

# The SHORT WAVE Magazine

4/-

VOL. XXVII

OCTOBER, 1969

NUMBER 8

## British Equipment Saves Imports

Buy KW . . . the finest  
communications equipment  
available and help yourself  
and the country.



### KW ATLANTA

High power transceiver designed for export, covers the whole of each band 10-80 metres (75 metres).



### KW2000B

SSB transceiver with all the frills you want. Independent receiver tuning. 'Break-in' telegraphy. CW side-tone monitoring. VOX and crystal calibrator. Ideal for mobile operation.

Write for illustrated detailed specification on the KW Atlanta and 2000B

### K. W. ELECTRONICS LIMITED

1 HEATH STREET . DARTFORD . KENT

TEL: DARTFORD 25574 CABLES: KAYDUBLEW DARTFORD

# Best Reception with TRIO

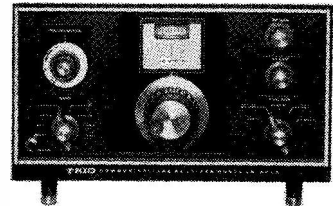


## Model 9R-59DE BUILT IN MECHANICAL FILTER 8 TUBES COMMUNICATION RECEIVER

\* Illuminated dials permit easy tuning and band spread readings. \* Continuous coverage from 550 KHz to 30 MHz and direct reading dial on amateur bands. \* Close calibration accuracy with an excellent anti-backlash mechanism. \* A mechanical filter enabling superb selectivity with ordinary IF transformers. \* One RF and two audio stages of amplification, insuring high sensitivity and selectivity. \* A Product Detector making possible clear SSB reception.

### Specifications:

\* Frequency Ranges: Band A 550-1600KHz, B 1.6-4.8MHz, C 4.8-14.5MHz, D 10.5-30MHz. \* Sensitivity: 2 $\mu$ V for 10dB S/N Ratio (at 10MHz) \* Selectivity  $\pm$ 5KHz at -50dB \* Power Consumption: 45 watts \* Audio Power Output: 1.5 watts \* Tube & Diode Complement: 6BA6 $\times$ 3, 6BE6 $\times$ 2, 6AQ8 $\times$ 2, 6AQ5, SW-05S $\times$ 2, SW-05 $\times$ 2, IN60 $\times$ 2. \* Dimensions: Width 15", Height 7", Depth 10".



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



## HS-4 HEAD PHONES (Designed Exclusively for Communications Work)

\* An ideal response for speech clarity of 300 to 3,000 Hz (-6 dB) using a special communication's element.



*the sound approach to quality*

**TRIO**  
TRIO ELECTRONICS, INC.

TO: B. H. Morris & Co., (Radio) Ltd. SW

Send me information on TRIO COMMUNICATION RECEIVERS & name of nearest TRIO retailer.

NAME: \_\_\_\_\_ AGE: \_\_\_\_\_

ADDRESS: \_\_\_\_\_

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

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



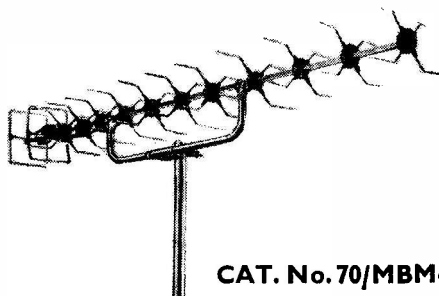
# AMATEUR RADIO ARRAYS

The "TRIPLE-3" Three Band Beam for 10, 15 & 20 Meters. A superbly engineered 3 Element Antenna using entirely new DESIGN OF TRAPS. With a performance on each band as good as a single band beam.



CAT. No. "TRIPLE-3"

The "MULTIBEAM" 70cms. 46 Element Array with "PARABEAM" Radiator/Reflector and 11 Multiple Director Units (each consisting of 4 Director Elements).



CAT. No. 70/MBM46

Band	Cat. No.	Description	dB Gain over Dipole	Price £ s. d.	New Decimal Currency
10, 15 & 20 Meters	"TRIPLE-3"	3 Element yagi for 10, 15 & 20 meters (as illustrated)	5.8	60 0 0	£60.00
10 Meters	10/4Y	4 Element array with twin crossbar	7.0	19 16 0	£19.80
4 Meters	4/3Y	3 Element folded dipole yagi with 1½" boom	5.7	3 3 0	£3.15
	4/4Y	4 Element folded dipole yagi with 1½" boom	7.0	4 6 0	£4.30
	PM4/2	Coaxial harness to match and phase two 4m. aerials		1 18 0	£1.90
2 Meters	2/4Y	4 Element folded dipole yagi with 1" dia. boom	7.0	2 3 0	£2.15
	2/6Y	6 Element folded dipole yagi with 1" dia. boom	8.7	2 13 0	£2.65
	2/8Y	8 Element folded dipole yagi with 1" dia. boom	10.0	3 4 0	£3.20
	2/10Y	10 Element "Long Yagi" with 1½" boom and braces	13.2	7 2 0	£7.10
	2/14P	14 Element "Parabeam" with 1½" boom and braces	15.5	11 11 0	£11.55
	2/8	Double 4 slot fed yagis with 1" dia. booms	10.0	3 17 0	£3.85
	2/12	Double 6 slot fed yagis with 1" dia. booms	11.7	5 5 0	£5.25
	2/16	Double 8 slot fed yagis with 1" dia. booms	12.6	6 12 0	£6.60
	2/HO	"Halo" mobile aerial, head only		1 0 0	£1.00
	2/HM	"Halo" mobile aerial with ½" dia. mast		1 6 0	£1.30
	PM2/2	Coaxial harness to match and phase two 2M aerials		1 6 0	£1.30
	PM2/4	Coaxial harness to match and phase four 2M aerials		3 5 0	£3.25
70 Cm.	70/16	Double 8 slot fed yagis with ¾" dia. booms	12.6	4 6 0	£4.30
	70/14Y	14 Element folded dipole yagi, multi reflector	16.0	5 10 0	£5.50
	70/18P	18 Element Parabeam yagi with 1½" boom	17.0	5 11 0	£5.55
	70/MBM46	"Multibeam" 46 Element array (as illustrated)	20.0	8 8 0	£8.40
	PM70/2	Coaxial harness to match and phase two 70 cm. aerials		1 0 0	£1.00
PM70/4	Coaxial harness to match and phase four 70 cm. aerials		2 9 0	£2.45	
Rotators	2010	Automatic transistorised aerial rotator		18 10 0	£18.50
	3001	Memomatic (semi-automatic) aerial rotator		14 10 0	£14.50
	C6/20	20 yards rotator control cable		2 0 0	£2.00
	C6/50	50 yards rotator control cable		5 0 0	£5.00

Prices and details of accessories, Chimney Lashings, Wall Brackets, Aluminium and Steel Masts, Tubing, Cable, etc., available on request.

TERMS: C.W.O. All prices include free delivery in U.K.

All Aerials fitted with Universal Mast Clamp, Balun and Waterproof Connector Box and matched to 75 ohms feed impedance, except for models "Triple-3" and 10/4Y which are 50 ohms impedance.

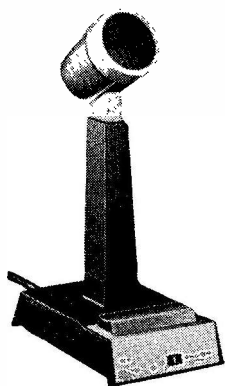


ROTHERSTHORPE CRESCENT, NORTHAMPTON, ENGLAND  
Telephone: NORTHAMPTON 62147 (ONO4)

## You can depend on Shure quality MICROPHONES For amateur radio communications

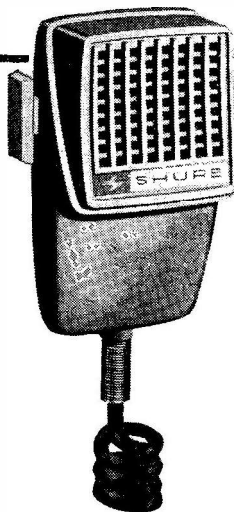
### Shure Model 444 Controlled Magnetic Microphone

Specially designed for radio communications, giving optimum performance from single sideband transmitters as well as AM and FM units. Response cuts off sharply below 300 c/s and above 3,000 c/s, with a rising characteristic to 3,000 c/s. This results in optimum speech intelligibility and audio punch to cut through noise interference. High impedance. Dependable under all operating conditions. Complete with switch for instantaneous press-to-talk or VOX operation; finger-tip control bar; long-life switch; adjustable microphone height; sturdy, high-impact base and case; 7 ft. two-conductor shielded cable.



### Shure Model 201 Diaphragm Type Ceramic Microphone

- \*Provides clear, crisp, natural voice reproduction of high intelligibility
- \*High impedance \*Ideal voice response and omni-directional polar pickup characteristics
- \*No humidity or temperature problems
- \*Light, strong and compact
- \*Heavy duty push-to-talk (non-locking) switch
- \*Frequency response: 200 to 4,000 c/s
- \*3-conductor retractable cable.



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Setting the  
world's standard  
in sound

SHURE ELECTRONICS LTD.  
84 Blackfriars Road, London, S.E.1. Tel.; 01-928 3424

## N. W. ELECTRICS

52 GT. ANCOATS STREET  
MANCHESTER 4

061-235 6276

## G3MAX

EDDYSTONE RECEIVERS AND COMPO-  
NENTS, DENCO, REPANCO, etc.

**Control Unit for Parts.** Contains: 2—500pF, 1—50pF, variable capacitors. 6—xtals with ceramic selector switch, freq. 150/151/152/153/154/152 Kc/s. FT243 bases. 3—flexible couplers, 3—epicyclic drives. 2—50K W/W var. (9—valves), 4—EF50. 2—SP61. 2—EA50. 1—EB34. Excellent value, 17/6, P.P. 10/6 unfortunately.

**'S' Meter.** 200 u.A. Scaled 0—200 marked in 'S' points +20+60 dB's. 2 3/8" dia. 2 3/32" mounting hole, 30/-, P.P. 1/6.

**Modulator Unit.** Ex-Aircraft Tx. EF92—EL91—Pair of 6C4, circuit supplied, 15/-, P.P. 4/6.

**High Voltage Transformer.** 340/0/340. Twice. Will give 2.5KV at 500 mA when used with doubler. This also has 2.5KV at 6 mA for CRT., 45/-, carriage 10/-.

**BY100 Rectifiers.** 5/- each, P.P. 1/-. Special price 10—for 45/-, post 2/6.

**Electrolytics.** TV type 400/200/50/16. 300v. DC wkg., 4/6 each. special price 10 for 37/6, post 4/6. Ideal for high voltage p.s.u. in series.

**CRT.** Monitor Tube. 3" E3G1 with base and screen, 25/-, P.P. 4/6. Useful for transmitter monitor.

**Coaxial Relay.** UHF type with BNC connectors. 75 ohm terminating resistors. U.S.A. make, 37/6, P.P. 2/6.

We still have some items from previous adverts.  
S.A.E. please with inquiries.

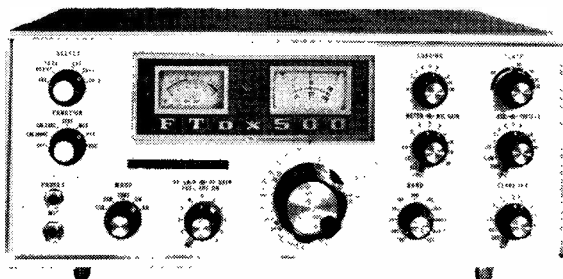
Business hours: 9 a.m.—6 p.m. Tuesday-Saturday  
CLOSED ALL DAY MONDAY

G3SMI



# SOMMERKAMP EUROPE'S MOST FAMOUS RADIO AMATEUR EQUIPMENT

Highest quality at most reasonable prices



**FT 500 TRANSCEIVER** 550 watt PEP SSB-AM CW. Built-in power supply 117-220 V. All bands 80-10M plus fixed channel operation. NOW WITH NEW DIAL, 1 KHZ = 1/3 inch.

*This powerful station does not require any power amplifier.*

ORDER TODAY . . . RECEIVE TOMORROW

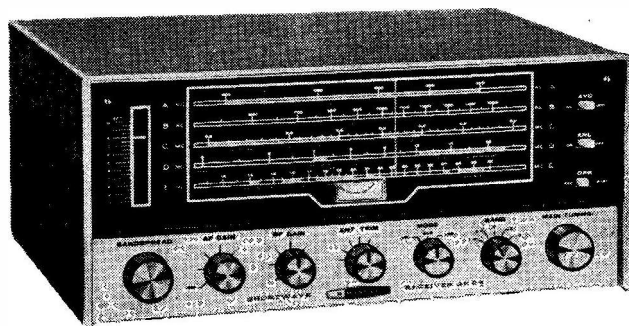
Sole agent in England:

**LOWE ELECTRONICS, Matlock, Derbyshire. Telephone: 2817**

Exporter:

**SOMMERKAMP ELECTRONICS, Lugano 3, Box 176. Switzerland. Telex: 79314**

## HEATHKIT for SW Receivers



- Compare with sets costing very much more.
- Offer world wide reception at low cost.
- Have high-performance features.
- Plus sleek low-boy styling.
- Treat yourself to a world trip in the comfort of your own armchair.

**THE DE-LUXE 5 BAND RECEIVER, GR-54**  
illustrated costs only **£48.16.0**, plus carr. 9/- as a kit.

Many other Transceivers, Receivers, ancillary equipment. Test Instruments, Hi-Fi and audio. Models for the home, workshop, hobbyist can be seen in the latest Free Heathkit catalogue.



**DAYSTROM LTD.**  
Dept. SW-10 Gloucester

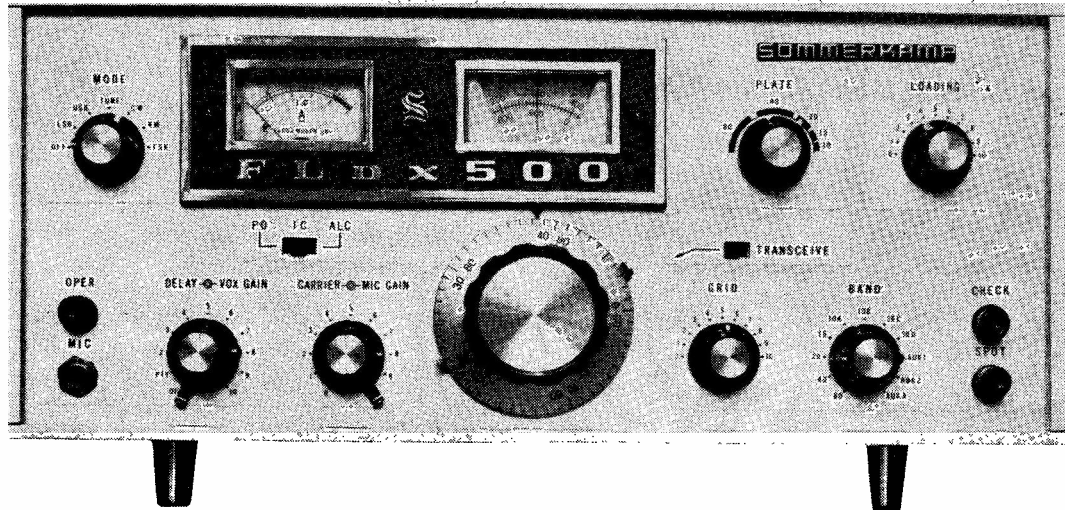
To **DAYSTROM LTD., Dept. SW-10 Gloucester, GL2-6EE**

Please send me details of your SW receivers immediately

NAME .....

ADDRESS .....

**LOWE ELECTRONICS** 50-52 Wellington Street, Matlock,  
Derbys. DE4 3GS Tel.: Matlock 2817 (2430 evenings)



## SOMMERKAMP FL-500 TRANSMITTER

The FL-500 transmitter is a precision built compact high performance desk top SSB transmitter with CW, AM, LSB and USB modes of operation. On all modes except AM, this transmitter works at an input of 240 watts on all bands through 80 to 10 metres. The AM mode consists of transmitted carrier and one sideband. The SSB is generated by a mechanical filter.

### SPECIFICATION :

Type of emission :	CW, AM, SSB (upper/lower sideband)
Operation :	VOX, PTT (push to talk) and MOX.
Power input :	240 watts PEP SSB and CW, 75 watts AM.
Output impedance :	50 to 120 ohms.
Frequency range :	3.5-4.1 ; 6.9-7.5 ; 13.9-14.5 ; 20.9-21 ; 27.9-28.5 ; 28.5-29.1 ; 28.9-29.5 ; 29.5-30.1 mc/s.
Frequency stability :	100 cps. after warm-up for 10% drift of line voltage.
Carrier suppression :	50 dB below peak output.
Sideband suppression :	50 dB below peak output at 1000 cps.
Distortion products :	Better than 30 dB.
Audio response :	60 dB at 300 to 2700 cps.
Power requirements :	110/117/220/234v. A.C. 50/60 cps. 350 watts.
Cabinet size :	6½" high, 14½" wide, 11½" deep.

### TUBE AND DIODE SPECIFICATION

6U8	1 speech amplifier	1S1007	1 output rectifier
1S1007	2 balanced modulator	6U8	1 carrier OSC. and antitrip amplifier
6U8	1 VOX amplifier, relay	12AU7	1 sideband oscillator
SH-1	1 antitrip rectifier	6BA6	1 IF amplifier
12AT7	1 sideband mixer	6CB6	1 VFO mixer
6AW8A	1 heterodyne osc. and mixer	6JS6A	2 linear amplifier
12AU7	1 VFO	SD-1	4 rectifier
12BY7A	1 driver	SH-1	automatic level control
SH-1	1 bias rectifier		

The above manufacturer's guff gives the salient features to which I would like to add my own two bits worth :-

The Tx can of course, be operated transceive with the companion FR-500 (or FR-100-B) Rx and in this case the Rx V.F.O. controls the station. However, on pressing the Tx "check" button, the Tx V.F.O. is switched in—useful for monitoring another frequency. It has spare relay contacts for operating a linear and features break-in C.W.

