lodge, The Park, Yeovil. *G3NOF*.

Region 10 RR C. H. Parsons, GW8NP.

Blackwood (ARC)—Fridays, 7.30 pm, Blanche Cottage, off High Street, Blackwood, Mon. *G6BK*.
Barry College of Further Education (ARS)—Thursdays, 7 pm, College of Further Education, Colcot Road, Barry, Glam.
Cardiff (RSGB) Group—12 May, 7.30 pm, TA Centre, Park Street, Cardiff. *GW3GHC*.
Mobile Picnic Rally, 18 May, 11 am, Porthkerry Park, Nr. Barry, Glam. See separate notice.
Port Talbot (ARC)—Meetings held at Trevelin Club & Institute, Port Talbot. For further details, write Secretary. *GW3RVG*.
Pontypool (ARC)—Tuesdays, 7 pm, Educational Settlement, Rockhill Road, Pontypool, Mon. *GW3JBH*.
Pembroke (ARC)—Last Friday in each month 7.30 pm, at the Defensible Barracks, Pembroke Dock. *GW3LXI*.
Rhondda (ARS)—Meetings held at Pengelli Hotel, Treochy, Rhondda, Glam. Details of future activities from Secretary. *GW3PHH*.
The annual Social will be held on Monday, 2 June, at the RAFA Club, Treorchy. An open invitation is extended, but numbers must be notified to GW3PHH well in advance.
The Society will have an exhibition statior GW3YBN/A at the Ynys Angharad Park, Pontypridd, Glam, on Saturday, 21 June, when the Chief Scout will be attending a large gathering of Welsh Scouts.
University College, Cardiff (ARS)—This Society has its own accommodation and equipment, and details are available from the Secretary, G3XSQ, c/o Student's Union, Dumfries Place, Cardiff.

Region 11 RR M. Williams, GW3LCQ.

Llandudno (CVARC)—15 May (" Communications at Sea " by Principal or assistant of Wireless College, Colwyn Bay) 7.40 pm, Parade Hotel, Llandudno. All clubs are cordially invited.
Rhyl (R & DARC)—At the last meeting a very interesting talk was given by R. M. Travers of the Veroboard Company on the uses of Veroboard in Amateur Radio and communications. At the Glwyndor Institute in Rhyl three members have passed their morse and are ready to become fully licensed amateurs.

Region 12 RR A. W. Smith, GM3AEL.

Aberdeen (AARS)—Fridays, 7.45 pm, 6 Blenheim Lane, Aberdeen. *GM3HGA*.
Lhanbryde (MFARS)—Mondays, 7.30 pm, St. Andrews School, Lhanbryde, By Elgin. *GM3UKG*.

Region 13 RR I. Sheffield, GM3VEI.

Edinburgh (Lothians RS)—8 May (Demonstration of Amateur TV by J. C. German, GM3VBB, GM6ADU/T) 22 May (Construction Competition and NFD briefing), 7.30 pm, YMCA, St Andrew Street, Edinburgh. *GM3VBB*.

Region 14 RR N. G. Cox, GM3MUY.

Ayrshire (AARG)—11, 25 May, 7.30 pm, ATC Hq, Kilmarnock.
Glasgow University (GURC)—9 May, 7.30 pm, (G. A. Hunter, GM6ARD/T Amateur TV) Venue, refer C. Weston, GM3VAP, 46 Manchester Drive, Glasgow W2.
Greenock (G & DARR)—2, 9, 16, 23, 30 May. 7.30 pm, Watt Library Union Street, Greenock. *GM3UWX*. Note new venue.
Mid-Lanark RSGB Group—16 May, 7.30 pm. YMCA Brandon Street, Motherwell.

Ragion 15 RR J. Thompson, GI3ILV.

Ballymena (BRC)—Tuesdays, 8 pm, morse and theory classes in progress, Club Rooms, 46A Bridge St, Ballymena. *GI3XDX*.
Belfast (B & D RSGB Group)—Wednesdays, War Memorial Building, Waring St, Belfast. *GI2DZG*.

Region 16 RR W. J. Green, G3FBA.

Great Yarmouth (GYRC)—Fridays, 7.30 pm, 98 South Market Rd, Gt. Yarmouth.
Norwich (NARC)—5 May (Film Show), 12 May (Informal Meeting), 19 May (Antennas; Discussion), 26 May (No meeting, Whitsun), 2 June (" The Good Old Days," Talk by G2UX, George Edwards, and G2IG, Reg. Hammans). All meetings at 7.30 pm, The Clubroom, Brickmakers Arms, Sprowston Road, Norwich. *G3PTB*.
Southend (SDRS)—2 May (National Field Day), by G3TNP. 16 May (Outside visit to Southend Pier Radar Installation). All meetings 8 pm, Staff Canteen, Ekco Electronics Ltd. *G8BSB*.

Region 17 RR C. Sharpe, G2HIF.

Basingstoke (BARC)—First and third Saturday in each month 7.30 pm. Clubroom, Chineham House, Popley, Basingstoke, Hants. *G8CIY*.
Chippenham (C & DARC)—6 May, (" Fault Finding " by G. W Spray, G3FXA), 13 May, (DF Hunt No 2), 20 May (Social evening with the Bristol ARC at the Queens Head Hotel, Box. YLs and XYLs invited. Other local amateurs with no club connections are also welcome), 27 May (" Vintage Receivers " by G8CFB), 7.30 pm, Clubroom, Chippenham High School for Boys, Hardenhuish Lane, Chippenham. *G3PQG*.
North Berks (AERE Harwell ARC)—Third Tuesday in each month 7.30 pm, Social Club, AERE, Harwell. *G2HIF*.
RAE and Morse classes each Wednesday, 7.30 pm, Post Graduate Education Centre, AERE, Harwell. *G3NNG*.
Salisbury (S & DSWC)—Tuesdays, 8 pm, Sawmills, Pembroke Park, Wilton, Salisbury, Wilts. Visitors and new members welcome. Secretary, D. E. C. Lockyer, G3HCL, 11 Merrifield Rd, Ford, Salisbury.
Swindon (S & DARC)—Alternate Wednesdays, 7.30 pm, Penhill Junior School, Swindon. *G3JAP*.

