

The

4/-

SHORT WAVE

Magazine

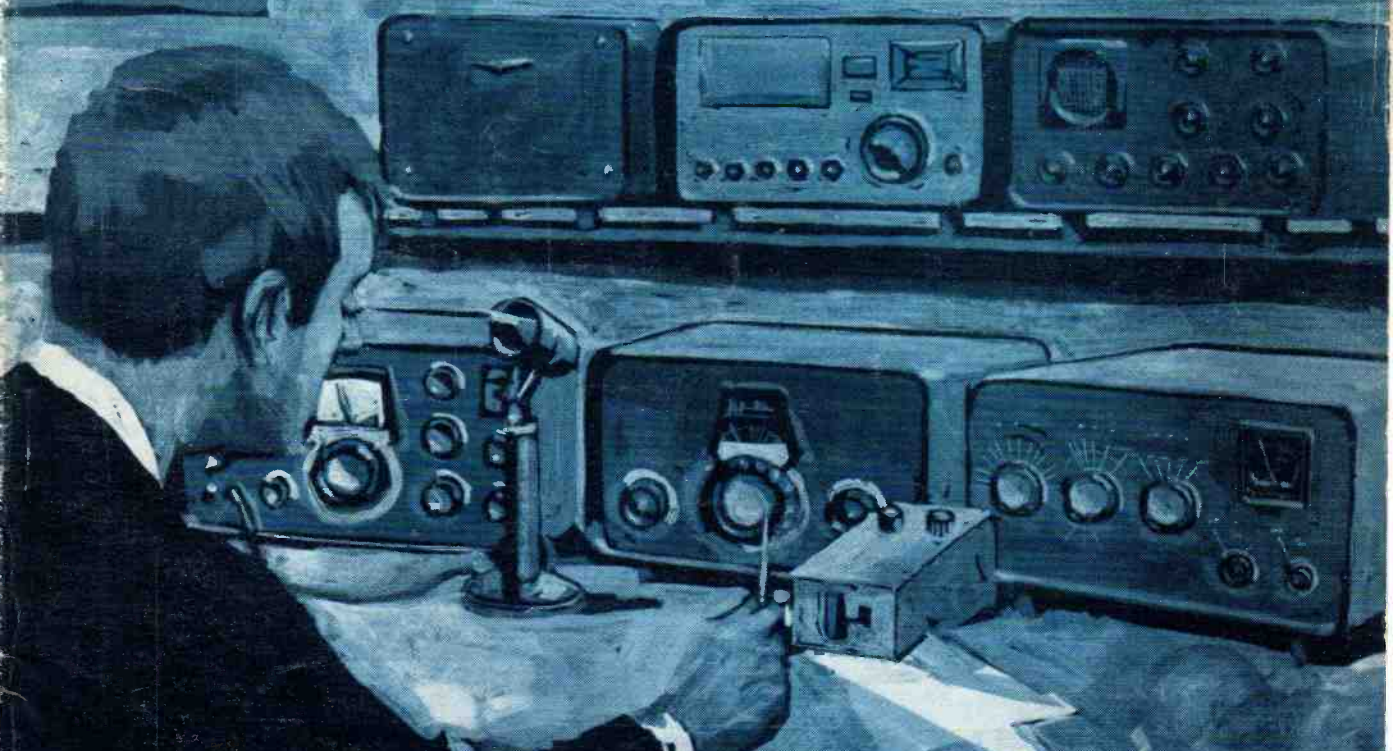
VOL. XXVI

FEBRUARY, 1969

NUMBER 12

Everything for the S.W.L.
and Radio Amateur
from

HEATHKIT



Please address
all enquiries to:-

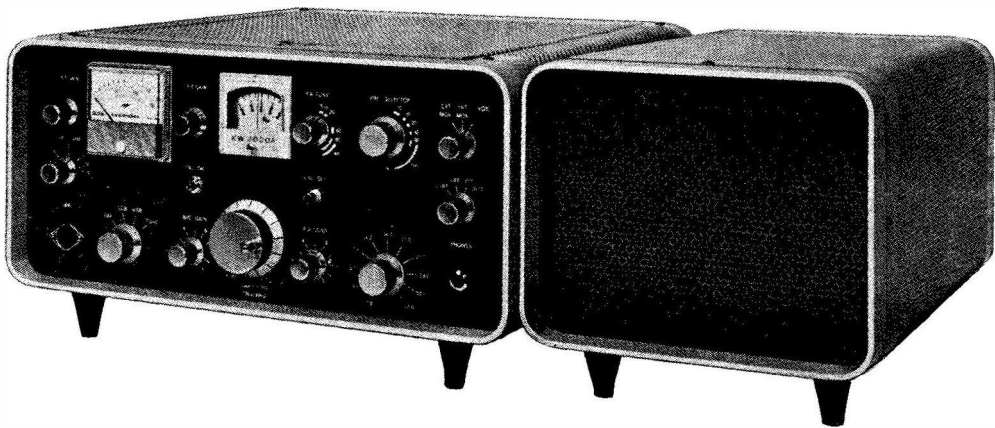
DAYSTROM LTD.

Dept. S.W.2
GLOUCESTER

choose

KW SSB EQUIPMENT

for reliability

**KW ATLANTA**

HIGH POWER
TRANSCIEVER
500 watts PEP, 10-80
metres; SSB, AM, CW.
Built-in 100KHz
crystal calibrator.

KW 2000A

SSB TRANSCIEVER
180 watt PEP, 10-160
metres, complete
AC psu, VOX,
P.T.T.

**KW VESPA
Mark II**

TRANSMITTER FOR
ALL H.F. BANDS
220 watts PEP SSB,
AM, CW.

KW 1000

LINEAR AMPLIFIER
1200 watts PEP with
built-in psu and
SWR indicator.

KW 201

AMATEUR BANDS
COMMUNICATIONS
RECEIVER
SSB CW, and AM;
10-160 metres.



*Write for illustrated detailed specification on the above
and our list of KW Tested, 'Trade-in' equipment*

K. W. ELECTRONICS LIMITED

1 HEATH STREET, DARTFORD, KENT

TELEPHONE: DARTFORD 25574 CABLES: KAYDUBLEW DARTFORD

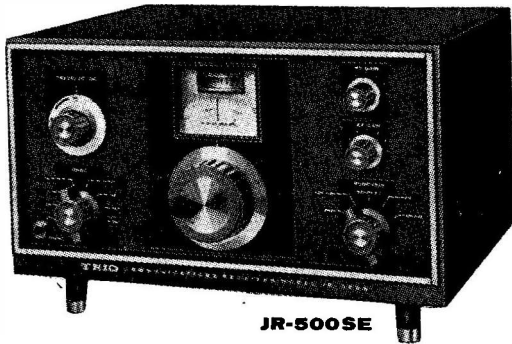
Other KW Products : KW Antenna Switch (3 position), KW E-Z Antenna Match Unit, KW PEP Meter, KW Match SWR Indicator,
KW Low-Pass Filters, KW Trap Dipoles, KW Balun, KW Dummy Load, KW Multipliers

THE MESSAGE IS PERFECTLY CLEAR: T-R-I-O

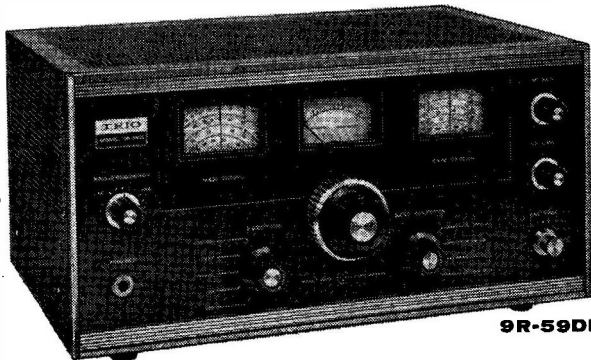
Model JR-500SE CRYSTAL CONTROL TYPE DOUBLE CONVERSION COMMUNICATION RECEIVER

Superior stability performance is obtained by the use of a crystal controlled first local oscillator and also, a VFO type 2nd oscillator:

- Frequency Range: 3.5 MHz–29.7 MHz (7 Bands)
- Hi-Sensitivity: 1.5 μ V for 10 dB S/N Ratio (at 14 MHz)
- Hi-Selectivity: \pm 2 KHz at – 6 dB \pm 6 KHz at – 60 dB
- Dimensions: Width 13", Height 7", Depth 10".



JR-500SE



9R-59DE

Model 9R-59DE BUILT IN MECHANICAL FILTER 8 TUBES COMMUNICATION RECEIVER

- Continuous coverage from 550 KHz to 30 MHz and direct reading dial on amateur bands.
- A mechanical filter enabling superb selectivity with ordinary IF transformers.
- Frequency Range: 550 KHz to 30 MHz (4 Bands)
- Sensitivity: 2 μ V for 10 dB S/N Ratio (at 10 MHz)
- Selectivity: \pm 5 KHz at – 60 dB (\pm 1.3 KHz at – 6 dB) When use the Mechanical Filter
- Dimensions: Width 15", Height 7", Depth 10".



Sole Agent for the U.K.

B. H. MORRIS & CO., (RADIO) LTD.
84/88 Nelson Street, Tower Hamlets, London E. 1. Phone: 01-790 4824

TRIO KENWOOD ELECTRONICS S.A.
160 AVE., Brugmann, Bruxelles 6, Belgium

TO: B.H. Morris & Co., (Radio) Ltd. SW
Send me information on TRIO COMMUNICATION
RECEIVERS & name of nearest TRIO retailer.

NAME:

AGE:

ADDRESS:

J. B. LOWE**50-52 Wellington Street, Matlock, Derbyshire**

Tel.: Matlock 2817 (2430 evenings)

SOMMERKAMP**STAR****INOUE**

I've been scratching my head for good advertising slogans—I know that what I peddle is the best value for money on the market, but I've got to think of some nice catchy slogans to induce you to part with your loot. The snag is that this new law on misrepresentation makes it an offence to indulge in misleading advertising. You have to tell the truth. The bit about marvelling at complete perfection is right out (many's the chuckle I've had at this one). What about "Transceiver for the Connoisseur." No, that's no good—a connoisseur would have separates with transceive facility. How about "Rock-like stability." No—even crystals in an oven drift a bit, so that's out. O.K. then, what about something like "Fabulously low price." No, I don't think I'd get away with it—I import at the Manufacturer's price and add my profit. Reasonable price yes, but nothing fabulous about it. "Fantastic Bargain." No, I don't think so. Actually there's no such thing advertised. A fantastic bargain needs no advertising and usually only occurs when the seller doesn't know what he's selling!! Most "Fantastic Bargains" I've ever come across are when the seller knows exactly what he's selling and wants to get rid of it as quickly as possible. I know, lets try "Top Quality." Oh dear, no! Quality costs a fortune. You might get it in Apollo 8 electronics, but not in Amateur Radio, not by a long chalk. O.K. then, let's try "Built to an exacting Specification." Back to Apollo 8 again! Best advertising gimmick is the "blind-you-with-science" technique using meaningless phrases. Fantastic the number of people impressed with some meaningless garble like "Fourth Generation Dynamic Concept Receiver with exclusive D.M.P." (Digital Modular Parameters).

It's really a problem what to put in advertising. I think I'll stick to my line that Sommerkamp, Star and Inoue are the best value for money. You can't even believe specification sheets and it just doesn't do to accept as gospel what the maker claims. Also of course specification sheets cleverly tell you what the maker would like you to know but even more cleverly conceal the bits he doesn't want you to know. A rig looks good on paper—people but it—then come the snags! How then is the average chap going to choose a rig. It's a problem and no getting away from it. The answer is to talk to as many people as possible, to listen to as many Q.S.O.'s as possible. Try and get intelligent and reasoned arguments for and against a particular rig. Eliminate as far as possible the bigotry and listen to the moderates. I suppose the ideal way is to do what I do—the above plus a very careful evaluation using good test equipment to measure performance. Then, like me, you too will go for Sommerkamp, Star and Inoue, as being the best value for money on the market.

SECOND-HAND RECEIVERS :

	£	s.	d.		£	s.	d.
EDDYSTONE 770U	60	0	0	RME 4350. Amateur band	45	0	0
RAI	32	10	0	HALLICRAFTERS SX140	20	0	0
KW201. Mint	90	0	0	GELOSO G209	30	0	0
HRO500. AI	350	0	0	HRO	20	0	0
SOMMERKAMP FR-100-B	90	0	0	HX28 (fault in xtal filter)	12	10	0
KW76	20	0	0	HA350	60	0	0
TCS12	12	0	0				
SIEMENS 745	60	0	0				

NEW CODAR ART's and p.s.u.'s in stock.

AR88's. JUST GOT A LOAD OF VERY NICE ONES. REWIRED PVC, "S" METERS, SPOT ON. THESE WILL TAKE A LOT OF BEATING. FULLY TESTED. LF'S AT £30. D'S AT £45.

SECOND-HAND TRANSMITTERS :

	£	s.	d.		£	s.	d.
FT-100-B	165	0	0	VICEROY III. Un-marked	90	0	0
FL-200-B	95	0	0	CODAR AT5, less p.s.u.	8	0	0

TEST GEAR :

	£	s.	d.
Solartron CD5235, D.C. to 10 mc/s. 'scope. Mint	45	0	0
Marconi TF885A video oscillator, mint	45	0	0
Industrial Electronics 2300 'scope, tiny thing	15	0	0
ME-118/U 15/60V., 30-600 mHz, r.f. wattmeter	20	0	0

SUNDRIES :

BC939 QRO ATU	15	0	0
Plain Morse keys, polished brass with ball bearing pivots	18	6	
C.W. practice sets, key plus buzzer	15	0	
G.D.O.'s Tech TE18. 240v. A.C. 300 kHz-220 mHz	11	10	0
S.W.R. bridges, Hansen SWR3, 50 or 75 ohm	3	10	0
Bug keys	4	0	0
Electronic keys DA1	16	0	0
Katsumi C.W. Monitors, High speed relay, built-in with spare contacts for break-in C.W.	7	15	0
Headsets, low impedance, padded	2	2	6
AR88 manual reprints	15	0	
VHF/UHF 50 ohm dummy loads	2	10	0
COLLINS 5 cycle VFO's, one or two left	35	0	0
2 metre 3 valve converters, excellent	10	0	0

ANOTHER BATCH OF TEISCO DM501 MICRO-PHONES JUST ARRIVED

Tubular trimmer, 1/2-5pF or 3-15pF 1/- each or 10/- doz. Feed-throughs 500v., 1000pF screw type 1/- each or 10/- a doz. Standard Belling Lee coax plugs, metal, 1/4, sockets 1/-. Octal BTG or B9A plugs 2/6 each. SE-05 1000piv 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/- a doz.; 10mF/16v. 6d. each, 5/- a doz.;
100mF/12v. 8d. each, 7/- a doz.; 1000/12v. 6d. each, 5/- a doz.;
30mF/16v. 8d. each, 7/- a doz.; 100mF/16v. 1/- each, 10/- a doz.

TANTALUMS :

4/20v., 4/38v., 8/9v., 10/12v., 16/20v. and 100/12v.—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 a doz.; 50 volt types 002, 005, 01 3d. each, 2/6 a doz.; 02, 05 4d. each, 3/6 doz.

SWITCHES :

DPDT slide switches with centre off 2/-.

KNOBS :

2 1/2" dia. fluted 2/-, AR88 type 1 1/8" 1/6, 1 1/8" 1/3.
Crystal holders HC6/U 1/- each, 10/- a doz.
75 or 300 ohm twin feeder good for 200V. 6d. a yard.

WELLER SOLDERING GUNS :

	£	s.	d.
"Expert"—dual heat 100/140W.	3	12	6
"Expert"—kit with solder, spare tips, soldering aid, brush and spanner, in strong carrying case	4	17	6
"Marksman"—25W.	1	11	6
"Marksman"—25W kit with solder, 2 spare tips and soldering aid	2	1	6

Converters 21 or 28 mc/s. These are hot stuff—twin triode cascode r.f. amp, 12AT7 low noise mixer/xtal osc. and 6AU6 I.F. out. The output is 5-5.5 mc/s. (21 mc/s.) and 5-7 mc/s. (28 mc/s.). They require 6.3v. A.C. and 150-200v. D.C. and are excellent value at £7 10s. 2m. version also available at £10.

SALE**SALE****SALE**

People tell me I should have a Spring sale—back to the "fabulous bargain" nonsense. Anyway, here's a few items I'll be glad to see the back of. No catch, just that they've been on the shelves long enough. Marconi HR22, complete with about three hundred quids' worth of xtal filters, £45. Laboratory audio oscillator £5. National 200 5 band transceiver. New, perfect, a damn' good rig which for some reason and goodness only knows why, hasn't caught on, £145. Taylor Sig. Gen. 100 kc/s.—45 mc/s., £5. Xtal activity tester, 30/- Minimitter Top-2-7, mains transformer u/s, £5. Heathkit DX40, mains transformer u/s, £10. 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 s.a.e. and I'll send you my latest lists.

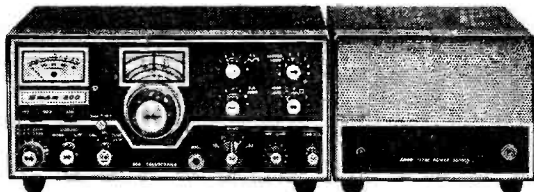
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**THE NEW SWAN 350C.
STILL WITHOUT DOUBT
THE MOST RELIABLE
QUALITY TRANSCEIVER**

SWAN 350C

**OFFERED TO THE
RADIO AMATEUR AT
UNDER £300 COMPLETE**

Transmitter power 520 Watts SSB PEP input 360 Watts CW input, 125 Watts AM input. Two 6LQ6 P.A. Tubes. Frequency range, 3.5-4.0 Mc., 7-7.45 Mc., 14-14.45 Mc., 21-21.45 Mc., 28.0-29.7 Mc. High frequency crystal lattice filter common to transmit and receive circuits. 2.7 Kc. bandwidth, 1.7-1 shapefactor. Overall audio bandpass essentially flat from 300 to 3000 cycles. Sideband suppression, 50 dB ; Carrier suppression, 60 dB ; Third order distortion, 30 dB ; Operates lower sideband on 80 and 40 metres, Upper sideband on 20, 15 and 10. Output circuit, wide range Pi Coupler, coarse and fine adjustment. Grid block CW keying, offset frequency.



Transistorised VFO Temperature stabilised. Precision Dual-Ratio Tuning. Receiver sensitivity better than 5 uV for 10 dB signal-plus noise to noise ratio. Amplified AGC System. S-Meter functions automatically when receiving. Panel Controls, Receiver A.F. Gain, Receiver R.F. Gain, Function Switch, Mic. Jack, Band Selector, Mic. Gain, Carrier Balance, P.A. Plate, P.A. Grid, P.A. Load, Coarse and fine-dial set. 5½" high, 13" wide, 11" deep, 15 lbs. weight. 100 Kc. Crystal calibrator kit available for simple installation. Accessory sockets may be easily added for installation of external VFO or voice control unit. Instruction manual provides data for simple addition of break-in CW and sidetone monitor.

Price, complete with matching A.C. PSU/Speaker, £281.

PETER SEYMOUR LIMITED
410 BEVERLEY ROAD, HULL, YORKSHIRE

Telephone: 41938

Fast Mail Order for the Amateur Radio Enthusiast!

AERIAL EQUIPMENT
TWIN FEEDER. 300 ohm twin ribbon feeder similar K25, 8d. per yard. 75 ohm twin feeder, 6d. per yard. Post on above feeders, 2/- any length.
COPPER WIRE. 14G, H/D. 140ft., 30/- ; 70ft., 16/- . Post and packing 3/3. Lengths are approx. only, actually sold by weight.
FEEDER SPREADERS. 6" Ceramic type F.S., 10d. each. Postage 2/6 up to 12.
CERAMIC CENTRE PIECE for dipoles Type AT, 1/6 each. P. & P. 1/-.
RIBBED INSULATORS. Ceramic, 2/6 each. P. & P. extra.
2 METRE BEAM, 5 ELEMENT W.S. YAGI. Complete in box with 1" to 2½" masthead bracket. Price: £3 7s. Carriage 5/-.
SUPER AERIALS. 70/80 ohm coax, 300 watt very low loss, 2/3 per yard. 50 ohm 300 watt, 2/6 per yard. P. & P. 2/6.
TOUGH POLYTHENE LINE, type MLI (100lb.), 2d. per yd. or 12/6 per 100 yds. Type ML2 (220 lb.), 4d. per yd. or 25/- per 100 yds., ML4 (400 lb.), 6d. per yd. Ideal for Guys, L.W. Supports, Halyards, etc. Postage 1/6 on all line.

Midland Agents
for
EDDYSTONE
K.W. ELECTRONICS
TRIO
FERROGRAPH

NEW BOXED VALVES. 3/6 each, 4 for 10/- . P. & P. 2/-.

Types 6N7GT, 6AB7, 6AC7, 6SK7, 6SF7, 6F7, 956, U10, MSP4, 1U5, 6G6G, X22, 958A, 5Z3, 6SK7GT.

LARGE CERAMIC COIL FORMERS. 4½" L. x 2½" diam. Grooved and threaded 9 T.P.I. Ideal for linears, 12/6 each. P. & P. 1/6.

SHORT WAVE KITS. One valve only, 50/-, phones, ant, and batts, 40/- extra if required. Ideal for Junior op.

ABSORPTION WAVEMETERS. New, improved model 3.00-35 Mc/s. in 3 switched bands, 3.5, 7, 14, 21 and 28 Mc/s. Ham Bands marked on scale. Complete with indicator bulb. A must for any Ham Shack. Price 30/- . P. & P. 2/6.

SEALED RELAYS. 12v. 105Ω Coil Type A, 4 Pole, C.O., 15/- . Type B, 2 Pole, C.O. + 2 Pole Norm. on, 12/6. P. & P. 1/6.

AMATEUR RADIO
CHAS. H. YOUNG LTD.

The Widest Range in the Midlands

★ **HIRE PURCHASE**
★ **PART EXCHANGE**

CHAS. H. **YOUNG** LTD.

At your service G2AK, G3LAY, G3VVF

Please print your address. No C.O.D. under £1.

'phone 021-236 1635

170-172 Corporation Street,
Birmingham 4

RADIO SHACK LTD.

LONDON'S AMATEUR RADIO STOCKISTS

Brand new equipment straight off the shelf

	£	s.	d.
Drake TR-4 transceiver, 300W. PEP	315	0	0
Drake RV-4 remote VFO and speaker	62	10	0
Drake AC-4 power supply, 230v.	62	10	0
Drake SW-4A, short wave receiver	185	0	0
Drake 2-NT CW transmitter	75	0	0
Drake 2-C receiver	130	10	0
Drake 2-CQ, Q mult. and speaker for 2-C	25	0	0
Drake MS-4 speaker, 2-CS speaker	13	10	0
Drake R-4B receiver	240	0	0
Drake T-4XB transmitter	250	0	0
Drake SC-2 2 metre converter	39	10	0
Drake converter console	14	10	0
Drake MN-200 matching network, 300W.	55	0	0
Drake MN-2000 matching network, 2000W.	105	0	0
Drake L-4B linear	415	0	0
Swan 350-C transceiver and 230-XC power supply	295	0	0
Swan 500-C transceiver and 230-XC power supply	345	0	0
Swan 410 VFO to match 350 and 500 models	60	0	0
Swan XV-1 VOX	17	0	0
KW 2000A transceiver and power supply	232	0	0
KW Vespa 2 transmitter and power supply	135	0	0
KW 1000 linear	135	0	0
KW 201 receiver	111	0	0
CDR rotators, AR-10 model	18	0	0
CDR AR-22R, medium size model	25	0	0
CDR TR-44, medium size model	40	0	0
CDR Ham-M. Suitable for the largest array	65	0	0
Hy-Gain antennas, every model in stock, 18-AVQ	35	10	0
Omega-T antenna noise bridge, TE 7-01	13	10	0
Omega-T TE 7-02 extended range, 300 mc, 2000 ohms	19	10	0
Copal 101 24 hr. digital clocks, desk model	13	15	0
Copal 201 12 hr. digital clocks, desk model	13	15	0
Copal 401 24 hr. digital clocks, wall mounting	18	15	0
Copal 601 24 hr. digital clocks, day, date, desk model	21	0	0
Koyo 1661 aircraft, FM, VHF, SW, LW, MW, transistor, mains/bat., port.	52	10	0
Aiwa 1850 aircraft, FM, SW, MW and 2 metres, mains/bat., port.	42	0	0
Ross RE-1018 aircraft, FW and MW portable	20	0	0
B-40 receiver in a new condition, unused	20	0	0

Used equipment

B 40 receivers, used, tested in clean condition	15	0	0
National NCX-5 transceiver with 230/115 NCX-A p.s.u.	235	0	0
Hammarlund HQ-170A rec. 160-6m. amateur, inc. 2 metre calib.	125	0	0
Hammarlund HX-500 TX 10/80 FM, FSK, CW, DSB, USB, LSB, VOX	110	0	0
Drake TR-3 transceiver with RV-3 remote VFO and new AC-4 p.s.u.	255	0	0
TW 4 metre communication transceiver, good condition, A.C. p.s.u.	45	0	0
Pye 2 metre base transmitter, ready to use, perfect 230v.	25	0	0
Collins 3-1 kc mechanical filter, 455 IF, brand new, boxed	10	10	0
Evershold recording ammeter D.C.	10	10	0
Evershold recording voltmeter D.C.	15	0	0
Megger. Needs 500v. supply	1	10	0
Heathkit Apache transmitter	65	0	0
National NC-109 general coverage receiver. .55-40 mc and amateur	30	0	0
Eddystone 750 receiver. Immaculate	42	0	0
Eddystone 750 receiver and S meter	45	0	0
Heathkit RA-1 receiver. Amateur 10-160m.	32	0	0
Drake 2-B receiver, cal. Q mult. and speaker	95	0	0
Elliott UHF receiver 301 D 169, telemetry, 400/420 mc. Serial No. 1	10	0	0
Ferris radio noise and field strength meter. .16-20 mc	20	0	0
RCA AR 85161 receiver, beautiful condition	175	0	0

Carriage extra. Hire purchase, one third deposit.

RADIO SHACK LTD.

182 BROADHURST GARDENS, LONDON, N.W.6

Tel.: 01-624 7174. Cables: RADIOSHACK LONDON N.W.6

Just around the corner to the left leaving West Hampstead Tube.

N. W. ELECTRICS

52 GT. ANCOATS STREET
MANCHESTER 4

061-236-6276

G3MAX

Business hours : 9 a.m.-6 p.m. Tuesday-Saturday
CLOSED ALL DAY MONDAY

Stamped addressed envelope please, for list and any inquiries.

"Marconi" TFI026/II Absorption Wavemeter. 100 to 160 Mc/s. with Calibration Charts. Detected output to phone jack. RF Indicated on Panel Meter 250 μ A. All good condition. Checked before despatch. £7, 6/- P.P.

Coaxial Cable. Low loss. 300W. 200 Mc/s., 22/- 20 yds.; 400W. 200 Mc/s. BBC 2, 25/- 20 yds. This can only be supplied in 20 yd. lengths. Post 4/6 20 yds.

Coaxial Relay. UHF type. Super quality. U.S.A. Make. "C" to "BNC" in operate. "C" to "C" at rest. 24 volt coil. With plugs (removed from cable), 37/6 post 2/6. New plugs, type "C" 5/- each. Ex equipment sockets "C", 2/- each. Plug and socket, 6/- pair. Post 1/-.

PL259. Plug and socket, 8/- pair. Post 1/-.

RF24. Components as in RF25, 10/-, post 6/-.

RF25 Bandswitched Converter. Pre-set frequency. Excellent component value. Contains: 15, 30pF Philips trimmers, ceramic switch, 1-pole 5-way, 3-bank, 3 $\frac{3}{8}$ x 1" ceramic formers, 3 SP61 valves, 2 $\frac{3}{8}$ " Aladdin formers, standoffs, etc. The complete unit for 7/6. Postage 6/- unfortunately.

'S' Meter. 200 u.A. Scaled 0-200 marked in 'S' points +20+60 DB's. 2 $\frac{3}{8}$ " dia. 2 3/32" mounting hole, 30/-, plus 1/6 postage.

Coaxial Relays. 'Londex' 24v. D.C. 70 watts. RF at 200 Mc/s. Supplied with 3 plugs (ex-cable), 22/6, plus 2/6 postage.

Low Resistance Headphones. 100 ohms, D.C. Brand new, boxed, 7/6. Postage 3/-.

We still have some items from previous adverts.

G3SMI

“ Listen in on the world ” with HEATHKIT shortwave receivers

FOR THE PROFESSIONAL . . . Quality and styling in the SB-310. A communications quality receiver without a budget-breaking price. Covers six shortwave broadcast bands and 80, 40 and 20 metre amateur bands.

Kit : K/SB-310, £138 . 12 . 0 P.P. 9/-.

Ready-to-use : A/SB-310, £168 . 12 . 0 P.P. 9/-.

MODEL GR-54 . . . A de luxe 5 band shortwave receiver. Three shortwave bands cover 2 MHz to 30 MHz plus 550 kHz to 1550 kHz AM broadcast band and 180 kHz to 420 kHz aeronautical and radio navigation band.

Kit : K/GR-54, £50 . 0 . 0 P.P. 9/-.

Ready-to-use : A/GR-54, £63 . 6 . 0 P.P. 9/-.

MODEL GR-64 . . . An exciting excursion into the world of shortwaves. 4 bands—3 shortwave bands cover 1 MHz to 30 MHz plus 550 kHz to 1620 kHz, AM broadcast band.

Kit : K/GR-64, £22 . 8 . 0 PP. 9/-.

Ready-to-use : A/GR-64, £29 . 8 . 0 P.P. 9/-.

Also available are model RA-1, providing unequalled value for the radio amateur—Tunes SSB, AM and CW on 160-10 metre bands, and model GC-IU, which tunes 580 to 1550 kHz and 1-69 to 30 MHz in five bands.

... and for the radio amateur ...

Among the wide selection of models which are available to suit most requirements and pockets are: the HW-100 (solid state (FET) VFO with 80-10 metre coverage) ; the SB-101 (180 watts input P.E.P. SSB—170 watts input CW on five bands, 80-10 metres) ; the SB-301 (80-10 metre coverage with 15 to 15.3 MHz for WWV) and others such as the SB-401, SB-200, and HW-12-22, all of which are designed with the discerning amateur in mind. For fuller details of any of these models, please send in the coupon below, and we will forward you a FREE copy of our 36-page illustrated catalogue, many pages of which are in full-colour.

**HEATHKIT SHORTWAVE AND AMATEUR RADIO COMMUNICATIONS
EQUIPMENT—THE ECONOMICAL MEANS TO A ROUND-THE-WORLD
TRIP.**

To : **DAYSTROM LTD., Dept. SW-2
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Please send me my FREE Heathkit 36-page colour catalogue.