This rig is so well known throughout the world that I don't have to go into a hard sell routine. It only remains to remind you of the price—

**£145.0.0**

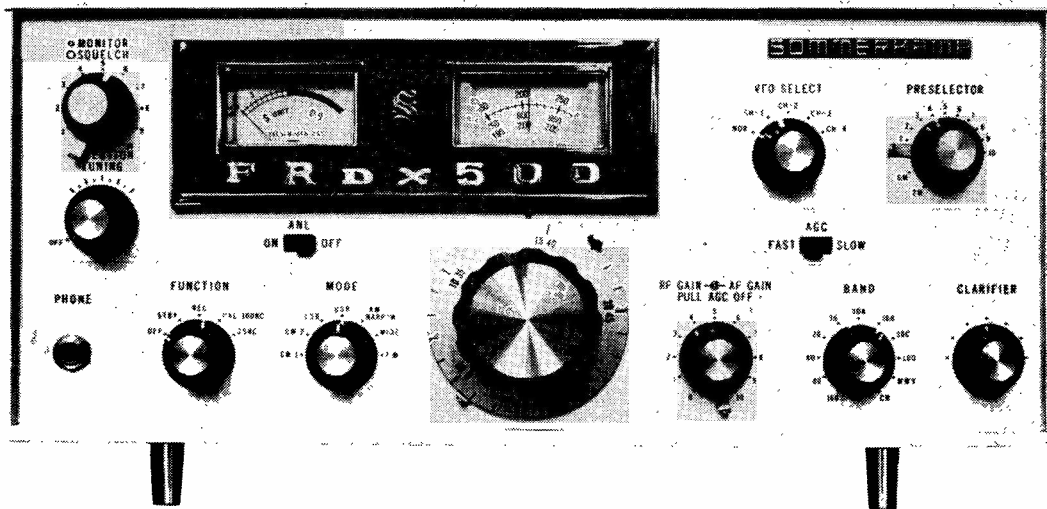
The complete Sommerkamp range, along with all the other gear we stock may be seen on Stand No. 13 at the R.S.G.B. Exhibition. In addition of course, our Agents, Alan Whitford, 4 Southwick Street, Southwick, Brighton, Tel. No. Southwick 4887 and Vic Newport, 38 Huckford Road, Winterbourne, Bristol, Tel. No. Winterbourne 3086 are anxious to lighten your wallet.

73, de Bill,

G3UBO/VE8DP.

# LOWE ELECTRONICS

50-52 Wellington Street, Matlock,  
Derbs. DE4 3GS Tel.: Matlock 2817 (2430 evenings)



## SOMMERKAMP FR-500 RECEIVER

Top band to 2m.

A New and much improved version of the FR-100-B. Improved in the sense of added features, as it would be difficult if not impossible to improve on the FR-100-B and still keep the price within bounds.

Coverage : 1.7-2.3 ; 3.5-4.1 ; 6.9-7.5 ; 13.9-14.5 ; 20.9-21.5 ; 26.9-27.5 ; 27.9-28.5 ; 28.5-29.1 ; 28.9-29.5 ; 29.5-30.1 ; 9.9-10.5 ; 144-146 mc/s.

Sensitivity : Better than  $\frac{1}{2}$  microvolt for 10 dB S+N/N in the SSB position.

Selectivity : 4 kc/s. AM ; 2.4 kc/s. SSB ; 600 cycles CW.

Calibration : 100 kc/s. and 25 kc/s. by built-in xtal calibrator and multivibrator. Direct readout to 1 kc/s. 25 kc/s. per turn of the tuning knob.

Notch filter, F.M. discriminator, fast/slow a.g.c. ANL and "clarifier" which acts as R.I.T. when used in transceive with the FL-500 Tx.

Line-up : 6BZ6—r.f.; 6U8—xtal osc./mixer, transistor VFO and buffer; 6BZ6—v.f.o. amp.; 6BE6—mixer; 12AT7 rejection tuning; 2-6BA6—I.F.'s; 12AT7—B.F.O.; 6BM8—Audio; 6U8—FM discriminator and squelch, zener stabilized VFO: solid state used for xtal calibrator, v.f.o. AM detector, product detector (ring diodes), AVC diodes, oscillator for xtal channels, noise limiter.

Controls : Monitor (used to monitor the signal when using the FL-500 Tx). Squelch, rejection tuning, function (off, standby, receive, calibrate 100 kc/s., calibrate 25 kc/s.).

Mode : (CW1, CW2, LSB, USB, AM narrow, AM wide, FM), Noise limiter on/off VFO, r.f. gain, i.f. gain, agc on/off, agc fast/slow, Bandswitch, clarifier, preselector, VFO select (normal, VFO or any of 4 optional xtal controlled channels).

Sensitivity, stability and accuracy are well up to FR-100-B standards—this in itself is sufficient recommendation, but in addition it is an altogether more versatile Rx than the FR-100-B and for my money the best Rx on the market at anywhere near the price.

**£160.00**

The complete Sommerkamp range, along with all the other gear we stock may be seen on Stand No. 13 at the R.S.G.B. Exhibition. In addition of course, our Agents, Alan Whitford, 4 Southwick Street, Southwick, Brighton, Tel. No. Southwick 4887 and Vic Newport, 38 Huckford Road, Winterbourne, Bristol, Tel. No. Winterbourne 3086 are anxious to lighten your wallet.

73, de Bill,

G3UBO/VE8DP.

## SWANCO PRODUCTS

LIMITED

AMATEUR RADIO SPECIALISTS

NEW EQUIPMENT

	£	s.	d.
<b>Eddystone Radio Ltd.:</b>			
Eddystone EA12 Amateur band receiver, 160-10 metres	193	0	0
Eddystone 940 communications receiver	143	0	0
Eddystone 840C short wave receiver	70	0	0
Eddystone ED10 transistorised communications receiver	59	10	0
Eddystone EB35 short wave and F.M. receiver	66	13	4
Eddystone EB36 short wave broadcast receiver	56	5	0

### Trio Communications Equipment :

Trio TS-500 5SB transceiver with a.c. p.s.u. and with split frequency V.F.O.	123	0	0
Trio 9R59DE communications receiver	42	0	0
Trio JR50SE amateur band receiver, 80-10 metres	69	10	0

### Lafayette Receivers :

Lafayette HA500 amateur band receiver, 80-6 metres	44	2	0
Lafayette HA600 solid state receiver	45	0	0

### Mosley Electronics (Beams) :

TA-33 Jr. Tri-band three element beam	27	5	0
TA-32 Jr. Tri-band two element beam	19	5	0
TA-31 Jr. Tri-band dipole	11	11	0
V3 Jr. Triband	8	5	0
TD-3 Jr. Wire trap dipole	6	15	0

### G-Whip Antennas :

G-Whip mobile antenna range. Lightweight design. Helical wound. Superior performance. S.A.E. illustrated brochure and Prices.

### Swanco/CSE :

	£	s.	d.
Type MM2 micro-phone	2	17	11

### Shure Microphones :

	£	s.	d.
Shure 201	5	12	6
Shure 202	6	0	0
Shure 444	12	15	0
Shure 401A	6	15	0
Shure 2755K	5	5	0

### Echelford Communications :

	£	s.	d.
BI/4 4 metre Tx	30	0	0
M1/4 4 metre Tx	40	0	0
CI/4 4 metre converter	10	10	0

### Halsion Electrical Services :

	£	s.	d.
Mobile antenna	6	17	6
Extra coils	3	17	6
S.W.R. and F.S.I.	4	19	6

### Partridge Electronics :

	£	s.	d.
Joystick standard	5	2	6
Joystick de-luxe	6	5	0
Type 3 tuner	2	15	0
Type 3A tuner	3	19	6
Type 4 tuner	5	5	0
Type 4RF tuner	6	17	6

### Codar Radio Company :

	£	s.	d.
CR.70A receiver	21	0	0
PR.30 preselector	5	19	6
PR.30X (with p.s.u.)	7	19	6
R.Q.10 Q multiplier	7	5	0
R.Q.10X (with p.s.u.)	8	17	6
CC40 control unit	6	15	0
CR.45K receiver	9	15	0
CR.45RB receiver	11	19	6
AT5 transmitter	16	19	6
250 volt p.s.u.	8	10	0
21/MS p.s.u.	11	10	0
12/RC control	2	10	0
T.28 receiver	15	17	6
Mini Clipper kit	2	4	6

Full range of KW Equipment available to order.

Full range of Drake Equipment available to order.

Full range of Heathkit Equipment available to order.

### SECOND-HAND EQUIPMENT

Many items in stock, including :—Eddystone EC10, S27, AR88LF, B.40, CR100, 9R59, DX100U, LG300, LG50, KW Vanguard, Lafayette Starflite, etc. Your enquiries please.

Full service facilities—receivers re-aligned, transmitters serviced, etc.

## SWANCO PRODUCTS LIMITED

Dept. S, 247 Humber Avenue, COVENTRY  
Telephone : Coventry 22714

Hours : Mon., Tues., Wed., Fri., Sat. 9 a.m.—5.30 p.m.

## CQ-CQ-CQ de G3VQM/KW

Well, it's Exhibition Time once more and we have our stand full of good quality gear for you to browse through and fiddle with. Let me tell you about some of the things you may not see at the Show.

The 'Mustang' beam which Mosley Electronics have come up with has caused such a stir I thought I must make mention of some of the first class antennae that issue forth from New Costessey. This Mustang is a really good British Made Senior Beam and costs only £33. Really fantastic value for money. Reports from users indicate that its performance is very good indeed and I for one, am most impressed. Drop me a S.A.E. for more details on the Mustang.

Most popular of all beams in U.K., is Mosley's TA-33Jr. This is not surprising because it costs only £27.5.0 and works like a bomb. It is easy to assemble and tune and being a wide spaced beam is really good for DXing on 20, 15 and 10 metres. You can build it in stages if you wish. The TA-31Jr. is the driven element. By adding the reflector and director in two stages, you can achieve your tri-band beam with the minimum financial pain. My only grouse about Mosley beams is the one-piece 12 foot boom which makes the package rather unwieldy from the transportation angle. This is, of course, no problem for owners of 32-seater coaches and those who prefer to have us despatch their Mosley by B.R.S.

Space is disappearing fast so I'll say 73 until next month when I'll give you some gen on gear for turning these antennae I've been telling you about.

BCNU, Mike.

## KW ELECTRONICS LTD

1 HEATH STREET, DARTFORD, KENT

Telephone: Dartford 25574

## "QSP, QSP . . .

## DE . . .

## G3IGW, G3IGW"

After 17 years of brewing, selling (and supping!) good ale, this O.M. has gone QRT, done a QSY and now finds himself at the QTH below.

Our QRL (ugh!) is the business transfer world. In fact the QRM is very heavy on the QRG right now.

We have businesses for sale—every size and type—all over the North of England and the North Midlands. Can I send you a comprehensive catalogue—gratis of course?

Ever thought of owning your own business?

T.V. and radio perhaps—with of course a ham radio counter just along the side!

Selling or buying, tune up on the new G3IGW QRG here in Leeds. Better still if passing—just break in (not literally LID!) and let's enjoy a QSO.

Ask for MIKE/G3IGW

## HENRY STEAD & PARTNERS LIMITED

BUSINESS TRANSFER AGENTS and CONSULTANTS,

29 COOKRIDGE STREET,

LEEDS 2

Telephone 20208

# **TRIO** **models**

**AS-510**

**VS-50 VFO-5D**

**UF-310**

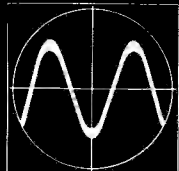
**9R-59DE**

**JR-500SE**

**SP-5D and HS-4**

**ON STAND 17**

at the International Radio Engineering and Communications Exhibition



exclusive United Kingdom distributors

**b.h. morris & co. (radio) ltd**

84-88 Nelson Street, London E.1 Tel: 01-790 4824



# AMATEUR ELECTRONICS G3FIK

**TRIO COMMUNICATIONS EQUIPMENT.** As announced last month we are now again able to offer the unique home demonstration service conducted by G3WQR on the new TRIO TS-510 TRANSCEIVER and this is a without-obligation scheme which gives the prospective purchaser an opportunity to see the TS-510 in operation at the home QTH which, without doubt, is the finest way of evaluating the performance of equipment. The TS-510 has no equal on the British market for quality of construction, performance and value for money and visitors to the forthcoming Radio Engineering and Communications Exhibition will have every opportunity of seeing this exceptional Transceiver at close hand.

We list below a selection of used equipment currently in stock at the time of going to press and following our standard procedure this is priced to include carriage which is deductible on goods collected.

	£	s.	d.		£	s.	d.
<b>NATIONAL NCX3 TRANSCEIVER.</b> In exceptional and little used condition. Complete with matching PSU/ Speaker unit. 200 Watts PEP on 20, 40 and 80 ...	105	0	0	<b>HEATHKIT DX100 TRANSMITTER.</b> In used but reasonable clean condition and not mutilated in any way ...	40	0	0
<b>SWAN 400 TRANSCEIVER.</b> In first class and unmarked condition and complete with Swan 230v. PSU and model 22 dual VFO adaptor unit enabling full split frequency working. Model 410 and 420 VFO's in similar mint condition also included. A first class buy at ...	205	0	0	<b>COLLINS TCS TRANSMITTER.</b> In excellent order and internal and external condition and with in-built mains PSU ...	16	0	0
<b>HEATH SB30IE PROFESSIONAL SW RECEIVER.</b> Exceptional condition and first class performance ...	120	0	0	<b>HEATHKIT RA-1 RECEIVER.</b> One only remaining ...	30	0	0
<b>KW VANGUARD TRANSMITTER.</b> Exceptional condition and fully air tested ...	39	10	0	<b>BC221 FREQUENCY METERS.</b> We regret that all brand new models are now sold but can still offer instruments in truly first class condition at ...	25	10	0
<b>LABGEAR LG300 TRANSMITTER.</b> Complete with matching PSU/MODULATOR. Again in exceptional and unmarked condition ...	55	0	0	Please note: We urgently require genuine BC221 xtals.			
<b>HRO SENIOR RECEIVER.</b> Complete with PSU and nine general coverage coils. Again in unusually good condition	29	10	0	<b>MARCONI TF144G SIGNAL GENERATORS.</b> In original transit cases and complete with all spares, etc. ...	25	0	0
<b>KW VICEROY TRANSMITTERS.</b> We seem to be collecting these FB transmitters of late mainly through taking them in part exchange against TS-510's. Several in stock from ...	97	10	0	<b>MARCONI 390G UHF SIGNAL GENERATORS.</b> Covering 16 to 150 mc/s. in four bands. BRAND NEW and each complete with individually calibrated chart ...	25	0	0
<b>TRIO 9R-59DE RECEIVERS.</b> Please note that we very much regret that all stocks of second-hand 9R's are now exhausted but we shall, of course, advertise immediately if further sets come in.				<b>HEATHKIT HM-11U REFLECTED POWER METERS.</b> Several in stock from ...	5	10	0
<b>TU TUNING UNITS.</b> Here again we much regret that with the exception of TU8, TU9 and TU10 these have now all been sold.				<b>KW VESPA MK. I TRANSMITTER.</b> Top grade in every respect ...	82	10	0
				<b>S. G. BROWN HIGH IMPEDANCE 'PHONES</b> TYPE F. List price £3 7 6. Brand new ...	2	2	6
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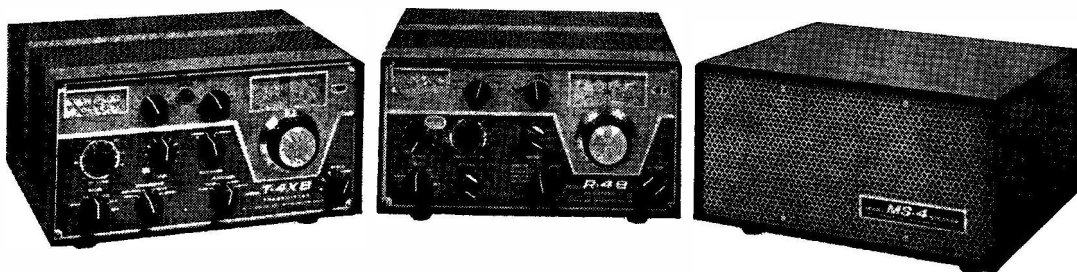
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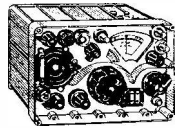
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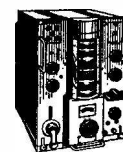
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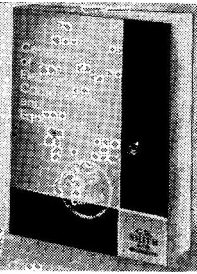


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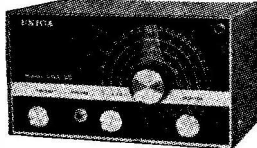
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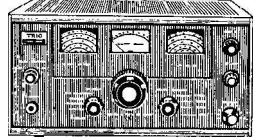


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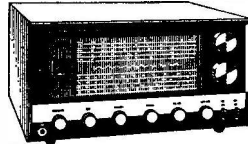
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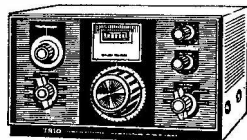
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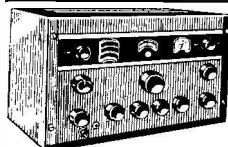


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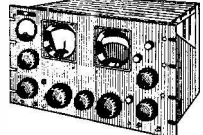


**RCA COMMUNICATIONS RECEIVERS AR88D**

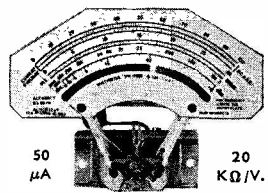
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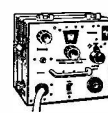


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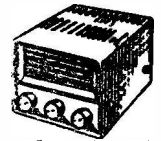
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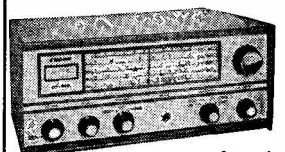


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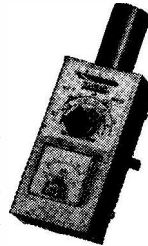
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INDEX TO  
ADVERTISERS

# SHORT WAVE MAGAZINE

(GB3SWM)