RSGB Film Library

Film No 11. **Radio News of 1968.** 16mm sound, 29 minutes. Hire: 25s. per day; additional days at half-rate.
" *We enjoyed the film immensely. Congratulations on a fine production.*" Lothians Radio Society.
" *FB Film. Many thanks.*" Fareham & District Radio Society. " Radio News of 1968 " is available to all Members, Affiliated Societies and Groups. Circulars have been sent to all Societies. Further copies of Film Library circulars can be obtained from the Librarian—sae please. (G3NDF)

LOOKING AHEAD

5-10 May—IARU Region 1, Conference, Brussels.
21 May—Summer Radio Amateurs' Examination (See page 236, April).
13-14 September—IARC Convention, Geneva.
1-4 October—RSGB International Radio Engineering and Communications Exhibition, Royal Horticultural Society's New Hall, Greycoat Street, Westminster, SW1. 10 am to 9 pm.

CONTESTS

18 May—Grimsby D/F Qualifying Event.
24-25 May—First 432 MHz (Open Contest).*
25 May—First 1296 MHz Contest.*
7-8 June—National Field Day (February, page 131).
22 June—Third 70 MHz (Portable) Contest.
29 June—Oxford D/F Qualifying Event
5-6 July—Summer 1·8 MHz Contest.
5-6 July—Fifth 144 MHz (Open) Contest.*
12-13 July—High Power Field Day (March, page 203).
20 July—Second 432 MHz (Portable) Contest.
20 July—Salisbury D/F Qualifying Event.
3 August—High Wycombe D/F Qualifying Event.
4 August—Sixth 144 MHz (SSB) Contest.
10 August—Third 432 MHz (Open Contest).
17 August—Fourth 70 MHz (CW) Contest).
6-7 September—VHF National Field Day.*
14 September—3·5 MHz Field Day.
21 September—Rugby D/F National Final.
21 September—Seventh 144 MHz (CW) Contest.
5 October—Second 1296 MHz (Open) Contest.
11-12 October—28 MHz Telephony Contest.
25-26 October—7 MHz Contest (CW).
3 November—Eighth 144 MHz (SSB) Contest.
8-9 November—7 MHz Contest (Phone).
15-16 November—Second 1·8 MHz Contest.
6-7 December—Tops CW Club 80m Contest.
7 December—Fifth 70 MHz (CW) Contest.

* To coincide with IARU Region 1 Contests

MOBILE RALLIES

11 May—Scunthorpe ARS Mobile Rally, Grange Farm Hobbies Centre, Franklin Crescent. Open at 11 am. Talk-in on 160m.
18 May—Northern Mobile Rally, Moor Grange, County School, Parkstone Avenue, Leeds 16.
1 June—ARMS Rally at the home of the Shuttleworth Aircraft Museum, Old Warden Aerodrome, Biggleswade, Beds.
1 June—Maidstone YMCA ARS Rally.
29 June—Longleat Mobile Rally, Longleat Park, Warminster, Wilts. Organized by the Bristol RSGB Group, assisted by the Bristol ARC.
6 July—South Shields Mobile Rally.
13 July—Worcester Mobile Rally.
27 July—Cornish Radio Amateur Club. Provisional location, Truro. The County Scout Headquarters, Malpas, Truro.
27 July—The White Rose Mobile Rally, Allerton High School, Leeds.
10 August—RSGB National Mobile Rally, Woburn Abbey.
17 August—Derby and District Mobile Rally.
24 August—Torbay ARS Mobile Rally.
24 August—ARMS/RSARS Rally, Blandford Camp, Dorset ARMS/RSARS members only.
24 August—Swindon Mobile Rally organized by the Swindon and District ARS.
31 August—Bromsgrove and District ARC Mobile picnic. Call G3VGG.
31 August—Preston ARS, Kimberley Barracks, Deepdale Road, Preston.
29 September—Harlow Mobile Rally, Magdalen Laver Village Hall, near Harlow, east of the A11. Open from 10 am. Talk-in station on 160m, 4m and 2m. Details from R. A. Sinclair, G3VAD, 244 Stanstead Road, Hoddesdon, Herts. Tel: Hoddesdon 66806.

MEMBERS' ADS

These advertisements are free to members and limited to 32 words, discounting the name, address and telephone number. Ads must be typed or printed on the form, or on a post card similarly laid out. They should be accompanied by a recent Radio Communication wrapper. No trade advertisements can be accepted in this section, although these and others requiring immediate inclusion should be sent to our classified advertisements department.

Entry period for June	..	5 May	to 12 May	Entry period for August	.. 9 July	to 15 July
Entry period for July	..	4 June	to 10 June	Entry period for Sept.	.. 5 Aug.	to 11 Aug.

Advance transistor tester, new, exch for gd 2m rx or 2m mobile gear. Anything considered or sell £20. Also for disposal Gestetner electric or hand duplicator. Details on request. M. Kirk, G8BPA, QTHR.

Courier CTR-1 tcvr, 1·8-30 MHz, all extras, CPS-1 ac psu, spkr, £130, ono. Dr S. Lazarus, G3TUA, QTHR. Tel 01-550 0012.

Long-bow, ideal for getting aerials up high, 63 in, 30 lb pull, excellent, £3 10s. L. Margolis, G3UML, QTHR. Tel 01-550 0882.

Rye Ranger transistor psu, comp with circuit, suit 2m, not wkg, £8. J. Bennet, 17 Downs View, Bradford-on-Avon, Wilts.

CR300 15 kHz-26 MHz, £4 15s. CR150 1, 9 MHz-60 MHz with pu, £19 10s. Pye car radio, 1 w, mw and 3 sw bands, sep spkr, £9 10s, all plus carriage. D. Byrne, G3KPO, Jersey House, Eye, Peterborough. Tel Eye 351.

HW32A 20m SSB tcvr with mic, psu's, spkr. Exc cnd, £65. J. Carter, G3PHR. Tel 01-647 1969.