Name

Address



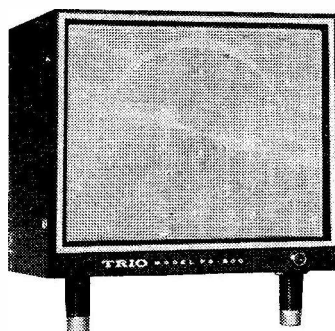
TECHNICAL PUBLICATIONS

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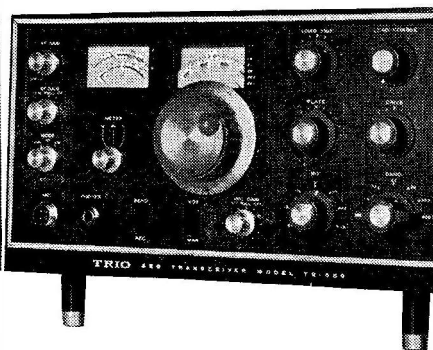
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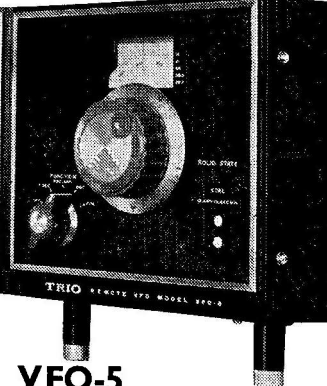
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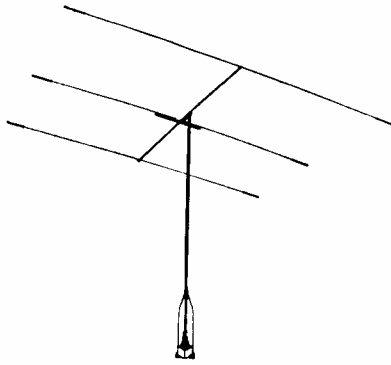
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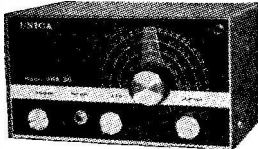
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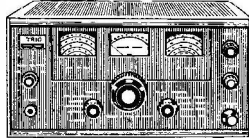


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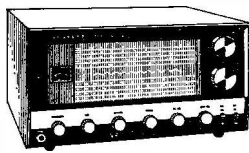
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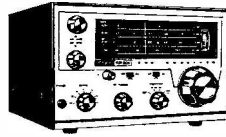
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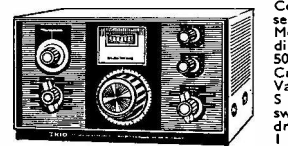
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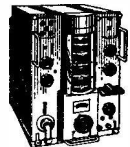


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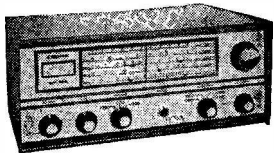
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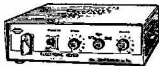


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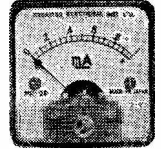
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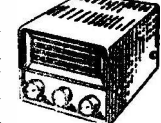


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PART EXCHANGES WELCOME

The SHORT-WAVE Magazine

EDITORIAL

Progress *All down the years, Amateur Radio has shown a steady process of development—from the loop-modulation and directly-keyed SEO transmitters of the early days to the modes and methods of the present time.*

During this long period, it has always been pretty clear “what was coming next.” From telephony by absorption loop we went to grid control, then to choke modulation and after that to high-level amplitude modulation, as it is called. The telegraphy transmitter has changed from the old keyed-oscillator-with-aerial-tapped-on (quite capable of a T9 note in the hands of those who knew what they were doing) to the elaborate CW systems now in use, which can give break-in working with all stages of a high-power transmitter cut dead when the key is up. Phone men would be quick to point out that the next move was to SSB, while CW operators were investigating the attractions of RTTY—sending and receiving by teleprinter.

There can, in fact, be little doubt as to the direction in which we are now headed. Within a minimum period of five years, the great majority of phone stations will be on Single-Sideband, radiating far more effective power than the AM stations of the old days. The only factor which can prolong the life of high-level amplitude modulation is its simplicity as compared with SSB. But nothing succeeds like success, and so we shall see it the rule rather than the exception for telephony stations to be on Sideband—indeed, it will not be long before the regulations require this to be so.

While the keyed carrier—or, in other words, CW telegraphy—is at present the easiest, most accurate and reliable method of communicating over any distance, it has some disadvantages—manual keying and the writing out of the received message—which are to a great extent overcome by the radio-teletype system of “sending and receiving on a typewriter.”

Though SSB is already well with us, the development of radio teleprinter communication (RTTY) has been a much slower process for amateurs, because for one thing the need for it is not so pressing, and for another comparatively expensive apparatus is required. What it comes to is that while SSB gives marked advantages for DX phone working, straight CW is still (in the purely Amateur Radio context) a very reliable and economical method of communication compared with any known telephony system—if the requirement is simply efficient communication.

It can be said, then, that while all the real DX is still being worked on CW (and so it will be for a long time to come), telephony communication in the DX sense has become something much more satisfactory to the phone man by the advent of SSB.

*Austin Forsyth,
G6FO.*

FRINGE AREA HARMONIC FILTERS

DESIGNS FOR AN ALL-BAND 150-WATT TRANSMITTER

Part II

G. ELLIS (G3LFZ)

The first part of this article dealt with theoretical and practical considerations and appeared in our January issue. It should be read with the following discussion, to ensure continuity in the explanations.—Editor.

TURNING now to a practical problem, it will be assumed that an all-band 150-watt transmitter is to be operated in a Ch. 3 area. Reference to Fig. 1 (p.685, January) will show that although Ch. 3 extends from 53.2 mc to 57.5 mc, it is only possible to get low-order harmonic interference on that portion of the TV bandwidth which is HF of 56.0 mc—the part, however, at which most damage can be caused to video signals, because the sync. signals are contained in the vicinity of the video carrier frequency. Therefore, F_x in this case will be 56 mc to obtain the greatest amount of attenuation of harmonics from the 28, 14, and 7 mc bands (21 mc is not affected). The degree of harmonic suppression between 53.2 and 56.0 mc will be more than adequate to suppress any 14th or 15th harmonics of the 3.5 mc band. Having determined F_x , then F_c can be calculated. (See Fig. 2, p.686, January.)

$$F_c = 0.8 F_x = 0.8 \times 56 = 44.8 \text{ mc.}$$

F_c is the frequency below which signals are passed with little or no attenuation, and around which the filter mathematics are based. Dealing with the constant-k "T" centre section, and again referring to Fig. 2, let the transmitter feeder impedance be 75 ohms:

Then,

$$L_k = \frac{R}{\pi \cdot F_c} = \frac{75}{3.14 \times 44.8} = 0.53 \mu\text{H (by logs).}$$

$$C_k = \frac{10^6}{\pi \cdot F_c \cdot R} = \frac{10^6}{3.14 \times 44.8 \times 75} = 95 \mu\mu\text{F.}$$

Since C_k is applied to the centre of L_k , the actual inductance L_k is comprised of two components, each having half the inductance of the original.

Next, the m-derived terminating sections will be determined and reference to Fig. 2 on p.686, January,

gives the formulae:

$$L_y = \frac{m \cdot L_k}{2} = \frac{0.6 \times 0.53}{2} = 0.16 \mu\text{H}$$

$$C_x = \frac{m \cdot C_k}{2} = \frac{0.6 \times 95}{2} = 28 \mu\mu\text{F}$$

$$L_x = \frac{(1-m^2) L_k}{2m} = \frac{(1-0.36) \times 0.53}{1.2} = 0.28 \mu\text{H.}$$

Once the individual component values have been calculated, they can be assembled to form a complete unit. To simplify construction, where two inductors appear in series they can be replaced by one inductance the value of which is equal to the sum of the two original inductors, to produce the circuit shown in Fig. 3 (on p.687, January) the values of each component being those calculated by way of illustration or as shown in Table 2 (p.687)—in which the optimum values of components for other TV channels and transmitter feeder impedances have been tabulated. Table 2 also emphasises the necessity for adhering to close tolerances in order to gain maximum effect for a given design. By using capacitors of known value and 1% or 0.5 $\mu\mu\text{F}$ tolerance, the careful adjustment of the coils in the next step will enable inductances to be set to similar limits.

From the old faithful formula $F = \frac{1}{2\pi\sqrt{LC}}$, it

can be calculated that a certain capacity with inductance will resonate at a particular frequency. Since in the manner described the capacitance can be provided very close to its optimum value, and as the calculated frequency can be marked with a correctly calibrated receiver, the inductance can be adjusted until resonance at that frequency is obtained as indicated by the GDO. Of course, if a GDO reliably calibrated to three significant figures is available, then the receiver check can be dispensed with.

The resonant frequencies of particular combinations of components within the filter are calculated before commencing construction, and are listed in Table 3, p.687, January. Note that L and C values vary greatly for differing impedances of a given design, but when resonant frequencies are compared, there is no difference except that due to mathematical correction.

Order of assembly is dictated by the presence (or absence) of circuitry to prevent the formation of simple parallel-tuned circuits at each state of alignment—hence it is necessary to loop the ends of a series-tuned circuit, or shunt components already aligned by a direct short, to give a simple parallel-tuned circuit which can be "dipped" by the GDO. In each case the order of construction is the same—first, the centre sections; then the series tuned circuit part of the end sections; finally completing the filter by adjusting the inductance

TABLE 4

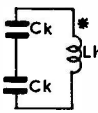
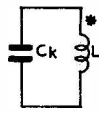
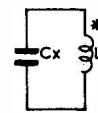
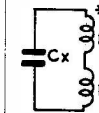
TV Channel	F _x	F _c	R				
				Mc	Mc	ohms	Mc
1	42	33.6	75	23.8	16.8	41.9	26.5
			50	23.8	16.9	32.1	26.8
2	49	39.2	75	27.7	19.6	48.6	30.7
			50	27.6	19.5	49.0	31.3
3	56	44.8	75	31.7	22.4	55.5	35.8
			50	31.5	22.25	55.7	35.2
4	58.25	46.6	75	33.0	23.4	58.9	37.1
			50	33.2	23.3	58.6	37.0
5	63.25	50.6	75	35.8	25.3	63.7	40.2
			50	36.0	25.4	63.6	40.0

Table 4. Resonant frequencies of specific component combinations, as discussed in the text. Adjust the starred items to resonate at correct frequency. Alignment should be carried out strictly in sequence (see text). Fig. 3 on p.687 of the January issue refers.

connecting the end section to the centre sections, as follows:

- (1) Provide the two correctly adjusted capacitors C_k,
- (2) Produce the inductance L_k and resonate the circuit formed by L_k and the series connected capacitors C_k to the frequency given in Table 3 (or short circuit one condenser C_k to form a parallel tuned circuit L_k/C_k and resonate at the revised frequency),
- (3) Only applies when additional centre sections fitted—provide additional components C_k and L_k, one section at a time, shunt to earth the junction formed with the previously adjusted section, to form a parallel tuned circuit L_k/C_k and resonate as in (2).
- (4) Fabricate the end section series tuned circuit components L_x and C_x. (It is as well at this stage to connect the terminal end of L_a to avoid disturbance of L_x once it has been adjusted.)
- (5) Short circuit the input (or output) terminals by the most direct means possible. This step converts the series tuned circuit L_x/C_x into a parallel tuned circuit for adjustment purposes, and removes any effect from L_a whilst the circuit is resonated.
- (6) Adjust L_a to resonate at the frequency given in Table 3, p.687, January, with the previously correctly set capacitor C_a.

- (7) Remove the short circuit from the input (or output, according to the end in question), terminate the free end of L_a to the junction L_k/C_k.
- (8) Short circuit junction L_k/C_k to earth, again by the most direct means possible.
- (9) Consider the parallel tuned circuit now formed by C_x, L_x and L_a. Since L_x and C_x have already been carefully adjusted, any adjustment to make this combination resonate at the frequency given in Table 3 must be made to inductance L_a.

It should be appreciated that steps (4) to (9) must be carried out for each end of the filter.

Table 4 above gives about the number of turns

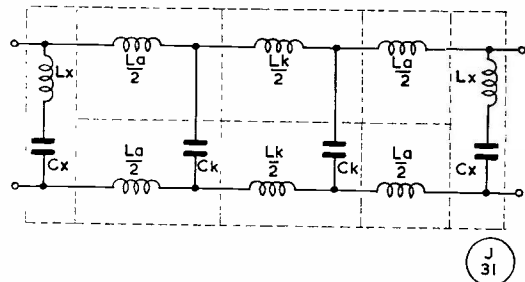


Fig. 4. Circuitry of a low-pass filter for balanced line, calculated from the formulae as given under Fig. 2 on p.686, January, and halved—see text. Note that screening requirements are more stringent.

of 16g. enamelled copper wire on a $\frac{1}{2}$ -inch diameter former to make a given inductance, and this should be used to estimate initially the number of turns required for each inductor. The actual number of turns required in practice may well be fewer because of the inductance of the coil "tails," etc., which will vary accordingly in individual cases.

When construction is finally complete, before applying the lid to the filter offer up the GDO to any coil in the filter. If the filter has been aligned correctly, a decisive dip will be found in the region of Fc. A departure from Fc of ± 250 kc will not materially affect the performance of the filter, but calculations and adjustments should be checked if beyond these limits. The unit should then be boxed up.

Checking Performance

To demonstrate the attenuation in the Band I TV region, simply insert the filter between a TV receiver and its aerial. (This assumes that both filter and TV Rx are designed for 75-ohm coaxial feed.) Provided the filter "sees" 75 ohms in each direction, the TV sound and video "buzz" should be deep in the noise level as the TV receiver is tuned across the local TV channel. Failure to meet this test fully will not necessarily reflect adversely on the filter. It may be due to incorrect matching of the television Rx or its aerial, too much feeder between the filter and the TV set, or TV signal pick-up by the receiver RF stages or from the mains.

To check the loss below Fc, first terminate say a 15-metre dipole direct to the input terminals of your communications receiver, and ensure that it presents a 75-ohm load to the dipole (if this is, for example, an AR88, with an input impedance of 200 ohms, a 100 ohm resistor should be shunted across the input terminals of the receiver for the duration of this test to load the dipole and the filter correctly). Select a steady, strong station around 21.5 mc and note its signal strength (preferably on an S-meter), then insert the filter into the feeder fairly close to the receiver and again note the signal strength from the receiver. The difference in signal level should be scarcely detectable on a normal receiver S-meter, being at most 1/6th of an S-point, or 1 dB.

If the completed filter satisfies these conditions, it can be assumed to be working correctly, and it can be applied to the transmitter feeder (within inches of the transmitter). However, there is nothing magic about a low-pass filter that will prevent interference from causes other than that for which it was specifically designed, and failure to bring about an ultimately satisfactory conclusion, *i.e.*, completely TVI proof transmissions, must *not* result in meddling with the various components within the filter. Instead, suspicion should fall upon the screening, decoupling or adjustment of the transmitter or its PA, in particular to provide a 75-ohm source if working directly into a dipole. If the transmitter cannot be loaded into a dummy load without causing TVI no low-pass filter in the world is going to clear the problem in one fell swoop, and the transmitter must itself be treated for the suppression of harmonic radiation.

An international requirement for all transmitters of less than 2 kW output is that the second harmonic shall be suppressed by at least 40 dB. Add to this a low-pass filter of the type described here with a maximum suppres-

sion of better than 60 dB at the design frequency, and the 2nd harmonic radiation should be better than 100 dB below the level of the fundamental. By way of example, assume that a 150-watt transmitter with a low-pass filter is fully loaded on 21 mc with an efficiency of 66%. The RF output on 21 mc will be 100 watts, but the 100 dB attenuated 2nd harmonic on 42 mc will be only 0.000,000,01 watts, or 0.01 microwatts.

Two filters have been constructed for use at G3LFZ, one designed for Channel 1 for protection against the second harmonic of 21 mc, and the other for Channel 3 (with three centre sections) for suppression of the second harmonic of 28 mc. Independent dipoles are used for each band without any ATU. Plate-and-screen high level modulation is used on each of these bands with no sign of any interference whatsoever but it is essential to use a high-pass filter (*see* SHORT WAVE MAGAZINE, May '68) on local TV receivers to avoid blocking the TV receiver RF stages. The shack TV monitor uses a wire dipole suspended from the station longwire, and its centre is just 10 feet above ground level to produce a TV picture well below entertainment standard.

Accurate pass-band losses measured on a Siemens Pegelsender/Pegelmesser combination gave the following results: 0.3 dB at 2 mc; 0.4 dB at 3.5 mc; 0.7 dB at 7 mc; and 1.0 dB at 14 mc. Unfortunately this magnificent instrument was not built with the amateur in mind, and its HF limit is 17 mc!

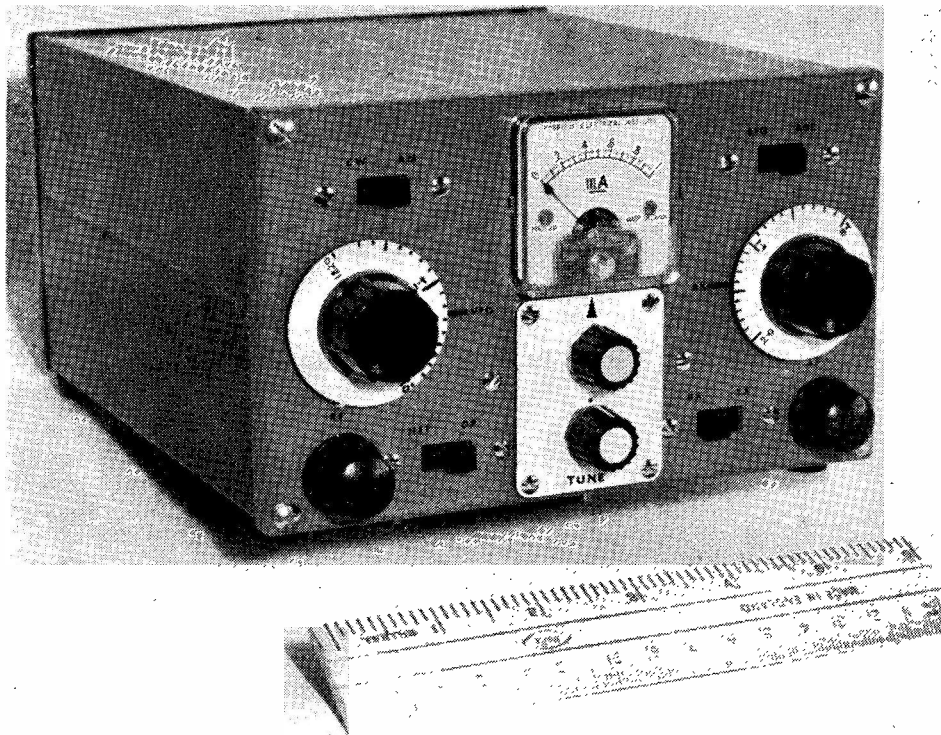
The author wishes to acknowledge the assistance given by G3TNO in checking the performance of the completed filters.

NEW QTH SLIPS

It is surprising how often we receive notifications for the "New QTH" page which either (a) Omit the call-sign, (b) Forget to mention the name, or (c) Fail to give the address fully. We are now awaiting indignant letters from two readers, demanding to know *why* their QTH's have not yet appeared—one forgot to mention the name of his town and the other gave a call-sign with no address, so we are unable to communicate with either of them!

NEW G. W. SMITH CATALOGUE

We have recently had a copy of the new (2nd Edn.) *Catalogue of Electronic Components and Equipment* now available from G. W. Smith & Co. (Radio), Ltd., 3/34 Lisle Street, London, W.C.2. This is an exceptionally fine compilation of nearly 200 pages, well printed on good paper, with a strong cover, and is fully indexed. In addition to covering a large number of the standard items for which this old-established firm is well known, a great variety of the smaller and often hard-to-get parts and components are listed, and illustrated—as they rightly remark "we feel that this catalogue will be of great help to anyone interested in Electronics and many associated fields." The price to readers of SHORT WAVE MAGAZINE is 8s. 6d. (post free)—but this is more than offset by the fact that 10s.-worth of discount coupons are included, for credit against purchases. We can commend this new Smith Catalogue for its reader-interest alone.



General appearance of the G3SRY Top Band Transceiver.

TRANSMITTER/RECEIVER IN SOLID STATE FOR TOP BAND

THE MINI-MOBILE MK. IV—
OPERATION EITHER FIXED OR
/M—TRANSISTORS USED
THROUGHOUT—DESIGN AND
CONSTRUCTION

R. J. HULBERT (G3SRY)

This fully transistorised design will be of great interest to many readers because it incorporates modern concepts in the practical use of solid-state devices in the amateur field. From the detailed information given, elements of the circuitry could also be adapted for incorporation in other apparatus using transistors. Furthermore, the receiver and transmitter sections could be separated and either built or operated as individual items.—Editor.

OVER three years have passed since the original article on the "Mk. II Mini-Mobile" appeared in SHORT WAVE MAGAZINE (August 1965). This concerned the transmitter only. The receiver section was never published. At that time it was more convenient to house the two units in separate cabinets, since it facilitated independent development work on either. The original intention was finally to marry the two units into one cabinet of small dimensions, and this has now been accomplished.

The Mk. II transmitter employed two AUY10 transistors in Class-B push-pull, operating from 24 volts for the power amplifier. This was embarrassing for mobile use, since it meant the use of an inverter. Unfortunately, at the time of writing the article, the writer had not managed to secure fully successful operation from a twelve-volt line. Readers will no doubt recall that, at that time, very little work had been done on transistor transmitters in general. Little information was available, and few devices at a reasonable price. The last three years have produced remarkable advances, and some of these are reflected in the Mk. IV design discussed here.

In the conclusion to the August 1965 article, the writer stated that development would continue towards a 12-volt only condition. (This was actually achieved by October 1965.) This simple statement has produced a

C35, C40	100 μ F, 1% poly.	R75	1.5 megohm
C36	680 μ F, 1% poly.	R76	330,000 ohms
C37	600 μ F, 1% poly.	R77	180,000 ohms
C38, C49	0.47/0.5 μ F met.	R78	1,800 ohms
C39, C41, C42, C50	film	R79	33 ohms
C43	0.1 μ F met. film	R80	100,000 ohms
C44, C45	390 μ F, 1% poly.	R81	100 ohms
C46, C47	0.22/0.25 μ F met.	R82	1,000-ohm w/wound
C48, C66	0.22/0.02 μ F met.	R83	1,000-ohm pre-set
C52	0.066 μ F, poly. (2/0033 μ F in part.)	R84	5,000-ohm pot.
C54, C56	1 μ F, 60v. met. film	VR8	1,000-ohm
C55	0.02 μ F, cer. in (4/500 μ F in part.)	VR9	5,000-ohm
C57, C59	0.001 μ F, 12v. elect.	VR10	500-ohm, w/wound
C60	50 μ F, 15v. elect.	S2, S3	DPCO, slide
C61	0.1 μ F, met. film	S4	As required, or p-1-1
C63, C67	100 μ F, 15v. elect.	S5	As required, or p-1-1
C64	500 μ F, 10v. elect.	S6	Key switch to im-
VC3	125 μ F	RL1	mobilise DPCO, 10v. coil
R44	68 ohms	M1	0.2 amp. FSD
R45	100,000 ohms	ZD2	9v. Zener
R46	270 ohms	ZD3	MS12 (silicon diode)
R47, R60	3,300 ohms	D2	MPF-105 f.e.t., (Motorola)
R48, R51	2,700 ohms	Tr15	BSY-95, BSY-95A or 2N706
R49, R82	2,700 ohms	Tr17	BFY-52 or 2N3053
R50, R53	470 ohms	Tr18	BFY-52 or 2N3053, or BFY-51/50
R52, R54	560 ohms	Tr19	2N3053, or BFY-51/50
R53, R56	1,000 ohms	Tr20	2G240, BD111, BD121 or BD123
R55, R72	100 ohms	Tr21	OC25, OC26, OC28, OC35, or NKT43
R57, R58	22 ohms	Tr22	ACY28, NKT222
R66	22 ohms	Tr23	GET-114, OC78D, NKT223
R69	3,900 ohms	Tr24	OC71, matched pair
R61	100 ohms, $\frac{1}{2}$ w.	Tr25	OC71, matched pair
R62, R65	10 ohms	Tr26	2N3708
R63	47 ohms	Tr27	2N3708
R64	1 ohm	Tr28	OC71
R67	330 ohms	Tr29	GET-114, OC81D
R68	4,700 ohms	Tr30	or NKT223
R69	18,000 ohms	Tr31	OC22, matched pair
R71	0.5-ohm		
R73	4.7K/5.1K ohms		
R74	1,200 ohms		

ADDITIONAL DATA: RFL1, 50 turns 22g. enam. on skin. dia. former. RFL2, 13 turns 22g. enam. wound in groove of dust slug for F-3804 former. Tr1, Radio/Sperry driver transformer type Tr1, strip secondary and rewind bifilar with 149 turns 36g. enam., assembled as original; an alternative for Tr1 would be 100-ohm primary and 5 $\frac{1}{2}$ ohm secondary, ratio 8.5:1 + 1. Tr4, core $\frac{1}{2}$ x $\frac{1}{2}$ in. (as from TV-R coil) primary 66 + 66 turns 22g. enam. bifilar wound, secondary 132 turns 22g. enam., to give ratio 1 + 1.2; an alternative for Tr4 would be core and bobbin from standard valve o/p former, with primary 72 + 72 turns 26g. enam. bifilar wound, secondary 144 turns 22g. enam. All resistors $\frac{1}{2}$ -watt carbon film unless otherwise stated.

fair stream of correspondence over the past three years. It seems that many readers were interested in how development was progressing, sufficiently so in fact to write. This was encouraging. A number of people requested information modifications, etc. But since little had been committed to paper, the writer was unable to help as much as he would have liked. Notes were made of readers' requirements, and this is reflected in the contents of this article—faults, modifications, alternative PA stages, and so on.

Faults in Mk. II Transmitter

The most disliked feature in the Mk. II transmitter was the 24-volt operation of the PA. This was remedied in the Mk. III, by running the AUY10's in Class-C, paralleled. At the same time advantage was taken of some silicon planar transistors, type 2N2297, which became available, to modify the driver stage. The circuit for the modified stage is given in Fig. 1. This operates with a loaded current of 900 mA, eleven volts being available after the I.R. drop in the modulation transformer secondary. The PA tank is series tuned—which means that the PA meter peaks, instead of dips, for resonance. The circuit requires a new modulation transformer, the specification of the Mk. IV transformer being satisfactory.

No other faults were remedied in the Mk. III transmitter, though the modulator was re-designed to permit operation with a crystal microphone. The circuit was not very different from the present Mk. IV modulator, and is therefore not worth including.

The Mk. III transmitter was a great improvement on the Mk. II, but it still exhibited several faults, as follows:

(1) *Drive variation with temperature due to transistor VBE drift:* This is an inherent fault in bipolar transistors. Class-B RF power amplifiers suffer greatly from this, unless they are temperature corrected. The simple way

out for AM is to use Class-C, with self bias. SSB requires correction, unless one wants constantly to be adjusting the drive level. Class-B was originally employed, because it was advised by the experts, who stated that Class-C did not produce the theoretical increase in efficiency expected, due to hole storage effects. While this may be true, it is only fair to say that no advice was given concerning the snags with Class-B at RF. Perhaps this is a reflection on the state of the art at that time.

(2) *Inconsistent drive over the band:* This was found to be due to excessive Q in the RF tuned circuits. Connecting collectors to the hot ends, instead of taps, considerably reduced this, but lowered drive, and made fault (3) worse.

(3) *Frequency modulation:* This varied from slight to severe in different models. The severe variety was always caused by heavy circulating currents in the chassis, battery line, or both. It was easily dealt with by the single earth-point technique, and better attention to decoupling. The slight variety was caused by the PA pulling the VFO through the collector base capacitance of all transistors in series. The collector base capacity of a bipolar transistor varies with collector voltage, and current. No way of completely eliminating this fault was found, while the VFO was on the final transmitted frequency. The choice for future design seemed to be crystal-mixer technique or frequency doubling, the latter being decided upon.

(4) *Warm-up frequency drift:* This was found to occur every time the VFO was switched on. Many single-transistor VFO's were tried, but in vain; the fault was always there, to greater or less degree. It was caused by internal transistor heating, affecting the collector current, and thus the effective collector base capacity. A much more sophisticated circuit, providing constant current feed for the VFO, coupled with a grounded-base isolating stage, i.e., a cascode circuit, removed the fault, and at the same time virtually removed the slight FM. This almos

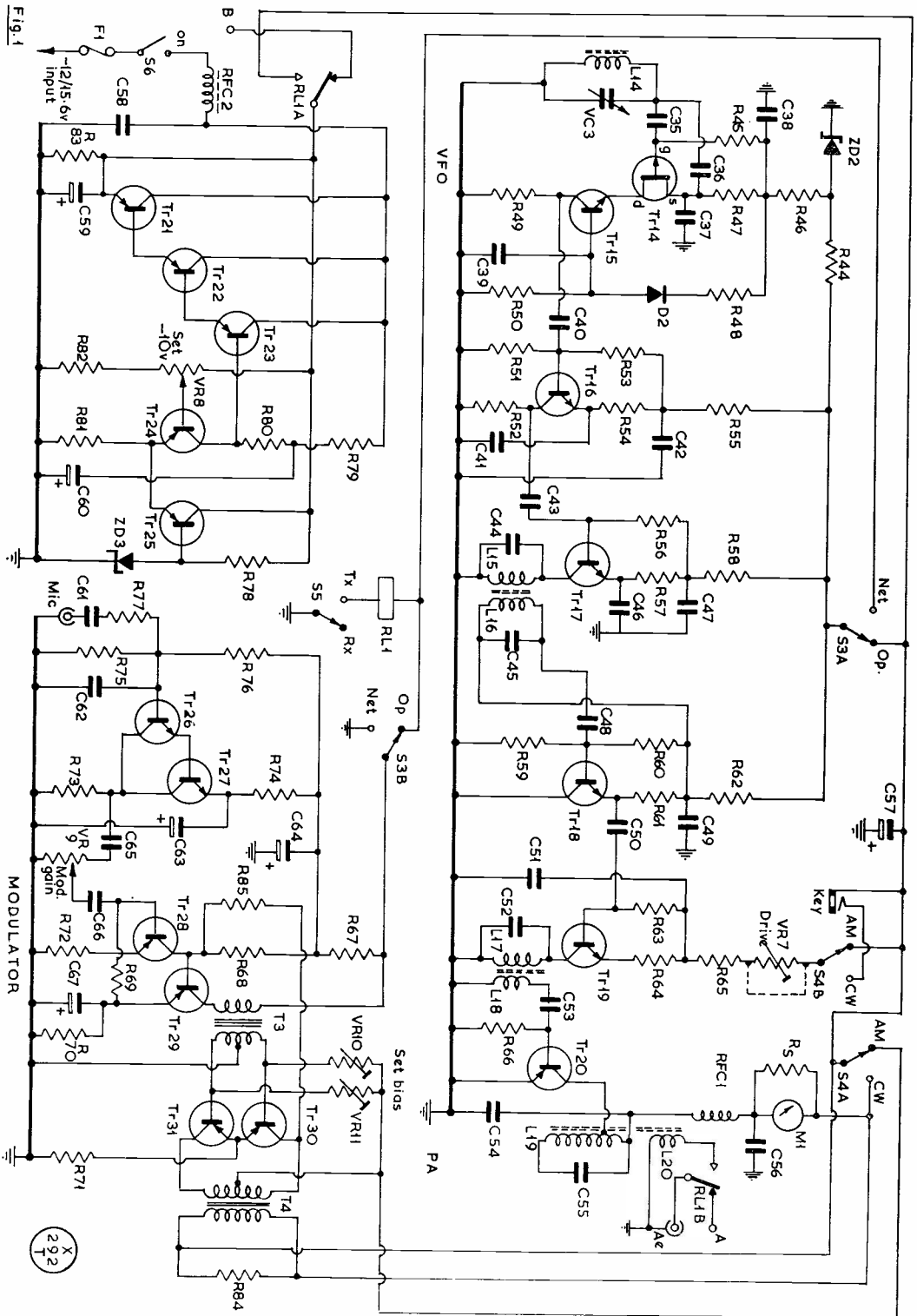


Fig. 1

Table of Values

Fig. 1. Circuit of the Transmitter Section, G3SRV Transceiver.

caused the decision to frequency-double to be abandoned, until it was discovered that the VFO would have to operate beside the PA in the transmitter-receiver. This produced some FM by direct inductive coupling, in spite of careful screening. The decision to frequency double therefore seemed wise.