	PAGE
Amateur Electronics (G3FIK)	472
Amateur Radio (C. H. Young)	474
Baginton Electronics ...	527
Belding & Bennett (Radar)	523
British Antarctic Survey ...	524
Carlton Hill (Amateur Radio)	527
Daystrom ... ..	467
Derwent Radio ... ..	526
Echelford Communications	527
Eley Electronics ... ..	519
Emsac ... ..	476
G. Francis (G3TWV) ... ..	524
Glasgow Electronic Services	523
Grigg ... ..	519
G.W.M. Radio ... ..	527
Halson Electrical ... ..	523
Hamgear Electronics ... ..	519
Henry Electric, Ltd. ... ..	522
Henry's Radio ... ..	525
Holdings Photo/Audio Centre	522
Imhof ... ..	523
J-Beam Engineering ... ..	465
K.W. Electronics <i>front cover,</i>	470, 520
Low Electronics ... ..	468, 469
L.S.T. Electronic	
Components, Ltd. ... ..	525
Minitenna ... ..	525
B. H. Morris & Co. Ltd. ... ..	471
Mosley ... ..	476
N.W. Electrics ... ..	466
Partridge (G3PRR) ... ..	521
Peter Seymour ... ..	474, 525
Radio Constructor	
(Data Publications) ... ..	521
Radio Shack ... ..	472
Rex Radio ... ..	526
R.T. & I. Electronics Ltd.	526
Shure Electronics ... ..	466
Sommerkamp Electronics	467
Small Advertisements ... ..	518-523
Smith, G. W. (Radio) ... ..	473
Spacemark, Ltd. ... ..	519
SSB Products ... ..	526
Henry Stead & Partners	470
Stephens-James, Ltd. ... ..	528
Swanco Products, Ltd. ... ..	470
S.W.M. Publications	
<i>inside back cover, back cover,</i>	525, 528
Taurus Electrical Services	520
Trio ... .. <i>inside front cover</i>	
VHF Communications ... ..	524
Walden Business Services	519
Western Electronics ... ..	528
Yukan ... ..	525

Vol. XXVII OCTOBER, 1969 No. 312

CONTENTS

	Page
Editorial— <i>How To Find Us</i> ... ..	477
Signal-Discriminator for CW Working, <i>by R/O W. J. Mullarkey, G3RSW</i> ... ..	478
Loop Aerial for Top Band, <i>by A. L. Bailey, G3WPO</i> ... ..	482
Radiating a Blip Tone, <i>by M. Marsden, G8BQH</i> ... ..	484
Tuning Coaxial-Fed Aerials, <i>by M. C. Brown, B.Sc. (Eng.), G3OVE</i> ... ..	486
Courses for the R.A.E. ... ..	490
Second-Channel BCI, <i>by F. G. Rayer, A.I.E.R.E., G3OGR</i> ... ..	491
Integrated Digital Morse Key, <i>by P. J. Brumfitt, G3XMH</i> ... ..	492
Mobile Rally Calendar ... ..	495
Communication and DX News, <i>by E. P. Essery, G3KFE</i> ... ..	497
VHF Bands, <i>by A. H. Dormer, G3DAH</i> ... ..	504
<i>VHF and UHF Band Planning for the Seventies</i> ... ..	506
The Month with The Clubs— <i>From Reports</i> ... ..	509
<i>Rules, The 24th MCC</i> ... ..	511
<i>Club Identification Codes, MCC</i> ... ..	512
The Other Man's Station—G3YAY ... ..	516
New QTH's... ..	517

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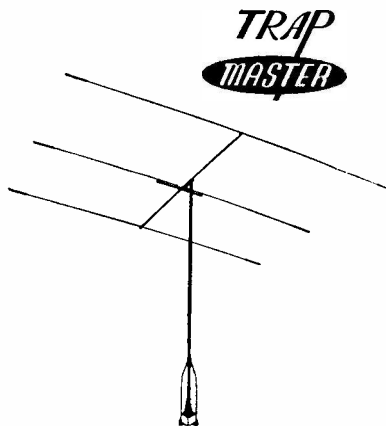
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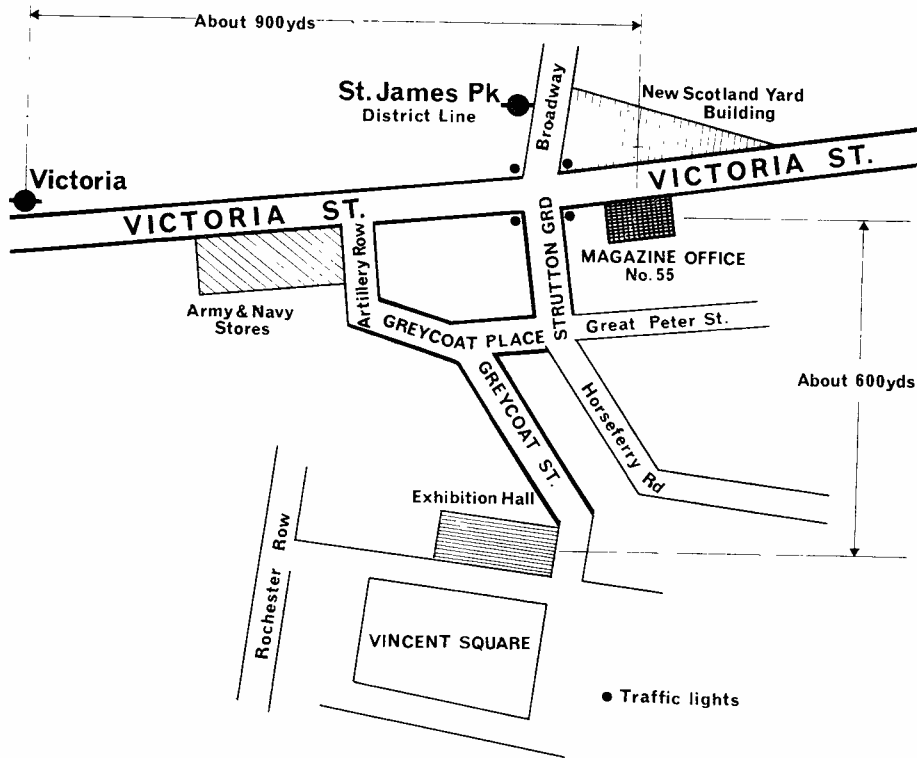
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*Austin Forster,  
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WORLD - WIDE COMMUNICATION

## SIGNAL-DISCRIMINATOR FOR CW WORKING

### INTERESTING RECEIVER TERMINAL UNIT — GIVING SINGLE-SIGNAL AUDIO SELECTIVITY — CIRCUITRY AND RESULTS

R/O W. J. MULLARKEY (G3RSW)

THE writer has spent the last two and a half years as radio officer of the m.v. *Scythia*, GNHT, a Cunard cargo liner on a regular service between Liverpool and New York.

From an operating point of view, the station on a ship in this sort of trade has more in common with one terminal of a W/T point-to-point circuit than with an amateur station. However, many of the problems and difficulties are much the same for both. The information mainly required on board for safety and navigation—about such things as weather and ice—is broadcast at regular times and on known frequencies. The transmissions originate from both sides of the Atlantic and the distant station is often at extreme range. It is not unusual for reception conditions to be very poor.

It is a well-known fact that an operator of reasonable experience can listen to, and read, one signal, even if it is nearly drowned out by adjacent-channel interference and static. But to copy such a signal for extended periods can be very fatiguing, especially when literally perfect copy of, say, iceberg positions, is needed.

This started a line of thought about exactly how the human operator, amateur or commercial, can concentrate on and accept one signal to the exclusion of all others. If a device could be built that imitated this process, and then presented the operator with a perfect signal minus the interference, how pleasant life would be! Roughly speaking, that is the object of the Receiver Terminal Unit described here.

The first conclusion reached was that the human operator discriminates against unwanted signals on the basis of audio pitch. So long as the wanted signal differs, even slightly, from the unwanted ones it can be read. The operator is effectively the last link in the chain of receiver selectivity. More than that must be involved, though, because when concentrating really hard on one signal the others seem to disappear.

They are not merely attenuated, as by a filter, but completely phased out mentally. No claim is made about understanding the physiology of this but an electronic way of imitating its effects is fairly simple.

If the wanted signal could first be passed through a very selective filter, at audio frequencies, then made to cross-modulate all others on channel noise, the final result would be that only this one signal would be heard in the output.

#### Circuit Functions

Fig. 1 is a block diagram of the unit. The signal from the receiver output is fed to a filter of extreme selectivity. The degree of selectivity required is obtained by using a Q-multiplier at the frequency of 850 c/s. The filter is followed by a level discriminator (simply a common collector amplifier biased well into saturation) and a switching circuit using a relay. Only signals of sufficient amplitude to cut off the saturated transistor will be passed to the switching circuit and operate the relay. Thus it can be arranged that, if the wanted signal is only frac-

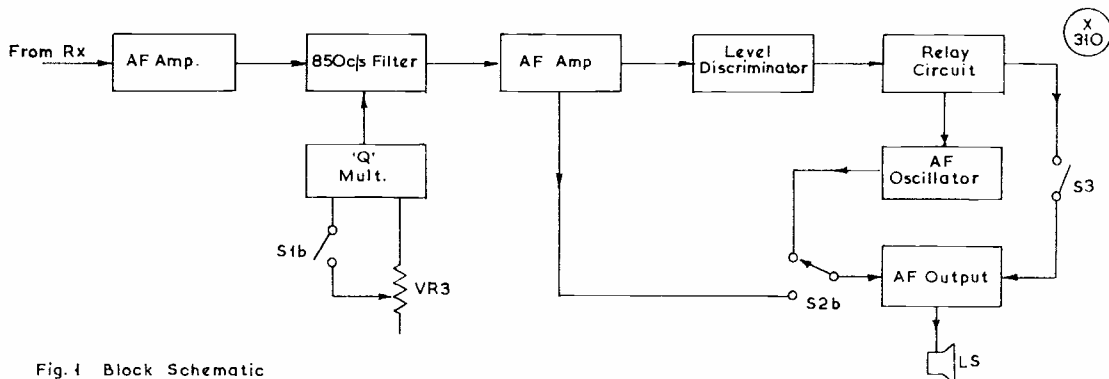


Fig. 1 Block Schematic

Fig. 1. Block diagram of the Receiver Terminal Unit.

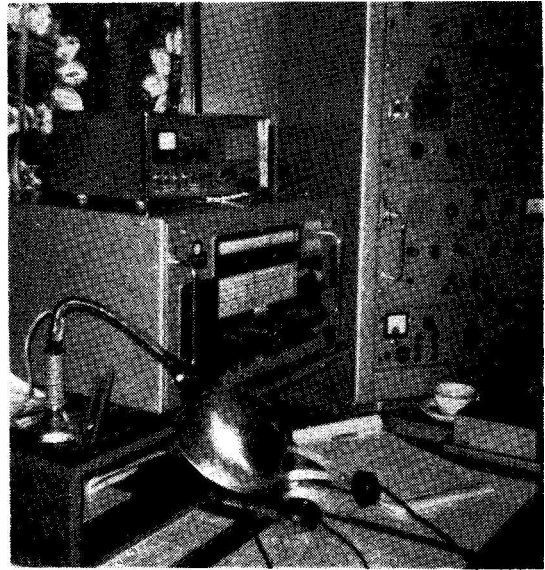
tionally stronger than the others after passing through the filter, only it will operate the switching circuit.

The filter output, after amplification, is also fed to a power amplifier that drives a speaker. One set of contacts on the relay is so connected that the loudspeaker is actually short circuited at all times that no signal is passing through the discriminator.

As soon as the wanted station goes "key down," the discriminator will pass the signal, the relay will operate, and the short circuit on the loudspeaker will be removed. The effect of this in operation is that when the terminal (or distant) station is "key up" nothing is heard from the speaker. But when he goes "key down," his signal and all others on channel noise are heard together. Whilst this cross-modulation effect is probably a completely different principle of operation to the concentration of a human operator (because the noise is still there) its end product is, in fact, the same.

Put in another way, the on-channel noise is now following the dots and dashes of the wanted signal.

Also included in the unit is an audio oscillator which is operated by the relay. The output stage can be switched so that the keyed oscillator is heard from the speaker instead of the signal. At first sight this would seem to be



The Unit as installed in the radio room of the Cunard cargo-liner "Scythia," signing GNHT, on a regular Trans-Atlantic run. The Receiver Terminal Unit described in the text stands on the ship's main Rx, a Marconi Atalanta, operated by R/O Mullarkey, G3RSW.

**Table of Values**

Fig. 2. The Filter Board for the Unit

C1, C6 = 50 $\mu$ F elect., 12v.	R9 = 1,500 ohms
C2 = 0.25 $\mu$ F, paper	R10 = 1,000 ohms
C3 = 0.1 $\mu$ F, paper	VR1 = 2K, carbon potentiometer
C4 = 1 $\mu$ F elect., 12v.	VR2 = 5K, carbon potentiometer
C5 = 5 $\mu$ F elect., 12v.	VR3 = 25K, carbon potentiometer
R1 = 100 ohms	L1 = 500 mH, see text
R2 = 10,000 ohms	S1 = DPST toggle
R3 = 150,000 ohms	Tr1, Tr2, Tr3 = OC72 (or similar)
R4 = 56,000 ohms	
R5 = 20,000 ohms	
R6 = 2,700 ohms	
R7 = 100,000 ohms	
R8 = 12,000 ohms	

All resistors 5% tolerance, rated quarter-watt.

ideal, a perfect note and an isolated signal. It does not in fact prove to be very useful in practice. This is because no matter how much we reinforce and assist the original signal, it still remains the actual signal of the station to which we are listening. The use of a local keyed audio tone makes it impersonal, the sense of contact is lost. When listening to a keyed tone it is impossible to know if circuit conditions are deteriorating, nor is it possible to anticipate a deep fade in time to change

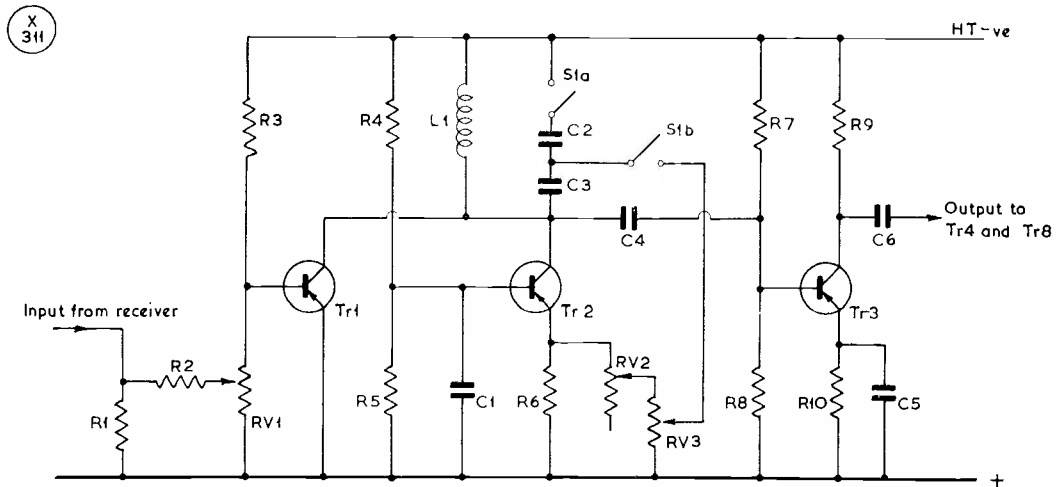


Fig. 2: Filter Board

Fig. 2. The Filter Board for the Unit.

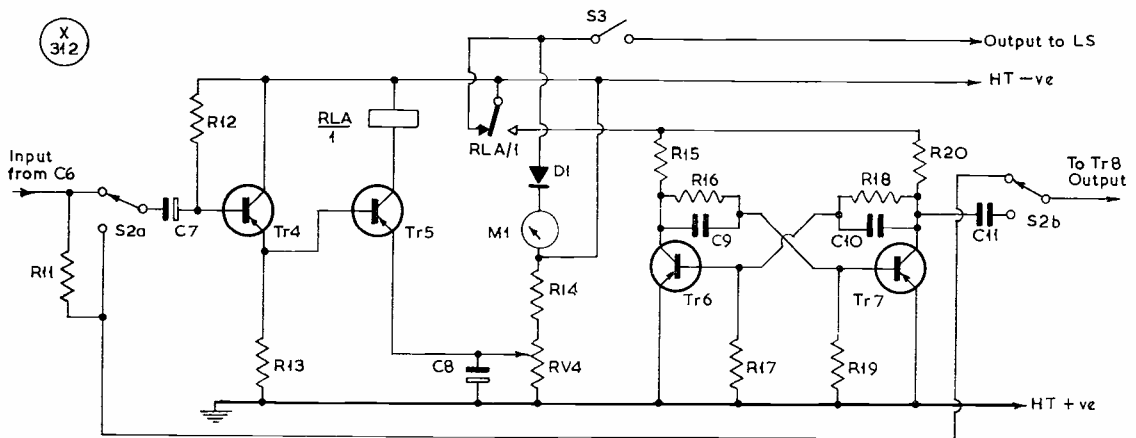


Fig. 3 : Background Silencer Board

Fig. 3. The Background-Silencer board for the Receiver Terminal Unit.

aerials or frequency.

**Construction**

The layout and form of construction of the unit are not critical, although obviously all the routine precautions should be taken. Leads carrying a low-level audio signal should be screened and power leads common to more than one stage should be decoupled if they are very long. The prototype was built on three pieces of Veroboard, each 4½ x 2½ inches—one for the filter, one for the level discriminator, relay circuit and oscillator, and one for the output amplifier. The three were finally housed in a 12 x 4 x 9 inch cabinet, together with the speaker. All the controls, together with the tuning meter, headphone sockets, and speaker were mounted on the front panel.

In the descriptions of the individual circuits that follow the three boards are dealt with separately. For ease of labelling they are designated "Filter Board," "Background Silencer Board," and "Output Amplifier Board."

**Filter Board**

The network R1, R2 and VR1, together with the input impedance of Tr1, form an attenuating circuit. The actual value of the resistors R1 and R2 will depend on the receiver with which the unit is to be used. The prototype was designed to work with the Marconi *Atalanta*, a marine communications receiver giving some 1.4 watts of output into 3 ohms. VR1 is part of the bias supply of Tr1, so R2 has to be large enough to prevent the D.C. loading from the output of the receiver upsetting the bias conditions by short circuiting VR1.