Automatic electronic keying paddle, mint cnd, £4 10s. E. Dedman, G2NH, QTHR. Tel 01-942 7246.

Short sighted amateur wishes to exchange new Trio 9R59DE rx for one with larger dial. 840C or consider AR88. W. Morris, 34 Birch Ave, Romiley, Ches. Tel 061-430 3858.

Canadian 52 set, 1·75-16 MHz, int psu, circuit, wkg but needs attention, £7, pp in Britain. A. Haines, 2 Hampton Dene Road, Topsley, Hereford. Tel HR 3964.

Heathkit GR54 rx, gen cov with xtal filter, switchable ssb, s mtr, anl, bandspread tuning, incl morse osc, intl spkr, prod det, mint with manual, would swap for cine camera or sell. Worthington, G3COI, Foxhills, Orton Lane, Penn, Wolverhampton. Tel Wombourn 2288.

DX40 VF1U, £25 ono, will deliver 50 miles or buyer can collect after dem. Grimshaw, G3TQX, 9 Canberra Cres, Manby Louth, Lincs.

AR88D, Class D Wavemeter, reasonable. E. Moloney, 132 Upper Essex St, Liverpool 8.

Member's widow must sell £25 debenture stock in Lambda Investment Co Ltd. Offers to Banks, Kendall, Taylor and Gorst Solicitors, 26 North John St, Liverpool 2.

Eddystone 770R, 888 and 880. All gd cnd. Hallicrafters HT37 100W am/cw/ssb as new. Tel Axminster 3163.

Self-contained 160m tx, nice prof case. Deliver reasonable distance London. Wanted trap vertical or beam hf bands. D. Pike, G3WDY, 27 Cintra Park, Crystal Palace, London, SE19. Tel 01-653 4738.

Bulletin 1958/68, *SWM* 1958/68. Offers. Require gdo and audio gen. F. Parsons, G3MIX QTHR. Tel Maidenhead 26723.

AR88D, £45, deliver 50 miles. Set 5 panel mounting meters, two each 0-10 mA, 0-200 mA, one 0-10 Vac, £2 10s. Many other items, psu's, valves, units, send for list. J. Drudge-Coates, G2DC, Moresden, Forest Lane, Hightown Hill, Ringwood, Hants. Tel Ringwood 3962.

KW Viceroy mk III, vgc, £85 ono. D. Platt, G3JNJ, 22 Charlcroft Gdns, Ponders End, Mddx.

Converter xtal controlled 10, 15, 20m, i.f. 6-7 MHz, exc cnd, £2. Grundig EN3 pocket tape rcdr with accessories, new, £25 ono. Numerous octal based valves. S. Gaunt, G3PXJ, 43 Appian Close, Kings Heath, Birmingham 14. Tel 021-444 4312.

BC453/Q5er 6·3V lt, £2 5s. BC455 12V lt, £1 15s. HRO 455 kHz xtal filter unit, 15/-. FL8A type filter, 13/6. Four Q5er 85 kHz i.f. trans, £1. KW Geloso converter also 4·6 KHz xtal filter unit, £13. All carriage paid. A. Taylor, G3JMO, 8 Heythrop Drive, Middlesborough.

KW Viceroy mk IIIa tx, extra half lattice filter, 6146B's in final, KW77 rx plus Dow Key coaxial antenna changeover relay and all interconnecting cables, complete station in exc wkg order, £160. P. de la Mothe, G3VIE, 35 Brookside, Wokingham, Berks. Tel West Forest 4048.

Blue Streak Launching Equipment. Enquiries invited for purchase of components, ie servo controls, ctr, indicators, transformers, power packs, valves, etc. E. Ward, G8AFT, Warren Cottage, Westergate, nr Chichester, Sussex. Tel Eastergate 2318.

Tape rcrd variable speed reflectograph, wkg order, nice fitted console less spkr, £7. Canadian WS 58 with vibrator pack new cnd, £4. Ektachrone 16mm outdated 600 ft, £5. Wanted 2m converter. D. Wilson, G8APS, 177 Dower Rd, Four Oaks, Sutton Coldfield. Tel 021-308 3044.

Two new 6146's, £3 the pair including post. J. Phillipson, G8BNJ QTHR.

DA41 (1), TZ40 (1), 15/- each. 5R4 2/6, 813 25/- each. 6L6M, 6V6M, 4/- each. 5/10 amplifier for callers at £3 10s. Post extra non-callers. Stead, 2 Cliff Road Gardens, Leeds LS6 2EY.

Joystick £3 5s. G4ZU 3 band aerial match £3. Woden UM2 35/-. Linguaphone German course (cost £17), perfect records used once with books £5 10s. R. Costford, 22 Haldane Place, East Kilbride, nr Glasgow. Phone after 6 pm East Kilbride 22663.

Cossor 1039 scope slight faults, £15. TA12B tx part modified, 30/-. TA12B psu parts, £1. Wanted commercial 2m equipment in gd cnd and 160m equipment. J. Thompson, G3WQM, White House, Tollerton, York.

Codar PR3OX preselector and psu never used, need money for other gear. £6 ono. I. Thornburn, 18 Aline Court, Glenrothes, Fife, Scotland.

HRO 5T mind cnd 9 coils psu, s meter, £28. Aviator II rx, new, cost £53 asking £35. Type 53 tx, £12. Consider exchanges 2m gear base or mobile. Also require 160-10m tx, xtal HC6U 12,358·3 kHz, 12,367·3 kHz. Ray Hill, 19 High St, Ross-on-Wye, Herefordshire. Tel Ross 3723.

G6JP BAY96 70cm tripler, £5. K6AXN 23cm converter plus 2C39A tripler, £8 pair. 50 yd aerialite 500, 50/-. Silver plated 2m anode lines for 6-40, 30/-. Collection or post extra. P. Walters, G3THW, 112 Windsor Ave, Penn, Wolverhampton. Tel W'ton 36497.