* * *

The foregoing notes led to basic design requirements being laid down for Mk. IV, as follows:

- (1) *Mechanical Stability*: Should be such that, during the course of being jolted about in a car, the VFO note should not vary by any detectable amount.
- (2) *Frequency Modulation*: There should be absolutely no frequency modulation.
- (3) *Frequency Drift*: Since the VFO would have to be confined to a very small space, it would be very difficult to find room for a fully temperature-compensated oscillator. In view of this, it was decided to permit *some* drift with temperature, providing this was of a sufficiently low order not to cause embarrassment.
- (4) *Modulation*: Modulation should be 100% on peaks. The audio response to be tailored to remove unwanted low and high frequencies.

All other requirements are too obvious to be worth setting down in print, it being sufficient to say that the transmitted signal should be comparable in all respects to a valved transmitter, and undetectable on the air as solid-state equipment.

In the course of putting these requirements into practice, the circuit became vastly different from the original, and unrecognisable as having been developed from it!

THE RECEIVER DESIGN

- (1) *Adjacent Channel Selectivity*: It was decided that the adjacent channel selectivity should be appreciably better than that given by the often-used front end converter, feeding into a car BC Rx. A figure of 4 kc at 3 dB down was considered to be satisfactory.
- (2) *Second Channel Rejection*: To be at least 50 dB.
- (3) *Bandsread*: The 160m. band should cover the whole dial.
- (4) *Automatic Gain Control*: Amplified AGC should be used, and capable of holding down the strongest signal.
- (5) *Functions*: The receiver should be designed primarily to receive AM, with provision for reception of CW and SSB, without AGC control. A BFO would therefore be incorporated.
- (6) *Audio output*: The undistorted audio output should be in excess of 500 milliwatts.
- (7) *Stability*: The mechanical and thermal stability to be of a high order, though not necessarily up to the standard of a good communications receiver.

This general specification is sufficient on which to design a satisfactory 160m. mobile receiver. The development stages of this receiver need not be presented in detail but the final design offered, with circuit description, is given later on.

THE TRANSMITTER CIRCUIT

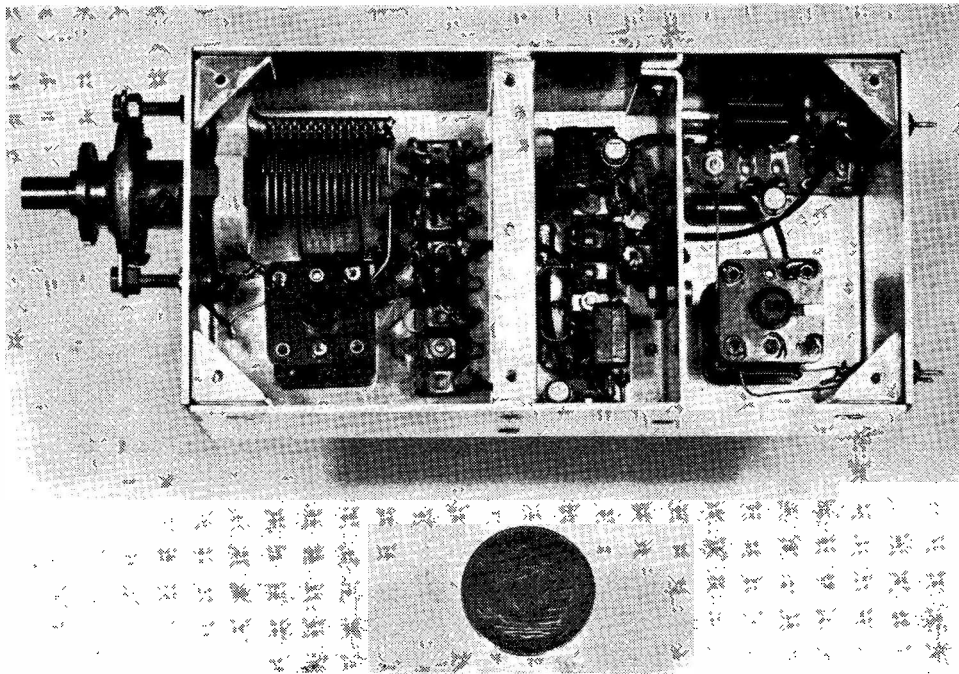
The VFO employs an N-channel junction field-effect transistor TR14, cascaded with an NPN silicon bipolar transistor, TR15.—see Fig. 1. The gate-to-drain capacity of TR14 remains constant regardless of applied voltage, or current flowing. This enables a VFO to be constructed that does not produce frequency changes with changing voltage. Such a VFO will also be less susceptible to pulling and therefore FM. Although satisfactory VFO's have been designed around two cascaded bipolar transistors, the low cost of the MPF105 made it an attractive proposition for the present purpose.

Operating over the frequency range 900-1000 kc (to give output over the 1.8-2.0 mc band) the oscillator is of Colpitts design. With the value quoted for VC3, the range is somewhat greater than this; the writer chose to restrict it by removing a few vanes. But if desired a polystyrene capacitor of suitable value may be connected in series with VC3 instead. TR14 is fed from a near-constant current source, *i.e.*, TR15, which also serves the dual purpose of a grounded-base isolating stage. The isolation provided by this configuration is superior to any other bipolar arrangement. With careful screening, the effective "see through" capacity of TR15 can be as low as $.02 \mu\mu\text{F}$ which, though not as good as a single pentode valve, is adequate for first stage isolation. The degree of isolation is such that short circuiting R49 with a $0.1 \mu\text{F}$ condenser produces a frequency change not greater than 5c. on the fundamental. Frequency shift with changing voltage is also good; with ZD2 out of circuit, changing the applied voltage from 6v. to 12v. shows about the same order of frequency change as the short circuit test.

Due to space restrictions, the VFO tuned circuit had to be made small. L14 is wound on a 0.3in. diameter bakelite former, with a low frequency grade powdered iron-dust slug for bandsetting purposes; this combination possesses a rather large positive temperature coefficient. Silvered mica capacitors have an even larger positive temperature coefficient, typically + 150 p.p.m. If they were used in the VFO, the frequency drift with temperature would be greater than could be tolerated. For this reason polystyrene types are incorporated in the tuned circuit. They can be obtained quite easily, and have the advantage of being small—moreover, their long-term life stability is almost as good as silvered mica. Polystyrene capacitors have a negative temperature coefficient of between - 50 and - 150 p.p.m. Unfortunately, the exact value is never marked on the body, which means taking pot luck, or applying to the manufacturer for information. The types used in the Mk. IV prototype were - 50 p.p.m., which leaves the VFO somewhat under-corrected. If space is available, there is considerable scope with this circuit for producing a highly stable VFO. In theory, only three components need adjustment.

The only other points worth mentioning in connection with this VFO are D2, which temperature-compensates TR15, and ZD2, which prevents unwanted audio ripple on the supply line modulating the oscillator, and helps to stabilise output amplitude.

Buffer Stage TR16: The buffer stage TR16, is a simple R/C coupled amplifier, operating in Class-A. Its function



*VFO-Exciter section of the Transceiver, interior view.
The coin is a half-penny, for size comparison.*

is to raise the power level to drive the frequency doubler TR17, while providing still more VFO isolation. A small proportion of the drive from TR15 is used. Short circuiting the output of TR16 produces no audible change in VFO frequency. Good screening is *essential* to produce this standard of result.

Frequency Doubler TR17: The frequency doubler TR17 operates in a similar way to valve doublers—that is, the conduction angle must be reduced to approximately 90° by biasing the transistor beyond cut-off. Part of this bias is produced by the fact that silicon transistors do not conduct until they are forward-biased to about 0.4-0.5 volt. The remainder is produced by base rectification, a negative voltage being produced across R56, and the voltage drop across R57. The circuit has drive-leveling qualities, the power output remaining fairly constant for reasonably large changes in input power.

TR17 produces one large pulse of output at every other cycle of the required output frequency. The remainder of the waveform has to be restored, and this is where trouble reared its ugly head. It is often stated that wideband couplers are not worth their space in transistor circuits, and in general the writer would agree with this statement. Normal modern practice is to use a single parallel-tuned circuit of large C/L ratio, working at low Q, and this type of circuit was originally installed in the collector of TR17. The results were very disappointing, it being obvious that much of the drive was at 1 mc. Oscilloscope inspection revealed that a very poor job was being made of the waveform restoration.

A few moments' thought disclosed that the results were exactly what might be expected, considering the low Q of the tuned circuit. It was therefore decided to construct a wide-band coupler, since it was obvious that a single high-Q tuned circuit would require re-tuning every time the frequency was changed, and this could not be tolerated. A little calculation was coupled with a little intelligent guesswork, and L15/L16 produced. This solved the problem nicely, producing level drive over the band to within a dB or so, and having no more than 3 dB ripple at the fundamental. (See Fig. 4B, p.752.)

Power Emitter Follower, TR18: The output power from the wide-band coupler is insufficient to drive TR19, so some form of level amplifier is necessary. Having no desire to incorporate further tuned circuits, it was decided to take advantage of the high input and low output impedances of an emitter follower, to increase drive power.

Damping for the wide-band coupler is provided by R59 and R60 (being effectively in parallel) in parallel with the base input impedance of TR18. The load for TR18 is of course the base input impedance of TR19, and since this is rather low, it is raised by including some undecoupled emitter resistance, R64. From this it may be seen that the exact performance of the wide-band coupler is dependent on values in the two stages TR18 and TR19. The moral here is to resist the temptation to modify values; actually, it sounds more critical than it is in practice. TR18 operates with approximately 60 mA emitter current, giving ample drive for TR19. [cont'd p.750]

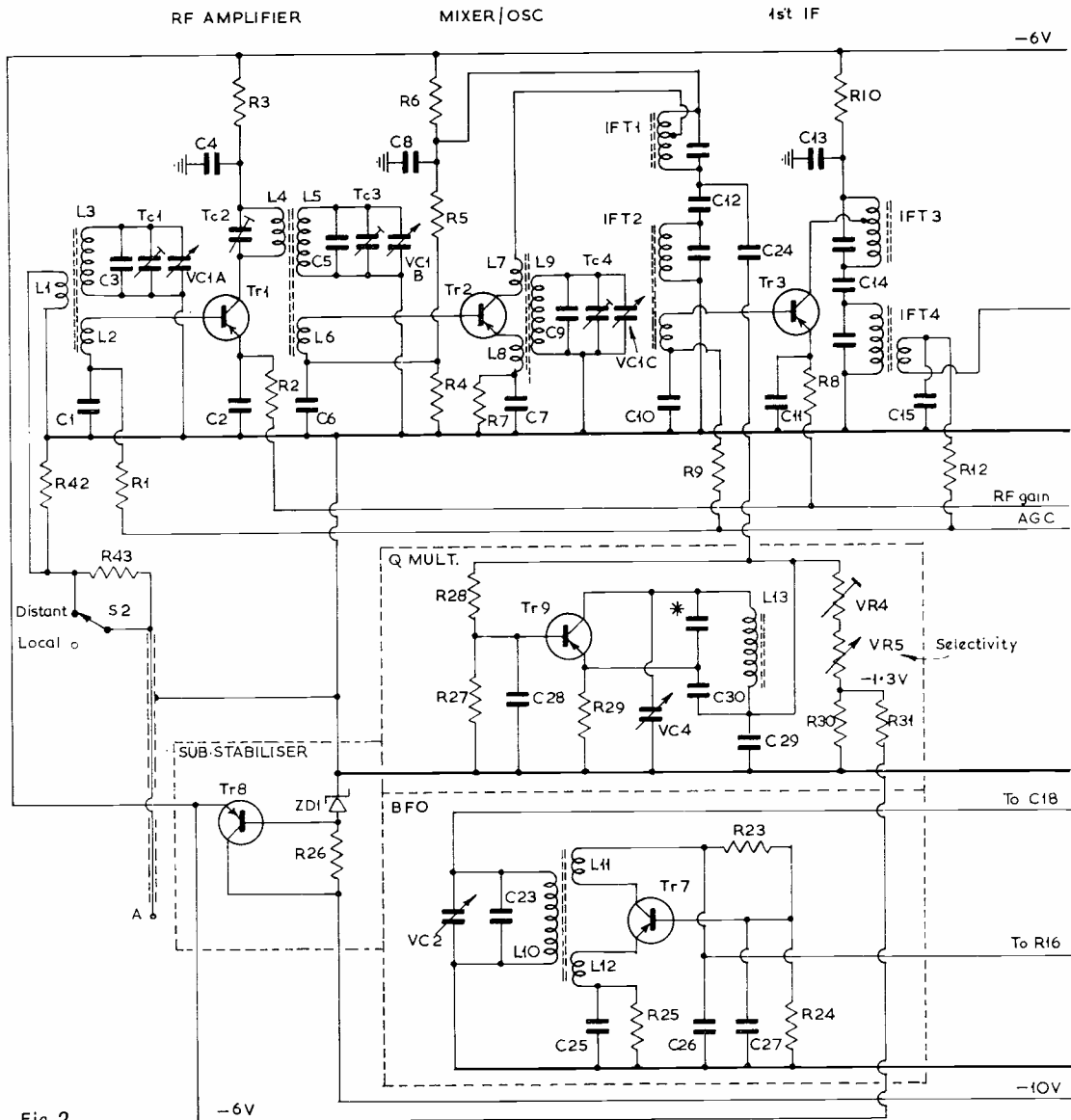


Fig. 2

Table of Values

Fig. 2. Circuit of Receiver Section

- C1, C2, C20, C21 = .047/.05 μ F met. film
- C3, C5, C19 = 150 μ F, 1% poly.
- C4, C6, C8, C10, C11, C13, C15, C16, C17, C26, C29 = 0.1 μ F, met. film
- C7, C25, C27 = .01 μ F, met. film
- C9 = 100 μ F, 1% poly.

- C12, C14, C18 = 2 μ F, cer.
- C22 = 4.7 μ F, tant.
- C23 = 680 μ F, 1% poly.
- C24 = .001 μ F, 5% poly.
- C28 = .022/.02 μ F, met. film
- C30 = .005 μ F, 5% poly.
- C31 = 0.47/0.5 μ F, met. film
- C32 = 30/32 μ F, 15v. elect.
- C33 = 100 μ F, 15v. elect.
- C34 = 50 μ F, 15v. elect.

- VC1, A, B, C = 50/50/35 μ F, 3-gang tuner
- VC1, A, B, C = 50/50/35 μ F, 3-gang tuner
- VC2 = 50 μ F
- VC4 = 15 μ F
- R1, R2, R6, R8, R9, R11, R12, R16, R19, R26, R39 = 1,000 ohms
- R3, R10, R13, R14, R34, R43 = 470 ohms
- R4, R15, R24 = 10,000 ohms

- R7, R29 = 1,800 ohms
- R5, R27 = 47,000 ohms
- R17, R18 = 22,000 ohms
- R20, R22, R32 = 18,000 ohms
- R21, R31, R37 = 4,700 ohms
- R23 = 27,000 ohms
- R25 = 680 ohms
- R28 = 150,000 ohms
- R30, R38 = 1,500 ohms
- R33 = 100 ohms
- R35 = 100,000 ohms
- R36 = 6,800 ohms
- R40 = 33 ohms
- R41 = 10 ohms
- R42 = 150 ohms
- VR1 = 5,000-ohm log pot.
- VR2 = 5,000-ohm lin. pot.

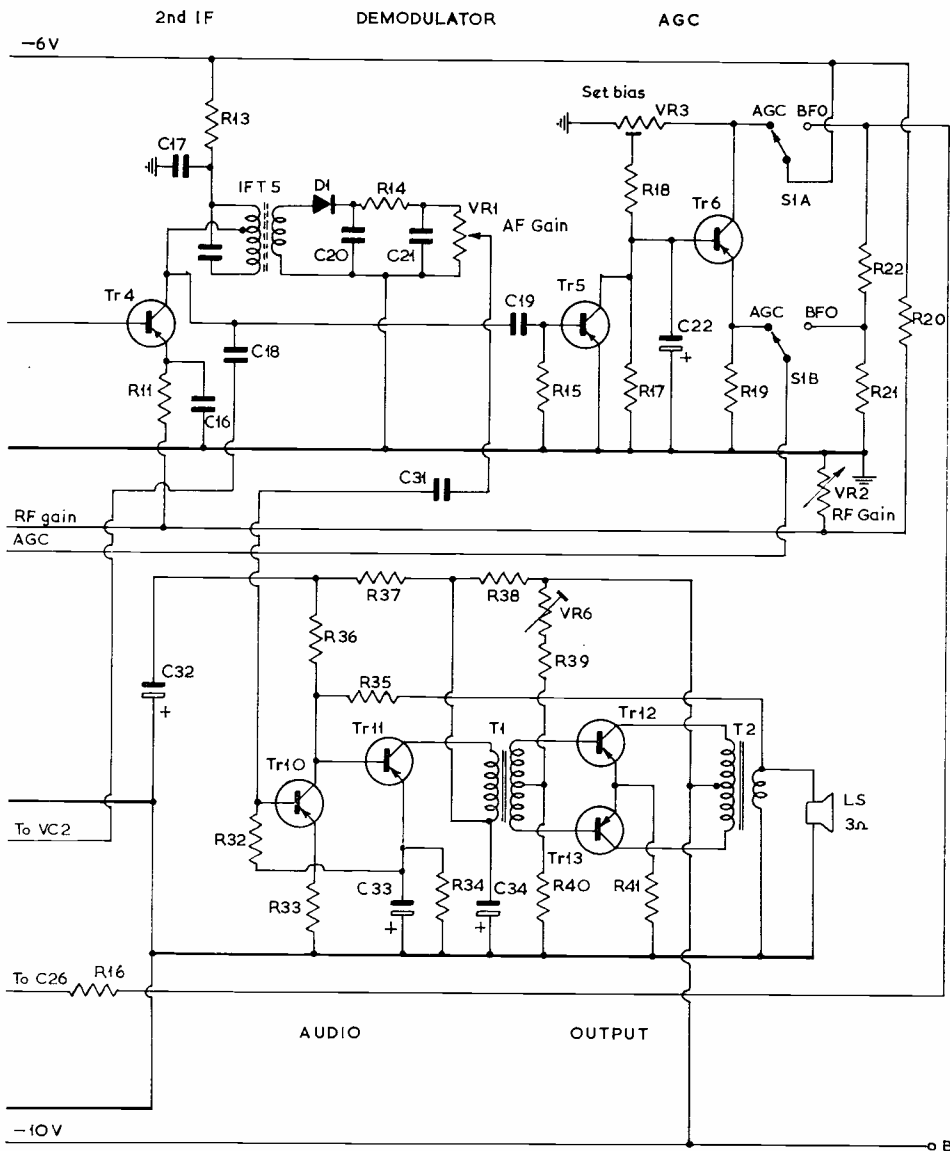


Fig. 2. Circuit of Receiver Section—read from left of p.748.

- VR3 = 1,000-ohm pre-set
- VR4 = 50,000-ohm pre-set
- VR5 = 100,000-ohm lin. pot.
- VR6 = 5,000-ohm pre-set
- ZD1 = 6.2v. zener
- D1 = OA91
- Tr1, Tr2, Tr3, Tr4, Tr9 = AF117, or OC170
- Tr5 = MPS-6533, Motorola

- Tr6 = OC200, BCY-31, etc.
- Tr7 = AF117, OC44, OC170
- Tr8 = NKT222, or similar
- Tr10 = OC71
- Tr11 = GET-114, NKT223 or OC78D
- Tr12, Tr13 = OC78, GET-114, or similar

ADDITIONAL DATA: IF transformers IFT1, IFT2, IFT3, IFT4, IFT5, Weyrad Type P51/3; TC1, TC3, TC4, 5-40 μF ceramic trimmers; TC2, Radiospares 750 μF compression trimmer. L10, L11, L12, Weyrad Type P50/1AC; L3, Weyrad Type P51/1. T1, Radiospares TT6 driver transformer; T2, Radiospares TT7 output transformer. All resistors on Rx side are 1/4-watt carbon film.

Driver Stage TR19: The driver stage TR19 operates as a conventional low power Class-C amplifier, reverse bias being obtained by base rectification. The drive control VR7 controls the driver output power, and thus the drive to the power amplifier TR20. VR7 is not normally required for operation from a 10v. battery line. The output tank, L17/C52 operates at low Q, and thus gives large bandwidth. The link L18 transfers power to TR20 base.

Power Amplifier TR20: The PA transistor TR20 is the only germanium transistor in the RF section of the transmitter. This is the *Texas* 2G240, and was intended as a core driver for computer ferrite stores. It has high current and voltage capability, and has proved almost indestructible in 160m. PA service. Due to its low F_T , it is unsuitable for use at any frequency higher than 2.0 mc. In fact close inspection reveals that its gain and power output fall off towards the HF end of Top Band.

Two of these devices have been in use since late 1965, due partly to the high capability, but mainly because they were to hand. The transistor is rather expensive, and does not compete in price or performance with modern silicon devices. For these reasons the writer would not recommend the purchase of the 2G240, and discusses alternatives, with minor circuit changes, at a later stage. (The 2G240 is in fact now obsolescent.) A glance at the circuit diagram will show that the power amplifier is of extremely simple design. It operates in Class-C, and has a tapped parallel tuned tank circuit. L19/L20 are wound on a ferrite rod, the type of ferrite being that used for broadcast receivers; the position of L20 is adjustable for loading. L19 is tuned by C55, with no variable element. This was found to be redundant, due to the broad band effect of the tank when fully loaded, and was therefore deleted. For those not convinced, a twin-gang 365 μF . with sections strapped, can be wired in parallel with

L19, and C55 reduced in value. The gang would have to be insulated from chassis. (Frankly, it is just not worth the space or expenditure.)

Exact value of drive for TR20 depends largely on the power gain of the particular transistor in use. In the case of a Class-C valve PA, the anode current would remain almost constant over and above a certain level of drive. This is *not* so with a Class-C transistor PA, where the collector current will continue to rise above the correct drive level, and therefore the setting needs to be made with more care. With the correct drive and loading, there will be virtually *no* PA dip, when M1 reads nearly 1 amp. A PA tuner may be wired in for the initial drive setting, and then discarded. S4 should be in the CW position when testing. An ounce of practice will be found to be worth a ton of theory in this instance. If the loaded current is not within the range 900 mA to 1 amp., AM from this transmitter will sound distorted, very much so on the low side. Values below 800 mA will produce strong distortion, down to a most unpleasant howl. At very low values of collector current the tank becomes completely mismatched to the PA, and TR20 will become unstable. This can be detected by a hissing noise in the station receiver, and is due to TR20 squegging. One may find that the transmitter is radiating a number of carriers spaced at say 100 kc intervals, depending on the frequency of squegging. Swinging the aerial tuner off resonance completely will illustrate this point clearly. (It has been found to be completely harmless to the transmitter, but annoying to others on the band!) Tuning up should therefore be done quickly. It should be pointed out that transistor power amplifiers cannot be neutralised, due to the fact that the collector base capacitance, the cause of the trouble, is changing continuously. It is strongly emphasised that S4 must be switched to "CW" during the familiarisation test, and

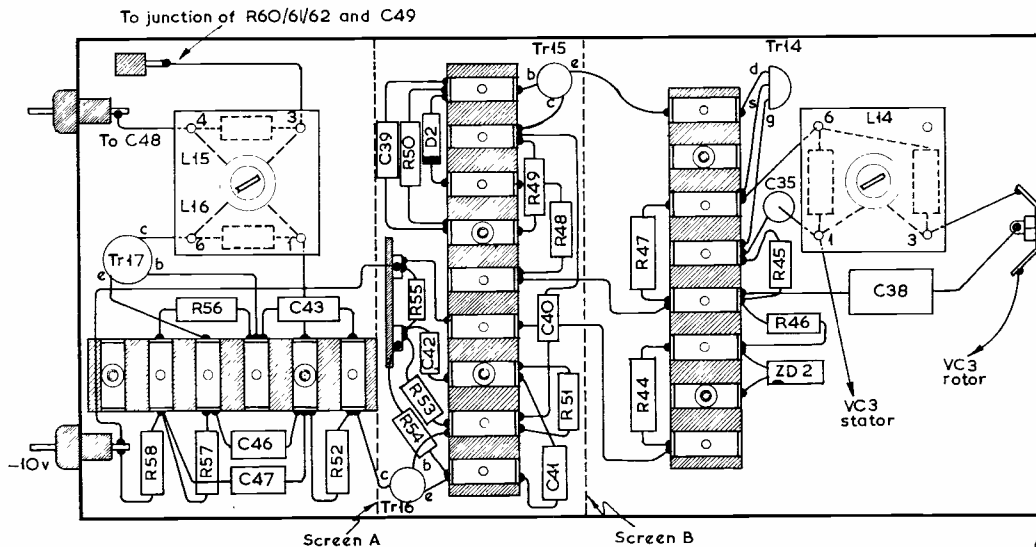
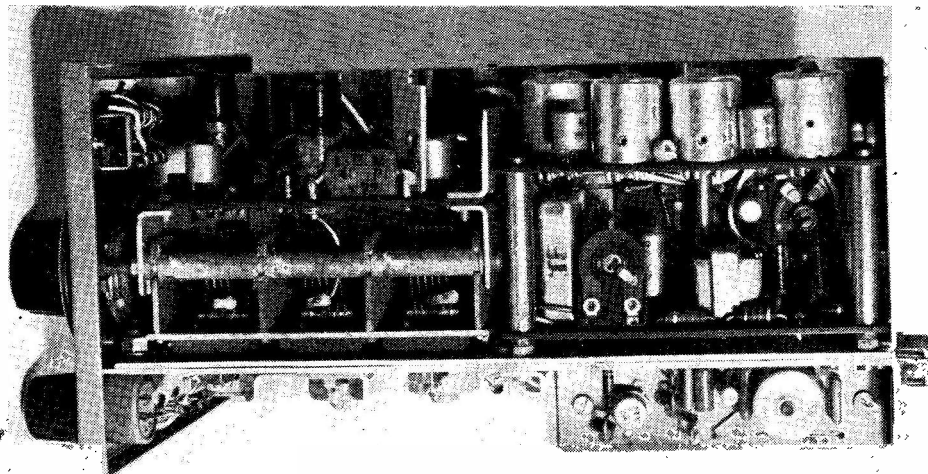


Fig. 3

Fig. 3. Component layout in the Exciter section.



View of the receiver side of the 160-metre solid-state Transceiver.

tuning, otherwise the howl mentioned is added to the confusion(!).

All this is completely normal behaviour for a solid-state transmitter with a bipolar PA stage—and it would be less than honest to gloss over snags, and peculiar-sounding behaviour patterns. But once set up, the transmitter is completely non-temperamental. In fact once one has got used to a solid-state rig, it can be tuned without instability occurring simply by adjusting the aerial tuner to approximately the correct position beforehand. In fact, an operator would probably have done this anyway, for the benefit of the receiver.

Due to the low Q of the tank circuit, the waveform developed therein is not purely *sine*. Harmonics are also produced, largely due to the inherent non-linearity of the PA transistor. For these reasons it is essential to employ a respectable ATU with all wire aerials. High Q mobile whips have sufficient flywheel action of their own. A tuner need not be employed here, unless for matching considerations. No Mk. IV transmitter has produced any TVI to date.

There has from time to time been talk of ferrites and transmitter applications in the Amateur Radio press. It has been stated that special ferrites are required for RF power use, and that to use unsuitable types produces losses and unwanted heating effects. Troubles of this nature seem to be proportional to the strength of the magnetic field, no problems having arisen with the use of ordinary broadcast receiver ferrite rods, providing low-Q tanks of small inductance are used. No heating of the ferrite associated with L19 and L20 has been observed. About 70% of the DC input is converted into RF power, which is comparable with small Class-C valve power amplifiers. It is possible to obtain somewhat more RF power output than this, with tank circuits of higher unloaded Q, but only at expense of stability, and temperament. The writer prefers docility to one extra watt. The single transmitter tuning knob also has much to commend it.

Keying: Is effected by breaking the supply line to TR19, R65 and C51, providing some measure of shaping. The resulting CW is clean, with very little click, and no chirp whatsoever. A small spacer wave can be detected, but its level is too low to be a nuisance. No external filter is required.

Modulator (General): The modulator is designed to operate from a conventional crystal microphone, and provide the necessary five watts of audio fully to modulate the power amplifier—see Fig. 1, p.745. Series transistor modulation is not practicable at such low rail voltages, unless a transistor with a reasonable power gain at high collector currents is available for the PA and the necessarily large heat sink capable of dissipating ten watts can be tolerated, for the series modulator transistor. It is therefore still an attractive proposition to employ a Class-AB1 pair, TR30, TR31, transformer coupled to the PA.

It would not be difficult to design a circuit not requiring the driver transformer T3 in Fig. 1 but no attempt has been made to do so, since the time was better spent on other parts of the circuit. The present circuit functions in a perfectly satisfactory manner.

Modulator (Pre-Amp): The pre-amplifier employs two low-noise silicon n.p.n. transistors, TR26 and TR27, connected as a super *alpha* pair. The combination provides high gain, with the high input impedance suited to a crystal microphone. R77 and C62 provide RF filtering. High-stability resistors are specified for the pre-amplifier, and are much to be preferred.

Modulator (Main Amplifier): The output of the pre-amplifier is coupled *via* the high-pass filter, C65, C66 and VR9 to TR28, VR9 being the modulation gain control. TR28 and TR29 are DC coupled, TR29 being the driver. The driver transformer T3 is a *Radiospares* TT3, modified to give a ratio of 8.5 : 1 + 1, and having suitably low output impedance and DC resistance for driving the modulators TR30 and TR31. Quiescent

current in TR30, TR31 is set by VR10, VR11 respectively, the correct setting giving 25-30 mA in each transistor. The modulation transformer T4 is a hand-wound component, resistively damped by R84. This resistor prevents "switch off" back EMF's from reaching proportions dangerous to the PA. Negative feedback is provided by R85.