Tr1 is a basic common emitter amplifier, with a tuned collector load consisting of L1, C2 and C3. It is always difficult to obtain really good AF selectivity in a transistorised amplifier because of the current drawn from the tuned circuit by the low input impedance of the following stage. The effective passband (*Af*) of a tuned circuit at the -3 dB points is equal to the ratio

**Table of Values**

Fig. 3. The Background Silencer Board

C7, C8 = 10 µF elect., 12v.	VR4 = 10K carbon potentiometer
C9, C10 = 0.1 µF, mica	RLA = High-speed relay, 3K coil
R11 = 3,300 ohms	S2 = DPDT toggle
R12 = 62,000 ohms	S3 = SPST toggle
R13 = 2,700 ohms	D1 = OA79
R14 = 10,000 ohms	M1 = 0.1 mA m/c meter
R15 = 22,000 ohms	Tr4, Tr6, Tr7 = OC72, or similar
R16 = 270,000 ohms	Tr5 = OC76, or similar
R17 = 33,000 ohms	
R18 = 270,000 ohms	
R19 = 330,000 ohms	
R20 = 22,000 ohms	

All resistors 5% tolerance, rated quarter-watt.

of the centre frequency (*fr*) to the Q-factor. That is:

$$Af = \frac{fr}{Q}$$

A useful expression for the loaded Q of a circuit is:

$$Q = \frac{1}{R} \sqrt{\frac{L}{C}}$$

Where L is the inductance, and C is the capacitance, both in basic units.

In this case R is the total effective series resistance. If the tank circuit has to provide power to the following stage, the effective series resistance increases and the Q-factor is degraded.

One way of reducing the problem is to tap the input to the following stage down the tuned circuit, either inductively or capacitively. This is often done in tuned RF and IF amplifiers. A much more effective solution, however, is to replace the power that has been drawn from the tuned circuit by using a Q-multiplier.

Tr2 is connected as a Colpitts oscillator operating in the common base mode. It shares the collector load of L1, C2 and C3 with Tr1. The degree of feedback is

controlled by a preset VR3 and a vernier VR2, the latter being on the front panel. A portion of the signal currents that are flowing in the tuned circuit, as a result of Tr1 Ic, is fed to the emitter of Tr2 via VR3/VR2. Tr2 Ic, which is an amplified version and of the correct phase, is fed back to the tuned circuit. If it is adjusted to feed back the same amount of power as is being lost to the tuned circuit by loading, then oscillation will occur. It matters not whether the power lost was being drained away in the actual tuned circuit or was being drawn by the following stage—the effect will be the same.

If, however, Tr2 Ic is reduced to a point just less than that necessary for oscillation, then the effective series resistance will have a finite but very small value. The Q-factor of the circuit will be very high and therefore the passband very narrow.

Bias for Tr1 is provided by R3 and VR1, and for Tr2 by R4 and R5. C1 grounds the base of Tr2 at the frequencies involved. S1a and S1b are included to disable the Q-multiplier and the tuned circuit, so that Tr1 can operate as an untuned AF amplifier. (See p.479.)

The load presented by the level discriminator to the stage before it will depend on whether or not it is conducting and will therefore vary widely. Tr3 is a common-emitter amplifier, acting as a buffer, and isolates this varying load from the tuned circuit.

### Background Silencer Board

As already described Tr4 is a saturated common-collector amplifier, bias being provided by R12. It is directly coupled to Tr5 via R13. Tr5<sub>VBE</sub> is the difference between the voltage at the slider of VR4 and the voltage at the emitter of Tr4. VR4 is a front-panel control that is set so that when Tr4 is saturated, Tr5 is conducting sufficiently to energise RLA1. A signal of sufficient level to cut off Tr4 will cause Tr5<sub>VBE</sub> to swing sharply positive, so cutting off the transistor and de-energising the relay. The actual level of signal necessary to cut off Tr5 can be varied at will by altering the setting of VR4.

The relay contacts that are closed in the energised condition are connected across the speaker via S3. Thus the circuit can be disabled by opening this switch. The combination D1 and M1 form a simple tuning indicator that make it an easy matter to get the correct setting for VR4.

Tr6 and Tr7 are a free-running multivibrator that oscillates at a frequency of about 1,000 cycles. Bias for Tr6 is provided by R20, R18 and R17, whilst that for Tr7 is produced by R15, R16 and R19. Coupling between the two transistors is through C9/R16 and C10/R18. The HT negative supply line for the multivibrator is obtained via the relay contacts that close when the relay is de-energised. S2b selects either the output of the filter or the output of the oscillator for feeding to the output stage. S2a introduces R11 into circuit to equalize loading when the output stage is not connected to the filter.

### Output Amplifier Board

Little comment need be made about this stage because the circuit itself is straightforward. Tr9 is a basic common-emitter Class-A amplifier, the tapped coil L2 in its collector acting as both load and matching transformer. Tr8 is an emitter-follower that is directly

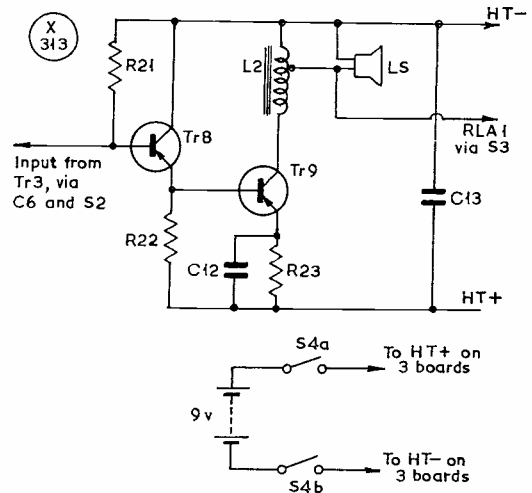


Fig. 4: Output Amplifier Board

Fig. 4. The Output Amplifier Board, for which values are: C12, C13, 100  $\mu$ F electrolytic, 12v.; R21, 47K; R22, 10K; R23, 33 ohms, half-watt; L2, tapped, see text; Tr8, OC72; Tr9, OC35. Transistors can be substituted, and resistors R21, R22, rated  $\frac{1}{2}$ -watt, 5% tolerance.

coupled to the output transistor. It also is biased to Class-A.

The reason for using an intermediate emitter follower in this way is that a high input impedance is needed. The filter is also feeding the level discriminator and if a low impedance were shunted across the input its operation would be adversely affected.

### Components

The majority of the components selected by the writer were *ex* junk box, hence the enthusiastic use of OC72's!

L1 and L2 are both starting chokes for tube lighting in the original unit, made in fact by Philips. Obviously, any similar inductors would do instead. Most of the resistors and capacitors can be changed in value to a small extent to suit whatever is available to the constructor. Care should be taken, though, about altering bias and temperature stabiliser components.

### Conclusion

The Receiver Terminal Unit so described can never make readable a signal that a good operator would not have been able to read anyway—that is not its aim. What it *will* do is to convert a barely readable signal into a near-perfect one. The idea for it was born as a result of trying to improve circuit performance at a commercial station, but it has application wherever Morse is used in less than perfect conditions. With the present crowding on the amateur bands, that must be most of the time? It is in conditions such as are caused by this overcrowding that the unit is most effective, because it will isolate the signal we want from its own channel competition. Gone is that station chirping away on top of the QSO, gone is the interference and the static. In its place just one signal surrounded by silence. Try it, and see!



## LOOP AERIAL FOR TOP BAND

GETTING OUT ON 160 METRES

FROM A

RESTRICTED SPACE

A. L. BAILEY (G3WPO)

FOR some time the aerial system in use for 160 metres at the writer's location had been similar to that known as the "Top Band Special," due to G8ON some years ago. This particular design was adopted due to severe space restrictions, in that our garden is only 60 feet long. This aerial is the familiar "U on its side," the idea being to arrange the total length so that the current antinode, which is the part that does the radiating, occurs away from the house, and in the clear. As with nearly all Top Band aeriels (although not *all*, as will be shown) the earthing arrangements need to be as efficient as possible. But, as is obvious from the size of the garden, no extensive ground system could be employed at G3WPO. Despite this, and after much effort, some 1,200 feet of assorted wire *was* buried in every conceivable place, the end-result being an irate Father (who kept digging it up when about his own occasions) and no particular improvement discernible in the radiated signal over that put out when using a mains earth. Despite this, the system fared well for many months.

### Another Approach

One evening at the local Club, the talk turned to earths and to the particular problem at G3WPO. In a moment of inspiration the Club chairman suggested that the free end of the aerial should be returned to the shack—which is located on the first storey of the house in a back bedroom—this end being connected to the ATU at the point where the earth was normally attached, thus forming a continuous loop, the aerial then acting as its own current return. At the same time, and this is the most important fact, the need for an aerial earth would not arise.

With a somewhat pessimistic feeling about the whole idea, but willing to try anything once, the adaptation was made. The existing ATU was unsuitable, being of the  $\pi$ -tank variety, so a quick lash-up was engineered and the system persuaded to load up. This it did at the first try (surprise!) exhibiting a very low standing-wave ratio. Tuning round, Top Band certainly seemed a bit livelier, and after a CQ call, some encouraging reports were exchanged with stations at about the 150-mile mark, followed by RST 589 from OK1AVX.

At this point, an estimation of the current distribution suggested that the current antinode was appearing approximately half-way up the vertical section and, as the aerial was roughly symmetrical about this point—neglecting capacitative shortening due to the presence of the lower horizontal section near ground, and shortening caused by the many right angle bends—it appeared that the current was a maximum at the electrical centre of the loop. This was confirmed by making a replica, of

a comparable fraction of a wavelength, at 28 mc, and checking the voltage distribution with a probe. The same procedure could be followed with the full size version if one wanted to, but in the writer's case, his arm does not extend to 35 feet!

From Fig. 1, the general layout and dimensions of the loop will be apparent, the support at the far end being a tall pine tree, complete of course, with counterpoise load system.

### Some Practical Points

Due to the small electrical size of the loop, the exact position of the current antinode is not very critical, as the portions which do the radiating (the top horizontal, and the vertical sections) are short in comparison with a wavelength. The lower leg does not contribute much to the signal as it is only two feet clear of the ground at this QTH. Also it could not be run directly underneath the top section, and is in fact displaced about 6 feet to one side. However, despite the small size, it was found that moving the current antinode to the centre of the top section resulted in better signals for inter-G working, while not affecting much the more DX signal, the former due to the increased high angle radiation. As already indicated, the current antinode appears at the electrical centre of the loop, so to move the current any given distance into the top section means increasing the length of wire in the top section by double that amount. Thus, in the writer's arrangement, to move the current approxi-

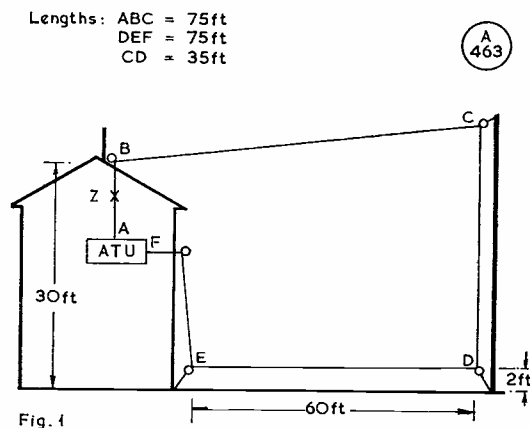


Fig. 1. The Loop Aerial for Top Band, as suggested by G3WPO. The exact feed point is not critical provided attention is paid to the positioning of the current antinode—see text. This can be estimated, as explained in the article.

mately the required 45 feet, 90 feet of extra wire was inserted at the point Z in Fig. 1, being accommodated by wrapping it around the loft. It would probably be better to use a loading coil to achieve the same result, as the extra wire also increases loss and does not contribute to the radiated signal. This is the system in use at the present time.

The actual dimensions would not appear to be critical, providing that the current antinode is placed correctly, preferably either in the vertical or top horizontal section, whichever is the longer. Calculation of the physical centre on length of wire used should give a near-enough indication of its position. The exact position of the current maximum will anyway be slightly displaced from the calculated point—how far depending on the number of bends, proximity of other objects and the general local ambience.

Quite what happens to the current distribution when the total circumference approaches, or exceeds, one wavelength, is not known, but it is evident that some changes must take place. The aerial shown here has in fact been tried as it stands on 80 and 40 metres, with very fair results. Unfortunately, TVI prevents any serious exploration of the possibilities on these bands due to the level of RF energy induced into the local mains, the house being virtually enclosed by the aerial! Fortunately, no such troubles have manifested themselves on Top Band.

Any followers of the great Terman (*Measurements in Radio Engineering* and other works on theory) may disagree with the ideas put forward, as he states that closed loops shorter than a wavelength behave like a solenoid from an H-plane viewpoint. No information could be found on the effects of exceeding one wavelength.

**Design of the ATU**

The ATU used (see Fig. 2) is similar to that suggested use with the "5RV" multiband dipole, but with some modification to the circuit constants. The connections to the loop are taken to the points normally used for the tuned feeder with a 5RV, although the feed can be taken from the outer ends of the coil instead. This type of parallel tuned circuit should be suitable for total lengths in the range 150-350 feet; outside of this range some sort of series tuned device will be required.

Actual values used are given in Fig. 2, these giving sufficient latitude to tune the loop with or without the loading coil in circuit. It will be found that the loading capacity required is much less than with most Top Band aerials—this because the input impedance tends to be very high. No trouble should be experienced in attaining a 1:1 SWR, unless an open circuit exists somewhere in the system!

The adjustment is quite critical, and a move of more than 10 kc on Top Band will require retuning all through. This shows that the loop is sharply resonant. It also happens that, as the static L/C ratio is near enough maintained, the position of the current antinode stays constant from one end of the band to the other.

An attempt at earthing the rotor of C2 resulted in a drastic reduction in reports, so it is suggested that the ATU be kept well clear of any earth connection, other than that to the link coupling from the transmitter. In

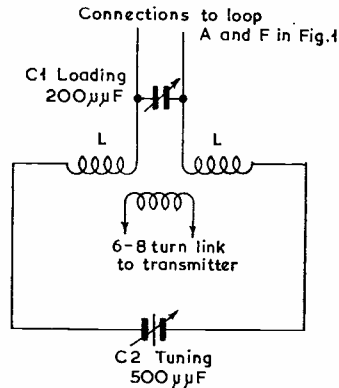


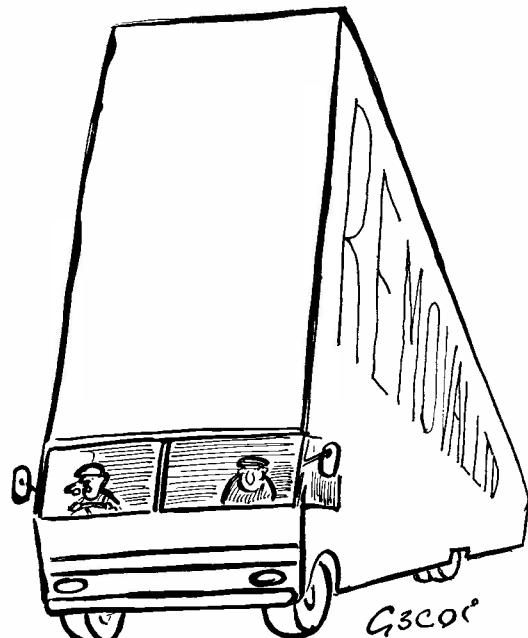
Fig. 2

Fig. 2. The ATU for his Loop Aerial, as designed by G3WPO. Coil L is 2/40 turns of 22g. on a 1 1/2 in. diam. former, with a half-inch gap for the link winding. These values should be suitable to accommodate any similar sort of loop aerial, but some alteration to the inductance may be required. The coil could be tapped at every three turns till the correct inductance loading is found. If the total wire-length of the Loop exceeds 150-300 feet, a series-tuned arrangement would be required to achieve resonance.

fact, the aforementioned earth system as this QTH was taken out of the ground soon after erection of the loop, in case it was giving any reflective contribution—so the aerial has no direct earth connection after the link coupling.

**Comment on Results**

The results achieved to date have been quite remark-



"... Using an indoor dipole here ..."

able, considering the small size of the system. Reports from U.K. stations during the hours of darkness are (from Sussex) very often S84, and most other British prefixes give the same sort of reports. All European stations called have been worked, including ZB2 and ZC4, the latter also on SSB. The most startling fact has been the working of five Transatlantic stations to date, though patience and good conditions have been required to achieve this. A report of 579 from VEIZZ is treated with reservations, the usual report being 339-449—but at least the loop has been successful where the earlier system failed after many attempts.

QSO's during daylight hours have been plentiful, using the vertical section as radiator, with a fair number at 100 miles plus, including a recent QSO with GC3XTJ in the middle of the afternoon, on 2-way SSB at RS-57 both ways.

No tests have been done against a larger aerial, such as a half-wave, as there is no room, but it is rather

optimistically thought that the loop would not be too far down!

No doubt variations on the system will manifest themselves to other operators at different locations. One could of course feed it instead at the centre of the base, if this suited better, and if made to the correct dimensions, would become a skeleton-slot on Top Band—for those who have that much space!

#### Development

Experiments are in hand with a much smaller layout, about 25 feet square, using similar tuning arrangements, and with a loop in the horizontal plane. The results are awaited with great interest.

In conclusion, thanks go to G3BZO for starting the whole ball rolling, for his suggestions which have been incorporated, and to those stations who have shown such great interest in the G3WPO loop aerial. They have prompted this article.

## RADIATING A BLIP TONE

### DESIGN AND CIRCUITRY FOR A SUITABLE UNIT

M. MARSDEN (G8BQH)

**D**URING the *Apollo 11* mission G8BQH decided to adopt the system used by Houston Control of starting and ending each transmission with a short "blip" of tone. At first it was intended to be a gimmick just for the time the space craft was up. However, during that time the blips of tone were found to serve quite a useful purpose to other amateur stations. It was discovered that, when working some DX with QSB, at the end of an over, when the normal modulation had faded into the noise, a sharp burst of 100% modulated tone at 2.5 kc broke through and signified the end of G8BQH's over to the distant station. Similarly, at the beginning of each over the tone blip signified that G8BQH had started. Another use was for break-in operation, eliminating the use of the words "over" or "break," and a rapid cross-fire of remarks can be made between two stations using the blips of tone. Yet another possibility is that the tone frequency, or pitch, would become a trade mark of the station—or perhaps two stations in QSO, but on different frequencies, could use the same tone frequency, making it easier for listeners to sort out which two stations on the band are in contact.

The general idea caught on and many stations wanted a similar facility on their transmitters, and asked how G8BQH was achieving his "blips" without any major modifications to the rig.

The basis of the system is a relay and electrolytic capacitor in series which, when connected to a suitable supply, cause the relay to go over for a short while, until, due to the charge build-up on the condenser, the voltage across the relay falls to such a value that the relay drops out. Hence, the relay stays energised for a period

depending upon the size of the electrolytic. The relay used was a high-speed sealed item of the plug-in variety, and when in series with a 100  $\mu$ F capacitor and using a 24-volt supply, held on for about half a second. This was decided to be a suitable time for the tone blip to last, hence this relay could control a tone source to obtain the blip of tone. On cutting the 24-volt supply a discharge action through a shunt resistor caused the same effect, hence another blip of tone could be obtained.