HRO b/s coils, 2 14-14·35 MHz inc post 50/- each. R1147B vhf rx inc acorn valves, pp 30/-. M. Darkin, G3KTH, 4 Ash Drive, Catshill, Bromsgrove, Worcs. Tel Bromsgrove 5554.

Oscillator 145 mo/xl 2-7·5 kHz with power pack 392, suitable technical college, offers. Many years Bulls, PW, SW, etc. Wanted dc 1500 Voltmeter not electrostatic. Clark, G6BJ QTHR.

80 xtals assorted, £4 all types. PA valves 3/10, 3/20, 6/40, 4/65A, 4X150, etc. Transformers, etc. Labgear Topbander 160/80 ps mod. Exchange Aquaria or radio control gear. J. Brown, G3LPB, Marlborough Farm, Falmouth, Cornwall.

Complete station Tiger 200 tx mint, Trio 9R59 rx new. Offers. T. Edwards, 29A Aughton Rd, Southport. Tel Southport 68064.

Cossor double beam scope model 1035 believed mk II in gd cnd, with some spares, £20. Buyer collects but could deliver 20 miles. A. Whatman, G2BQ, QTHR. Tel Hoghton 426.

KW2000 G line cabinets complete with ac, dc psu's, £150 or exch SB400, SB401 tx. G. Green, G3JNX, 54 Langley Ave, Brixham. Tel Brixham 3142.

Valves 2C40 (1), 813 (2), 6146 (2), TT21 (1), £1 each. ECC81 (10), ECC82 (3), ECC83 (4) ECC85 (4), E88CC (3), 6BR7 (2) EC91 (3), ECL80 (4), 2/- each or 6 for 10/-. QQVO3-10 (4), 7/6 each. UM2 mod tran, 35/-. Pp 1/- per order. R. Abraham, G8ATF, Kenlygreen, Moot Lane, Downton, Wilts.

R209 6V with spares, headset, handbook, £9 and army field telephones, 30/- each. A. Humphriss, 14 Fosseway Cres, Tredlington, nr Sipston-on-Stour, Warks. Tel Hanley-in-Arden 3305 (week daytime).

Vanguard tx 160-10m, £35. Wanted 2m table top tx. D. Pickering, GW8CGH, 25 Penybont Rd, Pencoed, Glam. Tel Pencoed 444.

New 931A, 30/- used. VCR97, 15/-. 35T, 7/6. Many B9G MO acorn valves any offers? Goodmans Axiom 110, £3 10s. Barker Duode, £5. B & O Stereodyne Arm, new stylus, £6 pp. L. Moxon, 1 Stoner Hill House, Froxfield, Petersfield, Hants. Tel Petersfield 3981.

AVO Multiminor dc current and voltage ranges perfect, ac ranges need repair, 50/- plus post. Wanted Woden UM2 or UM3 state price. H. Nicholls G8AQZ, 1 Alford Rd, Bristol BS4 3HS. Tel Bristol 77348.

SB300 exc cnd £90 ono. L. Barlow, G3JMR, 15 Kinnerley St, Walsall, Staffs.

TCS rx, 6V valves, prod det, etc, £5 or best offer. W. Hartog, G3JEJ, Cotton, Top Rd, Cawthorpe, Louth, Lincs. Tel Louth 2887.

R1155L (160m) complete with psu and o/p stage, ls, df meter and official handbook, gd cnd, unmodified, £15. Could deliver reasonable distance or buyer arrange carriage. Bowling, 103 Winkworth Rd, Banstead, Surrey. Tel Burgh Heath 50107.

Ferrograph 5A/N, W/Dale W12CS, Jason Tuner, defluxer, cardioid mic and trans, three new 1200 ft tapes £65 sae details. H. Shields, G3GB QTHR. Tel 061-681 4567.

KW Vanguard 80-10m, works built, exc cnd, circuit, manual and spare valves. £25 plus carriage. Roy McKinty, GI3GTR, 3 Rhanbury Park, Craigavad, Hollywood, Co Down. Tel Hollywood 3890.

Shure M3-D/M, £5. Heathkit HM11U, £4. Pye Ranger partly stripped, £2. Prefer buyer call and insp. S. Gall, G3UCM, QTHR. Tel 71-55342. Bush Radio, mw, sw, full coverage to 30 MHz, bs, rf stage, no bfo, simple to fit, beautiful walnut cabinet, 10 W hi-fi audio output, ideal swl/overseas travellers. Handbook, exc cnd, £15. G3LCS QTHR.

HRO5R vgc, blue hammer finish, 7 gc coils with psu, £20. S. Sherrat, 26 Blenheim Ave, Stony Stratford, Bucks. Tel Stony Stratford 3308. 48 copies *QST*, January 1946 to Dec 1949, 25/- plus carriage. G5LY, 53 Riders Bolt, Bexhill-on-Sea, Sussex. Tel Cooden 3758.

Ferrograph tape rcdr 4AN, £56 ono, will deliver up to 50 miles. B. Parsons, 46 Beaumont Rise, Hill Park Gardens, Fareham, Hants.

Hallicrafters HA1 keyer with operating and service manual. Mint cnd, two hours use only, £30 ono. F. Humphreys Jones, GW3CF, 15 Gronant Rd, Prestatyn, Flintshire. Tel Prestatyn 3627.

AR77E, hb, £20. Cossor tape rcdr, £10. Both lovely cnd, buyer tests, collects. R. Field, 1 Haines St, London, SW8.

R206 mk II new cnd, hb, circuits, all connectors, spare valves, 50 kHz to 30 MHz inclusive, unmod, 2 rf stages, xtal bandpass filters, nl, audio filter, buyer collects. M. Kidman, QTHR. Tel OLU2 55001.

Pye Rangers 2 and 4m, gd wkg cnd. Hartley scope 13A, offers to G3VXG. Tel Tollerton 320 QTHR.

Antique rx, Cosmos, original valves with BBC licence stamp on valves about 1925, table top cabinet rx in perfect cnd, offer to W. Crocker, GW3EJM, Hen Dyr Gof, Llangors, Brecon. Tel Llangor 277.