Modulator Frequency Response: As stated in the basic design considerations, the audio response is tailored to attenuate unwanted high and low frequencies. Bass roll-off is produced by the high-pass filter. Treble roll-off (anti-splatter) is given by C54 and C56 in the PA, and to a smaller degree by C62 and R77; the 3 dB points occur at 510c. and 4.0 kc. The response of any particular modulator will be coloured by the microphone in use, this being much more noticeable in the treble region. Additional treble cut can be obtained, if required, by adding a .005 μ F to 0.02 μ F condenser between the emitter of TR26 and chassis. Treble lift can be obtained by reducing the value of C62, but this must be below 100 μ F. The values of C54 and C56 must not be changed, since they are primarily RF by-pass components.

Power Supply: The battery voltage in a vehicle varies from 12 to 15.6 volts, which is a fairly considerable percentage swing. In earlier days, transmitters were designed to operate on the centre voltage of 13.8 volts, as is common in commercial practice. This was found to produce problems, since PA loading and drive were seldom correct. Peak voltages were observed with an oscilloscope, and found to be surprisingly high. Removing them with a filter produced the inevitable I.R. drop, which meant that the PA voltage could be as low as nine volts on AM.

Some thoughts on the subject showed that a series stabiliser could be used to provide this condition permanently, and give filtering at the same time, without bulky chokes. The resulting unit comprising the circuit containing transistors TR21 to TR25 is the outcome of these thoughts and observations. The stabiliser had to operate with a very low voltage drop when the input was 12v. This required plenty of loop gain, and germanium transistors, since this type of device has a much lower VBE than silicon—and in order to obtain sufficient gain, it was necessary to cascade three emitter followers, TR21/22/23, which effectively places the VBE of the three devices in series.

The stabiliser action depends on the differential amplifier TR24, TR25. This compares the stabilised line with the reference voltage developed across ZD3, and produces an error signal at the collector of TR24. This signal is in the correct sense for driving the compound emitter follower TR21/22/23, and corrects any wander on the output line. R83 provides a small load, since without it some variation in output voltage would occur at very low loads, due to transistor leakage; C59 gives filtering. RFC2 and C58 are intended to attenuate any fast rise pulses which may exist on the

COIL DATA: Fig. 4A, 100 turns 40g. close-wound on 0.3in. dia. slugged former 1½in. long; no can. Fig. 4B, former as in A, two windings 48 turns 37g., close-wound in same direction, no can, two slugs. Fig. 4C, former as in A and B, L17 12 turns 22g. close-wound; L18, 6 turns 22g. c/wound earthy end L17; in square can. Fig. 4D, former ¾in. dia. ferrite rod 1½in. long, L19 nine turns 20g. tinned copper, spaced to ¼in., cemented; L20, four to eight turns 22g. p.v.c., sliding fit to adjust loading.

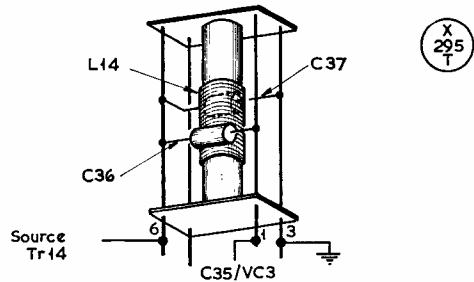


Fig. 4a. 0.9-1.0mc VFO coil assembly

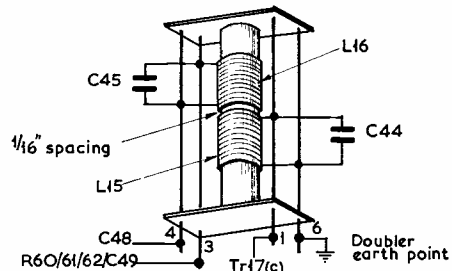


Fig. 4b. 1.8-2.0mc WBC - L15/L16

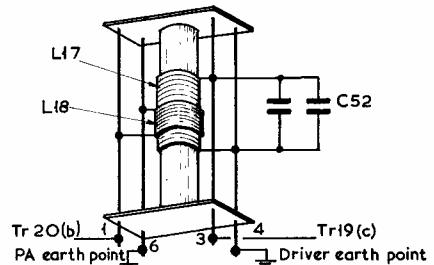


Fig. 4c. 1.8-2.0mc Driver coil assembly

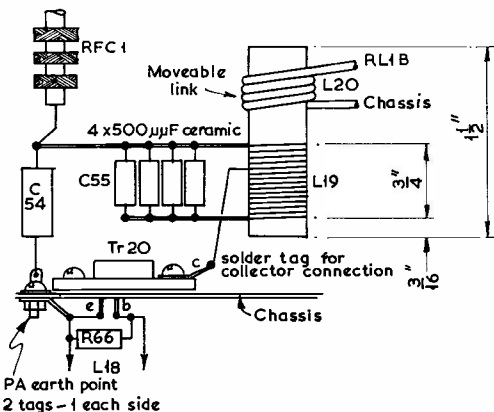


Fig. 4d. 1.8-2.0mc PA tank assembly L19/L20

vehicle battery supply. The only adjustment required to the stabiliser is to set VR8 to produce 10 volts output with 13.8 volts input, at a load current of approximately one amp. The output voltage will remain at this voltage within about 100 mV, over the full range of input voltage.

There is some temperature drift of output voltage, due to the positive temperature coefficient of ZD3. In practice this has not been found to be of sufficient magnitude to be a nuisance, and has been left uncorrected. TR24 and TR25 should be matched to within 20%. The transistors actually used were 6d. surplus types, sold as "similar to OC71." With the aid of a simple home-built transistor tester two were selected with a small-signal DC gain of 50.

TRANSMITTER—GENERAL NOTES

Transistors TR14-TR17 and associated circuitry are contained within a small aluminium box, this unit being designated the exciter—see Fig. 3, p.750. The box is formed from a rectangle of hard 18-gauge aluminium, folded to form a four-walled chassis. The corners are strengthened with corner plates, and the seams "welded" with *Araldite*. Two small cross-screens are fitted, the box being finally closed with a lid, fastened to the four corner plates, and one of the cross screens, with P.K. screws; the latter fixing increases the rigidity of the box considerably. The photograph of the VFO section, with lid removed (see p.747) shows the construction quite clearly. The remainder of the transmitter is not particularly critical, providing care is taken over earthing.

It should be noted that L14, and the wide-band coupler L15/16, are not mounted through the chassis in the conventional way. The method of fixing is as follows: The spills (side wires) are cut directly underneath the bakelite base, and a square of paxolin is sandwiched between the metalwork and the coil base. Connection is made to the spills at the sides. It will facilitate construction if short lengths of 24g. tinned copper are soldered to the spills before installing the coil assemblies.

Output from the exciter is taken from L16 to two feed through-insulators adjacent to the wide-band coupler assembly. Short lengths of wire are connected from here to TR18 circuit. If the mechanical arrangement calls for somewhat longer leads, screened lead may be employed, provided its self-capacity is deducted from C45. TR20, TR21, TR30 and TR31 are mounted on the main chassis with the usual mica washers and bushes. The PA earth point is located close to TR20.

Alignment: Assuming that the usual checks have been made, power may be connected and VR8 initially set for 10 volts stabilised. With the aid of the station receiver, adjust the slug of L14 to set the VFO frequency. With the transmitter on "CW" and a suitable dummy load connected, set the VFO for 1900 kc, and adjust L15, L16 and L18 for maximum drive at 2.0 mc, measuring the DC voltage at the base of TR20 and monitoring with an oscilloscope. Make compromise adjustments to L15, L16 to produce level drive over the band, consistent with adequate drive level over the whole band. During this procedure, maintain M1 at 1 amp. or slightly below with VR7 if fitted. (The relationship between drive and loading has already been discussed.) These settings must

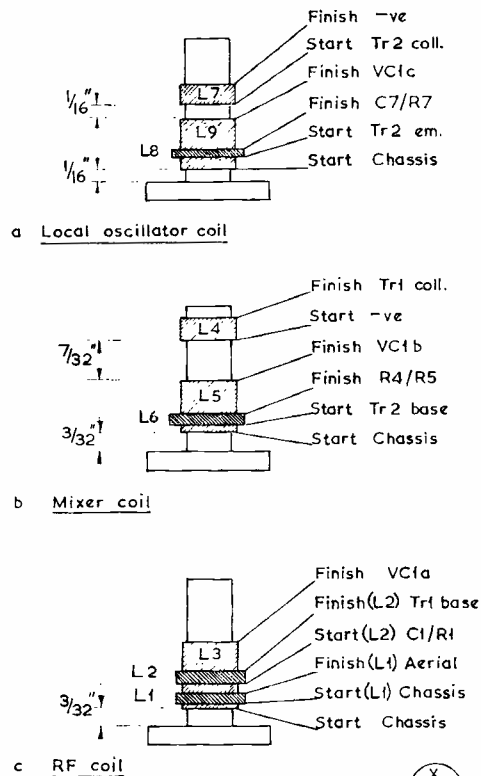


Fig. 5



COIL DATA: All wound in same direction, 37g. wire—L7, 13 turns; L8, 3t., L9, 45t.; L4, 25t.; L5, 45t.; L6, 3t.; L1, three turns; L2, 3t.; and L3, 45t. All formers are $\frac{1}{16}$ in. diameter, bakelite F.804.

be found with an aerial load. The only other point worthy of comment concerning the transmitter is S3, which must be of the break-before-make type. Failure to observe this warning will result in a short circuit to the 10-volt line during switching, and damage to the stabiliser circuit.

RECEIVER—GENERAL

The receiver (see Fig. 2, p.748) contains most of the germanium transistors of the types fitted to the original prototype of some few years ago. The circuit has been developed to a high degree, and operates very well. To substitute silicon devices would entail considerable re-design work, with little improvement in operation.

Early difficulties with transistor receivers were mainly poor 2nd channel attenuation, and indifferent AGC action. Much time was spent in improving these shortcomings, and as a result of this the Mk. IV receiver performs in a most satisfactory way.

R.F. Amplifier, TR1: The RF amplifier TR1 is fed from the tuned transformer L1, L2, L3. Coupling is arranged to be below that required for maximum power transfer, with improved 2nd channel rejection. Output to the mixer/oscillator TR2 is via the tuned transformer L4, L5, L6. L4 is tuned at the band centre by TC2. The

coupling between L4 and L5 is such that L5 tuned circuit pulls L4, to give even mixer drive over the band to within 1 dB. The transformer assembly must be wound with care to achieve these figures. L4/TC2 appears highly capacitive at 2nd channel frequencies, and therefore results in good attenuation.

Mixer/Oscillator TR2: TR2 is a conventional autodyne frequency changer, undercoupled to L5 tuned circuit, by L6. L7, L8, L9 comprise the local oscillator coil assembly.

IF Amplifier, TR3/4: The IF amplifier consists of two pairs of band-pass coupled IF transformers, and two transistors. The adjacent-channel selectivity is considerably better than the average 160m. mobile set up, the nose bandwidth being less than 4 kc at 3 dB down. IFT5 does not contribute much to selectivity because it is damped by the demodulator diode D1 and the AGC rectifier and gate TR5.

AGC Circuit: TR5 is fed through C19, from the collector of TR4. A silicon transistor is used here, since leakage would upset the circuit action. TR5 is in fact a solid-state equivalent of the well known anode-bend detector, well used in pre-war American midget TRF broadcast receivers. Automatic AGC delay is provided by the fact that silicon transistors require 0.4-0.5 volt VBE, before collector current starts to flow. Negative-going half-cycles of IF waveform at TR5 base, of amplitude greater than 0.4 volt approximately, cause TR5 to conduct; an inverted amplified signal then appears at the collector. This is "meant" by C22 to produce a steady drop in voltage at TR6 base, proportional to the strength of the received signal. TR6, which is also silicon, will now pass less current, and its emitter voltage will fall. This is fed as AGC to TR1, TR3 and TR4, assuming S1 is in the AM position. VR3 sets the "no signal input" voltage on TR6 base, and thus the forward bias point for TR1, TR3 and TR4. When S1 is set to CW, the AGC circuit is disconnected, and bias is obtained

from the potential divider R21, R22. VR2 is set for 1.2 volts on the AGC line.

The AGC action can only be as good as the devices it controls. Since transistors do not yet possess characteristics akin to variable *mu* in valves, it naturally follows that very strong signals will almost cut off the controlled devices. The practical effect of this is to cause some audio distortion, which is somewhat unpleasant. The RF gain control is of little use here, since it is trying to control the same devices, already nearly at cut-off. A simple solution is to attenuate the aerial input, by operating the local-distant switch S2. (A circuit is at present being developed to produce automatic electronic attenuation from the AGC control signal.) The distortion mentioned—which is really an overload effect—applies in practice only to strong local signals, a couple of streets away.

Q-Multiplier: This circuit employs a standard Weymouth IF transformer, modified in the following way: The can is removed, and the 250 $\mu\mu\text{F}$ polystyrene capacitor carefully unsoldered. This becomes the capacitor marked with an asterisk on the circuit diagram. VR4 is set so that VR5 just produces oscillation when turned fully clockwise on a cold day. (Like most transistor circuits, the Q-multiplier is somewhat temperature dependent, this being caused by VBE drift in TR9.) VC4 allows the circuit to be tuned about the IF passband. By tuning to one side of the passband, advantage can be taken of the main skirt selectivity, to produce considerable attenuation of an unwanted signal on that side. The Q-multiplier operates from 1.2 volts obtained from the potential divider R30, R31. The circuit has been found very effective when receiving SSB and weak AM signals, and provides excellent reception of CW. No on-off switch has been provided, since it has been found that rotating the selectivity control, VR5, fully counter-clockwise was sufficient: in fact, leaving L13 in circuit provides a noticeable increase in overall selectivity. There is no insertion loss with this Q-multiplier with the selectivity

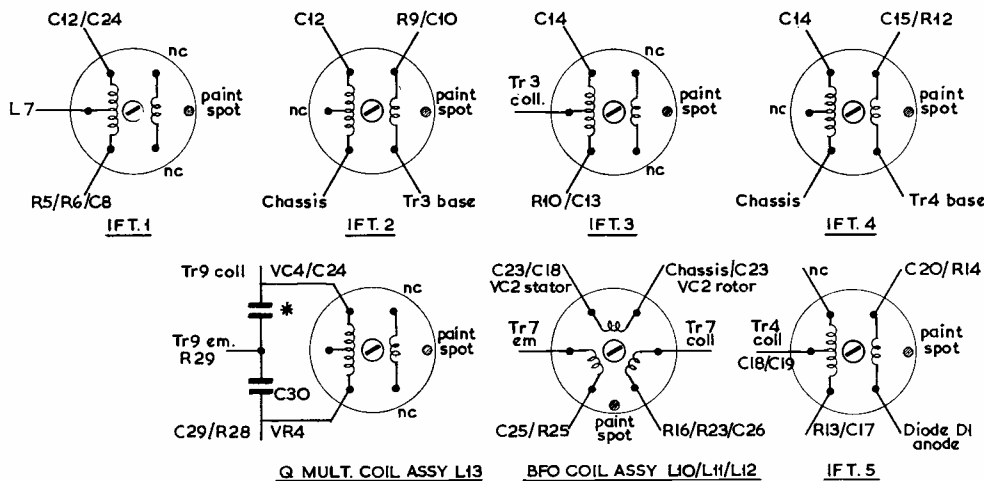
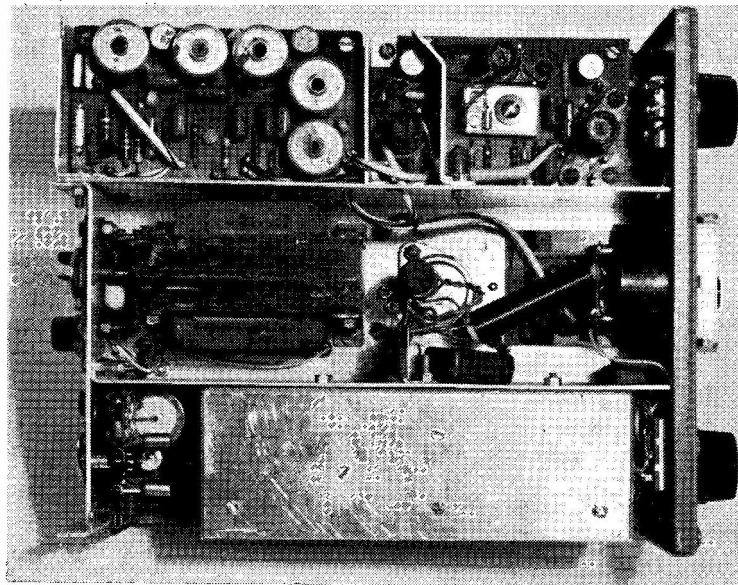


Fig. 6

Fig. 6. Connection details for the Weyrad coil assemblies used in the receiver section.

Looking into the G3SRY Transceiver, with the front panel to the right. The unit form of construction is clearly suggested. The VFO-exciter section is in the lower box.



control at minimum, and a large gain at maximum selectivity.

This unit could be used with valve receivers, powered from a 1.5 volt cell, but it must be mounted within the receiver, with a short connecting lead to L13.

BFO: This circuit is the oldest part of the receiver, having remained unchanged for at least five years—which is an indication of its reliability. The assembly is a standard *Weymouth* MW oscillator coil, padded down to 460 kc with capacity. Injection is via C18.

Sub-stabiliser: Is formed by TR8, ZD1 and R26. It is simply an emitter follower, controlled by ZD1. The circuit has the advantage of controlling fairly heavy currents, yet using an inexpensive light-duty zener diode. The output voltage is approximately 6v. and feeds the whole of the receiver, with the exception of the audio amplifier.

Audio Amplifier: This is conventional and needs little comment. TR10 and TR11 are DC coupled, and VR6 sets the quiescent current for TR12 and TR13, which should be approximately 3 mA per transistor. The overall gain of this amplifier is somewhat higher than usual. This is necessary since the amplified AGC produces a lower-than-average audio output from the demodulator.

The main tuning capacitor VC1-abc is of three section, 5-55, 5-55, and 3-35 $\mu\mu\text{F}$ respectively. This capacitor came from the 38 set. A suitable alternative would be a three gang 50 $\mu\mu\text{F}$, providing VC1c was stripped of a couple of vanes, or a series padder fitted. The BFO and Q-multiplier should be screened from the rest of the receiver, and from each other; and the receiver layout arranged so that no unintentional feedback path exists. The receiver alignment follows standard practice. The Q-multiplier should be disconnected during IF align-

ment. After re-connection it is aligned in the same way as other Q multipliers.

Some General Points

Correspondence has shown that many readers have AUY10 transistors in their possession, and two of these may be operated in parallel. For preference they should be fairly well matched. An alternative for the *Texas* 2G240 would be the 2N1907 and its variants. Although not as good as the 2G240, many samples provide satisfactory results.

Modern silicon transistors may be employed. Types BD111, BD121 and BD123 are all in common use for this application. The BD123 obtainable from *Mullard* is particularly to be recommended. Some circuit changes are called for when using these types. Another arrangement that will appeal to many employs three BFY50 or 2N3053 transistors mounted on a heat sink of generous proportions, and stood off the chassis on insulating pillars. This circuit can be re-arranged to bring the collectors to earth potential, allowing the chassis to be used as the heat sink. However, the writer strongly advises against this, since RF circulating currents of high magnitude will appear on the chassis. This will almost certainly induce some form of instability, frequency modulation also becoming possible, in spite of precautions taken to eliminate it.

In the case of alternative PA circuits being employed, less drive may be required with some of the transistors mentioned. This may mean fitting a drive control in a ten-volt transmitter.

* * *

As its name implies, the Mini-Mobile Mk. IV was designed to operate from a vehicle battery supply of varying voltage, and consequently has its own series

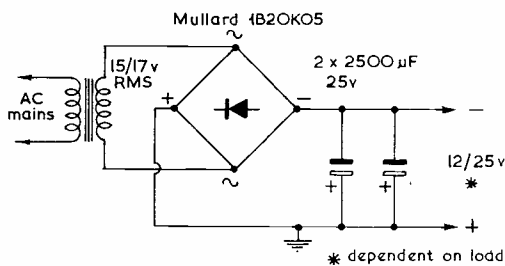


Fig.7

Fig. 7. Circuit of a suitable mains PSU for operating the Transceiver as fixed-station equipment.

stabiliser. To operate in the shack from a 12-volt source requires a number of small modifications, as follows:

Receiver: No modification is required to the receiver, other than the re-adjustment of VR6.

Transmitter: VFO feed: Delete R44 68 ohms, substitute R44 150 ohms. TR19 feed, add VR7.

Modulator: Re-set VR10/11; delete R67 330 ohms, substitute R67 1.2k ohms.

Main feed: Delete TR21-25 inclusive, and all components connected with them. Wire 12-volt supply via F1 and S6 to the moving blade of RL1a.

The receiver and transmitter may be separated by arranging extended leads. The Tx lead should be in coaxial cable, the screen forming the battery positive connection, and earth. Load PA to 900 mA (11 volts available to PA on AM). The 12-volt source used should be stable, and have high output capacity.

An alternative method of operating the transmitter-receiver from an AC power source is by the circuit of Fig. 7. This has the advantage of requiring no modifications, thus leaving the equipment ready for Mobile operation at a moment's notice. The only proviso is that the heat sink for TR21 be increased in size, to allow for more dissipation when operating from the AC power unit. The transformer should be chosen so that the open-circuit voltage from the power unit does not exceed 25 volts. The rectifier can be a Mullard 1B20K05.

Conclusion

In this article the writer has attempted to provide the sort of information that correspondence has shown readers to require. He will be pleased to deal with small points raised by letter (providing the customary s.a.e. is included). Re-design work to suit a particular reader's requirements cannot be undertaken by post.

The Mk. IV Mini-Mobile has now reached a very satisfactory stage of development, and functions well. As AM would seem to be dying a slow death no further development is planned and the writer had decided that future effort should be mainly devoted to solid-state SSB. A large part of a Sideband Tx has already been built and tested, and in due course it is hoped to replace the Mini-Mobile with a miniature SSB transceiver.

INTEGRATED CRYSTAL FILTERS

NOTES ON A NEW DESIGN

AN important advance in techniques of frequency selection is the integrated crystal filter developed at the Hirst Research Centre of the G.E.C. It provides a smaller, cheaper and more reliable component than conventional filters used (for example) in the IF circuits of mobile radio equipment. The saving in size is apparent from the photograph, which shows the conventional filter outline (left) compared with the flatpack (centre) and the elongated style D (right) holders for integrated filters. (See picture opposite).

These new filters can be of monolithic construction, in which a single quartz wafer has an array of thin-film electrodes deposited on both major surfaces, or it may have a bilithic structure comprising two multi-electrode wafers connected in series. In both cases considerable miniaturisation is possible by utilising mechanical rather than electrical coupling between the resonant sections in the equivalent electrical circuit, which may be represented as a ladder network (Fig. 1). The bilithic construction achieves an improved performance compared with the monolithic structure.

Recognition of the significance of the electrode mass loading on the distribution of strain energy within thickness-shear vibrating crystals was largely responsible for the new designs. Because of the mass loading of the electrodes, the fundamental thickness-shear resonance frequency of each resonator is lower than that of the surrounding quartz by an amount known as the "plateback." The energy of vibration of a resonator at its fundamental frequency cannot, therefore, be freely transmitted by the surrounding quartz, which behaves as a waveguide excited at a frequency below its cut-off. The particle displacement outside the electrodes decays exponentially with distance, forming an evanescent mode of propagation. The coupling between neighbouring resonators, which determines the bandwidth of the filter, is thus a function of resonator size, separation and the "plateback." The shape-factor of the passband and the magnitude of the stopband attenuation are governed by the number of coupled resonators used.

Work at the Hirst Research Centre has established the design and manufacturing techniques for filters covering a wide range of frequencies and bandwidths. One recently-solved problem is illustrated in Fig. 2(a),

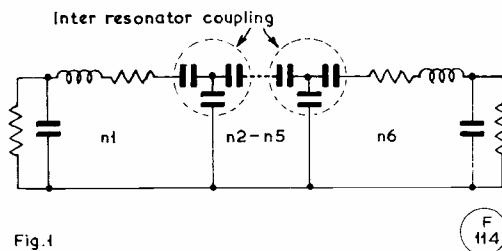
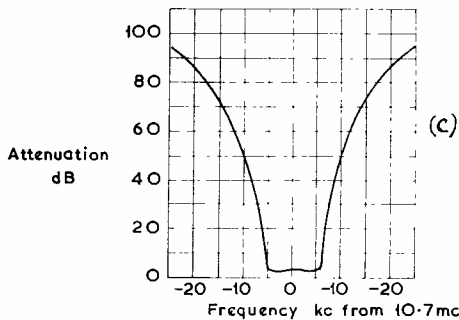
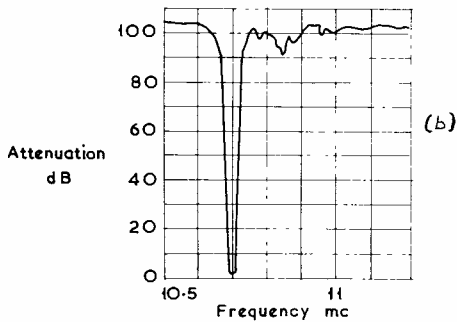
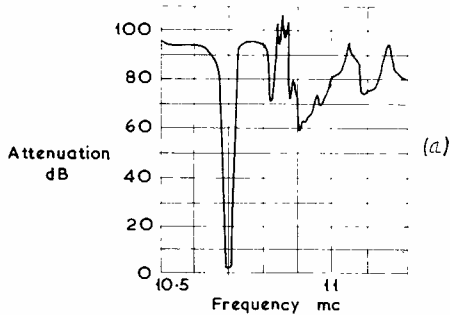
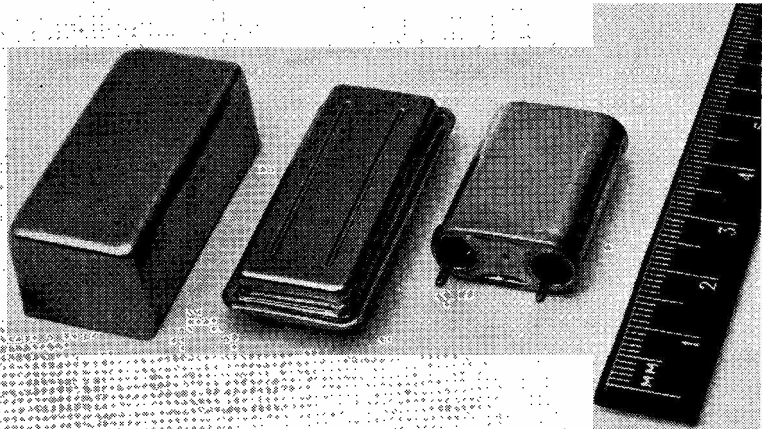


Fig.1

Fig. 1. Equivalent ladder network of the filter design discussed in the text—performance as at Fig. 2(B) opposite.

The filter unit described in the text is at right—the centimetre scale is for size comparison.



which shows the effect of unwanted crystal resonances in degrading the stopband attenuation of a 10.7 mc, 12.5 kc channel-spacing filter constructed in accordance with past practice. The vastly superior performance of a similar filter, made according to the new techniques, is evident in Fig. 2(b). An expanded view of the passband is shown in Fig. 2(c).

R.A.E. COURSE—BROMSGROVE

We have been asked to say that a course for the Radio Amateurs' Examination is being arranged at the College of Further Education, Bromsgrove—to start as soon as sufficient numbers can be got together (even though this is a bit late in the day for the May sitting—full listings of instruction centres appeared in our September-October issues). If you are interested and live in the district, apply right away to: R. Bantock, G3WNT, 38 Bittell Road, Barnt Green, Birmingham (Tel: Hillside 1405), or to the College, in Stratford Road, Bromsgrove.



“... Must apologise for the quality of the recording...”

Fig. 2

F 115

MOBILE RALLY FIXTURES

The Calendar of Mobile Events for the 1969 Season is filling up rapidly, and we now have the list as follows:

April 6 (Easter Sunday): A.R.M.S. talk-in and demonstration station at Lydd (Kent, near Dungeness) Air Show.

April 20: Midlands Mobile Rally at Drayton Park, Staffs., as in previous years.

May 18: Northern Mobile Rally, at Harewood House, near Leeds, as last year.

June 1: Maidstone Mobile Rally, in conjunction with the golden jubilee of the YMCA.

June 1: Amateur Radio Mobile Society (A.R.M.S.) annual Rally—location to be announced.

June 29: West of England Mobile Rally, at Longleat, Wilts.

July 6: Annual Mobile Rally at South Shields, Co. Durham.

July 13: Worcester Club annual Mobile Rally.

August 17: Annual Derby Mobile Rally.

Further information and details about arrangements for these events will be published as they are notified to us.



“... Well, I think I've held it long enough ...”

NORTHERN RADIO SOCIETIES ANNUAL CONVENTION

This will be held on April 27, at Belle Vue Gardens, Manchester (Cumberland Suite) and is organised by the ten member-societies of the Northern Radio Societies Association; last year more than 4,000 people attended. Stand space is available to the Trade, at attractive rates, and in previous years good business has been done. There will be talk-in facilities for visiting mobiles and various events of interest in the Amateur Radio context. The business manager for the Exhibition is R. M. Clarke, G8AYD, Hillside, Quickedge Road, Mossley, Ashton-under-Lyne, Lancs.—who would be glad to give details to any firm interested in taking stand space.

CARDIFF UNIVERSITY TRANS-AFRICA EXPEDITION

Five graduate members of the University of Cardiff have planned an overland expedition to South Africa, starting from Tangier and then working through Egypt, the Sudan, Ethiopia, the East African countries, into Rhodesia, Malawi and Mozambique, to Cape Town. They will travel in an adapted 5-ton, 4-wheel drive, Commer lorry which, among many other things, will carry amateur-band equipment, intended to maintain contact with the University Radio Society's station in Cardiff, and to work DX as opportunity offers. Their gear will include a KW-2000, a Mosley Elan Beam (10-15m.) and an RV4 ground-plane for 10-15-20m., together with G-Whips mobile antennae. The Expedition's licensing arrangements and callsign allocations had not been fully completed at the time of writing, but it is

known that they will sign 9J2XR/M in Zambia, GW3XRM/M/ZE for Rhodesia and GW3XRM/M/ZS when in South Africa. Their French callsign will be F0NA, and 7Q7DD has been issued for Malawi.

If all has gone to plan, the Exhibition should have started out by about the time this appears in print—to arrive in South Africa during late August or early September. Arrangements for this ambitious and enterprising venture are in the hands of D. J. Dunn, GW3XRM, chairman, Cardiff University Trans-Africa Expedition, Students' Union, Dumfries Place, Cardiff.