Using this principle the blips of tone could be obtained and all that remained was to position these at the start and end of each transmission. A system had to be found that would hold the transmission on for an extra half second after the change-over switch was operated.

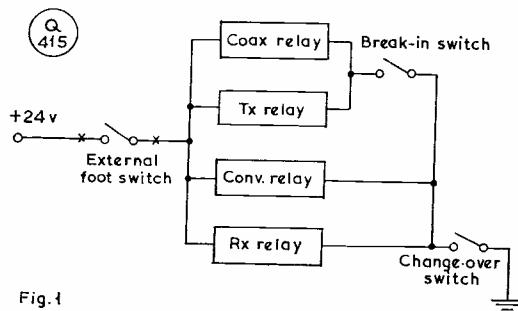


Fig. 1

Fig. 1. Normal relay layout at the G8BQH two-metre station. The foot switch jacks into the Tx, points x-x being shorted by the jack socket when not so used. All three switches are closed on "receive."

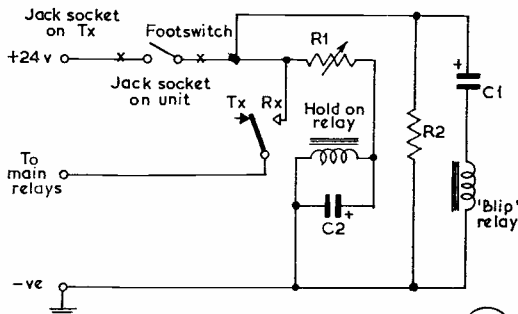


Fig. 2

Fig. 2. Blipper unit for a Tx with relays off when on "transmit." Values are: C1, 100  $\mu$ F; C2, 150  $\mu$ F; R1, 1K, controls hold-on time; R2, 500 ohms. Relays are discussed in the text, the hold-on relay shown here being in the energised position.

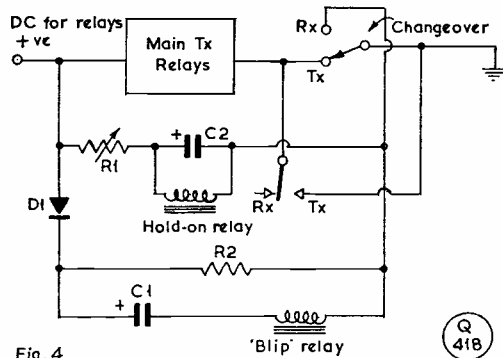


Fig. 4

Fig. 4. Blipper unit for a Tx with relays on for "transmit," with the hold-on relay shown in the energised mode. Values: C1, 100  $\mu$ F; C2, 150  $\mu$ F; R1, 1K, to control hold-on time; R2, 500 ohms. C1 is to isolate the blip relay circuit so that the charge on C1 does not affect other circuit elements when discharging. D1, BY100 or similar.

Slugging the relays in the transmitter with large condensers was no good as the various relays would drop out at different times, and this system would not suit the G8BQH rig. The system used involved another relay, this time a miniature sealed type, shunted by an electrolytic condenser and a resistor in series with the two. On applying a suitable supply the capacitor charges up at a rate depending upon the value of the resistor, until a voltage is reached when the relay goes over. It was arranged that this relay controlled the main transmitter and receiver relays, hence giving a hold-on effect.

The G8BQH two-metre set-up has four relays—two in the transmitter, one in the converter, and one in the receiver. These are energised in the "Receive" mode. This is non-standard and although the circuitry shown is that of G8BQH's rig, there is also a circuit for equipments with relays energised in the "transmit" mode, the circuit descriptions of course being similar.

Looking at Fig. 1, the foot switch jacks into the transmitter on a three-pin PO plug and pressing the foot switch removes the 24v. supply from the relays. The break-in switch only operates the transmitter relays. The change-over switch on the receiver breaks the earth to the relays. It was decided to use the foot switch facility for operating the "Blipper"—that is to say, use the foot switch to activate the "Blipper," which would then control the main relays through the foot switch jack socket. In this way no modifications inside the rig were necessary. The circuit of the "Blipper" unit is shown in Fig. 2. The foot switch plugs into the unit, and a jack plug from the unit goes into the jack socket on the transmitter normally used for the foot switch.

Circuit Description

Fig. 2 shows the unit in the "receive" mode, with the foot switch contacts closed, C1 charged up, and the hold-on relay energised. On pushing the foot switch down, the 24v. supply is cut from the main control relays so they go over to "transmit"; the supply is also cut from C1 and the blip relay. C1 then discharges through R2, causing the blip relay to operate for a short while. This allows a burst of tone to be transmitted, at the start of the transmission. (The tone circuit itself is as Fig. 3.)

At the end of the transmission, the foot switch is released replacing the 24 volt supply to the circuit. The blip relay operates again as C1 charges, but the main relays do not go on until the hold-on relay operates. This is controlled by the value of R1 regulating the charge rate of C2. R1 can be set so that the hold-on relay goes over just before the blip ends. Hence there is a burst of tone at the end of the transmission. The hold-on relay will stay energised during the "receive" period.

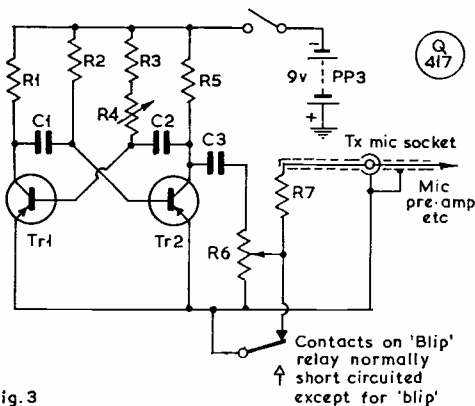


Fig. 3

Fig. 3. Square-wave multivibrator and mixing pad—see text—for which values can be: C1, C2, C3, .01  $\mu$ F; R1, R5, 1K; R2, 27K; R3, 2.2K; R4, 50K, varies tone frequency; R6, 50K, varies level, and is adjusted to give full modulation for blips; R7, 2-megohm, or suitable value to get 100% modulation for blips.

Tone Generator

G8BQH uses a two-transistor multivibrator to generate the tone, circuit as in Fig. 3. The output of the multivibrator is mixed in *via* a pad at microphone level,

the output normally being short circuited by contacts on the blip relay except when the relay operates. This method is better than switching the supply to the multivibrator as this gives rise to chirp and slow starts. Hence the tone source is un-muted by the blip relay. This multivibrator is variable from 1.5 to 6 kc and the frequency used by Houston Control is about 2.5 kc. The multivibrator is built in a small die-cast box as a portable unit and runs off its own battery. The blipper unit is built in another small die-cast box. Obviously any tone source can be used.

The circuit of the blipper unit for transmitters the relays of which are energised in the "transmit" mode is given in Fig. 4. The change-over switch needs to be two-

way so as to operate the hold-on relay on switching to "receive." The circuit description is similar to the previous circuit. The supply is kept on the main relays by the hold-on relay, which operates a short time after switching to "receive," controlled by the value of R1. The blip relay operates by charge-and-discharge action as before, the discharge path being through R2. The hold-on relay will remain energised on "receive" so long as the relay supply is available. D1 polarity depends on supply polarity.

As a point to finish on, Houston Control use the blips of tone as a way of telling the computers to log the call. G8BQH regrets he had not yet found a system of getting the log filled out automatically by this method.

## TUNING COAXIAL-FED AERIALS

### A METHOD OF OBTAINING TRUE RESONANCE

M. C. BROWN, B.Sc. (Eng.), G3OVE  
(ex - 5Z4JU)

**T**HERE are always a large number of factors affecting the performance of HF aerials. Some of these are fixed by the geography and geology of the location, and as such, completely evade quantitative assessment. For this reason it is rarely entirely satisfactory to use a slide rule or textbook design unless the aerial can be optimised after erection.

There are three approaches:

(1) Use a commercial aerial. This will have been carefully assessed by the manufacturers in a wide range of conditions. The purchaser need only erect it and perform simple tuning procedures with basic instruments. This may not guarantee the best possible performance but it should fall within the manufacturer's specified tolerance limits.

(2) Use a tuned aerial and line. This may be the most satisfactory method, especially for multiband systems. However, they require considerable space, and a fixed length of tuned line. This may be inconvenient, and the band changing procedures tend to be tiresome.

(3) Use a coaxial fed aerial, make an accurate assessment of performance after erection, then modify for optimum.

Many amateurs are forced into this last approach for a number of reasons—expense, space, and simplicity recommend it. However, nobody would deny that stations with small cheap aerial systems do not often rank high in the DX lists.

The big advantage of the more sophisticated systems is the gain, but is that all? A full size 3-element Yagi has a forward gain of about 6.5 dB over a dipole. At the receiver this is about one and a half S-units. If the

gain were the only advantage then dipole signals would be almost imperceptibly weaker than those from mini-beams. There must be other effects.

One wonders if less design consideration is given to dipoles than to Yagis. The factors for assessment are height, radiation angle, absorption, aerial loss, line loss, aerial length, matching, balancing, jointing, insulating and supporting. Without doubt, many simple aerials in use at amateur stations have been erected without consideration for many of these. The more complex aerials are, in the main, much better cared for.

#### A New Approach

A system is described here for ensuring that a simple coaxial fed aerial is correctly adjusted and matched for optimum performance. The test set can also be used for finding line loss and it provides the required information for making matching sections.

The first job on a newly erected aerial is to adjust its length. A GDO check is sometimes recommended, but unless the feed point is directly accessible this is not easy. Certainly any measurements taken from a loop at the end of the line can be very misleading. If the line is not perfectly matched there will be resonances of the line, aerial and the line/aerial couple. A commonly-used indirect method is to plot the VSWR throughout the band using a simple monimatch reflected-power meter. Aerial length is progressively adjusted until the minimum standing-wave ratio occurs in the middle of the band. This may be satisfactory to those who can trust their measuring instruments. There is a wide range of conditions in which monimatch readings can be misleading. Home made systems must be treated with much reserve. Personal experience has shown both commercial and home-built devices to give totally incorrect results. Another drawback to this indirect method of tuning and



finding the VSWR, is that it is still not possible to know whether the aerial impedance is greater or less than that of the line.

Ideally, the *actual* VSWR should be measured. A very simple system was constructed and has proved most satisfactory.

**Construction of the Meter**

The requirements are an electrical half wavelength of coaxial line of the same impedance as that used to drive the aerials, and a simple RF voltage probe.

There are semi-air spaced TV coax lines available very cheaply which are quite adequate, and will even stand fairly high power on SSB with a low VSWR. The required length is not critical and so can be estimated using an approximate velocity factor. For example:

$$\text{Free space } \frac{\lambda}{2} \text{ at 14 mc} = 35\text{ft.}$$

$$\begin{aligned} \text{Hence, length required} &= 35 \times 0.65 \\ &= 22.8\text{ft.} \end{aligned}$$

The line is to be interrupted at several points, evenly distributed along it. For principal use on the 14 mc band 2ft. spacing was thought sufficient to give enough graph points whilst not disturbing the line impedance too much. Great care should be taken with the surgery (see Figs. 1, 2, 3) so that the damage to the coax line is minimal. Cut off an inch of the outer insulation, spread and push back the braiding so that the inner sheath is exposed, and then cut half of the insulation away. Two pins pushed through the conductors will give suitable soldering points. These can be pushed into a mounting board.

The ends of the line are terminated in plugs to allow insertion of the section at any point in the feed line. Fig. 4 shows the completed unit.

The voltage probe may be already to hand, but if not, the arrangement shown in Figs. 5 and 6 will meet the case. The probe points can be made to fit the pins on the main board. This is shown more clearly on Fig. 7. The pins on the main board are bent to accommodate the probe pins.

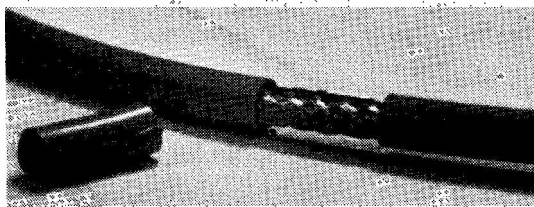


Fig. 1. Cut off an inch of the outer insulation.

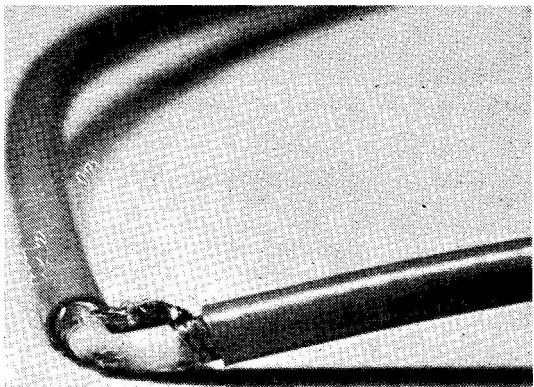


Fig. 2. Spread and push back the braiding.

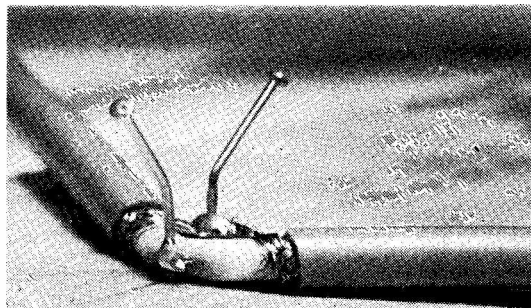


Fig. 3. Two pins pushed through the conductors provide satisfactory soldering points.

Table I

Nearest Fitting Curve	Position	Radiation Resistance	Aerial Length
O.C.	Lagging	$> R_0$	Short
O.C.	Leading	$> R_0$	Long
S.C.	Lagging	$< R_0$	Long
S.C.	Leading	$< R_0$	Short

$R_0$  is characteristic impedance of line.

**Checking the System**

Connect directly to the transmitter, apply low power, and leave the aerial end disconnected. The meter reading at the open end should be high, falling towards the centre to near zero and then rising again. Repeating this procedure with the end short-circuited should give the reverse effect.

**Application**

Take all the lines which you think you may at some time use and calibrate them on the test set. This involves open-circuit and short-circuit checks. They give line

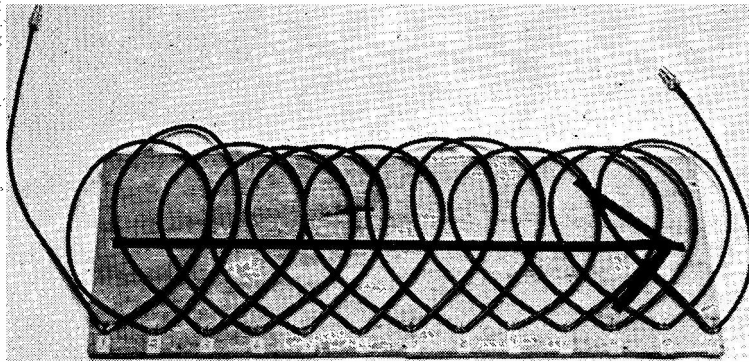


Fig. 4. The completed unit, mounted on a board, with insertion points marked.

Fig. 5. The voltage probe set-up —and see Fig. 6.

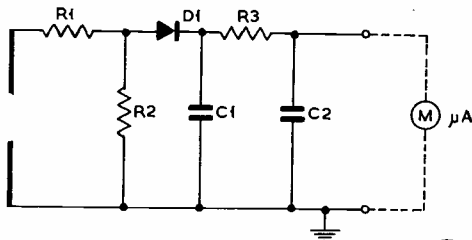
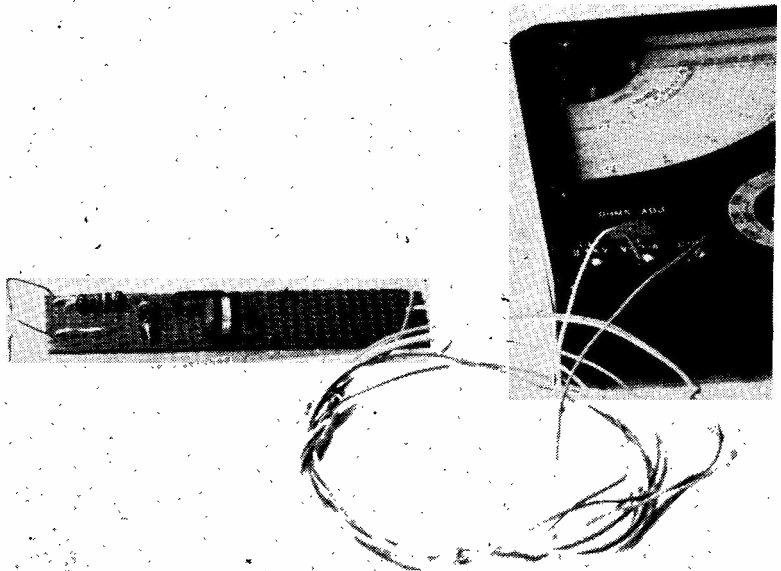


Fig. 6 : SUGGESTED PROBE CIRCUIT

Fig. 6. The probe circuit, for which values can be: C1, C2, .01  $\mu$ F; R1, 33K; R2, 1K; R3, 500 ohms; D1, germanium diode, OA81, OA91, etc.; M, 0-500 microamp meter. Note: R1, R2, can be adjusted as required for sensitivity. Silicon types should not be used for D1.

attenuation and effective length. If the line length is altered afterwards then the line length tests must be run again.

Connect the test set between the transmitter and the line. Leave the line open circuited at the far end. Number the test points on the test set and with a very small amount of power applied plot the voltages on a graph. Then repeat the procedure with the far end of the line short circuited. The relative magnitudes of the voltages is irrelevant and the transmitter power should only be adjusted to ensure a sensibly large scale on the graph. See Fig. 8 for the expected curves. The OC and SC curves should be exactly a quarter-wave out of step. There may be some slight deviation from this, probably because of the impossibility of getting a true RF open circuit. However, the shift should not be such as to invalidate the results.