Pen Recorder, £7. New watchmakers' 8mm precision lathe, £30. Both ono. Sae for details. A Peake, GW3SRG, 70 Higher Lane, Mumbles, Swansea, Glam. Tel Swansea 69885.

UM3, £3 10s. Two 4CX250F bases, £10. Two Collins Filters 455kHz, 3·1 bw, £6 10s each. Mains coax relays, Dow Key, £3. M devices, £2 10s. 50 yd hd coax 50 ohm, £3. CDR TR44, £28. DET29, £2. E. Elliott, G3BYY, QTHR. Tel Wraysbury 2007.

Handbook for BC348 models E/M/P, 10/-. J. Croysdale, G3OZV 14 Malwood Rd, Hythe, Southampton SO4 5FB. Tel Hythe 3578.

SB10 first class wkg cnd, exciter and 180 W linear, 80 to 10, £35 ono. SB10 alone, £20. R. Wheeler, G3MGW, QTHR.

2N706 transistors, silicon, npn, 2/- each or £1 per dozen. All new and tested. T. Boucher, G3OLB, 598 Long Cross, Lawrence Weston, Bristol BS11 OTT.

C52 with mains psu and spares, £9. Going transistorized. K. Bradley, 27 Broughton Drive, Wollaton Park, Nottingham NG8 1DW. Tel Nottingham 282814.

HRO rx full range of coils, gc, £11, buyer collects. Wanted 2 813 valve bases. Price to G3UXH QTHR.

Viceroy mk 4 factory mod from mk 3a, extra filter, final 6146B's, exc cnd, £93 ono. G3RUX, 70 Portland St, Exeter, Devon.

Pye Pocketfones, 70cm amateur band with nickel cadmium accumulators, two pairs available. Offers to Henderson, Rydene, Moor End, Radwell, Felmersham, Bedford. Tel Sharnbrook 306.

Cossor 339 scope and manual, £6. E. Parker, 5 Wentworth Hill, Wembley Park, Mddx. Tel 01-904 2761.

Minimitter MR44 wkg but needs attention, £15. Pair field telephones, type F, £4. PR30 preselector, 70/-. HRO amateur s meter, 35/-. Psu 1000V 180mA voltage metered, £8. LG300, two spare 813's, circuit, £25. B. Stone, G3JFC, 39 Purret Rd, Plumstead, London, SE18. Tel 01-854 6646.

Canadian 52 set, complete rx, psu, tx in full wkg order, no mods, handbook, mic, atu, spare 813. Will deliver free London, Surrey, Mddx, £20 or offers. D. Shepherd, G8CDR, 27 Fairmead, Tolworth, Surrey. Tel 01-399 2097 after 6.30.

B44 tr, £7. Indicators Selsyn type 181A, 17/6. Type 78 coax relays new, 20/-. Honda E20 ac petrol power unit, new unused, £25. BC221, charts, £12. Wanted Pye Ranger 2m. Carriage extra. W. Brown, G3AFN, Moordell Cottage, Garden Copse, Garden Lane, Witley, Surrey. Tel Wormley 2364.

23cm cavity with 2C39A, 30/-. B44 mk II part modified, £3. Jason AG10 audio generator, £6. Calibrator no 7 mk II, £1. UHF tv tuner with valves, 30/-. AVO test bridge, £3. QQV06-40A, 30/-. 2C39A, £1. M. Pawley, G8AWV, QTHR.

KW Vespa mk II with psu mint cnd, 20 hours use, £110. Hallicrafters treble superhet SX117, mint cnd, all xtals, buyer tests, prefer collect. Bungalow forces transceive. A. Ward, G3HSP, 47 Wash Lane, Kessingland, Lowestoft, Suffolk.

RSGB 1968 new *Communication Handbook*, £1 19s 6d pp 5/-. W. Whitworth, 94 Pine Hill, Epsom, Surrey. Tel Epsom 26016.

HRO senior all bands 160m to 10m with spkr, psu, manual, £20. Panda PR120V, £25, with manual, both exc cnd. Wanted G2DAF mk II tx need not be working but must be complete. J. Lester, G3VXV, 173 Damson Lane, Solihull, Works. Tel 021-705 3060.

LG50, fb cnd with aerial relay, exc, going QRO, £25 ovno. Need 150W 5 bander cheap. M. Deutsch, G3VJG QTHR. Tel 0536-3112.

Mint DX40 tx, Eddystone 640 rx with ls, class D wavemeter, ax, all with handbooks. Ronette xtal mic, nearest offer £40 or good binoculars with cash adjustment. J. Woodward, G3GYR, Greenacres, Brookside, Arclid, Sandbach, Cheshire. Tel Sandbach 2140.

Have ribbon mic, 2m xtals 8050, 8075, 6050, 12,062·5 kHz, 35 MHz. Exch for 4m transistor converter. R. Lamb, G3IDD, QTHR.

Heathkit IG82U sine/square gen, £18. Jason W11 wobbulator, £10. Industrial Electronics 2½ in scope, £9, carriage extra all fb cnd. G. Glover, G3AAV, 30 St Chads Ave, Leeds 6. Tel Leeds 51100.

Woden mod tran UMO new £2. Sig gens CT53 9/300 MHz, £15. TF390G 4/100 MHz, £20. Wanted Pye base F27AM. E. Page, G3HKV, 16 Abbey St, Crewkerne, Somerset. Tel Crewkern 2662.

Parmeko table top trans £3, also de luxe Woden, enquire. OC20's mains fw bridge rectifiers 10A, 25A. R107, £10. Mains rx PCR, £6. Compact smoothing capacitors, KV ratings, one 75mF 275 Vac, pf correction. Mk I AVO rc bridge, £6 carriage paid. Various Minimitter Top 2-7 modified, £8. D. Rickers, 97 Ruabon Rd, Wrexham. Tel 0978-4507.

SSB tx 160-10m, 898 dial, built in psu, modular construction, 50W pep, perfect, £35. Gibbs G3AAZ, Copperwood, New Rd, Digswell, Welwyn, Herts. Tel Welwyn 4078.