HB VISITOR-LICENCE ARRANGEMENTS

We are informed that the Swiss authorities are now prepared to issue a special three-month licence—with callsigns in the sequence HB9XBA-XBZ—for visitors to Switzerland this summer. Application should be made to the Posts & Telegraphs Dept. (P.T.T.), Berne, with a photostat of the current U.K. licence held.

OFF-THE-BANDS LISTENING

We have again to remind readers, and SWL's in particular, that it is contrary to the terms of the ordinary BC/TV receiving licence to listen on frequencies other than public broadcasting and amateur. There are international agreements about this, aimed to preserve “the secrecy of correspondence”—like not having your mail opened or your telephone tapped. It has often been suggested that we could make an interesting feature about “Off-The-Bands Listening,” such as ships, coast stations, aircraft, airports, police, emergency services and so on. Certainly, we could! But equally certainly it would lead to big trouble for everybody concerned!

COMMUNICATION and DX NEWS

E. P. Essery, G3KFE

QUITE a month to report for most people; although it has to be admitted that for the family men the Christmas period is one when the QRM from harmonics demanding instant repairs to this-or-that just as the band is opening is rather frustrating. And, of course, the extra food and drink tends to make one doze in the armchair when one could be up and doing—or even to make one a little slow on the uptake when operating. Then, before one has time to savour the new bit of gear, the uncivilised British rite of sending all the demand notes out signals the beginning of a New Year. Nonetheless, DX has been there a lot of it has been worked. It's a great life—if you can stand the pace!

Around the Bands

Some readers at least may remember the "Amateur Radio Friends of Ockendon" venture—helping children displaced by various catastrophes, originally World War II, but of late years from Tibet, Biafra and such situations. One of the ways in which they have been helped is financially, and for several years an annual figure of £40 or so has been achieved by means of an operating certificate. Basically, to become a "Friend of Ockendon" you have to work a number of other Friends, make a donation and hence gain the certificate. In the early days this was far from easy, but now many more members are about, a couple of "advanced certificates" are being made available. For one, you have to work fifty of the existing Friends of Ockendon, and make a donation of one pound; for the other, the same donation plus twenty-five Friends in 25 different countries. A third one may well interest the mobile fraternity—a *personal* QSO with five members and a donation of five bob. All the proceeds are devoted to the work of feeding, clothing and educating the youngsters at Ockendon. Your E.P.E. is not over-much in favour of many of the certificates and

awards that are nowadays offered, but here is one that could not only cover that patch on the shack wall, but also means that practical help has gone to a worthy charity. For all the information: G2FUX, *QTHR*.

Contests

The big one to mention this time is undoubtedly the **ARRL DX Contest**. Phone weekends are *February 1-2* and *March 1-2*, with the CW ends over *February 15-16* and *March 15-16*. All the details were in the December issue of *QST*, but suffice it here to say that the contest exchange is signal report

plus a three-figure number representing the watts input to the final stage. Mailing deadline is April 12, and the address is ARRL Communications Department, 225 Main Street, Newington, Conn., 06111, U.S.A.

From Geneva, the International Amateur Radio Club (I.A.R.C.) run a contest with the objective of gathering in propagation data; CW and RTTY *March 1 to 16*, and (AM/SSB) Phone *March 29 to April 13*. The object of the exercise is to work stations in as many Zones as possible. Categories are single operator, single and all-

SIX-BAND DX TABLE
(All-Time Post War)

Station	Countries	28 mc	21 mc	14 mc	7 mc	3.5 mc	1.8 mc
G2DC	335	169	307	327	165	109	20
G3IGW	204	127	152	168	122	86	42
G3DO	334	192	231	327	90	83	9
G3IAR	221	126	161	193	91	73	12
W6AM	348	131	140	347	116	54	7
G3PQF	153	93	42	84	84	49	11
G8DI	187	80	132	164	77	46	8
G3NOF	311	161	207	295	34	39	2
G3KOR	163	40	57	135	52	39	23
G3SED	128	20	18	62	43	39	38
G3LZQ	254	138	155	201	72	38	8
G3WJS	60	—	8	47	35	38	13
G3VPS	105	16	28	81	50	34	14
G3NYQ	147	35	70	107	40	30	21
G3VDL	137	47	98	100	45	22	—
G3WPO	?	11	9	40	28	20	20
G3IDG	122	74	89	55	27	19	11
G3MDW	116	47	66	83	20	15	7
G3EJA	106	100	23	51	22	12	2

Note: Placings this month are based on the "3.5 mc" Column.

band; multi-operator all-band; RTTY all-band; mobile all-band. In all sections, total from all modes and all bands count. Exchange reports plus your own Zone; score one point for each QSO and one for each Zone worked on each band as a multiplier, so that the final score is QSO points *times* the total number of zones worked on all bands. (A contact with your own zone counts only for multiplier purposes.) You may work the same station as often and for as long as you like but if the QSO is more than of six minutes, an additional entry is required for each period of six minutes of the QSO(!). Times, of course, in GMT, all bands from Top to Ten. Log forms and summary sheets are obtainable from I.A.R.C., Box 6, 1211 Geneva 20, Switzerland; and the logs when completed are to be posted by June 1. Certificates to all who make more than 100 valid QSO's and to top scorers in each zone area. Although this event is in the shape of a contest, its value is more in the random distribution of contacts over a specified period—a form of scientific exercise which amateurs are in a unique position to take part in—and which should produce data otherwise almost impossible to gather. (It is much to be regretted that for this event the I.A.R.C. has chosen to adopt a Zone definition slightly different from the accepted one, known throughout the world—but this does not detract from the interest of their event as a QSO party.)

From 0200 GMT March 15 to the same time on March 17 (out of which a maximum of 36 hours of operation is permitted) is the form as far as the 1969 Spring BARTG RTTY Contest is concerned. Eighty to Ten are the bands, one QSO per station per band, swapping message number, time in GMT, country and continent, KL7, KH6 and VO scoring as separate countries. QSO's with stations in one's own country are worth two points, with stations elsewhere ten, plus a bonus of 200 points per country. Total is contact points *times* countries worked points, *times* continents worked. Logs to be separate for each band, to indicate "rest periods," and to show Band, Message Number, Time GMT and Continents, and to be sent to arrive

before May 5, to G8CDW, 33B Windmill Hill, Enfield, Middx. The changed form is mainly to enable speedier processing of the RTTY logs. Two top scorers in each country will receive a certificate.

Incidentally, the 1968 BARTG Contest results have come out and show I1KG as winner, and G6JF in seventh place as top U.K. RTTY contest operator.

The 160-metre Band

Quite a mixed bag of reports on the "real DX" front this time. Perhaps the most interesting one is that from G3TSS, who heard VK3BM at 0100z, called him but got no contact; a GW3 also called without success at the same time (Date not stated!). QRG was 1812 kc. This does sound a possible, albeit there have been quite a few piratical pests around on Top Band of late. It will be interesting to see the outcome. As for the known pirates, G3SED reports that "9A1VF," "EP2BK/MM," and "6W8CW" are all confirmed to be NBG—the "6W8CW" was giving name of Stew and doing a roaring trade—while Jan, DL9KRA, the real owner of that call, was busy flying an aeroplane to earn his crust! However, it is so well known that there is a real 6W8CW who could, and has, appeared on 160 metres that it is not surprising quite a few fell for him. Incidentally, G3SED has changed his aerial system since being in his new QTH at Portchester, and finds the U.K. reports are down on the old system. However, he will keep it up for a couple of years so as to evaluate it properly against the previous inverted-vee.

Still on the problem of phoneyes, G3IGW (Halifax) mentions the presence of a station signing "TF9AA," about which he has his doubts, as it is not believed the TF's have been able to obtain authority for Top Band—anyone know anything?

Reverting to G3TSS, Colin mentions also a QSO he had with "LK1AR," claiming to be on Marion Island, and "QSL via W4STY"—which seems a little odd, to put it mildly. One cannot see a new prefix being allocated for Marion Is. (for Top Band) while ZS2MI is still around on the HF

ALL-BAND ZONES AND PREFIXES TABLE

Starting date: January 1, 1968

Station	Zones	Prefixes
G3IAR	40	392
G3LZQ	40	382
G3WSL	33	335
G3PQF	31	240
G3SED	29	141
G3AAQ/M	27	243
G3VPS	26	240
G3IDG	24	118
G3WPO	23	196
G3WJS	19	216

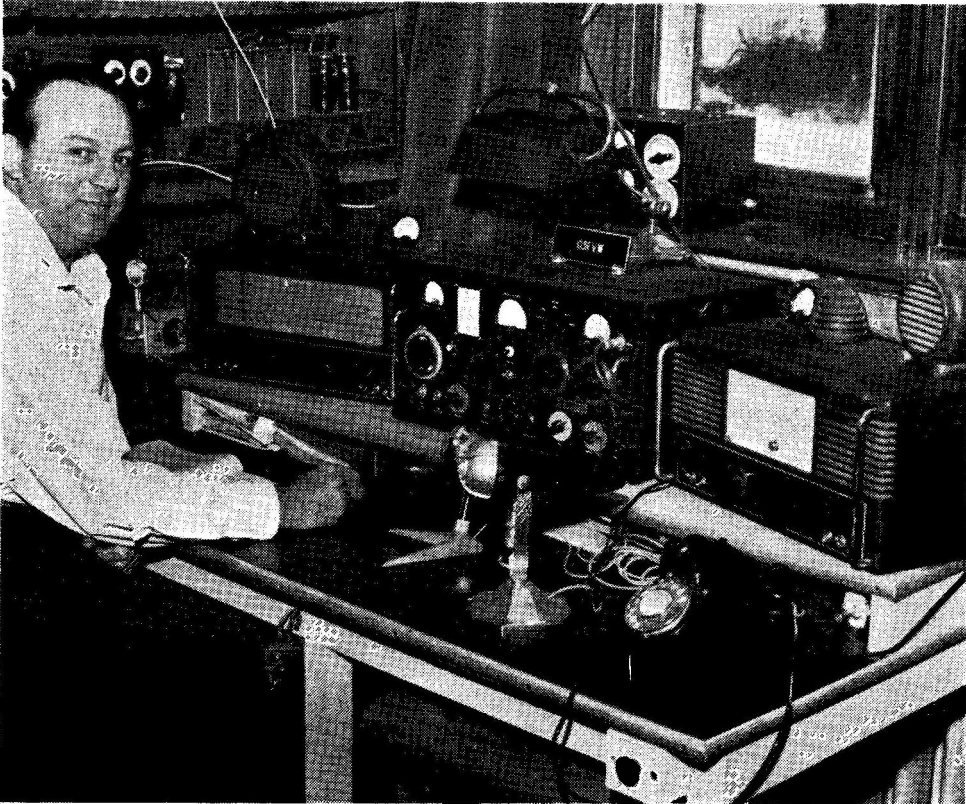
bands with his old call, which has been in use for Marion Is. for years!

EU/JA tests are now definitely organised, and indeed the first few dates are past history; sadly, WIBB's "flash" on this one arrived just too late for last month's piece. However, February 2 and 15 are still left—2000-2200z, and the JA's will be listening on 1823-1827 kc, with their own signals on 1907.5 to 1912.5 kc, CW. A pity they are compelled to use this particular area, as it is so popular for local SSB nattering—so a bit of give-and-take by the G's in keeping this part of the band clear for these DX/CW tests would be well received.

A Top Band station in 5R8 is on the cards, as G13PLL (*ex* ZB2AO) is off there at the end of January, and staying till March. Dick will be on all bands, using a Courier CTR-1 transceiver; it is hoped the call allocated will be 5R8AO.

Now to the more domestic news of 160 metres—of counties and matters of like nature. G3VLX (Sidcup) has been less active than usual, owing to "the cussedness of an inanimate object"—in this case, his new linear. Nonetheless, Deryck managed to find GM3TKV in Banff and Moray, ZB2AY and GM3VIO/A, in the intervals between muttering imprecations at the box-of-tricks.

Activity from G3KFE was a little thin during the period, oddly enough again due to defects in the machinery. But pretty well every foray on Top Band produced something of interest, with GM3VIO/A and GC3UJE



Gordon Brown, G3FVW, of Killerley Hall, Clayton, near Scarborough, Yorkshire, actually started as VS1AJ, Singapore, in 1945. The gear shown here was built largely from parts of British, American and Japanese origin, ex-equipment—indeed, at one time this station was run from a Japanese generator, with accumulator supply. His main Rx is an Eddystone S.750 (left on bench), much modified, and on the right is an Eddystone S.640, also brought up to date. Aerials include a half-wave end-fed for 160m., having the current antinode at the right point (in the clear), and a K.W. trap dipole. All bands are worked, and G3FVW is also /M on Top Band. Like many others, he is now planning a rebuild for SSB.

(Guernsey) as the high spots, both coming back first call at times when there just was not time to stick around had the first call not done the trick. Perhaps the greatest pleasure was hearing a thumping great signal from G3SVK—who for so long has adorned this piece pretty well every month as GM3SVK, GC3SVK and other interesting calls.

G3AAQ (Swinford) writes to report himself operational again from the new QTH, just inside the Leicestershire border although the postal address is Warwickshire. A local SWL was prevailed upon to help put up a half-wave end-fed, which has made life much more interesting on all bands, albeit it has mainly been used to renew old friendships on One-Sixty and, at the

beginning of January, to hear KV4FZ and 9H1MF at 0523z. Testing out this wire has shown, rather as would have been expected, that it is very good over about 75 miles but not so hot for the more local stuff—so because of this Jake has not yet found the Stourbridge gang, to his chagrin.

The silence from GI3WSS (Holywood, Co. Down) for the past couple of months is now explained, in that Cyril has been busy re-organising the shack to cater for his new toy, which is a Sphinx SSB transmitter. Operation has now become half-and-half CW and SSB and as a result the counties score has taken a lift. GC3SVK was booked in for Guernsey, where he was busily demonstrating that the old touch

has not deserted him; GM3WIG, G6VQ (CW), GW3DZJ for Flint; G3OVQ for Cambridge; and GM3TKV for Moray. Outstanding counties are Oxford and Cumberland, still to be picked out of the scrum.

G3XGD managed to get home on vacation over Christmas, having hitch-hiked to Sheffield *via* Haverhill, Suffolk; when he got back and fired up the gear the only QSO recorded at any distance was—Haverhill!

Now to G2HKU (Sheppey), who adds a rider to your scribe's preamble last time about the many facets of Amateur Radio activity, by suggesting to the CW types that they alternate between a straight pump-handle, an ordinary bug, and an el-bug. (It is surprising, he says, how

difficult it is to convert from one to another again after a period.) SSB gave Ted QSO's with PA0PN, GW3NMF, GM3VIO/A (for Sutherland); GM3WIG, Roxburgh; and GC3UJE who has now become permanent in Guernsey. The G2HKU CW yielded contacts with various OK's, GM3PFQ, DJ7YR and GW3XJC.

G3XTU (Mansfield) has filled in all English counties with the sole exception of Oxfordshire, and has busily been booking in the Scottish ones, all CW. Quite a lot of people regard Cumberland as one of the difficulties in the county-chasing game and so it is odd to hear from G3MNL (Carlisle) that he and the locals have a net most evenings at 8.0 p.m. on 1920 kc, which has been running for *eight* months now—they leave gaps regularly for breakers, and yet to date there have been *no takers!*

Good old Best Bent Wire is the radiating element at G3XDY (Cleethorpes) who has been on the air for nearly a year, and just manages to qualify for the first showing of the new table next time; his 120 feet hangs all of 15ft. up in the air, but nonetheless has yielded him fourteen counties so far; plans are in hand for a 60ft. loaded vertical, which will require a large amount of wire putting into the ground if it is really to give of its best. Incidentally, John complains that his luck last summer with the DX-peditions was just that he managed to be on holiday at all the wrong times and so missed out on a dozen possible new ones!

A novel idea for a constructional article is called for by GM3UVL (Bearsden, Dunbartonshire) who wants to see a piece on "how to build a simple cross-bow for putting up aerials in trees." In fact, although your old scribe has tried a long-bow (with a county champion archer to fire it) the result was more spectacular than useful, and definitely dangerous when the cord broke at blast-off. There is another technique to the same end (apart from climbing the tree) which is to put aside a few rockets from Bonfire Night and use these, with a light line attached—it's dead easy if you can get the aim right. Incidentally, Bill offers a good idea for Top Band operators using a Monimatch—

which is to have a one-transistor DC amplifier in front of the meter, to make the device much more sensitive on 1.8 mc. The circuit is often known as the "Millimatch," and appears to have been largely overlooked in the U.K.

Nice to hear from G3WJS (Halstead) who had a break from his University work over Christmas, and was rewarded with a crop of interesting stations: DL3FF, DL9KRA, OE5XPL, PA0FCM, and OK's were worked, along with the piratical "6W8CW," the heard including W's, KV4FZ, OH's and ZB2AY.

Another one to return to the fold after an absence is G3MDW (Halifax) who will be on the air signing G3MDW/W1 and/W2, with possible operation from VE3, as he is taking a trip to the States to present W1BB with his certificate of honorary membership of the Northern Heights Radio Club. Look out for him between the end of April to around May 19.

Does anyone want an SWL report on their signals either on 160 metres or any of the other five allocations? G3UOF/MM is in a tanker which finds its way to various "far-away places with strange names" and will listen out for anyone, although apparently he is not yet cleared for transmitting. Details from M. R. Wadsworth, G3UOF, Radio Officer, M.V. *British Judge*, c/o BP Tanker Co. Ltd., Britannic House, Moor Lane, London, E.C.2. If results are up to expectations Mike will also send a report into this piece, in due course.

A quick return to Top Band for the first time since last season pleased G3TKN (Wallasey) no end; Vincent found W1BB, W2RAA, W3MFW, VO1FB, W2FJ, W2PV, W2GGL and K1KSH, all between 0700 and 0900 BST. KV4FZ was heard, R5S6 on SSB at 0330, working a crop of Stateside stations. A lot of the improvement is believed to lie with the new aerial, which is a Marconi-type having a 70ft. near-vertical section worked against ground—which includes a load of buried copper wire radials, a water tank, counterpoises, a couple of wire fences and sundry other items, all linked together.

Another happy user of a Sphinx transmitter is G3WLW, who pleased

himself no end over Christmas by ringing the bell on Sideband with HB9T—although Bob is the first to admit that in his case also buried radials (meaning a good earth) have a lot to do with turning the trick.

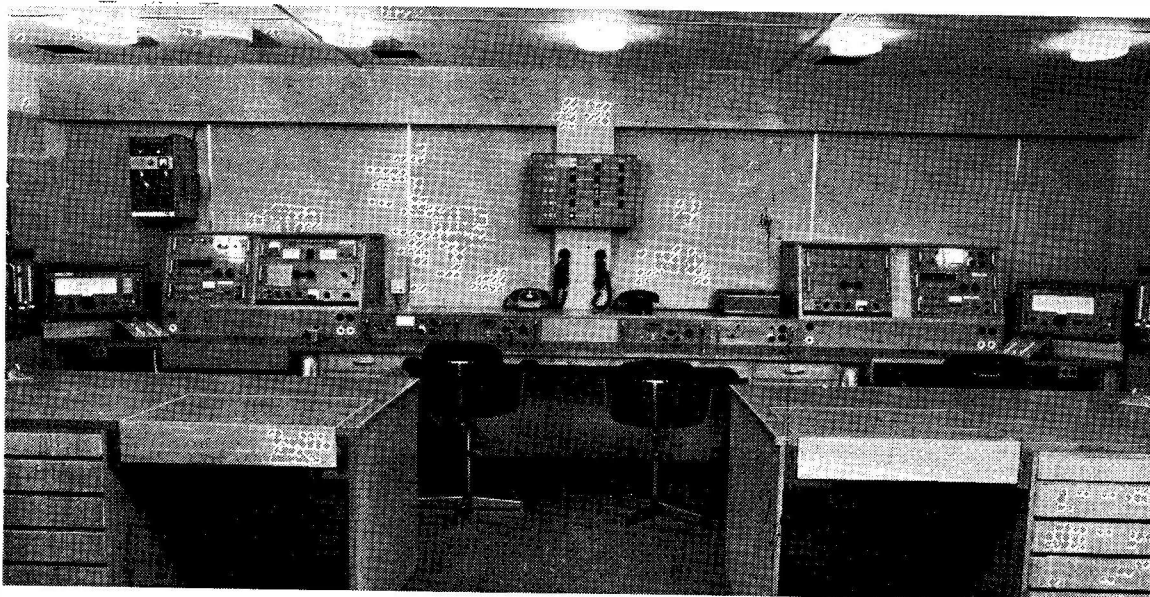
Forty and Eighty Metres

Oh, dear! What a neglected couple of bands these are! One supposes the activities of the "this is my frequency" brigade could be called "communication," although the mind boggles at the thought when listening to some of the QSO's on Eighty, and to the "DX-operating" of certain European operators on Forty. It has to be admitted that DX *can* be worked on these bands, either straight on CW or by keeping in with an SSB DX Net. Some people object to the way these lads are organised to work the stuff, but it has to be admitted that were it not for the way they go about it the clot-element could make things well-nigh impossible. Would that some of these goons could only know how they foul things up by their over-driven SSB or over-modulated AM! By looking at the result on a panadaptor or spectrum-

TOP BAND LADDER

(G3V-- and G3W-- stations only)

Station	Counties	Countries
G3VMW	97	21
G3VGR	94	16
G3VYF	92	19
G3WUD	92	14
G3VLX	88	13
G3WQQ	87	16
GW3VPL	85	18
G3WDW	83	9
G3WPO	82	18
G3VLT	80	16
G13WSS	78	10
G3VMK	74	19
G3VMQ	73	16
GW3WWN	67	8
G3VES	63	16
G3VOK	61	15
G3WJS	57	13
G3XTL	57	12
G3VPS	50	14
G3VWC	40	8



Not an amateur station at all—but the radio room of the new Cunarder "Queen Elizabeth II." She may have made rather an unfortunate start but that does not mean that everything goes wrong! Her radio gear has been supplied by the International Marine Radio Company (Croydon), founded in pre-war years by the late GW5WU, of Reardon-Smith's, Cardiff. He would be astonished to know that the contract price for the QE-2 installation was £70,000. Two operator positions are provided and eight transmitters, ranging from MF to VHF, give local, world-wide HF/CW/SSB, and passenger-cabin telephone communication to any part of the world. The transmitters are remote controlled from the operator positions and put 1 kW RF (or 1.5 kW for long-range working) into notch aerials cut in the funnel, selected by remote control for the bands required—from 1.5 to 25 mc (with any of 15 spot-frequency channels available in each of the marine bands at 4, 6, 8, 12, 16, 22 and 25 mc). The Rx side is taken care of by specialised general-coverage receivers, covering all modes and tunable over the whole spectrum from LF to VHF. This is a very fine commercial installation, of which all concerned can be proud.

analyser they would be more than shocked—but they seem to be blind as well as cloth-eared!

Just to prove the DX can be found, we kick off with G2HKU's report: Ted looked over *Eighty* and came up with VE1IE, WA2WMT, W3BMS and W4QCW, all SSB (the last three around 0700z) and OZ3FD, who is also licensed as OX3DX and whose father holds OZ4PC. CW gave UP2KBA as a new one for him on the band, also OY2H at 2205z. *Forty* metres produced PY2CSE, K4GSU/3 and W4UPJ, all CW.

A couple of new ones on *Eighty* for G3VPS (Hailsham) were VE1IE and LX1SL, together with UR2, EA and II on Sideband; while CW accounted for contacts with 9H1, W2MEL, and UP2—all rather pleasing to Peter as the VSWR on the feeder on this band is a bit *yeuch*.

A rather novel scheme is propounded by G3XYP (Navenby) in his letter this time—he proposes to put up a 40-metre inverted-Vee so as to be able to work *Eighty*! Reckon David didn't really mean that state-

ment. An inverted-Vee is also the aerial favoured for 3.5 mc by G3VMK, from his QTH at Abbots Langley. Dale did quite a bit on this band with his SB-101, and mentions QSO's with all W call areas, VK3APN (1900z), KV4CI, KV4FZ, PJ2VD, PJ0CC, VP9BO, UA9's, several ZL's, 3A2CJ, OY6FRA and SM5MX/OH0. As for *Forty*, all W call areas, ZL's, 4X4, ZD8Z (plus loads of the QRM) were put down in the log.

G13PLL, already mentioned in the Top Band context as regards his trip to 5R8, also intends to stir up the other bands while he is there, so the country seekers can keep an eye out for him on *Forty* and *Eighty*, as well as the HF bands.

The New Tables

These were discussed in detail in our December 1968 issue, on p.626. Suffice it for us to summarise by saying that the Six-Bander stays as it is, the Zones-and-Prefixes starts again from January 1 1969; the G3V-- and G3W-- list disappears and is replaced by a Table for

first-year operators showing Date of First Licence, Counties CW, Counties Phone, and Countries worked. As for the other Ladder, it remains Top Band Counties Worked and Confirmed All-Time—but we add a second disqualification of six months for *nil* entries. But there's nothing to prevent you starting at the bottom again!

And on the HF Bands

It is always the case that somebody who uses all bands, and writes in to talk about it, seems to be more prominent in these pages than a chap who has, maybe, worked more DX but done it all on one or two bands—or in some specialised way, like SSB on *Twenty*. But that's life! It is from the reports of our regular correspondents that the overall picture of the month is built up—it has to be admitted that there is nothing we can tell *them* that is news, and their help each month is therefore all the more appreciated. In fact, while we need to hear from them so that the real DX can be discussed, in the end this column is

mainly for the new operator, or the chap who only goes after the DX once in a while, or the laddie who has just worked (for him) something unusual and has his interest stimulated, and wants to find out what is going on, has recently gone on, and where that odd prefix not in the list hails from. For instance, G3WW (Wimblington, Cambs.) mentions his contact, early in December, with ZS2MI (Marion Island) who was on 14 mc AM, as being only the second time in 30 years around the bands that G3WW has heard a signal from this particular spot. Actually, ZS2MI has been around, on and off, for many years now, and his current QSL address is via P.O. Box 838, Germiston, South Africa.

VR6TC, Tom Christian, Pitcairn Island, keeps to the following programme: First Tuesday in the month on 21060 kc from 2130z, and 21350 kc SSB from 2200z. For a sked,

write well in advance to W5OLG, Box 261, Grapevine, Texas 76051, and state which Tuesday you propose to be on frequency. Then be there and listen for VR6TC to call you.

An odd one in the way of new prefixes heard recently was 4TA4OS, a special callsign allocated to OA4OS over the period December 27 to January 5. Those who heard or worked him can send their cards to OA4OS by the usual routes.

GM3JDR (Golspie) has been a strictly one-band merchant of late, his speciality being *Fifteen*. Don mentions that he is well and truly hammered by non-DX stations calling him in order to add GM to their collection for the 5-Band DXCC (recently started by ARRL). CW yielded, apart from these keen chaps, ZS6MM, W7ITN, EA8FH, PY2DB, UA0SL, ZC4JH, ZS6SX, JX3P, UA9GE, UD6AR, WA7ISO, UL7BF, W7EZC, HH9DL, K7KHA, W5IBQ, HI8IB and HK3RQ. In the Sideband modes appear VK3ABA, VK7GK, PY7LCL, SV0WL, HR3AC, YN1HSM, PY1CVT, 4X4QO, 6Y5AD, ZC4MO, HB0LL, SK2AU, MP4BGA, TF2WLJ, VK3VK, UD6HB, LX1FH, SK0TM, SK2AU and UD6BD. At the time of writing the band up there was closing by about 1830z, but by March the state of things should alter enough for the JA's and such to put in an appearance at a time when GM3JDR can be on to work them.

Last month we mentioned the first efforts of G3XYP (Navenby), on the HF bands, and this time we have another interesting letter from David. One evening he was in QSO with a UA when, to use his own description, "the band just erupted." The QSO had to be cut short, and G3XYP moved up a little to see what all the rumpus was about; it turned out to be half the U.S. calling XZ2BW. Suddenly someone said "He's gone QRT" and from then it was just like people drifting away at the end of a party. David wonders whether this one was in fact genuine and adds

a very reasonable comment that if he were OK, the size of the pile-up would surely have scared him off the band for six months! In terms of QSO's this month, G3XYP mentions 14 mc as having given HV3SJ, KH6's, VP8FL, VP8KD, VP8JT, YK1AA, 4TA4OS and 6W8DY. *Fifteen* produced HR2WTA, LG5LG, VK3XB, VS6AL and YA5RG. As for *Ten*, attention to the details resulted in HP1EM, KZ5EK, VP2MK, VP8KD and 9F3USA. There are not many operators with this sort of stuff to show for their pains in their second month on the air—and it only goes to prove the old truth that a good SWL serves an apprenticeship with a receiver which will set him quite a way up over the others when once the ticket is finally obtained.

A trick worked by G3VPS (Wartling) with some considerable advantage was to try a CQ call just as *Twenty* was beginning to go out. This resulted in contacts with W6 and W7, KP4, PZ1 and CN8. Other sessions gave VP2MK—all so far CW QSO's, while SSB made 9H1, plus a crop of W/VE contacts. Neither *Twenty* nor *Fifteen* (on which 9H1, W's and ZC4 were booked in) received very much attention as compared with *Ten*, but it did not give a great increase either, as only Stateside stations were collected. Nonetheless, the countries score has taken a further upward turn with three new ones, by way of the LX, PZ1 and VP2.

Beastly Summer Time, as A. P. Herbert so fairly describes our present tinkering-with-time, is a nuisance to most amateurs, who for years have worked all their best stuff in the mornings before going to work. Such a one is G2HKU, who finds it is virtually impossible to make a go of his regular sked with ZL2KP, ZL3JQ and ZL3SE at 0645z, though when an attempt is made at 0800z S8 is about the form in both directions. Bad enough having to go to work in the dark, but worse to be frustrated as well!

An interesting letter from G3WLW

TOP BAND COUNTIES LADDER

Station	Confirmed	Worked
<i>Phone and CW</i>		
G2NJ	98	98
GM3UVL	98	98
G3APA	95	96
G3SED	93	95
G2HKU	90	94
G3WPO	78	84
G3WQQ	74	87
G13WSS	72	82
G8HX	72	81
G3VLX	63	88
G3IDG	55	61
G3WJS	52	80
G3VPS	27	50
G3XTL	26	57
G3XGD	25	54
<i>Phone only</i>		
G2NJ	98	98
G3VGB	81	90
G3MDW	67	82
G3WPO	62	70
G3PQF	52	76

(Failure to report for three months entails removal from this Table. Claims may be made at any time.)

(Huddersfield) concerns mainly odd items not relevant here, but Bob recalls a recent QSO with TA3AB which pleased him no end. As we have already seen, he has recently acquired a Sphinx, but frankly did not think very seriously about getting at the DX with 50 watts p.e.p. of SSB. Actually, it is surprising what can be worked with low power—but it puts a major premium on operating ability in avoiding rather than trying to compete with the QRM.