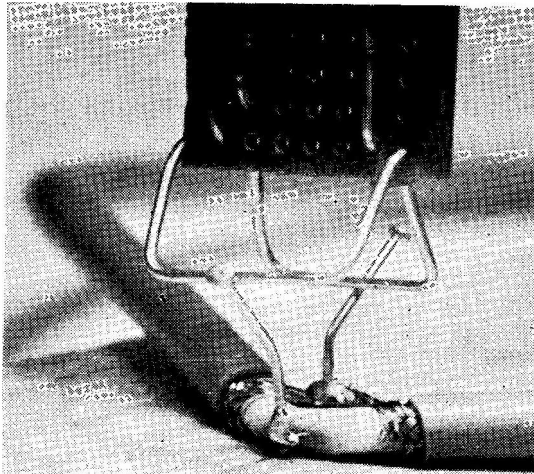


Fig. 7. Setting up the probe connection.

This graph should be retained for use when tuning an aerial driven by the same line. Several copies would not be wasted.

**Attenuation**

The VSWR, being defined as the ratio of the maximum to minimum voltage appearing on the line, varies along the line. This is because of the line attenuation and the difference in travelled distance of the reflected and forward power, at each point in the line. At the OC or SC end the VSWR can be assumed infinite and so the VSWR measured at the transmitter end is a guide to the line attenuation. The relationship can be expressed by:

$$\text{Line loss in dB} = 10 \log_{10} \frac{u + 1}{u - 1}$$

where *u* is the standing-wave ratio.

For example, if the VSWR at the Tx end in an SC or OC line test is 8, then,

$$\begin{aligned} \text{loss} &= 10 \log_{10} \frac{8 + 1}{8 - 1} \\ &= 1.1 \text{ dB.} \end{aligned}$$

This may be compared to the quoted loss specification for the line. Lines which have been in the open for quite some time, *i.e.*, exposed to the weather, especially air-spaced lines, may give some surprises when tested.

**Aerial Measurements**

With the aerial connected, another voltage graph is drawn, preferably over the calibration curves. On the first check, the humps and dips will coincide with neither the OC nor SC curves, but it will be nearer to one than the other. Which it is nearest to and whether it leads or lags it, gives some immediate information about the

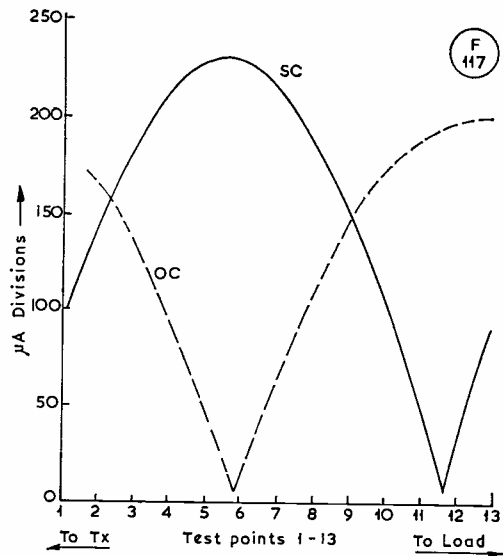


Fig. 8: Calibration Curves for Unknown Line at 14.2mc

Fig. 8. See text for explanation.

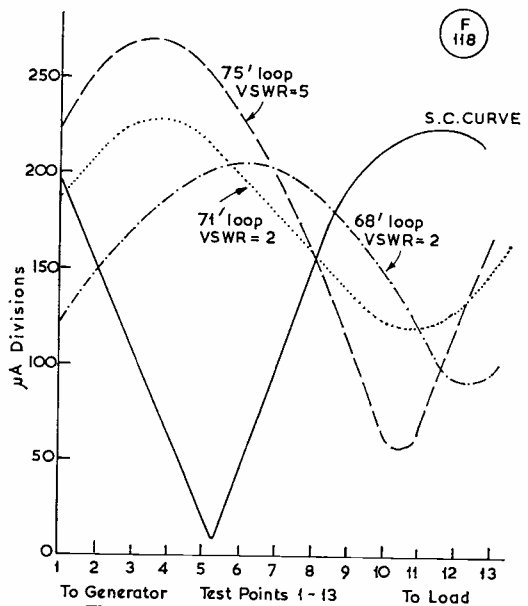


Fig. 9

Fig. 9. Use of these curves is explained in the text.

aerial. (Note: "Leading" means peaks occur nearer the transmitter.) See Table I, p.487.

From this information the aerial can be trimmed or lengthened and the graph replotted. When the aerial plot coincides in position with one of the calibration

plots then the aerial is the right length. It will also be noted that as the length was adjusted the VSWR improved. The VSWR is, of course, the ratio of the tops of the humps to the bottoms.

The aerial resistance is now directly accessible from the data. It is greater or less than the line impedance from Table I and the actual value is given by:

$$R_{aer} = u \times R_o \quad (u = \text{VSWR})$$

$$\text{or, } R_{aer} = 1/u \times R_o$$

The correct result is that which is possible by Table I.

Now that the actual impedance of the aerial is known it is possible to look up the correct lengths to make a matching transformer from coax.

A typical set of curves from the tuning procedure of a single full-wave loop for 14 mc is shown in Fig. 9. At 71 feet the aerial is just too long, at 68ft. just too short. At each the VSWR is 2.0. A 69ft. loop then tried fitted exactly over the null in the SC calibration curve, giving a VSWR of 1.9.

From Table I the aerial impedance is greater than the line impedance. Hence, for a 75-ohm line the aerial feed point resistance is 142 ohms. A coaxial matching section was later made and tested for VSWR feeding a 142-ohm resistor. The results confirmed the method and the calculations.

The method described here, though simple, gives direct access to correct aerial assessment. Those acquainted with transmission line theory and the circle diagrams will no doubt be able to go much further.

### U.K. LICENCES AND RSGB MEMBERSHIP

With reference to the item on p.417 of our September issue, we are now informed by the RSGB that at the relevant time the number of U.K. amateurs holding licences who were members of the Society was 7,836—out of the 14,976 British licences in issue. This makes the RSGB proportion 52.4%—rather better than the figure (“less than 50%”) that we had worked out. It is also understood that by the end of August the RSGB Tx membership had increased to “in excess of 8,000”—but of course over the two months July-August there has also been a significant increase (by reason of natural growth and the results of the May R.A.E.) of the total U.K. licences in issue. So it could be taken that a proportion of 53% for the RSGB represents just about the true position. (And even at that, they are doing better than the ARRL).

### COURSES FOR THE R.A.E.

In addition to the lists that have already appeared—on p.389, August and pp.428-429, September—we have since been asked to publicise the following:

**Durham:** At the Technical College, Framwellgate Moor, Fridays 6.30-9.30 p.m., R.A.E. Theory and Morse instruction. Candidates should apply immediately, as course has already started.—Instructor, F. G. Martin, G3PDM, *QTHR*.

**Grantham (Lincs.):** At the College of Further Education, commencing September 29, 7.0-9.0 p.m.—Tutor, E. J. Pestell, G3BPB, *QTHR*.

**London (Islington):** At the De Beauvoir Evening Institute, Tottenham Road, Balls Pond Road, N.1, each evening 7.30-9.30 p.m. (except Tuesdays), a booster course is available for those who have failed the R.A.E.—Instructor, F. G. Barns, G3AGP.

**Peterborough:** At the Technical College, Eastfield Road. Details from the office, or D. Byrne, G3KPO, *QTHR*.

This makes it a total of 32 known R.A.E. Courses now running, with the country pretty well covered. No doubt there are at least as many more, not notified for publicity outside the local area—so try the local office of your Education Authority, quoting “Subject

No. 55, City & Guilds” for information about what arrangements there may be in your neighbourhood.

### MCC—“MAGAZINE CLUB CONTEST”

On pp.511-513 of this issue appear details covering the 24th Annual Magazine Top Band Club Transmitting Contest (“MCC”). This is always a well supported and keenly-fought event—all on the key, as one of the objectives is to nurture CW operators—when Clubs within the same Zonal area vie with one another to become the local leaders. In other words, we look not only for the winners overall, but also for the leading Club stations in various areas of the country. Since contacts with non-Club stations (*see* Rules, p.511) score one point, individual Top Band operators are invited to join in the *melée*. Over the years, it has been found that these single-point QSO's can make all the difference between winning and losing a lead position. We would also welcome check logs, on contacts overheard, with comments on the general conduct of the Contest—these will be credited in the summary to appear in the January 1970 issue. It may seem a long way off but *now* is the time to be making preparations if you want to be in on the Top Band CW operating event of the year—November 8-9, 1700-2100z each day.

### FIFTY YEARS MAKING VALVES

It is very interesting to note that the M-O Valve Co., Ltd. was established as such as long ago as 1919—and has been to the fore in the design and development of thermionic types ever since. Many notable achievements can be recorded—such as the early post-Kaiser's War bright emitters for reception and transmission, leading on to big transmitting valves for BC stations, the extra high-power VT58 for the CH radar installations so essential for the defence of this country during Hitler's War, and later such specialised types as the magnetron, travelling-wave tubes, backward-wave oscillators, cathode ray tubes and now the double-gun bi-colour screen tube, and many others. In the strictly amateur transmitting context the range is from the famous DE5B (always a reliable crystal oscillator!) of the 1920's to the TT21 of today. There may even be some seeing these lines who (like the writer of this piece) have handled both types!

## SECOND-CHANNEL BCI

### INTERFERENCE BETWEEN TOP BAND Tx AND MEDIUM-WAVE Rx

F. G. Rayer, A.I.E.R.E. (G3CGR)

WHEN an amateur station is working Top Band, its signals may be heard in the medium wave broadcast band. The first indication of this may come in a comment such as "I heard (or can hear) you while listening to Radio 4." This may not be due to any fault in the 160-metre transmitter, or its operation.

The pick-up could be in the form of the amateur signals over-riding the wanted transmission, with or without a more or less serious whistle, or could be mostly one sideband. The level of interference can be anything from loud to barely audible.

When the interference arises from the particular effect described here, it may be quite easy to avoid it, or at least its results in terms of nuisance to other people.

#### Second Channel

As we know, a 2nd channel or image response arises with a superhet, at 2/IF from the wanted frequency. Assume a broadcast band receiver is tuned to 341m., or 881 kc: If the receiver IF is 470 kc, the receiver oscillator is working on  $881 + 470 = 1351$  kc. The 2nd channel is 470 kc higher than this, or  $1351 + 470 = 1821$  kc. This is in Top Band (1800-2000 kc) so amateur signals around 1821 kc might come through on the receiver.

Most popular domestic receivers have no tuned RF stage, and so 2nd channel signals may come in strongly.

If a receiver IF is 470 kc, 2/IF = 940, and 1800 - 940 = 860, while 2000 - 940 = 1060. So operating over the frequency range 1800-2000 kc could produce 2nd channel interference over the medium-wave band from 860-1060 kc, or about 350-270 metres. Should the receiver IF be 450 kc, 2nd channel interference might arise over the 900-1100 kc section of its medium wave band.

With interference of this kind, the fact that an amateur's faultless signals can be heard in the MW band really arises from a deficiency in the receiver—its inability to reject 2nd channel signals to a sufficient extent. On the other hand, it is unlikely the average user would want to exchange his small portable for an AR88. So it would seem that the best solution is to avoid those frequencies in the 1800-2000 kc band which are likely to result in amateur signals accompanying someone's wanted MW programme.

Reference to the log book might show a frequency which proved troublesome. Calculating a frequency likely to cause interference is somewhat hindered by the spread in receiver IF's, but may give a pointer. As an example, assume neighbours expect to enjoy 908 kc (330m.) broadcasts. If we suppose a receiver IF will be in the 450-470 kc range, then the 2nd channel could be from 1808-1848 kc. It is difficult to be more exact, without information of the receiver or an actual case of interference.

#### Other Causes

There are of course other causes of BCI, but with a mere 10 watts the foregoing is among the most likely.

It is worth noting that because of the increased power, and strong harmonics of some receiver oscillators, a somewhat similar effect can arise with 80m. signals. The amateur signals are then above or below the receiver oscillator harmonic, by the extent of the receiver IF. Suppose the receiver is tuned to 1151 kc and its IF is 470 kc: Its oscillator is on  $1151 + 470 = 1621$  kc. The 2nd harmonic of this oscillator frequency is  $1621 \times 2 = 3242$  kc. Adding the receiver IF gives  $3242 + 470 = 3712$  kc, in the 3500-3800 kc amateur band. Remembering this may occasionally give a pointer to explain a sudden case of interference.

#### EUROPEAN AMATEUR BAND PLAN

It is too often forgotten that there exists a Band Plan effective for Region I—which means the whole of Europe—covering all amateur assignments from 80m. to ten metres. Though the rules are too-often broken, the fact remains that they ought to be observed, in the interests of all concerned—particularly as the Plan has been worked out after much patient negotiation between the Region I IARU member-societies.

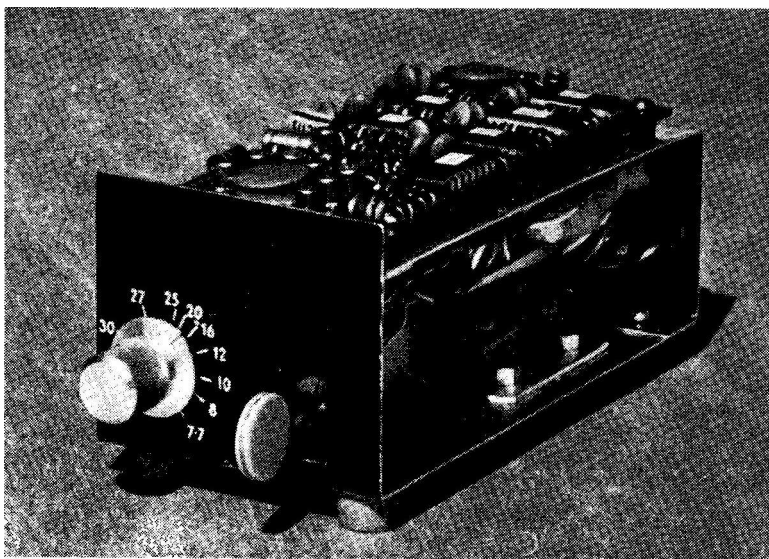
So let us take heed of the fact that the allocations are as follows: CW only, 3.5-3.6 mc; 7.0-7.04 mc; 14.0-14.10 mc; 21.0-21.15 mc; and 28.0-28.2 mc. The remaining areas of each of these bands—3.6-3.8 mc, 7.04-7.10 mc, 14.10-14.35 mc, 21.15-21.45 mc and 28.20-29.70 mc—accommodate stations working Phone, though they are not to object to CW operation in these areas. What it amounts to is that, while CW/Phone operation is envisaged as allowable throughout all bands, the LF end of each is reserved exclusively for CW—which seems fair enough.

For the DX RTTY channel, 14.09 mc is suggested. For DX on 80 metres, which is a popular exercise with many AT-stations throughout the world, 3500-3510 kc is reserved for CW and 3790-3800 kc for Phone.

A clean-up along these lines would make life more tolerable for us all.



"... All right, then, if I'm wrong you can take the next bearing..."



## INTEGRATED DIGITAL MORSE KEY

DESIGN BASED ON SURPLUS  
INTEGRATED-CIRCUIT MODULES  
— SPEEDS 8 to 40 W.P.M.

P. J. BRUMFITT (G3XMH)

**T**HE key described in this article incorporates built in side-tone, speaker and power supply. The speed can be varied from 8 to 40 words per minute and the use of a relay output enables almost any transmitter to be keyed. Unlike most digital Morse keys this one uses a continuously-running reference oscillator, enabling accurately spaced Morse to be sent. The circuit is somewhat complicated but small size and low cost are attained by the use of surplus integrated circuits.

### Logic Circuitry

Since the oscillator runs continuously automatic spacing between words and between letters can be achieved. The oscillator produces a square wave with a 50 : 50 mark-space ratio. However this cannot be used to switch the output directly when the paddle is pressed to the dot side, otherwise it would be necessary to hold the paddle until the last dot to be sent had finished. To overcome this difficulty a bistable is used, consisting of gates G and H in Fig. 1. If the paddle is pressed to the dot side this causes the output of gate A to change from negative to positive. The output of this gate is connected to one input of gate B, allowing the next pulse from the oscillator to pass through gate B after differentiation by C1 and R5. This changes the state of the bistable formed by gates G and H. The bistable is reset by means of C9

each time an oscillator pulse finishes and so a square wave is obtained at the output of the bistable. If the paddle is released when the last dot to be sent in a row of dots has started, the dot being sent is continued until the bistable is reset *via* C9.

However, the paddle would have to be held over until a dot had started if only one dot were required and this would result in dots being omitted accidentally. To avoid this difficulty a dot store is included in the circuit, consisting of gates E and F. The dot store bistable is set if the paddle is momentarily pressed to the dot side. The output of this bistable is connected to gate A. The dot store only operates on the first dot in a row of dots because of the differentiator formed by C6 and R14. The author has seen a digital key circuit in which a dot store was used but having the store turned on by earthing its output *via* the paddle, so that the store did not turn off after the first dot. If the paddle were released after the third dot, for example, then a fourth dot would be sent. This is avoided in the circuit used here by including gate A and the differentiator formed by C6 and R14.

A third input is applied to gate B from gate K. This is the dot inhibit line which enables a dot to be stored while a dash is being sent.