Set of 8 valves, spares for Marconi 52 set, £2. Genuine Mullard QQVO7-40 pa valve, 50/-, gd wkg cnd. Post extra. A5483, Merry Acres, Week St Mary, Holsworthy, Devon.

Smart, modern desk, £12. Also QQVO3-20A, 15/-. J. Morris, 3 Astley Rd, Harwood, nr Bolton, Lancs. Tel Bolton 52384.

Offers please for 3 vols 1959-62 Newnes *Radio TV Servicing*, also copies *Radio Constructor, Practical TV*. Would exchange for 2m gear. Wanted Jan *Radio Comm.* John Stacey, G8BXO, 3 Westpark, South Molton, Devon.

Mobile or home station, Minimitter tx, 160, 80, 40m, control unit, transistorized power supply (12V neg or pos earth), £10 the lot. J. Swinnerton, G2YS, 29 Beacon Way, Rickmansworth, Herts WD3 2PF. Tel 76864.

Mobile psu KW2000, exc cnd, £18. Hustler Whip 10/20m coils, £4 10s. TD3 Jnr dipole 10/15/20m, one year old, £4. Deliver reasonable distance. Walker, G3RNX, 105 Coupe Lane, Old Tupton, nr Chesterfield. Tel Clay Cross 3326.

Move to 5B4 means sale of late model Drake TR3, RV3 remote vfo spkr, AC3 230/115 psu, new unused spare valves, etc. Condition as new, £225 ono. Insp and try at QTH. D. Barry, G3ONU, 67 Harcourt Rd, Bushey, Herts. Tel 01-950 3091.

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RSGB Bulletins 1963 to 1968 complete, £2. Delivery extra. N. Owen, G4KS, 11 Collswell Lane, Blakesley, Towcester, Northants. Tel Blakesley 225.

Codar CR70A gd cnd, £10. 2 x 15 ft galvanized steel 2 in diameter masts and jointing sleeve, £3. 30 *RSGB Bulletins* covering 1962-64 and all 1968, offers? Prefer collect. A. Rostron, 43 Oakroyd Cres, Wisbech, Cambs.

Going SSB so selling Heathkit RA1 in gd order, £30 ono, and Geloso G222TR tx 60W am, 75W cw 6146 pa, 10-80m also £30 ono or £50 the pair. A Senior, G3TZI, Park-View, Bilsby, Alford, Lincs. Tel Alford 3489.

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Bukta Falcon NFD tent, fly sheet, green proofed, £7. Vickers Biolux microscope, quadruple nosepiece, x3, x10, x40 objectives, £20. Garrard twin speed battery tape deck with amplifier, £4. Write, phone or call J. Hey, G3TDZ, 8 Armley Grange Cres, Leeds 12, LS12 3 QL. Tel Pudsey 5478 or 77631 daytime only.

Eddystone EC10 battery and mains pack phones, £32 10s. LG300 rf unit and hb pp all voltages up to 1200V fine cw rig, £25. H. Caldwell, G8US, 3 Milton Ave, Bath, Somerset.

36 set 10-40 MHz, am cw 50W tx, mic, key and hb. £10 collect. W. Mott, 7 Farm Way, Elm Park, Hornchurch, Essex. Tel HX48911.

SWM September 1965 to February 1968, £1. *Practical Wireless* June 1965 to February 1969, £1. P. Fox, 14 Southfields, Letchworth, Herts.

Eddystone 688 ls, 30/-. Napoleon swr, 50/-. DM16HL dynamic mic cw, stand, 40/-. All items as new. B. Edwards, G3RJB, 5 Poweys Walk, Hereford.

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Hudson am 4m tx rx mobile 6146 pa, 25W ip, £5. Heathkit RA1 with ls, £27. BATC vidicon deflection and focus coils, £4. BC455B, dial u/s, £2. B44 mk II with mains psu, £5. B. Robertson, G3TTV, 12 Hazel Close, Mildenhall, Suffolk.

Selling cheap car vhf aerial base, mounting allows aerial fold down. Foot operated changeover switch. Wanted 100 yd 18 gauge copper wire new or used. Parker, G3KH, 133 Station Rd, Cropston, Leicester LE7 7HH.

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WB Stentorian HF1016 10 in spkr as new, bargain, £4. McMichael 501AC four wave receiver, £5 or offers. 91 *Bulletins*, 68 *SWM*'s, 3d per copy plus post. F. Ainsworth, 2 Westgate Ave, Holcombe Brook, Ramsbottom, via Bury. Tel Tottington 2297.

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LG300 tx rf section, home built modulator, pair KT88's and UM3. Two B44's mk I and II, £43 ono collect, free to purchaser, Benxi TA12 and SCR 522 chassis. A. Whyte, GI3CGO, 13 McClay Park, Omagh, Co Tyrone, Northern Ireland. Tel 3483 (Business).

Cossor d/b scope, £15. Leyland audio oscillator, £10. Uhf rx, £2. SCR522 tx rx, £5. BC733A rx, £2. Wireless set 31 with headset, 25/-. Radar tx rx test set 102A, 60/-. Meters, transformers, crystals, sae lists, carriage extra. A. Thorburn, 27 Banklands, Workington.

National NC190 rx gen cov and bs, ex cnd, £50. Quad am tuner m and 2 sw, £15. Retinette with er case, £10. P. Simpson, The Beagles, Highfields, Caldecote, Cambridge. Tel Madingley 374.

DX100U, mic, hb, mint, £50. HRO rx 4 coils, psu, £15 ono, buyer collects or carriage extra. R. Mitchell, G3YBM, 91 Cants Lane, Burgess Hill, Sussex. Tel 3851.

£250 complete station comprising latest KW2000A, G2DAF linear, Z match, dummy load, output meter, micro match meter, full 400W output, all in polished solid mahogany cabinet on castors, buyer collects. Rowland, G3TFN, Elms Bungalow, Whitefield.

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Racal Digital freq meter SA28 10 Hz-30 MHz read to 1 Hz, complete, fb wkg order, also Racal RA17 rx tuning unit, 5 ft film scale read 1 kHz, offers or exch SSB tcvr. J. Priddy, GM3CIG, 39 Hillfield Cres, Inverkeithing, Fife. Tel Inverkeithing 3590.