One always tends to think of G3IGW in terms of Top Band, but a glance at the six-band table shows this to be far from the case. This time Mike refers to his efforts on Ten in the CQ Contest with CW, using only his sloping long-wire, as an encouragement to the people who, for one reason or another, cannot sport a beam. The QSO's included EP2BQ, HZ1AB, PJ2VD, PJ0CC, UH8AE, UH8BO, UI8AT, VQ8CC, VS6AA, SV0WN, ZD5X, 5R8AM and 9F3USA. Of 147 W/VE stations worked during the Contest it is interesting to note that half gave reports of 589 or better to G3IGW.

Nice to hear G3AAQ coming back to the surface after all the

kerfuffle of moving to Rugby last September. Jake discusses his activity during the year: The /M gear gave QSO with 91 countries, 27 Zones and 243 prefixes, the vast majority of which were in the period prior to the move. The best DX in the G3AAQ eyes was XW8, VQ8CC, VP8, 9M2, ET3, CR6, CR7, ZL and several VK contacts. The same long-wire that was referred to in the Top Band context seems to be going very well on the HF bands, although as yet it has not had a real airing. As a reserve addition to this wire there is always the Joystick, which has successfully worked ZS5UT/MM, among others, from the new place.

Here and There

It is interesting to see the YB stations are being given permission to work the U.S.—and almost immediately after to find YB0AAB popping up on the band with a QSL address as follows: c/o American Embassy, Djakarta, APO San Francisco 96356.

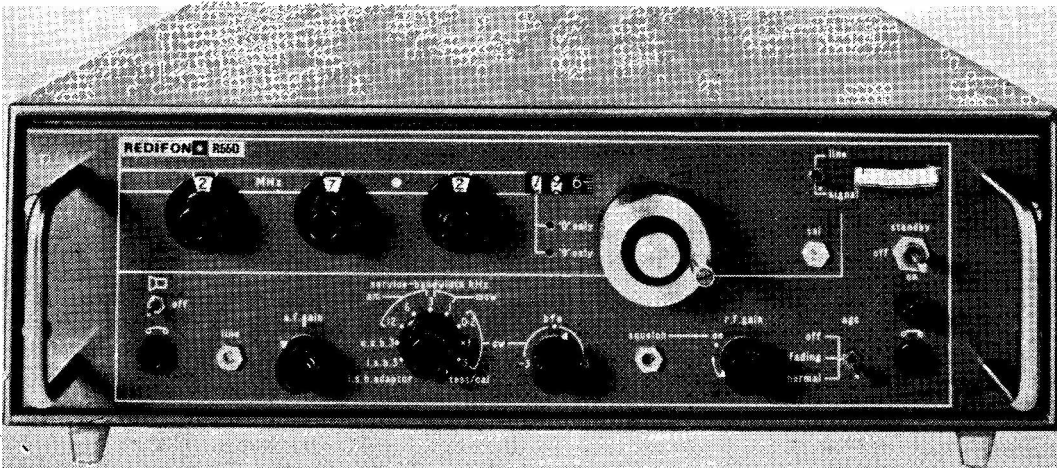
As this piece comes to the book-stalls, KH6GLU and VE6AJT will be appearing for FW8 for six days; operating all bands, twelve hours a day, one using a Swan 500C and

two VFO's, while t'other has a FTDX-100 transceiver. One QSO per band per mode per station, and after this look out for them for another four days from 5W1. CW frequencies to monitor are 5 kc up from the LF band-edge of each band, *Eighty to Ten*. Phone frequencies 3795, 7095, 14195, 21295, 28495 kc. Call as directed and *not* on his own frequency.

Another one to listen for will be VP2MK (Montserrat) who is W8EWS in disguise, and he is going to have a fair old pile of QSL cards to handle when he returns home on April 1. Those who remember VQ8CC but missed out on either Rodrigues and St. Brandon will be pleased to hear that VQ8CC proposes to go there between March and May before returning on holiday to the U.K. Further details should appear in due course.

The Islands-on-the-Air 'chasers who want Campbell Island could well note that ZL5AA/3 was heard to say he would be on from there by the time this reaches print for a period of a couple of months.

The deadline for March is **Monday, February 10**, addressed CDXN, SHORT WAVE MAGAZINE, BUCKINGHAM. 73, es DX.



The Redifon "Altair" R.550 is a new general-purpose communications receiver, giving continuous coverage over the range 200 kc to 30 mc, with tuning across 100 kc sweeps to give digital read-out to 10 cycles, calibration accuracy always being within 25 cycles. The circuitry is double-conversion, with the IF's at 38 mc and 1.4 mc, and special attention has been paid to front-end protection—the R.550 will tolerate 30v. across its 50-ohm input terminals, meaning that it can be positioned for operation in the near vicinity of kilowatt transmitters. Reception modes are SSB (USB or LSB) DSB, MCW and CW. The selectivity adjustment varies from 200 c.p.s. on CW to 3 kc on SSB, and for sensitivity the optimum figures are (for 500 mW AF output) 0.5 μ V input on CW for an S/N ratio of better than 21 dB. The variable BFO has a 6 kc swing across zero-beat. Squelch level control is provided, for noise suppression in point-to-point working, or when tuning between stations with the Rx at full sensitivity. The Redifon R.550 measures 5in. by 19in. across the panel, and is 15in. deep, panel to rear chassis drop. It weighs 35 lbs., and takes 40 watts from a mains source.

THE least said about conditions this month the better! With the exception of a couple of minor lifts in mid-December and during the first week of January, both activity and propagation conditions have been very poor. Even the customary Christmas Day morning and New Year's Eve periods seemed flat this year, with little over hundred mile ranges to be heard or worked. The highlight was probably the advent of OZ1OF in "EQ68f" and OZ5HF in "EQ65d" on Two, right out of the blue, on the night of December 12. Some weak DJ/DL stations were coming through at the time but ducting was much in evidence, as signal strengths were very low in the South-East. OZ5HF was also on 70 cm. that evening, working G. Pressure during the SSB Contest on January 13, the first VHF event this year, was down to 980 mB in the South and high winds and disturbed weather generally must have played a large part in the disappointing results, of which many participants complain.

Three Band Annual VHF Tables

Congratulations go to John Butcher, G3LAS (Hertford Heath, Herts) as the overall winner of the 1968 Three-Band Annual VHF Tables by a handsome margin. He receives one year's free subscription to SHORT WAVE MAGAZINE to mark the achievement.

Roger Hargreaves, G3OHH, from that excellent Mow Cop site, carries off the Four-Metre Section with a lead of nine points over G3LAS. The team of G3OHH and G3TEY (which is likely to become permanent in May of this year) seems to put in a consistently good signal over most of the country, and it would have been surprising if they had not pulled this off.

To G8AEJ (London, S.E.20) goes the top placing in the 70 cm. Table. Bill has been a keen operator on this band for some time now and it is hoped that this will continue to be so even though it must now be shared with operation on 23 centimetres.

(Modesty forbids further mention of the leading station in the two-metre placings!)

Thanks go to all readers who have

VHF BANDS

A. H. DORMER, G3DAH

supported this project, with a gentle reminder that the Tables have started again, with effect from **January 1, 1969**, and that claims should be sent in as regularly as possible so that the results can be kept up-to-date. If it appears warranted, a Table for 23 cm. will be started, but with the comparatively low level of activity on that band it remains to be seen whether there are enough entries to make it worth while from the general interest point of view.

Location Systems

The rumbles and squeaks in the "corridors of power"(!) and elsewhere on the pros and cons of locator systems are still to be heard. All of which is very surprising when the issue would appear to be quite clear-cut. Granted that there are many amateurs who dislike location systems *per se*, and prefer to give the QTH as "Little-Piddlington-in-the-Marsh," (and to them good luck and the following remarks do not apply) one is left with those who like the QRA system, those who don't, and those who would prefer some other abbreviated means of identifying a distant position. Let us take a look at the requirement in the context of a contest, where scores are based on points per unit

distance. It is here that the greatest accuracy is required. Lat. and Long. pin-points are capable of giving great accuracy but require the transmission of at least *ten* alpha-numerical symbols (some would say fourteen) and this all takes time during a CW Contest when that commodity is at a premium and when conditions are poor. The alternative which is being offered is the NATO *Georef* system, but even this requires the transmission of at least a six-symbol group and it is doubtful whether suitable maps are available for all the countries with which we may be concerned during a VHF Contest, particularly on the Iron Curtain side.

This leaves the *QRA Locator* system which requires a five-symbol group only to give a position with an accuracy that has long been accepted by all European authorities organising Contests, if not by all individuals.

Now, the question of general applicability: Lat. and Long. are obviously in general use. Most operators can lay their hands on maps with a Lat./Long. overprint and the method of using the system is well known. Not so with *Georef*, which is not in general, wide-spread use, not understood by most operators, and for which suitable maps are not readily available. (A recent enquiry to a well-known firm in London who supply Admiralty Charts and the like, produced the answer "What is *Georef*, then"?) This leaves QRA, which is in general use in this country and most of the Continental countries also, for which maps are easily obtainable at low cost, and which is simple to use. It is rubbish to say that "high mathematical ability" is required to work out a *QRA Locator*, one's own or anyone else's, and for those who doubt this statement, reference should be made to the excellent articles which have been written by G3HRH and G3JKY, which show that the whole operation need not take more than a few minutes.

The next aspect to be considered is ease of use. Taking a 1 : 1,000,000 scale as a basis, a Lat./Long. or *Georef* map covering the British Isles is of the order of 3ft. by 3ft. 6in. in size. If one wanted to cover down as far as Spain in the South, Norway in the North and Czechoslovakia in

the East (all of which countries have been worked fairly frequently on VHF) then twelve maps covering an area of 14ft. by 9ft. would be required. This is nearly 130 sq. ft. of wall space, if one wished to display them for quick reference—to get a beam heading for example. The alternative is to use a 1 : 2,500,000 scale, but then the accuracy with which degrees and minutes can be read is no greater than with the existing *QRA Locator Map*. The situation with the expensive HB9RG “QRA Locator Maps” is just about as bad. There are four charts comprising the series with a total area of 36 sq. ft. and a scale of 1 : 2,500,000. This is better—but the maps extend as far as Israel, well into Russia and down into Egypt—a little optimistic for even four metres—and, this is the crunch, two maps are required to cover the British Isles and Western Europe and one can only buy the complete set, and that for 32s. 6d.! The ON4IB *QRA Locator Map* costs 7s. 6d., covers most of the area required (*pace* GM) and is 2½ft. square. Any system which requires the transfer of a distance and bearing to a second chart is a confounded nuisance when working out contest scores on the usual basis of points per distance covered, whether actual distances are required or range brackets, and for Contest Committee members becomes more than a nuisance when entries total 100 or more, as they can well do. A single chart with a simple range overlay is the only logical answer.

Accuracy now : Both Lat. and Long. and *Georef* do offer extreme accuracies, but far better than is in fact required for normal contest purposes. The standard ON4IB *QRA Locator Map* is accurate to within 2½ km. and this is virtually all that is required for U.K. and IARU Contest purposes. There will be minor errors, but these will tend to cancel out with a multiplicity of contacts on different bearings, and anyway they will be the same for everyone, since very nearly all British and Continental Contests now call for the exchange of a *QRA Locator*, and the ON4IB issue is in wide-spread use by the whole of the European VHF fraternity.

So, to sum up, *QRA Locators* offer a speedy and simple means of

exchanging location information, they are already in wide-spread use, charts are readily available at low cost and give adequate accuracy for the type of contest with which we are concerned. A statistically significant sample of adverse comment from among the thousands of VHF operators in this and other IARU countries is what is required before a change from the in-use system should be accepted as necessary or desirable. At present it seems that the current manifestation of noisy protest from a vociferous minority is, regrettably, spreading into the field of Amateur Radio, too.

VHFCC Awards

Awards this month go to G3EJA, G8AWO, G8AZU, G2CDX, G8AUE and G8ATK. Congratulations to them all.

Bob Nash, G3EJA, gets his Award for operation on two metres from a QTH in Reading, Berks. The gear consists of the usual xtal chain to an 829B, modulated by a pair of KT66's and under normal circumstances runs about 75 watts input. The intention is to replace the 829B with a QQV06-40A. His receiver consists of a nuvistor converter into an AR88 tuning 24-26 mc. The aerial is a five-element

THREE-BAND ANNUAL VHF TABLE

January to December, 1968

FINAL PLACINGS

Station	FOUR METRES		TWO METRES		70 CENTIMETRES		TOTAL pts.
	Counties	Countries	Counties	Countries	Counties	Countries	
G3LAS	41	5	51	15	17	3	132
G3DAH	26	2	53	15	10	2	108
G8BBB	—	—	53	13	34	7	107
G3COJ	10	3	45	10	25	3	96
G8AEJ	—	—	32	7	37	8	84
G8AUE	—	—	38	4	33	3	78
G2AXI	18	2	34	4	5	1	64
G8AAZ	—	—	38	8	16	1	63
EI6AS	17	7	32	6	—	—	62
G3OHH	48	7	—	—	—	—	55
G8APZ	—	—	33	5	9	1	48
G3FIJ	3	1	20	4	17	2	47
G3AHB	—	—	28	5	7	2	42
G8BNR	—	—	35	6	—	—	41
G8BJK	—	—	33	6	—	—	39
G3WW	—	—	32	7	—	—	39
G8AUN	—	—	26	8	—	—	34
G3XFW	—	—	15	4	11	2	32
G8AYN	—	—	18	2	11	1	32
G8APJ	—	—	20	4	6	1	31
G8APX	—	—	16	2	11	2	31
G2AIW	—	—	27	4	—	—	31
G8BJC	—	—	16	4	—	—	20
GC8AAZ	—	—	14	4	—	—	18

Position overall is shown in the last column of this Table, which closed on December 31, 1968. The Table opened again v.e.f. January 1st, 1969, and claims for the new listings should be made as they accrue.

Yagi at about 35ft., mounted on the same hand-rotated mast as the four-metre and 70 cm beams. QTH is about 180ft. a.s.l. with a good take-off in all directions but the North, where the Chilterns form a barrier. Best heading is east along the Thames valley. The four-metre gear consists of an 832A running 25 watts input and modulated with a pair of 6V6's; the 4-metre converter is an old-faithful 6AK5 job tuning 2-4 mc into an AR77, and the antenna a 4-ele Yagi. On 70 cm, a separate two-metre driver pushes a QQV03-20A tripler to about 17 watts input, again modulated by 6V6's. Care has been taken to reduce the two-metre radiation from this set-up to a minimum. The converter is a GMO-290 RF stage followed by a GMO-290 mixer and first IF stage tuning 28-30 mc, again into the AR88; antenna is a *J-Beam* Skybeam. Bob wonders what has happened to the Monday night activity on 70 cm (as indeed many do) but perhaps the re-introduction of the Cumulatives will help to step up the activity, at least on Saturdays.

G8AWO, Ron Gray, operates from Welwyn Garden City. His QTH is 265ft. a.s.l. with gently rising ground to the South and West. The surroundings are fairly well wooded, which makes take-off to the West and North a little tricky. The antennae are at 40ft. (shortly to be increased to 50ft. by the construction of a lattice tower) the two-metre beam being a 10-ele Yagi and the 70 cm radiator a pair of 18-ele *J-Beam* Parabeads. The Tx on 70 cm runs 100 watts to a 4X150A (which is now just about on its last legs) screen-grid modulated by a pair of EL84's; drive is developed from a ten-watt two metre rig, with a QQV03-20A in the final, to a BAY96 varactor—with a high-Q break! The final 70 cm. amplifier is a QQV06-40A in a cavity. For reception, the set-up is a BF180 trough line pre-amp. into a Gazeley converter, tuning 10-20 mc, to an AR88D as main IF/AF strip. The two-metre gear consists of the 50 mW rig previously described and a G3BKQ-type converter tuning 18-20 mc, as for 70 cm. The greater part of the operating time is spent on 70 cm trying to work new stations, a task which Ron says is getting more and more

difficult, but even so he has knocked off 38 counties and 8 countries, with the best DX as OZ7SP and G3ILO.

The award to Brian Coleman, G8AZU, is for two-metre operation, at which he has done phenomenally well with an output which is usually

under one watt. The line-up is an OC170 or BSY26 transistor oscillator on 24 mc, 2N708 tripler, P.346A doubler, P.346A driver and UI.5905-2 PA, the latter being the "high power" version of the P.346A. For reception, Brian uses a

THREE-BAND ANNUAL VHF TABLE

January to December, 1968

FINAL PLACINGS BY BANDS

FOUR METRES			
Station	Counties	Countries	Total
G3OHH	48	7	55
G3LAS	41	5	46
G3DAH	26	2	28
EI6AS	17	7	24
G2AX1	18	2	20
G3COJ	10	3	13
G3FIJ	3	1	4

TWO METRES			
Station	Counties	Countries	Total
G3DAH	53	15	68
G3LAS	51	15	66
G8BBB	53	13	66
G3COJ	45	10	55
G8AAZ	38	8	46
G8AUE	38	4	42
G8BNR	35	6	41
G8BJK	33	6	39
G8AEJ	32	7	39
G3WW	32	7	39
G2AX1	34	4	38
EI6AS	32	6	38
G8APZ	33	5	38
G8AUN	26	8	34
G3AHB	28	5	33
G2AIW	27	4	31
G8APJ	20	4	24
G3FIJ	20	4	24
G8BJC	16	4	20
G8AYN	18	2	20
G3FXW	15	4	19
G8APX	16	2	18
GC8AAZ	14	4	18

SEVENTY CENTIMETRES [†]			
Station	Counties	Countries	Total
G8AEJ	37	8	45
G8BBB	34	7	41
G8AUE	33	3	36
G3COJ	25	3	28
G3LAS	17	3	20
G3FIJ	17	2	19
G8AAZ	16	1	17
G3XFW	11	2	13
G8APX	11	2	13
G3DAH	10	2	12
G8AYN	11	1	12
G8APZ	9	1	10
G3AHB	7	2	9
G8APJ	6	1	7
G2AXI	5	1	6

T.W. Nuvistor converter or a transistor job with an AF239 RF stage followed by a 2N3819 FET mixer; the IF is 4-6 mc, into an Eddystone EC-10. Various antennae have been used, from a simple dipole to the current 8-ele Yagi at 35ft. The QTH is 20ft. a.s.l. beside the Thames at Sunbury, so is nothing startling from the VHF point of view, which makes his achievement all the more creditable.

And so to Cambridge from whence G2CDX, Arthur Porter, made his necessary contacts for the two-metre award. (He has now moved to Norwich and hopes to be back on the band shortly.) First contact on Two was with a local, G3EDD, in February, 1963, and the last one with DL9GS/M near Osnabrueck in June 1968. In those five years, 827 different stations were worked on the band, of which 187 were outside the U.K. and of them 122 have QSL'd—which sounds a better return rate than is often achieved from U.K. stations. The Cambridge QTH was 50ft. a.s.l. with the take-off screened to the North and West but fairly clear in other directions. The G2CDX transmitter is an EF91 oscillator tripling to 24 mc in the anode, EL91 tripler, 5763 doubler and QQV03-20A PA with 30 watts input. The modulator takes drive from a xtal microphone into

an EF86 and culminates in push-pull 6V6's. On the receiving side, there is a 6CW4 pre-amp feeding an ECC84 cascode RF stage, and EF95 mixer tuning 4-6 mc, into a BC-348. The antenna has been either a 4/4 or 8/8 *J-Beam* at 50ft. and both transmitter and converter are home-built. (And G2CDX was always a nice signal from where A.J. Devon still listens.)

Ian Sncap, G8AUE (Ambergate, Derby) is well known for his 70 cm activity and is becoming so for his work on 23 cm. His award for 70 cm operation was gained while running a QRP rig with 4-5 watts output using a QQV02-6 to drive a pair of PC 88's to 8 watts input, although this has now been converted into a driver unit for a QQV03-20A with 50 watts going in. The antenna was an 18-ele Parabeam at 30ft. and the converter two AF139's in the RF stages and an AF139 mixer. These items have now been improved by the addition of another 18-ele *J-Beam* Parabeam and the substitution of the AF139's by AF239's in the converter. The G8AUE 23 cm set-up has already been described in this column, so it is only necessary to say that the 5ft. paraboloid is fed from a 2C39 tripler/PA. To date, 17 counties and two countries have been worked from G8AUE. The two-metre gear is a modified Pye

base station and the converter a transistor RF and mixer arrangement. The secret must also lie in the QTH as this is at 695ft. a.s.l., with a clear take-off in all directions but the North, where a 1,000ft. hill blocks the view a bit.

The G8ATK award is for operation on two metres from Yateley in Surrey, although the present QTH is now at Farnham (also Surrey). It is in fact the same site from which G5NF made his two-metre European record and set up the first G/F contact on 23 cm, so it has an illustrious background! Mike Harsey was first licensed in October, 1967, and came on the air on 70 cm with assistance from G8AMK of Bracknell. The rig was a QQV02-6 tripler driving a QQV02-6 PA, and the converter a GMO-290 job feeding an AR88D, with a 14-ele Yagi. This was later modified to a MA-4060B varactor tripler feeding a QQV03-20A, anode-screen modulated, and an 8/8 Yagi is now available for the reception of A/TV. When two metres was opened for the G8/3's, Mike acquired a T.W. "Communicator" and by the time he left the Yateley QTH had worked 36 counties and 7 countries on two metres, and 30 counties and four countries on 70 cm. Plans are in hand for modifications to existing gear by the erection of a pair of 18-ele *J-Beam* Parabeams for 70 cm, and a 14-element Parabeam for Two. The Tx for two metres will run a QQV06-40A in the PA and the 70 cm Tx a 4CX250B. His original two-metre Tx was part of the 70 cm gear and consisted of a 6AK5 xtal oscillator into two 12AT7 multipliers, with a QQV03-10 delivering some 15 watts to an 8-ele Yagi at 25ft. The modulation was a pair of EL84's and the receiver a GMO-290 pre-amp and RF, feeding into an AR88.

News Items

G3USB (Cambridge) has developed an electronic key which uses five silicon transistors, five diodes and a "small handful" of other components. The keying element is a reed relay and the whole outfit runs from a 12v. supply and draws 20 mA. Details will be published in due course.

[over

From G3JHM (Worthing) comes news of a new publication for the VHF man. The title is *VHF Communications*—see advertisement p.719, *SHORT WAVE MAGAZINE*—and the contents cover VHF, UHF and microwave techniques and information on the construction of a wide range of equipment for the amateur. A useful feature is the offer to make available, *via* the national representative, epoxy-printed circuit boards and other complicated and difficult-to-get items for the published designs. Issues are quarterly starting this month, and the cost of one year's subscription is the equivalent of \$3.00 U.S. or 25s. (in real money!). Further information from Terry Bittan, G3JVQ, *QTHR*.

Amateur TV activity in the London area is on the up-and-up with several new stations now QRV. Among these G6ADJ is getting good results using a 405-line rig with positive modulation and modest power. G8ATI will shortly be on from Bexleyheath and will be looking for A/TV contacts. The (BBC) Aerial Group have had to move from Hammersmith as they were having considerable reflection problems (to say nothing of the handicap of little height) and have now gone to the Club site at Langham Place. Eight storeys high and a clear take-off have paid handsome dividends. They are running 120 watts peak, positive or negative modulation from a transistor modulator, 405-line, and sound is on 144.7 mc. Mike Bues, G6OBP/T, will be back on the air again shortly with 625-line transmission and hints that a colour system is not far away. The British Amateur Television Club (B.A.T.C., who have been working on the A/TV theme for many years) are always prepared to give advice in these matters. Their secretary is: P. Blakeborough, G3PYB/G6ACU/T, 51 West Kensington Mansions, Beaumont Crescent, London, W.14.

G8BBI, (Keighley, Yorks.) is now on the air with a Pye "Ranger" (a useful Christmas present!). He was one of those who heard WA1JZB/AM, as did G8BUP and G8BVA in Bradford and Leeds respectively, so the signals were getting up beyond the Midlands after all—see this space last month.

G8BVA and G8BUP are organising a local two-metre contest for stations in the county of Yorkshire. Date is February 23 and time 0933-1100z, 1330-1500z and 1900-2100z. Further details from G8BVA at 129 Stainbeck Lane, Leeds, LS7-2EB.

News of further two-metre activity from Cumberland, which will gladden the hearts of the County chasers. G8CAU is now on from Carlisle with 15 watts to a QQV03-10 to a 4/4 slot-fed Yagi at 30ft. He would like to arrange skeds on 145.8 mc, and those interested should write to 47 Shady Grove Road, Raffles, Carlisle, Cumberland.

Cambridge University Wireless Society, G6UW, will be off on their annual expedition to the Isle of Man over the period March 17-25. They will have gear for two metres and 70 cm, and will probably sign GD6UW/P or GD6UW/M on these bands, as this year it is not expected that they will be able to operate from Snaefell.

EI7AF (Co. Offaly) has joined the esoteric group who work for meteor-scatter (M/S) contacts. He was able to have a splendid QSO with OZ9PZ on December 10, 11 and 12. Gear ran 60 watts to a QQV06-40A and the antenna a 15 x 8 x 20ft. collinear stack. A very good series of bursts was recorded, some of them lasting as long as 13 seconds. EI7AF says that the biggest difficulty with the whole operation was keeping the RF out of the tape recorder! He acknowledges gratefully the help given by EI4AC and EI2A in making this noteworthy QSO. He plans to get going on SSB on Two and is building a 40ft. long-Yagi which, after successful trials, will be one of four to go in a 20ft. square box formation, giving a calculated gain of some 22 dB over a dipole. EI4AC and EI5BH are already active on SSB and the latter would welcome skeds. EI7AF holds to other calls, EI3AE and GI3UIG, so it should be possible to work him at some time and place. The address for those interested in the plans for the antenna (and who live in gale-free areas) is 31 Main Street, Birr, Offaly.

The frequency of the French beacon, F3THF, has now been changed officially to 144-01353 mc. with keying shift to 144-01317 mc. The frequency stability is reported

to be better than 200 cycles over one hour. Very few DX reception reports are being received, but one of the most interesting was from a Dundee SWL, which is just about 90° off the line of shoot of the aerial. F8SH is still the addressee for information.

The Midlands VHF/UHF convention and dinner will be held on June 14, in the Dunstall Suite at Wolverhampton Racecourse, about two miles north of the town centre on the A.449. Accommodation and catering arrangements demand that the numbers attending be kept to about 130 for Convention and Dinner, and another 40 or so for the afternoon session only. Tickets are priced at 40s. for the whole day, or 10s. for the afternoon only (including tea). Applications to J. R. Hartley, G8AEV, 30a Salop Street, Bridgnorth, Shropshire.

G2JF (Wye, Kent) sends an interesting analysis of DX contacts at distances over 350 miles during the year 1968. January produced QSO's with GM, DL and F; February with DL; March, April and May were blanks; June was a good month with F, PA, DL, OZ, SM, DM and LA; July gave F, DL, OZ and SM—as did August with the addition of EA. In September he worked F and DL; October, F, DL, HB and EA; November, F and December, OZ. This follows the general pattern over the last few years and is a good indication of what can be expected. G2JF is now QRV on 70 cm with 50 watts, *VFO controlled*, to a QQV06-40A and a 14-element beam. Receiving gear is a JXK FET converter tuning 18-20 mc, into an HRO. The QRO PA, a pair of 4X150A's, is just about complete and awaiting transport to the 625ft. a.s.l. site at Hastingleigh. A new Kentish beacon is obviously on its way and results should be very good indeed. GB3GEC is S9 + 60 dB at Hastingleigh for most of the time.

* * *

G3LTF (Galleywood, Essex) has got his own back! He is now hearing his Moon echoes on 1296 mc; strength on January 8 was peaking to 10 dB in c.p.s. bandwidth. Those who follow this piece may recall that on November 9, Peter set up a new world-record for 23 cm

E-M-E by a contact with WB6IOM, raising the previous best by 400 miles. Since then, tests with K6HCP resulted in G3LTF copying the K6 at 3.5 dB/noise in 100 c.p.s. This is very good going indeed and although only one-way at present, a complete QSO obviously is on. Modifications are being made to the gear at Chelmsford to incorporate water-cooling of the PA(!)—G3LQR has already modified his, and further tests are scheduled.

On December 13, G3LTF had his 12th M/S contact, with OM1VHK. Signals were 30 dB over noise in 1 kc (S-24) and the incoming report gave Peter S-28. OH2BEW was heard on the night of December 11, testing with LX1SI; this was on SSB on 144.150 mc, when he was about 6.8 dB above noise. G3CCH (Scunthorpe) has also been busy during the recent *Quadrantids* M/S shower and other non-periodic appearances—and he has worked OH2BEW and heard OH1NL doing E-M-E tests. Reports are coming in of a new “First” on M/S, by contact OX-OZ. The next major shower will be the *Lyrids* over April 20-22.

G3EHD (Chingford) has been listening to solar noise on his A.2531 g-g converter on Two and has observed fluctuations of up to 6 dB during the last few weeks, when the Sun has been comparatively quiet. These observations are very useful for checking converter signal/noise ratios and are easily performed. G3EHD is getting ready for operation on 70 cm and already has the metal work completed for a new Tx.

A newcomer to the bands is G8CBW who passed the R.A.E. in 1956 (yes, 1956) but did not take his ticket till last October. QTH is Sheffield. G8BQX in Hastings has been having a field day with the French two-metre stations—from where he is, he could hardly miss them! Over January 3/4 he was in contact with F1QZ, FIRQ, F1SA, F1TB, F1VW, F1XQ, F1GJ, F1AIK, F1AIS, F2XO, F2YT, F3XY, F5FM, F5NS, F5WH, F6AAW, F6ADB, F6AGO, F6AIF (Pascal, daughter of F8MM) F8WE and, on December 13, F9NL in the Pyrénées, which is very good doing even from the South Coast under the sort of conditions which we have been

subjected to recently.

A watch has been kept on the bands to see how the issue of new VHF call signs is going and the most recent seems to be G8CFZ. It is understood that when the G3/3 calls are exhausted, the G4/3 will follow.

G6YP (Orpington, Kent) has moved his radio QTH and now operates from Forest Hill, London; he is running 10 watts with an indoor dipole at present, but will soon have a 4/4 up and rather more power.

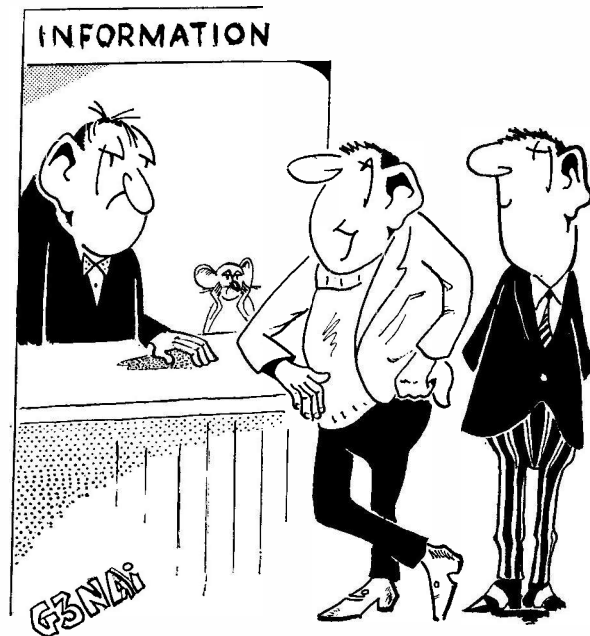
* * *

G8AYN (Croydon, Surrey) is very active on 23 cm these days. He has an 8/8 beam and a 2C39A in a box cavity tripler circuit with about 20 watts input, driven from a QQV03-20A on 70 cm; the converter works into an AR88. He has now had contacts with five stations in three counties since operation began, with plenty of cross-band QSO's to 70 cm. Best DX to date is with G3LTF near Chelmsford. G8AYN quotes QSL return rates of 60% on 70 cm and 35% on Two! As he is at Southampton University he can

only be on during vacations and the occasional weekend, but would be pleased to make 1296 mc skeds with local stations; there seems to be a rapidly increasing interest in operation on this band these days, and it would be very helpful to have more information about activity generally.