A dash is formed from two dots and the space between

[cont'd. p.494

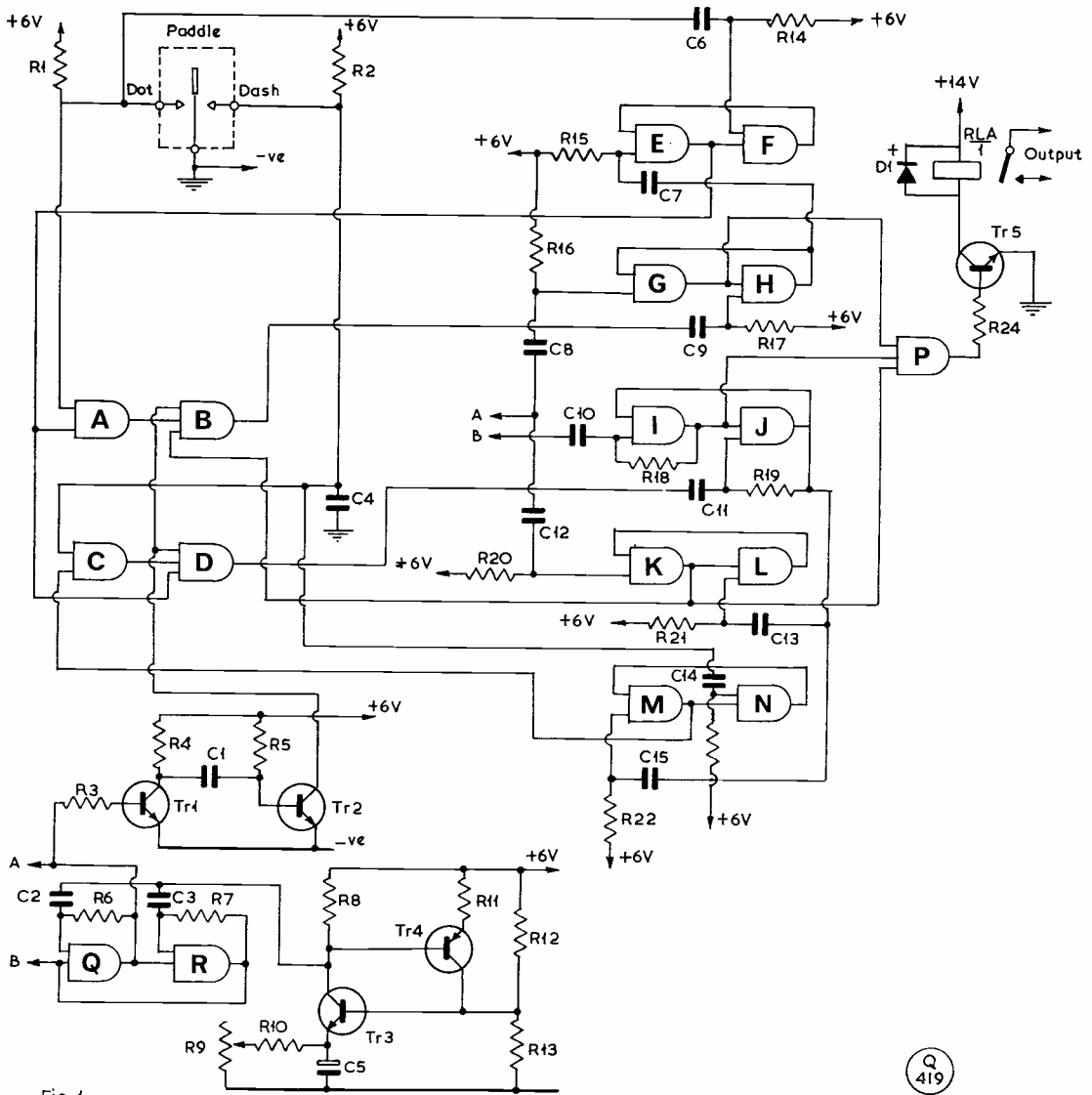


Fig. 1

Q  
419

Fig. 1. Main circuit of the Key.

**Table of Values**

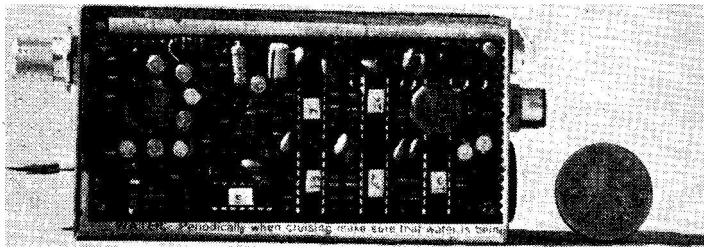
Fig. 1. The Logic Circuitry

C1 = 0.1  $\mu$ F  
 C2, C3, C6 to C15 = .001  $\mu$ F  
 C4 = .01  $\mu$ F  
 C5 = 6.4  $\mu$ F  
 R1, R2 = 5,600 ohms  
 R3 = 100,000 ohm

R4, R6, R7 = 10,000 ohms  
 R5 = 22,000 ohms  
 R8 = 1,000 ohms  
 R9 = 10K potentiometer  
 R10 = 2,200 ohms  
 R11 = 180 ohms  
 R12 = 1,500 ohms

R13, R24 = 470 ohms  
 R14 to R23 = 4,700 ohms  
 Tr1, Tr2, Tr3, Tr5 = Silicon n.p.n., hfe greater than 20, e.g., 2N706

Tr4 = p.n.p. type  
 D1 = Germanium or silicon diode  
 Gates A to N, P to R = see text  
 Relay = Claire-Elliott, 12-volt (Henry's Radio)



Showing general construction underneath the Keyer unit, using "Veroboard." The coin, for size comparison is a florin. If you can read the line of print along the lower edge, it has nothing whatever to do with the matter in hand!

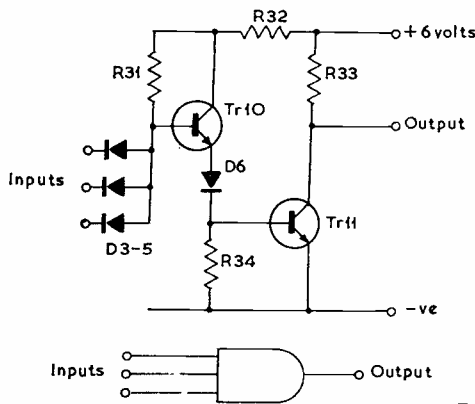


Fig. 2: Circuit of the integrated gates

Q 420

Fig. 2. Circuit of the Integrated Gates. R31, 2K; R32, 1,750 ohms; R33, 2K (MIC963), or 6K for MIC962; R34, 5K. Unmarked circuit elements are contained in the I.C.'s used, which were from the STC DTL9-30 series.

them so that the dashes are exactly three dot lengths. The dash circuits are almost the same as the dot circuits apart from the addition of another bistable consisting of gates K and L to lengthen the dashes from two to three dot lengths. Gates C, D, I, J, M and N in the *dash* circuitry correspond to gates A, B, G, H, E and F in the *dot* circuitry respectively. The reset input to gate I is an inverted version of the reset input to gate G, so that the bistable formed by gates I and J produces an output which is two dot lengths instead of one dot length, as in the dot circuitry. This means that the set and reset inputs to the bistable arrive simultaneously and so the differentiator resistors R18 and R19 are returned to the outputs of gates I and J instead of to the positive line, in order that the correct one triggers the bistable. When the two dot length output of gates I and J finishes this triggers the bistable formed by gates K and L. This bistable is turned off via C12 one dot length later. The outputs from gates I and K are added in gate P to produce a dash which is three dot lengths. The output from the dot circuitry is added to the output from the dash circuitry in gate P. The output of gate P is connected to Tr5 which operates the relay.

Integrated Circuits

The integrated circuits were obtained for the price of ten shillings a dozen. The author purchased three packets and found that these consisted mainly of NOR gates. Fortunately, a bistable can be made by connecting two NOR gates together. Each integrated circuit contains two, three or four gates although several of the surplus integrated circuits tested were found to have one gate faulty, although the remaining gates could still be used. The connection details were supplied with the integrated circuits which were surplus STC units, suitable types being MIC930, MIC961, MIC962, MIC963, MIC946, MIC949 and MIC932. The circuit of a gate is shown in Fig. 2. If other types of integrated circuits are to be used then most negative logic NOR gates or positive logic NAND gates are suitable except for a few non-saturating high speed types which do not switch the output between the battery supply lines.

Pulse Generator

Tr3 and Tr4 are connected together to form a silicon controlled switch. This is used in a relaxation oscillator,

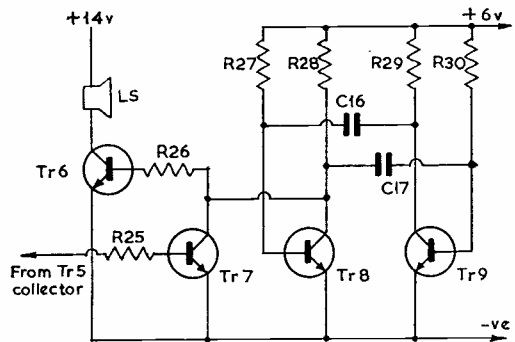


Fig.3 Sidetone circuit

Q 421

Table of Values

Fig. 3. Sidetone Circuit

- C16, C17 = 0.1  $\mu$ F
- R25 = 22,000 ohms
- R26 = 4,700 ohms
- R27, R30 = 15,000 ohms
- R28, R29 = 1,000 ohms
- Tr6 to Tr9 = Silicon, as Tr1, Fig. 1
- LS = Speaker, 80-ohm 2in. diameter



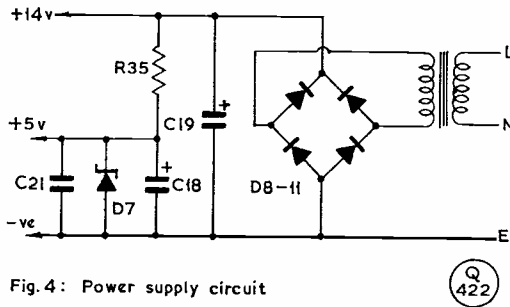


Fig. 4: Power supply circuit

Fig. 4. Circuit of a suitable PSU. C18, C19, 100  $\mu$ F, electrolytic; C21, .01  $\mu$ F; R35, see text; D7, 6.25v. zener; D8 to D11, germanium or silicon, rated 50v. p.i.v. 100 mA each, at least. Transformer, see text.

the speed being controlled by R9. A linear potentiometer would compress the speed scale at the fast end. The author used a logarithmic potentiometer connected so that maximum speed was anti-clockwise. This resulted in a more linear scale. The output from the oscillator is fed into a bistable formed by gates Q and R. This produces a square wave output with exactly 50 : 50 mark-space ratio. It also provides the required inverted output. This method of pulse generation gives a much better square wave output and a greater speed range than is easily obtainable from a conventional astable multivibrator operating from a five-volt supply.

C1 and R5 form a differentiator. The time constant is much larger than necessary for operation but enables an oscilloscope to be used much more easily. Tr1 is a buffer amplifier to prevent the capacitor loading the output of the pulse generator when the base-emitter junction of Tr2 is forward biased. Tr2 is an inverter and buffer.

#### Sidetone

The sidetone circuit is shown in Fig. 3. An astable multivibrator was used instead of a transformer coupled oscillator as it is smaller and cheaper. The oscillator is switched on and off by Tr7. The quiescent current drawn by the sidetone circuitry is small because Tr6 is cut off when Tr7 is bottomed.

#### Power Supply

The circuit of the power supply is shown in Fig. 4. The voltage required for the integrated circuits is about five to six volts. The author used a 6.25 volt zener diode for D7. The relay is a 12-volt Claire-Elliott type available from *Henry's Radio, Ltd.* This relay follows the Morse characters well even at 40 words per minute when operated on 14 volts. The transformer should have a secondary giving about 15 volts at 100 mA. The value of R35 should be chosen to suit the transformer and zener diode used.

#### Construction

The integrated circuits have a 0.1 inch pin spacing and so 0.1 inch matrix plain *Veroboard* can be used.

The case is made of aluminium and measures 2 x 2½ x

4½ in. A metal case is necessary for screening since stray RF getting into the key can trigger the integrated circuits! It may be found necessary to decouple the mains leads entering the key if this trouble occurs. The paddle consists of a nail-file fixed about two inches behind the front panel. Two contacts are mounted on the back of the front panel. The contacts should be connected so that dots are sent when the paddle is pressed to the right.

#### Testing the Key

The speed control can be calibrated by measuring the dot length on an oscilloscope and dividing 1154 by the dot length in milliseconds to give the speed in words per minute.

The two gates forming each bistable should be connected together and the bistables tested individually before connecting them into circuit. The output of one gate should be connected to one input of the other gate, and *vice versa*. A five or six volt supply should then be connected and the output voltage of one of the two gates should be measured on a meter. If a wire connected to the negative line is touched on an unused input of one of the gates the bistable should change state as shown by a large change in meter voltage. When the wire is touched on to an input of the other gate the bistable should change state again.

## MOBILE RALLY CALENDAR

It is quite possible to have fine and dry weather for the month of October—so we hope that the events listed here will be favoured with good Wx. Please note particularly the date for the Colchester/Ipswich Rally. It was notified incorrectly for the last issue, and should have been October 26, as now given.

**October 5:** Scottish Mobile Rally, incorporating an exhibition of radio equipment, at the Beach Ballroom, Aberdeen. Free parking with ample space, a grand draw and refreshments available on the premises. Trade support is solicited. This is a first venture, and we wish them well. Information from—A. W. Smith, GM3AEL, 1 Sclattie Place, Bucksburn, Aberdeen, AB2-9QD, Scotland.

**October 12:** Peterborough Radio & Scientific Society's Mobile Rally at Walton County School, Mountsteven Avenue (off Lincoln Road), Peterborough. Opens at 2 p.m., with free admission, parking and entertainment. Talk-in stations on 2m., 4m. and Top Band, also trade stalls. Refreshments available on site, and plenty of indoor accommodation if wet.—D. R. Byrne, G3KPO, Jersey House, Eye (351), Peterborough.

**October 26:** Ipswich Radio Club and Colchester Radio Society are jointly organising a Mobile Rally to be held at the Suffolk Show Ground, Ipswich, starting 10 a.m. There are to be trade stands of Amateur Radio, electronics, Hi-Fi and Do-It-Yourself interest. Adequate car parking, under-cover accommodation, and light refreshments available on site. Talk-in on Top Band, 80m. and two metres.—D. W. N. Thomas, G8BVE, 9 Burlington Road, Ipswich, Suffolk.



Above—two of the trade stands at the Longleat Mobile Rally in June. Left, Bailey & Co., printers, Weston-super-Mare, showing their QSL cards and log books. Right, the stand of Graham Newbery, Axminster, displayed a selection of Eddystone equipment, with Reg. Ward, G2BSW, in charge.



Left—during the recent very successful White Rose Rally at Leeds, the "Radio Leeds" roving reporter Geoff Leonard interviewed Ruth Sinclair, G3TNN, and recorded a QSO. Looking on is Mike Gaunt, G3WGW, chairman of the Pudsey Radio Club.

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General view of the hall during the prize-draw on the occasion of the White Rose Rally in July. Some very attractive items had been assembled by the Pudsey Radio Club for the raffle.

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# COMMUNICATION and DX NEWS

*E. P. Essery, G3KFE*

WRITING "CDXN" each month is sometimes both chore and pleasure; pleasure at reading the mail, and chore in that it is always somewhat of a problem to strike a mean between all the opinions offered by correspondents on this-or-that, particularly when they are violently in opposition, one to another, or when your scribe holds strong views one way or the other.

Just such a situation arises in that G3VYF (Basildon) is "all anti-" about the recent Editorial "Tendencies." He feels that the QSL manager has a place in the world of Amateur Radio, even for the run-of-the-mill chaps such as G's or even W stations. Mike even goes so far as to say that there would be no need for the QSL manager if the QSL Bureau system worked properly! Elaborating on his theme, G3VYF goes on to comment that the *Magazine* does not offer the facilities for free interchange of opinion and thought among its readership. Good grief—what else does this piece, to say nothing of "VHF Bands" and "SWL," do, if not ventilate the ideas and opinions of readers on all manner of subjects.

In terms of QSL managers and their activities, one would possibly be fair in saying that in some cases they do provide a useful service to the "rare DX" operator in some area where the mails are not to be trusted or only operate at very rare and erratic intervals—but in others they are merely an excuse for some DX operator, or even Joe Average, to avoid the chore of writing out the cards and paying for their printing in favour of the more pleasant occupation of working the stuff, while at the same time giving his "manager" the opportunity of acquiring a goodly crop of foreign stamps. Much of it springs from the practice, which has long since got completely out of hand, of designating a varied assortment of rocks, reefs, mudbanks and what-have-you

as "countries," quite without serious justification, in the attempt to keep lifting the target figure for the top-notch DX operators.

And what does it all come to? As far as this Column is concerned, on the one hand complaints pretty well every month that some station or other is not coming across with a much-wanted card, and on the other, complaints that the "proof of presence" called for by the ARRL from DX operators is unreasonable. The truth, as ever, lies somewhere in the middle. The vast majority of operators—and that means about 90%—play the game over their QSL cards. Missing ones are usually due to inadequate addressing or inefficient postal services in some part of the world. Similarly, the vast majority of DX-peditions are abiding by the letter and the spirit of the game—"you work me, we both want a card, let's exchange." But, in both situations there is an increasing number of "black sheep," and it behoves us all to keep a weather eye lifting for them.

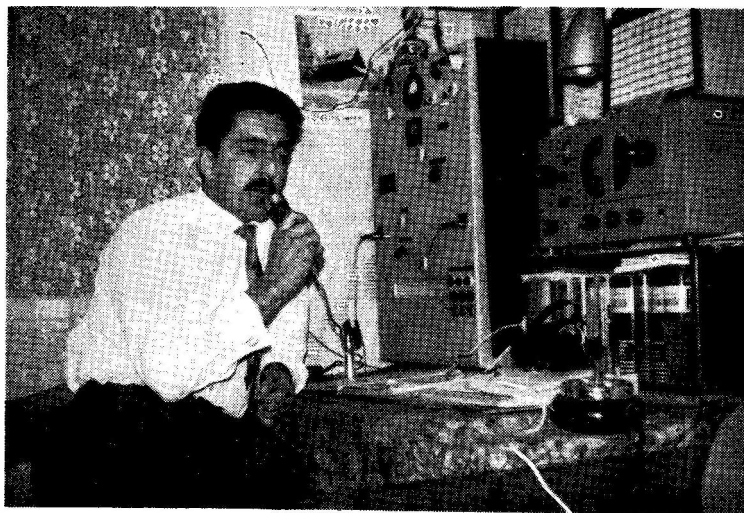
As for the Bureaux, while some

are more efficient than others, most of the complaints against them are due to failings on the part of the *users*, as by not getting cards away with reasonable promptitude, or not keeping a supply of return-envelopes in stock. After all, the object of any Bureau is to reduce the cost of QSL'ing. It should be borne in mind that for many of the younger element—the top DX operators of the future—sending the cards by Bureau is the only practical way of meeting the cost of sending out cards. The more we (sensibly) use the Bureau, the better it works as a system.

## Around The Bands

As was expected, things started to perk up all round towards the end of the period, with Ten manifesting signs of life on the odd occasion—need it be said, *not* when G3KFE could find the time to be there! Fifteen at times going like the proverbial bomb, right down to DX openings on Top Band.