Canadian 52 set with mains psu, gd cnd, £6 10s, carriage extra. R. Johnson, 87 Esther Grove, Wakefield, Yorks.

UM3, £2 10s. Geloso 4/104 vfo, £2. B2 rx, £2 10s. B2 tx, £5 10s. Large tran 700-0-700V, £1 5s. 829 valve, 15/-. ZC1 tx/rx, £4. Wanted Heath HP13 dc psu. R. Newland, G3VW, QTHR. Tel 01-205 1443.

WANTED

Portable mobile rx covering at least 160 and 80m, eg T28. M. Cooke, 76 Falcon Rd West, Norwich, Nor 73R.

Hamgear preselector, new with rf control, self psu, will swop for Class D wavemeter or why cash adjustment. R. Andreang, 10 Vermont St, Beverley Rd, Hull, E Yorks. Tel 0482-45150.

Large 2m beam, at least 10 elements. Hy-Gain, Telrex, J-Beam, Cush Craft, etc, long yagis preferred to multi-stack. Details please to L. Margolis QTHR. Tel 01-550 0882.

Circuit for Hallicrafters S38B will buy or borrow. Also 100 kHz war surplus xtals. N. Hydes, 9 Marshal Grove, Darwen, Lancs. Tel 0254-71687.

AR88LF manual please by purchase also Codar PR3OX. Cradduck, G3PIE, QTHR. Tel Alresford 2521.

Rx, gc or hamband, no mods, also TW 4m Communicator or Four-mobile rx, state polarity. R. Johnston, GI3HCG, 6 Beechdene Drive, Lisburn, NI.

Tape rcdr for blind fellow £5-£10 replay only required. Shackle, G3MIS, The Mead, Todber, Sturminster Newton, Dorset. Tel Marnhull 209.

M & G transceiver or similar required, would consider older KW2000 wkg or not or home brew SSB gear. About £50 available. Powell, G3SEI, Wits End, Lower Odcombe, Yeovil, Somerset. Tel West Coker, 712.

Loan or buy circuit diagram of BC454 3-6 MHz Command rx, all letters acknowledged and post refunded. J. Walker, G2DCF, 16 Himley Rd, Clayton Estate, Manchester M11 4 JF.

Wanted for College club station. Tx am, cw, power at least 100W, PR120V type or similar, particulars, stating price, condition, viewing, etc, with sae please. R. Stringer, G3IOZ, lecturer, Mid Herts College of Further Education, The Campus, Welwyn Garden City, Herts.

160m mobile aerial also xtal mic with switch. F. Baxter, GM3VEY, 22 Leggart Ave, Aberdeen. Tel Aberdeen 22852.

M & G tcvr, Webster Bandspanner, Collins TCS Mains psu, negative earth alternator. Jolly, G3TJY, Little Russel, Lytchett Minster, Poole, Dorset. Tel Lyt Min 142.

Manual for BC455B, prefer borrow. Also any inexpensive 70cm or 2m gear. Especially if converter has 1·8 MHz if. 7H7 octal wanted. Sell DH149, X148, 6K7G, 6K8G, TV4, DH63, 6Q7GT (2), X61M, cheap. G. Peck, Pexholme, 22 Lowes Wong, Westgate, Southwell, Notts. Tel Southwell 3418.

Base, chimney, anode fingering, and mains blower for 4CX250B. Also c-mount lens for vidicon camera. M. Allard, G3WFC QTHR. Tel Brentwood 1653.

December 1964 *Practical Wireless* wanted urgently, your price paid. M. Kent, 4 Haig Rd, Bedlington, Northumberland.

Small 2m tx, eg TW2. Also good 2m converter (28-30 MHz if) and 9 MHz filter with carrier xtals. A. Shepherd, G3RKK, 3 Cearn Way, Coulsdon, Surrey. Tel 01-660 7572.

4-6 ft high 19 in rack, also 8 MHz FT243 xtal. Also manual to buy or borrow of P104 vhf rx. S. Haseldine, 31 Ellesmere Rd, West Bridgford, Nottingham NG2 7DE. Tel Nottingham 23-1933 (after 6).

RTTY Creed 7B perforator no 44. Auto transmitter 6S any cnd. D. Rowan, 13 Fleming Dr, Newark, Notts.

Heathkit GDO, reasonable price and cnd. W. Rivis, Hampsfield, Grange-over-Sands, Lancs. Tel G. 2268.

March *Radio Communication*. J. Butcher, G3LAS, 7 Barclay Close, Hertford Heath, Hertford, Herts.

Twomobile Withers rx or similar 144 MHz rx, reasonable price paid, gd cnd. R. Specer, G8CEA, Officers' Mess, Guards Depot, Pirbright, Surrey. Tel Brookwood 4511 ext 314, working hours.

Scope, vhf sig gen, 2m Communicator or similar tx/rx, new Praktica camera offered in part exchange. F. Webb, G8BRI, 37 Alwyne Grove, York. Tel York 25798.

Handbook for R1475. A.P. 28836 vol 2, second edit. Also three coax relays, 12 v coil preferred. L. O'Loughlin, G8AXC, 3 Beacon Rd, Seamer, Scarborough, Yorks.

Any magazine with information on building radio telescopes and circuit diagrams for receiving equipment. Borrow or might buy. P. Hyde, 8 Highgate Drive, Walsall, Staffs. Tel Walsall 22745.

Wireless World, April, July, 1967, February 1968. Cover price and post paid. D. Coker, 9 Cobbet Rd, Bitterne Park, Southampton SO2 4HJ.

T & R Bulls, May and Aug, Jan 30, July 33, Aug 37, 1928 RSGB Annual log book and supplements, *Handbook* 1st edition. G3IDG QTHR.

Eddystone third i.f. transformer 1-6 MHz. Also Sommerkamp FR100B rx in perfect cnd. C. Renshaw, 24 Trafalgar Square, Scarborough, Yorks. Tel 4775.