It would probably not be very productive at this stage to start another Annual Table for 23 cm but if operators will write in giving details of gear, QSO's made, QTH and the rest, the details will be published as a guide to other actual and potential users. Something on the lines of “Calls Heard and Worked” perhaps?

G3QG (Luton Hoo, Beds.) president of the Dunstable Downs Radio Club, is now active on Two from an excellent site 535ft. a.s.l. in the grounds of the Wernher Mansion, of which he is the security custodian. His *J-Beam* Turnstile antenna (as used by A. J. Devon for many years) is 112ft. up on a chimney stack and take-off is good in all directions. The transmitter runs 10 watts to a QQV03-20A in the PA and the converter tunes 28-30 mc into a Minimitter. A most attractive hand-coloured QSL card will con-



“... when's the next opening on Two ...”

firm a QSO with Bill (who does a bit of portrait-painting in his spare time).

G8AYC/G6ADK/T (Gillingham, Kent) now has video on 70 cm with a pair of 4CX250's running 150 watts to an 18-ele beam; best DX to date has been, almost inevitably, G6NOX/T near Saffron Walden. Nigel will welcome viewer reports and A/TV skeds; he is on most evenings. G8AKH and G8BIM had a *ten-hour* QSO the other day and ask if this is a record(!).

EI2W (Dublin) has been out of circulation for some time, but is now active again. His latest QSL card shows that he is operating from Sandyford, 1,000ft. a.s.l., with 50 watts to 15-ele long Yagi on Two and 20 watts to a 96-ele array (4 x 24) on 70 cm. Best DX is YU1EXY/P at 1,387 miles. *Phew!*

* * *

The Verulam Radio Club is planning an expedition to GW during the first or second week of August. They will be operating with the callsigns GW3XMP, GW8BNR or GW3VER, all /P, and will be taking two-metre gear with them. They are keen to give contacts from some of the rarer spots and ask, therefore, that those interested in making skeds should write in and say what counties they most wish to work. From the replies an itinerary will be worked out to give the best coverage; correspondence should go to G8BNR, *QTHR*.

G3MCS (Aylesbury) has not been very active, but is now back on the two-metre-air with ten watts from a mobile rig; his activity on 23 cm has been pretty spasmodic, but he is planning tests with G3BNL in Gloucestershire when the weather improves. CW operation on Two has never been at a very high level and it was pleasing to hear another addict the other evening—G3CLW (Paignton, Devon) working G6OX with RST 569 reports; he has been heard and worked from Herne Bay on several occasions, always with a good signal, even under barely

average conditions.

The Farnborough Radio Club is very much engaged at the present time in the construction of two-metre printed-circuit transmitters. They have a large VHF/UHF membership including G8ATK, G8BEJ, G8AXZ, G8BVM, G3KND, G3RGR, G3PMC, G8AYF, G3MNV and G3XUU. Judging by the demand for the kits, there will soon be something like 50 stations operating on two metres within a 10-mile range of Farnborough! G3COJ (High Wycombe) took advantage of the minor lift in December to work GW8ASA/P in Flintshire and G8BIL in Warks, both on 70 cm. DL9LU was heard weakly on SSB on that band but could not be raised. PA0COB and PA0PCR were both worked on December 12, although ON4HN got away. G8BBB (Littleport, Cambs.) worked OZ5HF on the same evening, on 70 cm, and also OZ1OF on Two; Roger is very active on 70 cm at present with 300 watts of sideband on 433.02 mc.

Over the weekend of January 11/12, G3BNL (Cheltenham) and G3EEZ exchanged 13 *centimetre* signals at the S9 level over a 95-mile path between sites 10 miles south of Cheltenham, and Mow Cop just north of Stoke. A test over a 105-mile path from Dursley to Mow Cop resulted in S7 reception at the Gloucester end only, and modifications are in hand at G3EEZ to improve the performance of the receiver there before proceeding with further tests. G3BNL has now completed the narrow-band equipment for this frequency and is running about 1.5 watts into a varactor at 2306 mc. The receiver tunes 2304 to 2310 mc, and Les would be pleased to set up skeds from /P locations in the Cotswolds. Congratulations to both operators.

Protection for the front and rear end of transistor converters on two metres and 70 cm can be given by the connection of silicon diodes Type IN914 back-to-back directly across the input and output sockets respectively to the nearest earthed

point. They will not affect the S/N ratio if the aerial is tapped down on the input coil to give a low-impedance connection, but cannot be used across high-impedance circuits without degrading the performance.

Meeting Notes

The Mid-Herts. group held their annual dinner at Welwyn on January 17, when some 40 members and visitors enjoyed a very pleasant evening under the urbane surveillance of their president, Ray Hills, G3HRH, well known for his contributions in the VHF field.

For the Leicester VHF/UHF group their next meeting is on February 20, when G3MNQ will talk about VFO's for VHF and will describe a design using an FET master oscillator. Venue is the Regional College of Technology, Leicester, time 7.0 p.m., and the hon. secretary is G5UM, *QTHR*.

The 70-centimetre cumulative contest on January 18 was very quiet, to say the least—the best score heard was G8AKE (Leicester) at around 25 stations worked; conditions were poor, and activity low.

Contests

February 16 is the date for the first of a new type of contest. This is a 4-metre event for *fixed* stations only, and was laid on to meet a growing demand from those who felt that the competition with well-sited portables was a bit unfair and did not truly reflect the efficiency of gear or operator. Time is 1000z to 1600z. The Third 144 mc (Open) Contest takes place over the weekend of March 1-2 and coincides with the Region I IARU event.

Deadline

That's it for this month. Deadline for the March issue is **February 8** and the address for comments and claims is "VHF Bands," **SHORT WAVE MAGAZINE, BUCKINGHAM.** Cheers for now and *73 de G3DAH.*

THE MONTH WITH THE CLUBS

By "Club Secretary"

(Deadline for March Issue: February 7)

(Please address all reports for this feature to "Club Secretary," Editorial Dept., SHORT WAVE MAGAZINE Buckingham.)

THIS month we resume "normal service" after the January break in which this space was used for the MCC report; and as the break has resulted in the clip being one of the fattest ever—in fact, a record number of Club reports—let us get straight in with no more formalities.

A minor point is that this month, for various reasons, it has not been possible to take in anything at all late; so if your news has not appeared, it is because of this.

Scotland and the North

Let our Scottish friends, in the shape of **Moray Firth**, open this time. They have recently had a change of Hq. from Buckie, to St. Andrews School, Llanbryde, Morayshire, where they get together every Monday evening at 7.30, with an additional session on the first Sunday in each month at 2.30 in the afternoon.

At the time of writing we did not have the very latest information on the **Wirral** programme, but it looks rather as if the form is a couple of meetings each month, plus Slow Morse classes at Hq. every Sunday and Monday; for all the details contact the hon. sec. at the address shown in the Panel—see p.776. (We were very sorry to hear that Wirral have recently lost, by death, three of their members—G3CCW, G3FRT and G3JHZ.)

G3OHT is down to demonstrate the **Hull** group's Swan transceiver on February 7; on the 14th there is a Junk Sale, followed on the 21st by a discussion on Technical Topics among the members. The month is rounded off by a talk on Receiver Fault-Finding on February 28, by G3SSA—and if he wants a guinea-pig he can borrow the "Club Secretary" shack receiver which has been playing up for months! All these are at Hq. 592 Hessle Road.

Derby are a group that has been an organised body for a very long time indeed; and, with a very large membership, they are still going strong at their home in Room 4, 119 Green Lane, Derby. Here they assemble on February 5 for a Surplus Sale, followed by the Annual General Meeting on the 12th. This hurdle being out of the way, February 15 is down for the annual dinner and dance which is at the "Derbyshire Yeoman" in Kingsway. Back to business on February 19, with an illustrated lecture on VHF Aerials by well-known V. Hartopp of J-Beams, and on the 26th a Technical Film Show.

At **Northern Heights** attendances have been rising of late, and in February they have G3KKP talking about VHF on the 12th followed on the 26th by a talk on Computers, both at Hq., which should help to keep the trend going.

Liverpool University have "come to the surface" again after quite a while, and mention that they have a Club station which is equipped and operated on all bands from 1.8 to 144 mc, and shortly will also be up on Seventycems.

A change of hon. sec. to record at **Bradford**, where G3VFR takes over the "hot seat" and G3RXS, who has for long been the sparking-plug, has had to reduce his commitments in the Club, albeit still remaining as a member of the committee. Notwithstanding these changes, things are still going with a swing, and in February the W1BB tape-and-slide lecture is booked for the 4th, while G3RXS will be talking "Mainly for Beginners" on the 18th. "Home" to this group is Bradford Technical College, Great Horton Road, Bradford, 7.

At **Pudsey**, they intend to make R.A.E. tuition the feature of their year, as the classes have been so popular and successful. The past year's activities for this group included participation in Jamboree-on-The-Air and MCC; they ran coach trips for members to all the major Mobile Rallies; paid a Club visit to the Amateur Radio Exhibition in London; held one or two outside events, and got no less than 14 members through the R.A.E. All in all, a very fine record of achievement for a comparatively new Club.

The **Eccles** group now meets on Tuesdays, 8.0 p.m., at the Bridgewater School, Worsley—this being a change of QTH.

Wales and the West of England

From Wales we hear that the **Barry** (College of Further Education) chaps get together on Thursdays in Room W5, unless they are "playing away" for some reason. It is understood that as a result of the success which they had at the Eisteddfod in 1968, there are plans afoot for an even better "do" this year; and in addition thoughts are being turned in the general direction of organising a shack at the base of their sixty-foot tower.

Burraton Toc H Hall on alternate Fridays is the scheme of things at **Saltash**; the last evening on which firm information is to hand was January 10, when they were sorting out the details of the group VHF project. In addition there is a Club library, and the news-sheet, which is called *Tamar Pegasus*—and which is referred to in the plural (when discussing back issues) as "Pegasi!"

Bath Lane, rear of 94 Belgrave Road is the address of the **Torbay** crowd, and we understand the booking is for the last evening of each month; but the full details can be obtained from the Hon. Sec.—see Panel, p.776.

Any Monday or Thursday evening is the time to seek out the **Bristol** lads, who have Hq. at 41 Ducie Road, Barton Hill, Bristol 5. It seems they have a good programme going; and they have been pretty steadily improving since the last time they wrote in, way back around 1965.

February 6 is the provisional date for the **Cornish** main meeting at SWEB Clubroom, Pool, Camborne, but there seems to be an element of doubt here, and before going a contact with the hon. sec. would probably be advisable. In addition to the main group there is also a Newquay gang, plus VHF and SSB groups all associated with the main Club.

Quite a large sweep of territory is included in the "and District" part of **Chippenham's** title, insofar as they have a couple of members in VK and another in Swaziland. Every Tuesday evening they have something on, but the main attraction in February is the talk on DX Operating by G3NMH, which comes off on the 25th. Hq. is at the Chippenham High School for Boys, Hardenhuish Lane, Chippenham.

Starting in February, the chaps at **Hereford** are going to have two meetings every month, on the first and third Friday; the former to be an arranged programme, and the latter informal unless anything special arises.

Somerset Emergency Voluntary Organisation Hq. is also the home of the **Taunton** crowd, on the left as one enters the Barracks from The Mount, Taunton. The lads get together every Friday evening, and the RAEN section operate from here as well. Recently they have—lucky chaps!—been presented with a *caravan* and a pneumatic extending mast, which are being fitted up as a mobile station! This newly-formed group has a committee which is very busily occupied in organising a programme.

With a membership around the 50-mark, the **Exeter** Amateur Radio Society can fairly be said to be flourishing. Their meeting place is the Committee Room, St. Sidwell's Methodist Church, in Sidwell Street, on the first Tuesday in the month—the next being on February 4, when the lecture will be on Marine Radio, by G3ABU. (It is the interest to recall that there was an active Amateur Radio club in Exeter as long ago as 1936, drawing attendances from all over Devon. The probability is that the records of its activities no longer exist.)

The Midlands

A library, museum, workshops, test equipment and a station are all included in the facilities offered by **Mid-Warwickshire** members at 28 Hamilton Terrace, Leamington Spa, together with a weekly get-together at which there is usually "something doing." For all the details, contact the hon. secretary—see Panel.

Alternate Thursdays at the Anchor Inn, Hartshill, Nuneaton, is the form for the **Nuneaton** club, starting at 8 p.m. but for the remaining details we have again to refer you to the address shown for the hon. sec. in the Panel on p.776.

A new Secretary writes on behalf of **South Birmingham**, and immediately puts us in a difficulty—we can't read his writing! It looks as though the meeting is the first Wednesday in each month, and the venue is certainly

the Scout Hut, Pershore Road, Selly Park, Birmingham 29. For the details, we refer you to the hon. sec. (and hope we have deciphered his address correctly!).

Something happens every Monday evening at Neachells Cottage, Stockwell Road, Tettenhall, Wolverhampton, says the **Wolverhampton** club *Newsletter*. The first Monday is usually a rather formal talk, often by someone outside the Club; the third Monday is a discussion on a set topic, the fourth is a committee meeting—albeit anyone can turn up—while the other Mondays are given over to ragchewing or operating the Club station, which should be back on the air by the time this reaches print.

A temporary Secretary writes in for **East Worcestershire**, due to the departure of G3HZG for Fiji, where he is to lecture on engineering. The venue for their normal affairs is the Old People's Centre in Park Road, Redditch, and the details can be obtained from the hon. sec.—see Panel.

The progress of the **Solihull** group since its inception a few months ago has been quite encouraging, with a healthy bank balance and Hq. at the Masons' Arms Hotel, High Street, Solihull, where they have a private room on the third Thursday in each month. Visitors are especially welcomed.

Worcester and District are quite an active group, with Hq. at 35 Perdiswell Park, Droitwich Road, Worcester. However, the December *Newsletter*, which is to hand, details the programme only till the end of January, so we have to refer you to the Secretary for dates and details.

Our little "rhubarb" about honorary Secretaries who forget to name the group they are reporting for, back in the December piece, produced an apologetic letter from Lincoln—but we had already forgiven him as he had just obtained his ticket, which excuses anything! **Lincoln** assemble—or should it be parade?—in No. 2 Guardroom, Sobraon Barracks, Breedon Drive, Burton Road, Lincoln, where they seem to have all sorts of things "cooking up."

A brief note advises of a change of Secretary for **Northampton** (Short Wave Radio Club) to that shown in the Panel; these chaps meet at the Community Centre, Kingsthorpe Hall, Northampton.

On now to **Salop**, where the meeting-place has had to be changed; they now have the use of the Signals Hut at Shrewsbury School. This means a return to the programme of weekly meetings, with February 6 given over to a show of colour slides by members, on the 13th a talk on UHF to be given by GW3RBM and G3RME, and on the 20th a firing-up of the Club station, which will be operational from the Signals Hut by then. Finally, on February 27, a "special," which has been organised by G3UDA and G3UQH in conjunction.

We have late news to put in for **Midland**, of a change in their arrangements for February; they will be putting on an exhibition station at the Birmingham Boat Show again this year, signing GB3BBS, over the period February 15 to March 1—so if you want to look them up just trot along to Bingley Hall, Broad Street, any time during the period of the Boat Show.

Not often we hear from **Northampton** (Amateur Radio Social Club) but they have a couple of "specials" in the near future. February 27 sees the lads being



Picture taken at a recent meeting of the Scarborough Radio Club, who gather every Thursday at Firbeck House, Westover Road, Scarborough. The call signs present here include G2CP, G8AZA, G2AQN, G3FVW, G3HKO, G3VAN, G3STL, G8KU, G3RIG and G3VLM.

treated to a demonstration by Amateur Electronics (G3FIK) of Birmingham, on the Trio equipment, but at the time of writing the venue had not been settled. In March there is a coach trip, in conjunction with the Astronomical Section of the Natural History Society, to Kettering Grammar School to hear Geoff Perry lecture and demonstrate his Satellite Tracking gear. For details on both these events, contact the hon. sec. at the address in the Panel.

The 10th and 24th are the February dates for **Sutton Coldfield** Radio Society; on the former date they have the annual equipment sale, while the latter is set for a Nattering Session and Projects. Hq. is Coles Lane, Sutton Coldfield.

London and District

Here we kick off with **Crystal Palace**, for which the next meetings are on February 8 and March 15. This meeting on February 8 will be the AGM, originally scheduled for the 15th, because a prominent member is getting married on the 15th and doesn't want to miss the AGM!

Cray Valley always make sure we know what is happening—they send a copy of *QUA* and, independently, write in and make sure your conductor does not forget! So—February 6 at the Congregational Church Hall, Court Road, Eltham, when Eric Godsmark, G3IWL (of the G.P.O.) will tell “The GB5QM Story.” The other meeting, a Natter Nite, is at All Saints Church Hall, Bercta Road, New Eltham, on February 20.

Surrey are shifting their meeting-place, from the Blue Anchor to the Swan and Sugar-Loaf; and so we have to refer you for all the important details to the hon. sec.—see Panel, p.776.

Two issues of the **Southgate Newsletter** are on file, from which we note that they have recently had an AGM; thus here again the programme is not known at the time of writing and we have to refer you to the hon. secretary.

Wimbledon and South London Mobile have Hq. at the

St. John Ambulance Hall, 124 Kingston Road, South Wimbledon, where they congregate on the second and last Friday of each month. In addition they have a Top Band net each Sunday evening at 2100z, controlled by the club call G3WIM; a two-metre net at the same time on Monday evening, and (a good idea, this) a Top Band CW net on 1838 kc, Wednesday evenings with G3JBA as net control. This is a fine way of enabling the locals to keep up the Morse, and probably a considerable stimulus to the local SWL's to try for solid copy, as a change from the more boring texts which are, of necessity, the mainstay of the normal Slow Morse transmissions.

Tuesday, February 18 is the date of the next **Acton, Brentford & Chiswick** get-together, and the venue, as ever, Chiswick Trades and Social Club, 66 High Road, Chiswick, London, W.4. G3DJX is in the “hot seat” this time, to demonstrate and discuss his hybrid CW Transmitter.

We have already discussed Wimbledon; **Purley** have ties with them and they ran a very successful joint Christmas Party, which is organised by each group in alternate years. February sees them getting together on the 7th and 21st, the first date being the usual natter-session, and the latter a lecture-demonstration by K.W. Electronics, which ought to bring in the troops.

National and International Groups

Hong Kong have their meetings at the China Fleet Club each Tuesday evening, and in addition run a net on 14200 kc at 0930z; there are various other activities to keep the lads on the ball. Your conductor was amused by the comment in the *Newsletter* about a reply-paid letter they sent out—“about as much response as a CQ ZA on Two Metres!”

Talking of chuckles, the **Cyprus** Amateur Radio Society manages to strike a consistently witty note in its *Newsletter* each month. This is compiled by ZC4GM and gives details of all the activities in Cyprus.

A.R.M.S. consists of the gang who operate /M, organise Rallies, and publish *Mobile News* each month,

with articles of special interest to the mobileer. A similar "special-activity" group is B.A.T.C., the television boys, who put out their useful and interesting CQ-TV as well as carrying out many other group activities in the field of Amateur TV.

Those members of the Civil Service Radio Society who are in the London area on the first or third Tuesday in each month would do well to look in at the meeting, at the Civil Service Sports Centre, Monck Street. February 18 is noted as being set aside for a talk on the Joystick. In addition to this sort of activity, the Club station G3CSR comes up on Eighty-six-thirty, clock, 3625 kc—on Friday evenings, so that the "country" members can join the net.

The Royal Navy of course has its own club, with Hq. at H.M.S. *Mercury*, Petersfield. They have various

activities, like the Morse runs which are so handy for working up real speed after passing the GPO Test, a *Newsletter* at regular intervals, contests and what-have-you. For all the details write to the hon. sec.—see Panel.

Those who work on the railways and associated services can be members of British Rail Amateur Radio Society, which in its turn is a member of an international tie-up of Amateur Radio enthusiasts on railways around the world.

Now to RAIBC, who have the laudable objective of helping our invalid and blind friends to get on the air, either as licensed amateurs or SWL's. To do this they need hordes of supporters, and the offer of good receivers to pass on to new members. One of their main objectives is to organise a receiver for every member, and help as may be needed in getting and keeping it going, which

Names and Addresses of Club Secretaries reporting in this issue.

- ACTON, BRENTFORD & CHISWICK: W. G. Dyer, G3GEH, 188 Gunnersbury Avenue, Acton, London, W.3.
 A.R.M.S.: N. A. S. Fitch, G3FPK, BCM/ARMS, London, W.C.1
 BARRY (College of Further Education): D. H. Adams, GW3VBP, 49 Colcot Road, Barry, Glam.
 BISHOPS STORTFORD: A. Stanley, G3WUR, 43 Havers Lane, Bishops Stortford, Herts
 BRADFORD: P. Denhirst, G3VFR, 80 Ley Fleaks Road, Idle, Bradford, Yorks.
 BRIGHTON (Technical College): R. A. Bravery, G3SKI, 7 Cope Hill, Brighton (506418), BN1-5GA.
 BRISTOL: P. Furzeman, G3WLZ, 49 Meadow View, Frampton Cotterell, Bristol.
 B.A.T.C.: I. Lever, I Abbots Close, Swanley, Kent.
 BRITISH RAILWAYS: H. A. J. Gray, Eleven, Swanton Drive, East Dereham, Norfolk.
 CHIPPENHAM: N. Cutter, G3PQG, I Fosseyway Close, Colerne, Chippenham, Wilts. (Box 664)
 CHESHUNT: K. Arnold, G3XMP, 21 Montayne Road, Cheshunt, Herts.
 CIVIL SERVICE: D. McLennan, G3KGM, 52 Pinewood Avenue, Sidcup, Kent. (01-300 0767.)
 CORNISH: W. J. Gilbert, 7 Poltair Road, Penrhyn, Cornwall.
 CRAWLEY: G. Bowden, G8BQE, 51 Leighlands, Pound Hill (3253), Crawley, Sussex.
 CRAY VALLEY: D. Buckley, G3VLX, 234 Halfway Street, Sidcup, Kent. (01-850 6945.)
 CRYSTAL PALACE: G. M. C. Stone, G3FZL, 11 Liphook Crescent, London, SE.23. (FO Rest Hill 6940.)
 CYPRUS: Flt./Lt. G. Moore, ZC4GM, H.Q.N.E.A.F. Officers' Mess, R.A.F. Episkopi, B.F.P.O. 23.
 DERBY: F. C. Ward, G2CVV, 5 Uplands Avenue, Littleover, Derby (21931), DE3-7GE.
 DUNSTABLE DOWNS: G. N. Bath, G3NMZ, 9 Chalton Heights, Chalton, Luton, Beds.
 EAST WORCS.: R. J. Mutton, G3EVT, Summerhayes, Mill Lane, Alcester (2140).
 ECCLES: R. W. Mothersole, 57 Devonshire Street, Salford, M7-0BE. (Tel. 061-792 4813.)
 ECHELFORD: M. Clift, G3UNV, 45 Fordbridge Road, Ashford (59628), Middlesex.
 EXETER: E. G. Wheatcroft, G3HMY, 27 Lower Wear Road, Countess Wear, Exeter.
 GUILDFORD: A. Wilkes, G3SLH, Schiehallion, Hookley Lane, Elstead (2150), Godalming, Surrey.
 HARLOW: B. G. King, 36 Upper Park, Little Parndon, Harlow (20812), Essex.
 HEREFORD: B. Edwards, G3RJB, 5 Powys Walk, Hereford.
 HONG KONG: H. Asmussen, VS6AD, P.O. Box 541, Hong Kong.
 HULL: Mrs. Mary Longson, 4 Chester Road, Wold Road, Hull.
 KINGSTON: N. J. Dudman, 82 Chessington Hill Park, Chessington, Surrey.
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 LIVERPOOL (University): S. J. Dean, GW8CGN, c/o Students' Union, 2 Bedford Street North, Liverpool, J. Atkinson, G3OPA, 6 Rochford Avenue, Loughton, Essex.
 LOUGHTON: J. M. Stuart, G3TUN, 10 Stewarts Close, Epping, Essex.
 MAIDENHEAD: E. C. Palmer, G3FVC, 37 Headington Road, Maidenhead (20107), Berks.
 MIDLAND: R. Partridge, 42 Maxstoke Road, Sutton Coldfield, Warks. (021-354 5921.)
 MID-SUSSEX: E. J. Letts, G3RXJ, 87 Meadow Lane, Burgess Hill, Sussex.
 MID-WARWICKSHIRE: J. F. Coggins, G3TFC, Market Corner, Coventry Road, Baginton, Warks. (Toll Bar 3688.)
 MORAY FIRTH: G. M. Grant, GM3UKG, Easterbogs, Buckie, AB5-2EL. (Clochan 225.)
 NORTHAMPTON (Radio Amateur Social Club): B. Hayes, G3JBU, 31 Beverley Crescent, The Headlands, Northampton (33944), NN3-2PY.
 NORTHAMPTON (Short Wave Club): W. F. Stratton, G3XJJ, c/o Community Centre, Kingsthorpe Hall, Northampton. (39196.)
 NORTHERN HEIGHTS: A. Robinson, G3MDW, Candy Cabin, Ogden, Halifax. (44329.)
 NORTH KENT: P. T. Baber, 64 Latham Road, Bexleyheath, Kent. (01-303 8655.)
 NUNEATON: J. Roughton, 42 Severn Road, Bulkington, Nr. Nuneaton, Warwickshire.
 PURLEY: A. Frost, G3FTQ, 62 Gonville Road, Thornton Heath, Surrey, CR2-6DB.
 PUDSEY: P. Conway, G3XLV, c/o R. Short, 10 Tyersal Grove, Bradford, 4.
 R.A.I.B.C.: Mrs. F. Woolley, G3LWY, 331 Wigan Lane, Wigan, Lancs.
 REIGATE: D. Thom, G3NKS, 6 Bracken Close, Cophorne (2165), Crawley, Sussex.
 ROYAL NAVY: R/S R. Malconson, H.M.S. *Mercury*, Leydene, Petersfield, Hants.
 SALOP: W. Lindsay-Smith, G3WNI, 22 Kingswood Crescent, Cophorne, Shrewsbury.
 SALTASH: J. A. Ennis, G3XWA, 19 Coombe Road, Saltash, Cornwall.
 SHEFFORD: M. B. Goodwin, G3WKR, 16 Roe Close, Stotfold, Hitchin, Herts.
 SILVERTHORN: D. Standley, G3XSA, 212 Westwood Road, Chingford, London, E.4.
 SOLIHULL: J. Lester, G3VXY, 173 Damson Lane, Solihull, Warwickshire. (021-705 3060.)
 SOUTH BIRMINGHAM: R. Brice, 60 Coraline Close, Chelmsley Wood, Birmingham, 37.
 SOUTHDOWN: L. Tagliaferro, 9 Tugwell Road, Hampden Park, Eastbourne (54244), Sussex.
 SOUTHEND-ON-SEA: Mrs. P. Collop, G8BSB, 53 Beedell Avenue, Westcliff-on-Sea, Essex.
 SOUTHGATE: A. Hydes, G3XSV, 6 Glenbrook North, Enfield, Middlesex.
 SURREY: R. Morrison, G3KGA, 33 Sefton Road, Croydon, CRO-7HS, Surrey. (01-654 5982.)
 SUTTON COLDFIELD: A. W. Fernyhough, G8AVH, 114 Endhill Road, Kingstanding, Birmingham, 22c.
 TAUNTON: G. Swetman, Little Copse, Monkton Heathfield, Taunton, Somerset.
 TORBAY: D. T. Hind, G3VNG, 46 Thurlow Road, Torquay, Devon.
 VERULAM: J. Thomas, G3RXA, 9 Highland Drive, Hemel Hempstead (55136), Herts.
 WIMBLEDON: W. Hardcastle, G3XQX, 13 Carlwell Street, Tooting, London, S.W.17.
 WIRRAL: A. Seed, G3FOO, 31 Wither Avenue, Bebington, Wirral, Cheshire, L63-5NE.
 WOLVERHAMPTON: J. P. H. Burden, G3UBX, 28 Coalway Road, Wolverhampton.
 WORCESTER: R. I. Avery, G3TQD, 24 Alexander Avenue, Droitwich (3943), Wores.
 WORTHING: P. J. Robinson G6KFH/T 46 Hillview Road, Worthing Sussex.

The Maidenhead Club constructors competition was won by G3VXZ (right), with his two-metre transceiver built into a cash box. Judging was by Mr. G. Edwards, of the Slough College of Technology.



means not only help but funds. (A particular problem at the moment is the resolution of SSB.) Many of our local Clubs run some event or other and pass on the proceeds to RAIBC, or make a donation at the AGM to help these objectives along. All the organising—and there is plenty to do—is by Mrs. Frances Woolley, G3LWY, to whom we refer you for details. (See p.776).

Southern England

The Christmas issue of the *Echelford Newsletter* is the latest to hand, and is really extremely amusing; in fact consistently one of the best to come our way. However, it naturally gives no detail on the February plans for the group, for which we have to refer you to the hon. secretary.

Victory Hall, Cox Green, Maidenhead is the Hq. of the **Maidenhead** chaps, where they assemble to hear a lecture on Aerials and Aerial Matching by G3JGO—as important a topic for the SWL's as for the transmitting types, which is down for February 3. Later in the month, on the 18th, there is an informal at the same venue, both timed for 7.30 p.m.

Worthing are quite definitely in the Southern clip—no puzzling over maps of England here! They have their annual dinner at the Lennox Hotel on February 22, but earlier in the month they get together for an evening judging their Constructional Contest, on the 11th.

Dunstable Downs have their home in “Chews House,” High Street South, Dunstable, where they meet on February 7 for what they call an “in-between week” at which they ragchew and work on their project, and on February 14 for the AGM—when they also celebrate

their first birthday as a group. Incidentally, the dinner took place on January 17 at the “Winston Churchill” in Luton Road, and was much enjoyed by all.

A review in the *Verulam Newsletter* of the past year and its events indicates that things went pretty well for them in 1968, and the indications are that the programme for the first half of 1969 is already firmed up. They were particularly pleased with their MCC result, which made them the leaders in the well-populated Southern Region. These lads get together twice each month, and Hq. is at the Cavalier Hall, St. Albans, where there is adequate parking space; other meetings take place on occasion at Salisbury Hall. The next meeting is on February 5, for a talk on the Diode Box and its Mysteries, by G3PAO. On February 19, G8PD will demonstrate his home-built two-metre gear.