Half amp rf meter, 10A 8481. W. Lewis, G3IFV, 57 Nicholls Lane, Winterbourne, Bristol. Tel Winterbourne 2190.

Xtals 11671 to 11783 kHz, FT243 or details of surplus sources. I. R. Firth, G3WWF, 6 Eastfield Drive, Woodlesford, Leeds LS268SQ. Tel 0-532 34455 daytime.

2m and 70cm converters. Must be gd wkg order and fairly low i.f., please. M. Costello, 73 Rosslyn Cres, Luton, Beds. Tel Luton 26547.

Heathkit VF1U in gd wkg order. A. Wragg, G3WEX, 29 Eastern Rd, Sutton Coldfield, Warks. Tel 021-354 4265.

Receiver and other radio gear cheaply for school society, may collect. P. Murray, The Amateur Radio Society, Boys' Technical Grammar School, Llanelli, Carms.

Command rx BC454 3·0-6·0 MHz, prefer unmodified. R. Morris, 29 Nettleton Rd, Benhall, Cheltenham. Tel 0242-31595.

Transistor psu 12V dc, input 240V, 50W ac/dc output or similar £10 max. R. Forge, G3FRG, 1 Beaumont Rd, Worthing, Sussex.

Circuit of SR2000 output driver and pa using 4CX250s. Beg, Borrow or otherwise. G3AAJ, QTHR. Tel 01-989 6741.

Hy-Gain beam, TH6, TH4, TH3. Gd cnd essential, also 160m helical for mobile use. Thurlow, G3WBN, 19 Gravel Hill, Croydon. Tel 01-654 2761.

Un-mod Pye Rangers both base station and mobiles. Crystals and mics also required. R. Kerby, 46 Manor Rd, Selsey, Chichester, Sussex.

2m mobile rx or rcvr. G3MWZ, 31 Fiskerton Rd, Cherry Willingham, Lincoln. Tel Reepham 243.

Kite suitable for aerial erection, also help in building 2m and 70cm gear. Consider buying complete or semi-built equipment. Phone after 1800 weekdays please. C. Pearson, 24 Mulberry Rd, Northfleet, Kent. Tel Gravesend 68165.

Technical manuals for US Navy equipment. Receiving equipment RDO (NAVSHIPS 900527), panoaramic adaptor RDP (NAVSHIPS 900555). To buy or borrow (against a deposit if desired). J. Barry-Peters, Blue Coat School, Wavertree, Liverpool 15.

Unmodified B44 mk II or BCC69D or BCC69E, please state price and condition, willing to collect reasonable distance. H. Knott, G3CU, 15 Hampden Rd, Wantage, Berks. Tel Wantage 2566.

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Gloucester Special Station

The Gloucester Amateur Radio Society are running a special event station on Saturday, 17 May, in conjunction with the Sir Thomas Rich Grammar School open day. The school was founded in 1666 as a Bluecote School and it is now situated in new buildings at Oakleaze, Gloucester. It is hoped that over a thousand people will be attending.

The callsign GB3STR has been applied for and the station will be active on 80, 40, 20 and 2 metres, using ssb on the hf bands and am on vhf.

Aberdeen Lecture

On Saturday afternoon, 24 May, 1969, Dr P. Foster of the Department of Natural Philosophy, Aberdeen University, wil give a short lecture on radio astronomy with a question period. This will be followed by a tour of telescopes, receivers and other exhibits. The meeting will take place at 2.30 pm at the Department of Natural Philosophy, Kings College, Aberdeen. All interested are requested to notify A. W. Smith, GM3AEL, 1 Sclattie Place, Bucksburn, Aberdeen, so that necessary arrangements can be made. Those unacquainted with Aberdeen will be met on request. RSGB members, affiliated Societies and others will be very welcome.

Royal Naval ARS

Ken Randall, G3RFH, Ex VP8HF, is taking over as Secretary of the Royal Naval Amateur Radio Society with effect from 1 April, 1969. Membership of the society has greatly increased since the admittance of amateurs who are, or have been, connected with the Merchant or Foreign navies. Membership now covers 15 countries including the USA. In response to popular demand the society had established its own weekly net on 3720 kHz at 18.00 on Wednesday evenings. Members, and any others with service connections, are welcome to join in.

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The Chief Engineer (Personnel),
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BARGAIN. KW77 receiver, £60. KW Viceroy Mk III transmitter inc psu, £70. Both excellent condition. Can be demonstrated at my QTH. Personally deliver free to 150 miles. P. D. Smith, 38 Leasway, Wickford, Essex. G3PZZ. Telephone: Wickford 2791.

COMPLETE CODAR Station. 160/80m, mains and mobile, tx/rx, supplies, etc., plus stabilized filtered receiver psu, silicon cascode pre-amp, spares, plus Joystick. £34 ono. Gladly demonstrated (going SSB). G3VAG, QTHR, Colchester 78260. R. C. Greenleaf.

EDDYSTONE 898 dial, 50/-. Ready built Scarab Xtal Filter 436 kHz, £6. Japanese Paddle for electronic keyer, £3. J-36 Bug Key, 12/6. QQVO3-40 and two QQVO3-10 with bases, £2. Two 5B254M, 10/-. 6 10X xtals 5390 kHz, 10/-. 4 Electroniques 85 kHz if's, 12/6, pp extra. Wanted: Transformer 3 kV-0-3 kV at 400mA. G3TTK, 79 Rosslyn Road, Whitwick, Coalville, Leicestershire.

MARCONI FSK monitor unit, brand new, £20. Marconi Psu, 1100V 500mA, fully stabilized, brand new, £12 10s. Loaded Z-match, 600W pep, £7 10s. Brand new and boxed air-dux pi-net assembly, 1 kW pep, £7. Parmek. Potted 2800V 300mA transformer, £6. Ideal BK linear. 4 x 250 bases and chimneys, £5 each. Tube type QY4-250 and 4-65A, £1 each. Phone: 0276-25040.

FOR SALE (contd.)

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(FOUNDED 1913) (INCORPORATED 1926)

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

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