Brighton (Technical College) have not yet been able to advise details of their February programme, but we can say they will be in session on alternate Thursdays, at the College.

The Congregational Church Hall, adjacent to the Clock Tower, Bexleyheath is the home of the **North Kent** chaps—and this group must be pretty rare in being blessed with a couple of fully-licensed YL's as members. For all the details, contact the hon. sec.—see Panel.

Talking of YL's, it is noticeable that those few groups who have YL members always seem to find them a job. This thought is provoked by the next couple of reports, the first of which is **Southend** (one of the oldest Clubs in the country) where G8BSB does the secretarial chore—see Panel. These types meet in the Staff Canteen of Messrs. E. K. Cole on February 7 and 21; and *anyone*

in Southend can point you in the direction of the Ecco works!

At **Bishops Stortford**, members gather at the British Legion Club, Windhill—at the top of the hill going out of the town towards Ware on the A120—the date always being the third Monday in each month. On February 17, G3XYI will be talking about the intricacies of Electronic Control of Machine Tools.

February 7 is down at **Cheshunt** for K.W. Electronics, Ltd., to show all their goodies, while March 7 sees the AGM. Their date is always the first Friday in each month, and the venue the Methodist Church Hall, Crossbrook Street, Cheshunt.

Quite a shock this time to have the **Crawley** news that G3FRV has given up the duties of honorary secretary—because Ron has been doing the job and well indeed, ever since the group was founded, a long time ago. However, it was pleasing to note that the new appointee is Geoff Bowden, now G8BQE, who for so long has been a correspondent to our “SWL” feature and on the HPX Ladder. As for the meetings, they have Hq. at Trinity Congregational Church, Ifield, Crawley, where they can be found on February 26 to hear a lecture about RSG.B affairs.

Southdown is the name of a Club centred on Eastbourne, where they seem to assemble in the Victoria Hotel on the first Monday in each month. In addition, by the time this is in print they should have the new shack completed; and on every Monday when there is not a formal meeting they can take Slow Morse tuition at the Ordnance Yard, Seaside, Eastbourne, from 7.30 p.m.

The pattern at **Mid-Sussex** seems to be one of alternating informal gatherings and lectures plus visits to the best of the meetings of the adjoining groups. Hq. is at the Marle Place Further Education Centre, where they have a Club shack—and at the informals they are redecorating it, so go suitably dressed!

A most interesting newsletter called *Natter* came to hand, bearing no indication of the Club which puts it out—but luckily the reference file gave a firm identification—the **Guildford** crowd. They now have alternate meetings, between **Surrey University** and their own place at the Model Engineering Hq. in Stoek Park, Guildford—to the advantage of both Clubs. Thus, on February 11, they go to Surrey University to discuss “Contests in 1969,” and on the 28th are at home to hear G2YL giving her well-known travelogue.

Harlow have their being at Mark Hall Barn, First Avenue, where they meet frequently, the place being “all their own,” so that several evenings each week can be set aside for various activities. Full details of these can be obtained from the new hon. sec.—see Panel, p.776.

Church Hall, Amptill Road is where the **Shefford** group can be found, and they assemble there weekly. Details for February include a Quiz and Surplus Sale on the 6th, and G3OLY talking about his SSB transmitter on the 13th. Mr. J. Johnson is the speaker on the 20th, to discourse on Crystals, and on the 27th the subject is ‘Indicators and Their Uses,’ by G3VMI.

A film show is on the agenda for **Reigate** on February 5, at the “George and Dragon” in Redhill; a good idea to lay on something of this sort for the meeting

after the AGM, to give the incoming committee a chance to discuss and organise the programme; in so many groups there is a tendency to be a blank after the AGM.

Now to Hemel Hempstead. Here we have two reports—the first from the **Hemel Hempstead** group, saying that they are to be found on the first and third Friday in each month at Rucklers Lane Hall, Kings Langley; here they get together for Junk Sales, lectures, and all the other activities of a normal Club. For details, see or write to the hon. secretary, at the address in the Panel.

The other report we have is in the form of a newsletter called the *Pathfinder DX-er*, which talks about a proposal to form a “West Herts. Radio Group in Hemel Hempstead,” a condition of joining to be membership of a body called “The Pathfinder Radio Group.” It is interesting to note that the “Pathfinder Radio Group” has never, to our knowledge, actually existed nor has it disclosed the QTH’s of any committee members, or even that of an honorary secretary—but merely of an “organiser,” who is also the author of this news-sheet. Anyone in the district who has a mind to join a Radio Club would be well advised to look to the organised Amateur Radio Societies in the neighbourhood—such as Hemel Hempstead or Verulam, the addresses of which can be found in the Panel on p.776. (We don’t want to be too difficult, but in the interests of all concerned, things must be done in proper form.)

At Kingston, the New Year has started well, with an interesting lecture by an N.P.L. scientist on Frequency Standards. On February 12, G3GVU will discuss his own design for a solid-state Tx/Rx for the 4-metre band. Kingston welcome visitors and prospective new members, their meeting place being The Penguin Lounge, 37 Brighton Road, Surbiton, timed for 8.0 p.m.

The **Loughton** (Essex) group have meetings fixed for February 7 and 21st—colour films on the Post Office Tower, and cable-laying on a deep-sea route—their venue being Loughton Hall, Rectory Lane, Loughton (near the Debden Underground station). All are welcome at these meetings.

From **Mid-Herts** (Amateur Radio Society) we have a programme showing fixtures till their AGM, ’way ahead in October. Next immediate meetings are on February 13, “Radio Quiz” v. Stevenage, at Welwyn; March 13, Constructors’ Competition and film show; and April 10, “Equipment Reviews,” by G3GGK (and we would like to hear more, in due course, about this one). The place to find is the Welwyn Civic Centre, Old Welwyn, Herts., time 8.0 p.m. sharp. This Club was among the many entering for MCC, and they feel that the operators who “got their feet wet” in the Contest learnt something from it, even if the final placing “was not very wonderful”—to quote their January *Newsletter*.

Conclusion

This wraps it up for another month, one of the busiest we have ever had for this feature—which means that it is with and among the local Radio Clubs that Amateur Radio really lives. We of **SHORT WAVE MAGAZINE** have always known and appreciated this, and it is why, for more than 20 years, we have been glad to give space to local Club doings and activities. Over the years,

Station GW3XEJ/A entered in MCC for the Cardiff Contest Club, gaining 42nd place with 364 points. Operators (seen here) were GW3NJW, on the key, with GW3XSQ. The picture was taken by GW3OAY, also an operator.



we have come to know quite a lot about small Clubs and big Clubs; those who start with a tremendous bang and then fade out; little Clubs which grow into something of significance in their district; Clubs with a long history, revived from time to time by the infusion of new blood and fresh interests in the Amateur Radio context; and groups that start just with the idea of gathering locally those with an active interest in Amateur Radio. They are all welcome in these pages. We do not ask for any "formal declaration of intent"—merely that the chaps are

coming together, on some sort of a regular basis, holding meetings and discussing matters of common interest.

For the March issue, reports should be with us by February 7, addressed "Club Secretary," *SHORT WAVE MAGAZINE*, BUCKINGHAM. And looking further forward, to April, the closing date for this feature will be March 7. Please do not put us in the embarrassing position of having to list your report under the heading of "too late"—it happens every month and, really, there is no reason why it should. 73 to all.

"R.A.E. QUESTIONS AND ANSWERS"

Further to this article in our January issue, it has been suggested that it would be useful to have the values of the CO circuit on p.711. Here they are: C1, .01 μ F; C2, 100 μ F; C3, .01-0.1 μ F; R, 50-100K; L, Vc, tuned circuit to cover crystal frequency; and X, crystal of frequency required, X-cut type.

SPECIALLY ON THE AIR

It is at about this time of year that plans are made for Club or group participation in some public event locally—gymkhanas, fêtes, galas, shows, sports days and the like. The Post Office will usually issue a special "duration only" callsign for such occasions, which are a good opportunity to show Amateur Radio off to the public. We are pleased to publish details in this space.

GB3FC, June 5-7: Station to be provided by staff members in connection with the Forestry Com-

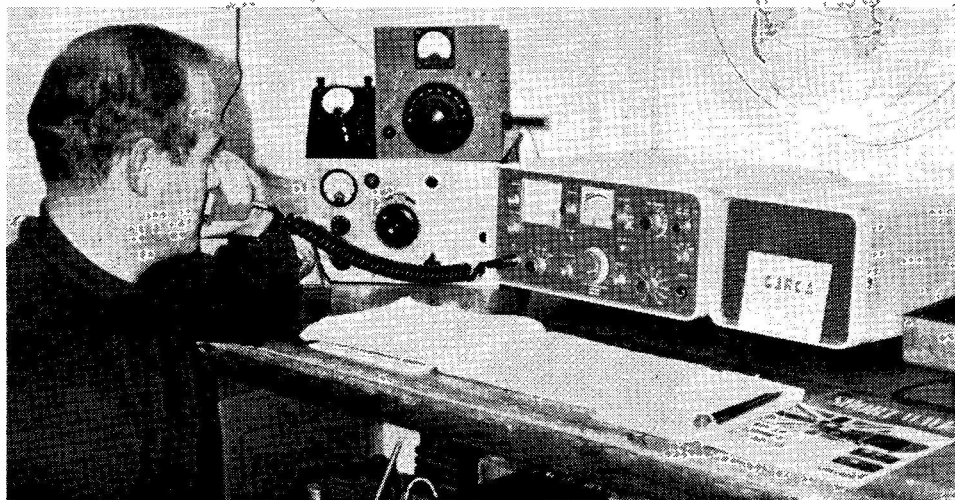
mission exhibition in Bush Estate, Edinburgh, bands to be used 160-80-20-15 metres. A special "50th anniversary" QSL card will be sent for all contacts and reports. The organiser is: W. A. Lindsay-Smith, G3WNI, 22 Kingswood Crescent, Copthorne, Shrewsbury.

CALLSIGN CORRECTION

For the recent Magazine Club Contest (MCC), reported in our January issue, the callsign of the Bangor (Northern Ireland) group was incorrectly quoted—it should have been G13XRQ.

INDEX TO VOLUME XXVI

As is customary, the next (March) issue of *SHORT WAVE MAGAZINE*—which starts a new volume—will contain, as a free loose supplement, a complete Index to Vol. XXVI, which ends with the present issue.



THE OTHER MAN'S STATION

G3RGA

PPETER Toynton, G3RGA (Wildhern, Old Mead Lane, Henham, near Bishops Stortford, Herts.) did his two years' National Service in the Royal Navy. When he joined he was offered training either as a wireless operator a Russian interpreter or an officers' cook. Not much fancying these latter occupations, he took the radio option, and in six months learnt to send and receive Morse at 25 words per minute with 95% accuracy, also to handle the Naval gear in use at the time. After this training, he was posted for sea-going duties as a full-blown W/T operator.

But it was not until he had been out of the Navy for ten years, had married and settled down in life that he turned again to radio and decided to get on the air. As a member of the Grafton Radio Society, he took their well-known (and very successful) R.A.E. course, and duly became G3RGA (the Morse Test not having presented much difficulty!)

The first step on the amateur side was to build a Top Band rig (which worked) and Peter says that he still remembers his big thrill in Amateur Radio as being the "inaugural QSO" he made with that Tx—with a station about five miles away! For some years, G3RGA continued with home-built gear for the various bands, using AM/CW and chasing the DX around the world.

It is only comparatively recently that G3RGA has gone in for the equipment shown in our picture—a

KW-2000A, with which he finds he can work the DX across the world, with pleasure and comparative ease, on SSB or CW. And all off a single-wire aerial coupled through an ATU.

As already reported in our January issue, this station was used as the Bishops Stortford & District Amateur Radio Club entry for MCC (with G3VWC and G3XYI assisting), the KW-2000A being adaptable for 160-metre operation—which shows that the operating interests at G3RGA cover all the communication bands.

NOTE FOR THE R.A.E.

Though the next sitting for the Radio Amateurs' Examination is not till May, entries for it should be put in during *this* month—do not leave it too long, or you may have to pay the "extra fee for late entries." As sittings are held at centres up and down the country, we cannot say what the closing date is in your particular district—so enquire at the local office of your County Education Authority, quoting "Subject No. 55, Radio Amateurs' Examination." If you are taking an R.A.E. course locally, at evening school or technical college under the Education Authority, your instructor will know when individual entries should go in, and what the arrangements are for sitting the Examination.

NEW QTH's

This space is available for the publication of the addresses of all holders of new U.K. call signs, as issued, or changes of address of transmitters already licensed. All addresses published here are reprinted in the U.K. section of the "RADIO AMATEUR CALL BOOK" in preparation. QTH's are inserted as they are received, up to the limit of the space allowance each month. Please write clearly and address on a separate slip to QTH Section.

- G3WZW**, G. W. Laycock, 1 Campsall Cottages, Churchfield Road, Campsall, Doncaster, Yorkshire.
- G3XNQ**, J. G. Wilson, 49 Medway Crescent, Gateshead, Co. Durham. NE8-3SN.
- G3XSQ**, J. F. Seller, 77 Hawkwood Crescent, Chingford, London, E.4.
- GW3XSQ**, J. F. Seller. *QSL via G3XSQ.*
- G3XUO**, K. V. Edwards, 99-A Wilton Crescent, Shirley, Southampton, Hants. SO1-2QF.
- G3XUS**, P. D. Simmons, 62 Lawes Avenue, Newhaven, Sussex. (Tel. *Newhaven 4465.*)
- G3XWE**, Mrs. G. Crooks, 4 Victoria Grove, Fairfield, Stockton-on-Tees, Teesside.
- G3XWW**, H. R. de Beneducci, Westwood, Sandy Lane, Cobham, Surrey.
- G3XYJ**, R. M. Walker, 50 Hill Road, Pinner, Middlesex.
- G3XYT**, L. W. Rice, 542 Chester Road, Wyke Green, Sutton Coldfield, Warks.
- G3XZB**, N. M. Edwards, 99-A Wilton Crescent, Shirley, Southampton, Hants. SO1-2QF.
- G3XZK**, D. B. Gething, 1 Miserden Road, Cheltenham, Glos. GL51-6BN.
- G3XZQ**, R. Hargreaves, 8 Woodbank, Egremont, Cumberland.
- G3XZS**, J. K. Clayton, 30 Moorland Crescent, Baildon, Shipley, Yorkshire.
- G3XZT**, T. W. Allison (*DL5ZX*), 12 Ashley Gardens, Blackshots Lane, Grays, Essex. RM16-2LR.
- G3XZV**, J. M. Sonley, 59 Maxwell Road, Winton, Bournemouth, Hants. BH9-1DQ.
- G3YAA**, G. S. Dunn, 5 Eden Close, Beverley, Yorkshire.
- G3YAL**, B. D. Sheasby, 75 Amberley Avenue, Bulkington, Nuneaton, Warks.
- GM3YAU**, J. Hill, 67 Caledonian Road, Stevenston, Ayrshire.
- G3YBA**, E. Cooper, 182 Crimicar Lane, Sheffield. S10-4EJ.
- GSYBH**, P. Storey, 29 Chalfont Road, Liverpool, 18.
- G3YBI**, R. J. C. Baynham, 3 Kilvert Close, Edgmond, Newport, Salop.
- G3YBK**, R. J. Donno, 6 Mincinglake Road, Stoke Hill, Exeter, Devon. (Tel. *Exeter 78710.*)
- GM8BRM**, I. B. Petrie, 7 Gladstone Terrace, New Deer, Aberdeenshire. AB4-8TE. (Tel. *New Deer 488.*)
- GM8BVX**, J. G. Whyte, 38 Deeside Gardens, Aberdeen. AB1-7PN.
- G8BWM**, P. J. Hubert, 575 Bramford Lane, Ipswich, Suffolk.
- G8BYA**, F. Sims, 33 Harrowby Street, Stafford, Staffs.
- GM8BYF**, J. R. Buchanan, 50 Priestfield Road, Edinburgh, 9. (Tel. *031-667 6797.*)
- G8CBW**, F. Hutchinson, 41 Thorp Road, Sheffield. S2-4SW.
- G8CEV**, J. Housden, 21 Pygall Avenue, Gotham, Nottingham. NG11-0JW. (Tel. *Gotham 317.*)
- G8CFB**, K. R. Cates, 267 Uppingham Road, Leicester.
- G8CFN**, H. B. F. Powell, 6 Oak Way, Ashtead, Surrey.
- G8CGR**, P. R. Tuton, 154 Gillshill Road, Hull, Yorkshire.
- CHANGE OF ADDRESS**
- G3AQQ**, J. Kelsall, 4 Acomb Crescent, Hambrook Park, Charlton Kings, Cheltenham, Glos.
- GM3AWW**, W. S. Murray, 16 Broom Road, Newton Mearns, Renfrewshire.
- G3CBW**, H. Walker, 62 Highmoor Park, Wigton, Cumberland.
- G3CCU**, G. Phillips, 48 Bradstow Way, Broadstairs, Kent.
- G3DDG**, G. Cowey, 7 St. Mary's Close, Easington Village, Peterlee, Co. Durham.
- G3GDJ**, R. B. Wilson, 91 Church Street, Derby. (Tel. *Derby 22929.*)
- G3IDF**, A. R. Dyer, 37 Ditchling Hill, Southgate West, Crawley, Sussex.
- G3LGL**, J. E. French, 54 Reddall Hill Road, Cradley Heath, Warley, Worcs.
- G3OIE**, A. J. MacRae, 38 Essex Road, Birkdale, Southport, Lancs. (Tel. *Southport 66135.*)
- GM3POK**, E. J. Kelly, Hewlett Packard Ltd., South Queensferry, West Lothian.
- G3SGS**, J. H. Clements, 24 Volley Road, Tasburgh, Norwich, Norfolk. NOR.66-W.
- G3SNN**, A. B. Woolford (*ex-ZC4CN*), 23 Copt Elm Close, Charlton Kings, Cheltenham, Glos.
- G3SUO**, A. A. Spencer, 9 Lower Way, Chickerell, Weymouth, Dorset.
- G3SUP**, A. T. Spencer, 9 Lower Way, Chickerell, Weymouth, Dorset.
- GC3UJE**, B. D. R. Gale, c/o The Forest Hotel, Guernsey.
- GM3UTO**, I. Balloch (*ex-9VIN F/5ASTY*), 70 Tarvit Drive, Cupar, Fife.
- G3VIQ**, S. W. Williams, Flat 3, 67-A Coltham Road, Short Heath, Willenhall, Staffs.
- G3VQY**, J. W. Cumming, 30 Victoria Avenue, Wickford, Essex.
- G3WOC**, R. J. Worbey, 13 Havelock Road, Dartford, Kent.
- G3WQY**, T. A. Codrai, 225 Ashcroft Road, Stopsley, Luton, Beds.
- G3XIV**, G. G. Bullyment, 42 The Fairway, Portchester, Fareham, Hants.
- G3XJW**, L. G. Rix, 142 Penn Grove, Norwich, Norfolk. NOR.94-N.
- G3XJW/A**, L. G. Rix, 5 Winsford Avenue, Preston Grange, Tynemouth, Northumberland.
- G3XVC**, Maureen Worbey, 13 Havelock Road, Dartford, Kent.
- G6ACS/T**, R. B. Wilson, 91 Church Street, Derby. (Tel. *Derby 22929.*)
- G8ATK**, M. Hearsey, Halcyon, Lawday Link, Upper Hale, Farnham, Surrey. (Tel. *Farnham 5765.*)
- G8BGE**, P. M. Jones, 73 Redwood Road, Kings Norton, Birmingham, 30. (Tel. *021-458 7879.*)

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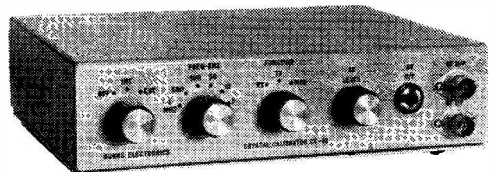
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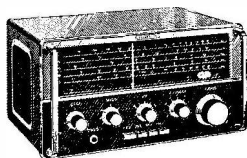
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(Extract from January Short Wave Magazine, p.696).

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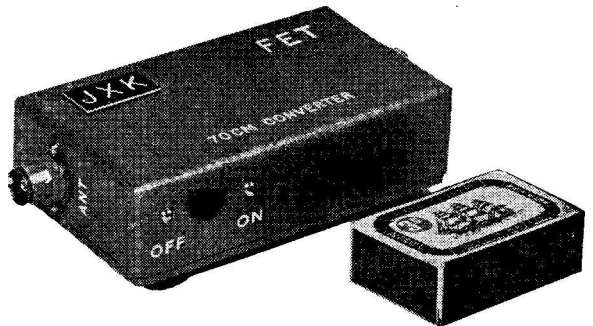
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Eddystone EC 10	£40	Eagle RX 80	£20
Heath SB 10U. Perfect	£25	Green and Davis LA 600	£65
Sphinx SSB Tx and Delta	£60	Hallcrafters SX 62A	£60
Minimitter MC-8 Conv.	£10	Heath OS-2 scope	£18
TCS Transmitter	£12	Eagle SWR Bridge	£7
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B2 "Spy" Tx/Rx	£14	Codar CR 45 with speaker	£9
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SMALL ADVERTISEMENTS, READERS—continued

SALE: VHF Rx tunable 60-180 mc approx., with internal mains PSU/speaker, £25; Marconi valve voltmeter, with probe, mains PSU, £20; these items carriage extra. Also MANUALS: Crystal Monitor Type 4, UHF Test Set No. 28, 10s. each; No. 58 Set, 25s.; R.208 Rx, 20s.; R.3066, R.3102A, Rx 36, Indicators Type 20 and 48A, Modulator 20, Transmitters T.3065A/B, 30s. each; Crystal Calibrator Type 18, 20s.; Rebecca Test Set Type 31, 30s.; Crystal Calibrator Type 120, 30s. **CIRCUITS:** BC-1000 (Type 31 Tx/Rx), 5s.; and Test Sets Type 31A/B, 10s. Please include s.a.e. with all enquiries.—Hayward, Sunnyfields, Lighthouse Road, St. Margarets Bay, Near Dover, Kent.

EXCHANGE or SELL: KW-2000, with AC and DC PSU's, mint condition, in KW-2000A cabinet, with 12-volt 50 amp. alternator, brand new, all at £225, or EXCHANGE for SB-400/1 Tx, with cash adjustment.—Green, G3JNX, 54 Langley Avenue, Brixham (3142). Devon.

FOR SALE: T.28, case a bit rough, £9. CR-100/7, with handbook notes, £14. Codar A.T.5, unused, £14. Codar 12/RC control unit, 30s. Reporter, 4-metre model, 40s. R.1155 Rx, condensers u/s, 20s.; PSU to suit, 10s. All items carriage extra.—Hawker, 9 Church Close, Tatton, Bristol.

WANTED: T.W. Fourmobile receiver or 4-metre Communicator; state polarity to chassis and any modifications. Also accurate HF or VHF frequency meter, and any type of UM mod. transformer. **FOR SALE:** FM tuner, in mint condition, and 12w. hifi amplifier, both by Tripletone, cost £37. Or would EXCHANGE for any foregoing, or general-coverage receiver, with cash adjustment as necessary (Northern Ireland).—Box No. 4738, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1

WANTED: Faulty CR-100 receiver, any condition acceptable, even incomplete; also circuit for Hammarlund Super-Pro with separate PSU; BC-779, BC-794, SP-110, SP-120, complete receiver, working or not. State price, details, etc. Collection arranged anywhere.—Bentley, 27 De Vere Gardens, Cranbrook, Ilford, Essex. (Tel. 01-554 6631.)

FOR SALE: Sideband Engineers (Raytheon) SBE-34 Transceiver, transistorised except for driver and final stages, with built-in 110v. AC/12v. DC PSU's and speaker, complete with (unused) mobile antenna system comprising single-hole swivel base mounting and fibre-glass Heliwhips for 15-20-80 metres, all in at £155.—Barry, G3UFU, 15 Fairlawn Court, Acton Lane, London, W.4.

WANTED: Urgently, valves Type TZ-40 and GU-50. Details of price, condition, usage, etc.—Wadsworth, G3NPF, 130 Ashingdon Road, Rochford, Essex.

SALE or EXCHANGE: Eddystone S.640 receiver, their first post-war design with amateur bandspread, overhauled and perfect, cheap at £15 (or near offer). Also Star 200 AM/SSB receiver, two months old, £30 or near offer. Would EXCHANGE for Heathkit Mohican GC-1U, RA-1 or quality VHF portable.—Stampton, 67 Medhurst Crescent, Gravesend (63284), Kent.

MARCH Issue of "Short Wave Magazine," appearing on February 28, will include as a free loose supplement the full Index to the previous 12 months, Vol. XXVI. Looking back over the years, we don't know how we've done it—our present Editor, in terms of continuous service, is now the longest-lived and most senior incumbent in the chair of any Amateur Radio periodical in the world. This does not mean that we know everything—it is only to say that if you want the March issue on time, send your postal order for 4s. (or 4s. 3d. "first class") to reach us by February 26.—Circulation Dept., Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SMALL ADVERTISEMENTS, READERS—continued

SELLING: Hammarlund HQ-180AC receiver, amateur bandspread, suitable SSB mode, complete with clock and speaker, £145 or near offer.—Ring Hawes, Aldershot 25050, evenings or weekends.

WANTED: BC-221 frequency meter, with mains PSU and original charts. Also a Heathkit DX-40U or similar Tx. All in good condition.—Sherwood, 12 Albion Close, Heaton Norris, Stockport, Cheshire SK4-1TU.

WANTED: Trap Vertical, Trap Dipole Antennae; TVI-proof CW Tx; also Z-match and balun units. (Staffordshire).—Box No. 4739, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SALE: Heathkit HD-10 electronic keyer, for grid-block keying; in good condition, with manual, price £15. Could deliver in the Ilford/Stafford areas.—Kemble, G3UYK, QTHR.

AVAILABLE at Godshill, Isle of Wight: Bed-breakfast accommodation with evening meal; hot and cold in all rooms; TV lounge; and children welcome. Also an all-electric 4-berth caravan, with main water and flush you-know. Write for terms.—Berden, G3RND, Bridgecourt Farmhouse, Godshill.

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FOR SALE: Heathkit DX-100U transmitter £50. Eddystone 888A receiver, £70.—Bushell, GW3OSV, Park East, Clarboston Road, Pembrokeshire, West Wales.

SELLING: Eddystone EB-35 receiver, coverage LW/MW, three S/W bands and FM, latest circuitry with extra transistor, new and perfect, price £43, prefer buyer to collect (Kent).—Box No. 4742, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

EXCHANGE: Juliette NA-5018 receiver, five weeks old, for Heathkit Mohican GC-1U, or similar.—Akinas, 164 Sutcliffe Avenue, Grimsby, Lincs.

SALE: Heathkit transmitter, absolutely in mint condition, price £125.—Waters, G3OJV, 16 Hill Crescent, Hornchurch, Essex. (Tel. Chancery 8877, 10 a.m. to 4 p.m.).

FOR SALE: R.209 communication receiver, Mk. II model, coverage 1.0 to 20 mc in four bands, AM/FM, variable BFO, built-in speaker and 12v. DC/PSU (new), price £12, carriage 30s.—Jesson, 181 Kings Acre Road, Hereford. (Tel. 3237, evenings).

SALE: Eddystone 840C receiver, as-new condition and still under guarantee, price £45 or near offer. (West Midlands).—Box No. 4744, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SELLING: Copies of "Practical Wireless," "Practical Electronics," "Short Wave Magazine" and "Radio Constructor"—various issues between November '63 and December '68. Pse. send s.a.e. for lists, or with enquiries.—Patton, 85 Manchester Road, Accrington, Lancs.

DISPOSING: Lafayette HA-350 Rx, as new and boxed, with calibrator crystal and speaker, £55 or near offer. Smart 160-metre transmitter, sprayed grey, with matching PSU, price £20. Eddystone Type 898 dial, new, £4. Q-multiplier, 470 kc, 40s. Also tape amplifier, vertical aerial, dipoles, copies "Bulletin" and "Short Wave Magazine"; offers?—Bray, 24 Old Hatch Manor, Ruislip (38165), Middlesex.

SALE: National HRO receiver, Model 5T, coverage 50 kc to 30 mc, with set of nine coil packs, including crystal filter with phasing control, and S-meter. This Rx is in first-class condition, complete with original PSU, price £25, carriage 30s.—Jesson, 181 Kings Acre Road, Hereford. (Ring 3237, evenings).

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Trio 9R59DE communications receiver	39	15	0
Trio JR500SE amateur band receiver, 80-10 metres	69	10	0

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Lafayette HA500 amateur band receiver, 80-6 metres	44	2	0
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SX-122 communications receiver	148	5	0
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R.Q.10 Q multiplier	7	5	0	Shure 2755K	5	5	0
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CR-45K receiver	9	15	0	BI/4 4 metre Tx	30	0	0
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12/MS p.s.u.	11	10	0	Mobile antenna	6	7	6
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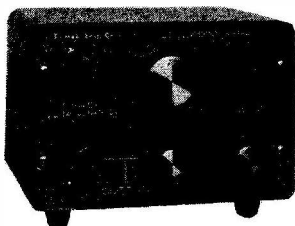
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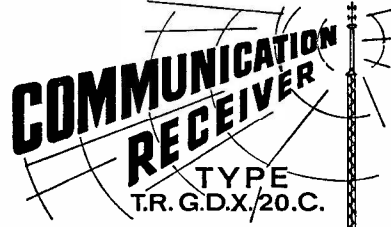


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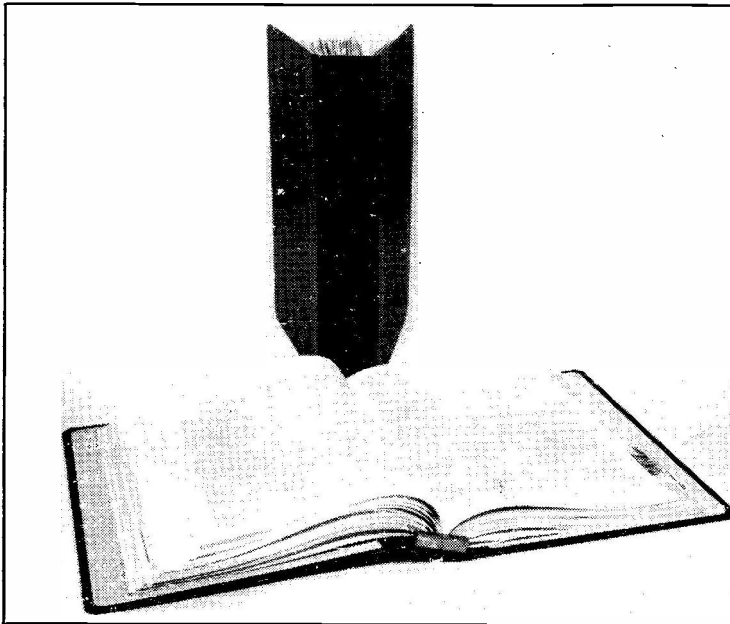
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