Perhaps, therefore, we should start by taking a look at the clip



Mehmed Cosovia, YU4CA, Novo Naselje b/b, Visoko, Yugoslavia, runs a 200-watt transmitter on the HF bands, with a Drake 2-C receiver, and gets out well on all bands with a single-wire aerial.

covering 28 mc, leading off with G3NMH (Swindon) who has been QRT through the summer while taking down his 70ft. tower and replacing it by a 105-foot telescopic monster, at the same time changing from a two-element Quad to a four-element. As yet Hal has not been able to evaluate it properly, but contacts were made with CR6IY, 9J2VX, VP8KD and 8KL, DL6UH /SM7/M, ZE1DE, 9G1GD and LU3AX. One of the advantages of the telescopic arrangement is the ability to compare the effect of changing the two-element arrangement against a four at the same height, and then to see the improvement brought about by increasing the height; it should be interesting to know how it all works out when G3NMH has had the opportunity to get it "on the nose" and evaluate it properly.

G2DC (Ringwood) found things somewhat as usual—not much

activity till some rare DX station popped up on the 10-metre band, or a contest made people take a look, and then plenty. As examples, Jack made CW contact with CR6GO, CR6AI, EP2BQ, JA5TQ, KR8AG, OD5LX, UL7BF, UL7BG, UL7JG, UL7BB, UF6KAF, UH8BO, a horde of UA9's, ZE3JO, VU2VZ, VU2KV, VK8HA (who said he was on almost every day from 1000 to 1100z but very few takers), VS6AF, XW8BP, 4X4MR and 4X4CJ.

Things were pretty poor during August for G3NOF (Yeovil), but in the early part of September they perked up considerably, with several short-path openings to S.E. Asia—JA, VK, and South Africa, plus of course the W's. SSB contacts were made with JA2CRT, JA3ERT, K5FHL, KR6JT, KX6FJ, VK9XI, XT2AA, VQ8CG, ZS, 9J2DT, 9J2CX and many East Coast W's.

Just to make sure that his report covered all *six* bands, G3UOF

(Wigston Magna), one of our /MM's, took time out to work G3XWO across Leicester! Mike is back on dry land until mid-January 1970, while taking a conversion course at Bristol Technical College, before resuming his /MM travels.

By and large, a good month, reports G3XYP (Navenby) who had some interesting contacts as a hint of things to come during the Autumn. But he is a little worried as to what may happen after next Spring to ten-metre DX. Who knows—the fall in conditions from peak to trough of the sunspot cycle is usually a slower process than the rise, so there may well be the odd opening on good days, albeit more and more limited to the chaps with the right aerial layout. David mentions contacts with CE8AA, a crop of JA's, OH0AM, VS6DR and 8P6AH.

9H1BL (Malta, G.C.) reports "conditions getting sneakily better," although he only mentions QSO's with LU, CR6 and ET3. All the same, Alan intends to put his "ZL Special" back up aloft, and be on the lookout for an improvement during the coming month.

#### 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	336	171	308	328	166	113	20
G3IGW	204	127	156	168	122	91	42
G3DO	337	199	239	330	90	83	9
G3IAR	221	126	161	193	91	73	12
G3PQF	159	103	46	96	84	57	12
G3KMA	244	185	177	184	113	54	11
W6AM	348	131	140	347	116	54	7
G3VDL	145	59	105	101	53	31	—
G3XBY	156	93	108	91	56	53	5
G3WJS	66	—	8	55	41	45	14
9H1BL	157	86	92	119	51	44	—
G3NOF	316	180	218	299	34	40	2
G3SED	136	31	26	66	43	40	39
G3LZQ	254	138	155	201	72	38	8
G3RJB	163	63	48	149	59	37	8
G3VPS	128	36	42	108	50	36	14
G3WPO	101	35	20	63	49	29	21
G3MDW	116	47	66	83	20	15	7

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

#### Fifteen Metres

With Ten showing signs of life, *Fifteen* simply had to be worth a going-over—and more the pity that TVI makes it extremely difficult for many U.K. operators to use the band. However, with the number of UHF-equipped TV sets about nowadays, and the opening-up of BBC and ITA on the 625-line standard in November, there may well be cases which could be cleared by the complainant tuning up to UHF channels.

An inverted-Vee aerial is used at 9H1BL for 21 mc, and it yielded CW contacts with XW8CS, FL8MB and a crop of smaller fry; SSB giving CT3/DJ5JK and another QSO with FL8MB.

A brace of new ones for the 15-metre band were clocked up by G3DO (Sutton Coldfield) with FY7YQ and AP2AG; Doug reports 21 mc as being in pretty fair shape, particularly in the way of Pacific DX openings in the mornings.

Fifteen-metre specialist GM3JDR (Golspie) found that the band really opened into flower during the latter part of the period; an average of fifteen JA QSO's in the morning

prior to going to work and at lunch-time, W's being there from noon till after Don went QRT around 2100. CW was the main mode, and contacts were logged with 9V0PD, K3FDQ/KP4, CX9BT, LU4ECO, W4VPD/KC4, 3V8AA, UD6BD, OK7CSD, ZS6ARC, OA4MS, PY's, G6ZY/CN/M, TG4SR, ZS6AY, 9Q5EH, ZP9BG, CE1IJ, HS1AQ, KA2JM, UW0IH/M, OD5LX, UA9, UI8KBA, PJ1AA, 4S7DA, 9Q5YP, 9V0OT, UA0, ZC4GM, VS6AA, VS6BC, VS6FX, KZ5II, HL9VX, OX3LP, ZL, UH8, KH6AG, many W6 and W7, VE7 and all JA call areas among the 110 contacts made with Japan. As for SSB, it was only used to work 3V8AA, PZ1CU, LUI DVT and WA9YGT/KG6.

In the opinion of G3XYP there is usually some DX to be found in amongst the QRM—David instances EA9ER, FO8BS, HL9WN, MP4MBB, YA1AR, ZD9BM, 4S7PB and 7P8AR. Incidentally, the FO8BS contact was made after a QSY down from Twenty, and on scanning the band G3XYP could find nothing, but FO8BS came up on frequency at RS57, both ways; there were no other callers!

Now to G3UOF, who used CW for exchanges with JA1, JA2, JA6 and UI8, SSB giving a rather larger crop which included VE8RCS, MP4TDA, EA8AV, SV1BV, MP4BHL, 3V8AA, VO2KR, VK2BNS/MM (off VK5), KV4AD, 9V0PD, KP4DCR, CE3OE, 4X4KT, PY's, CR6LF, 9M2BD and OY7S.

G3NOF found the early mornings good to KL7, followed by JA, with the latter sometimes available in the afternoons, and 9V1 often S9 around 1700, while W's were there for the taking right round into the small hours. SSB contacts were netted with ET3REL, JA's, KC6JC, VP8KO, 3V8AA and 3V8MOL.

That new beam at G3NMH is doing extremely well on 21 mc, the frontal lobe being much sharper than the old one, with signals well up. Most of his DX contacts were W's but among the others were VP8KO, JA, OD5, VP8HZ, VS6AA, MP4TDA, VP8KL, LU8FAM, PY2PE, GC5AON (with assistance from a W!), VP8JB, ZC4AK, 5Z4KM, 9M2FR and loads of W's in all call areas. Just to show how much the pile-up is under (or not)



Station of ILLZ, Luigi Zavattero, 12 Eleonora Duse, Rome 00197, running the Collins line 75S-3A and 32S-3A, into a Telrex TM30D beam. During the period 1937-'40, he was KAILZ in the Philippines, and from there was one of the leading phone stations in the 1939 international DX Phone contest. At that time, KA was the Philippines prefix, whereas now it is the indicator for U.S. Forces amateur stations in Japan.

the control of the DX station, Hal instances a KG6 who was busily trying to "save time" by working the EU stuff by countries, alphabetically, and averaging a QSO rate of about one every three minutes, as well as demonstrating that he had either forgotten, or had never been taught, the alphabet!

Early evenings were the best for 15 metres, in G2DC's opinion, although his stamping-ground at the CW end of the band was marred by an S5 background noise from a parked jammer which spread itself, like an electronic banyan tree, from 21025 to 21075 kc. However, in spite of it all, Jack worked CE1DD, CE2DL, CX1JM, EP2BQ, HC2GG, HK3RQ, all JA call areas, KZ5II, KL7MF, OA4MS, OD5LX, UI8AI, UI8KAB, UH8DL, UM8FM, UL7BG, UL7JE, UL7GW, VK2EO, VK2BKM, VK4ZB, VK6OV, VK0WK, ZL3GQ, ZL4BO, VP8KD, VS6BC, VS9MB, 5H3KJ, 6W8XX and 9Q5YP.

#### QSL Addresses

Before pressing on with the information we have on this front, let us first make it clear that the writer cannot undertake to answer letters from hopefuls who regard him as an easy substitute for a

Call-Book, or a subscription to Geoff Watts' *DX News-sheet*! We do *not* hand out, even for an s.a.c., QTH's which already appear in the *Call Books*—if they are not in the *C.B.*, we don't know them, either, and if they are, you should be equipped with *Call Books* to keep you up-to-date.

From G3NOF, as always, a clip of useful QSL addresses, as follows: 3V8MOL to DOTM; 3V8AA to F50J; HB0XVM to WA9LUD; ET3REL to W5LEF; VP8KO to G3NMH; JDIYAB via JARL; VP9 to VE2DCY; VP2GZ to W4YHB, or direct; 8RIJ to PO Box 557, Georgetown, Guyana; ZS3LU to W2CTN; KC6JC to W2RDD; 9V1PA to G3LQP; VK9XI to W2GHK's DOTM; F0QJ/FC to DK1SN; KX6BS to A.P.O. San Francisco, California 96333; and XW8AL to K6EVR. GM3JDR writes in to remind us that he is handling the cards for VS6BC, who is ex-GM3KGT, and mentions that he is, at the time of writing, up-to-date on the ones so far received.

Some more useful ones come in from G3UOF, who mentions DL7NS /OH0, who wants his cards directed to DL7MQ; TF2WLW to K3EST; TF2WLQ to WA2WIB; and

HBØXXA to WB6SCM. One wonders how much unnecessary paper-work all this involves!

### Twenty Metres

As ever, the band on which most of the DX is worked by the majority of operators—*ergo*, the greatest of the QRM! In addition, there have been times when the static level on 20m. has been somewhat more than maddening to one not already rendered immune by long experience of Top Band!

G2HKU (Sheppey) comments that he has not much to offer, having spent much of his time on the air just ragchewing, renewing acquaintances—such as the one with VK3NC, first worked back twenty years or more, and many times since. Ted

wonders if some, at least, of the decreasing interest by U.K. amateurs in the DX bands is not because of the myth that there is no other type of QSO acceptable on these bands than the contest or “rubber-stamp” variety. (Of course not! Each contact is as you make it, whether on Phone or CW. *Editor.*) SSB was used by G2HKU for contacts with VK3AKP, K6QDD, JW1CI on Bear Island (who offered the information that there they had fifty men and no women), WA7GDK, ZL3SE and ZL3JQ. CW made it two-way with VK3NC and VK7CH.

Although there was plenty of all-round DX about at the CW end of the 20-metre band, there was also much competition both from the horrible signals from Mittel-Europa—Heaven only knows what they must sound like locally!—and the static level. Though G2DC had nothing to add to the score, his crop make pleasant reading: AP5HQ, CE2DI, ET3USA, HC2GG, all JA call areas, KZ5LL, KL7MF,

KG4GS, HK3RQ, LU, OA, OD5LX, PX1AV, TI2DL, UF6, UG6, UL7, UM8, UH8, UI8, UJ8, UAØ, VP9AT, VK1-8, VKØXF, ZL3GQ, ZL4BO, 3V8AA, 3V8NC and 5H3KJ. All of them worked between 0700-0800z or 1800-2000z.

Although on 14 mc the beam is good, G3NMH wonders whether the extra strain at the top is worth it in the performance of the system—hardly fair, as it has so far not been properly tuned up. Seems that it wouldn't behave at first, and didn't want to tune, so in the end Hal had to wind it up out of the way while he got on with his other jobs. However, contacts were made with VP8, HZ, JB, FL, KL, KD, and JH (by way of the skeds on 14127 kc at 2020z, Tuesdays, Thursdays, and Saturdays, in which other G's are invited to participate), LU9GGH, CE3ZN, 4Z4HS, TF2WKL, 4Z4CZD, K7JCA/KH6, KH6GLU, VR2FT, KJ6CF, KH6VG, KH6SP, G3NOF(!) OY9LV, FP8AP,

### TOP BAND COUNTIES LADDER

Station	Confirmed	Worked
<i>Phone and CW</i>		
G2NJ	98	98
G3NPB	98	98
GM3OXX	98	98
G2HKU	96	96
G3WPO	94	94
G3SED	93	96
G13WSS	88	92
G3VLX	77	95
G8HX	76	83
G3XTL	62	78
G3WJS	60	86
G3XDY	65	89
G3XTJ	63	88
G3XGD	42	55
G3KFE	41	65
<i>Phone only</i>		
G2NJ	98	98
G3TSL	94	97
G3SED	91	92
G3WPO	88	89
G3VGB	84	95
G3PQF	71	86
G13WSS	36	55
G3NPB	17	62

(Failure to report for three months entails removal from the Table. Claims may be made at any time. Six months of “Nil” reports will also result in deletion.)

## Reporting the HF Bands



Almost, one would say, the perfect site for a field day station—G3OHB/P, of the Cornish Radio Amateur Club, at their cliff-top location, Porthkerrers Point, The Lizard, Cornwall. Directly overlooking the sea, with a clear take-off, they were able to put up a Vee-beam with 412ft. in each leg. In his report G3VJB says “it was a marvellous location”—we should say so!



VK2AVA, G3RJS/MM (several times when the latter was in the South Pacific), C3ICL, FO8BH, KC2USV, KH6GQM, IS1DKL, VK7AZ, VK7WI/P, ZB2AV, HB0AAI, TA2SC, VP2KC, FO8BY, 4L0CR (Zone 19), VS6DR, VP5TH, KH6AFN, 3V8AA, VP8JT and TF2WLS.

The beam in use at 9H1BL was a "ZL Special" for Twenty but it gave Alan so many anxious nights whenever the wind was blowing that he had the choice between a nervous breakdown or taking it down! It has been replaced by a ground-plane which seems to be going quite well, is less of an eyesore, and allows 9H1BL to relax when the wind blows. DX worked includes FC, HB0AK, K6JGS/HK0, VP2GAO, all SSB—while pounding the brass resulted in reports from JW2QK and HC2GG/1.

Definitely the best band is Twenty, says G3XYP, who used SSB to catch CR3KD, JD1YAB, JW9DL, VK0MI, WA4MMO/KC6, XT2AA, ZD3D, 5Z4KL/A, 601KM, 7X2SX, 9N1MM and 9V0PA for twelve new countries.

Not such a long list from G3UOF, who seems to have gone somewhat against the general trend and produced more from the LF allocations than the HF bands. However, CW on 14 mc was used to work HP1BR, YN1CW, PJ7VL, YV5CKR and ZL, and Sideband for contacts with YN2JS, OY1X, HB0XXA, and MP4TCM.

Once you get over the three-hundred countries mark, the going gets a bit tough and you can go months without a gain—as a look at the card-index for the Six-Band Table would confirm. So G3NOF is justifiably pleased to go up a couple this month. He found conditions good most mornings to VK, with W6 and W7 also strong, and evenings, unusually, giving good hefty signals over the short path to S.E. Asia, JA and even the South Pacific, at times like 1700 to 1900z. Sideband failed to connect with either AP2AD, FO8BX, FY7YM, although Don had better luck with F2CD/FC, FO8AA, FO8BY, FO8CT (all at 0900), HK0BKK, JA, JD1YAB, KX6BS, UG6AW, VK1-4, VP2GZ, VR6TC, VS6DR, W6-7, WA4MMO/KC6, ZL, ZS, 9J2DT, 9VOPA, 9Y4's, 3V8MOL, 4L0CR and 4S7PB.



At the White Rose Rally on July 27, left to right: G3VDR, G3TPX, DJ4UP and ZB2BK, G3VNH.

### Here and There

The batch of 8000 cards ordered from the printers bearing the legend "3V8NC" has now arrived. From the contemplation and the action G3TXF now has the clearing of this battlefield. A start has been made on the job, and any more requests should be sent to G3TXF, *QTHR*. Nigel feels it should not be too difficult for a tourist to get a licence in Tunisia, if he writes his initial letter at least six months ahead, quotes his full Tunisian address on the application, and writes all the correspondence in French; All amateur operations are "Tourist" at the moment, there being no Tunisian nationals licensed as yet.

Last month, colleague Justin Cooper in his SWL piece made a comment which G3WET feels could be taken as meaning that GB2HRH will not QSL SWL reports. Not so, indeed, what was meant was simply that an operator faced with the chore of writing out several thousand cards will not look favourably on the sort of report one so often gets—and gripes about—from some SWL's. In fact GB2HRH will QSL all genuine SWL reports received.

### Forty and Eighty

It really does seem a shame that it is necessary to lump these two

bands together, as once again there has been little enough in the way of comment on them in the letters, although what there has been indicates both have been in pretty fair shape.

WA2WOR has some nice things to say about this piece, and remarks that he has a QTH which just *has* to be the world's worst, right in the heart of New York City, from which he is using an HW-22 and an indoor Joystick, with occasional portable forays as he travels about the country—though there is a six-band CW rig running about 75 watts on the stocks. Morgan has another call, W4WFL, and on a recent trip to a local radio store, flipped through a current copy of the *Callbook* to find "W4WFL" listed as belonging to a chap in St. Petersburg, Florida! Anyhow, the licence was due for renewal, and so a letter was sent to FCC pointing out the slip; but FCC sent along the renewal without further comment which only goes to prove—again!—that the computer is not quite blameless!

*Forty* is a band which G2NJ (Peterborough) often uses; Nick is interested in the Maritime Mobiles, and this month found another of them in OH1WP/MM, located NW of Aland Islands and bound for Gavle in Sweden.

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### ALL-BAND ZONES AND PREFIXES TABLE

Starting date: January 1, 1969

Station	Zones	Prefixes
G3XYP	40	355
9H1BL	39	351
G3XBY	36	308
G3VPS	29	228
G3WPO	28	174
G3PQF	15	96

### FIRST YEAR OPERATOR'S LADDER

#### TOP BAND ONLY

Call	Counties CW	Counties Phone	Countries
G3XTL	78	—	15
G3XTJ	73	73	16
GM3YCB	52	81	11
G3XVC	40	27	11

Note: A first entry for this Table must be accompanied by a note of the date of first licensing. The same county may be claimed for both CW and Phone. Placings will be determined by taking a different column each month; this time it is based on the "Counties CW" column.

Just to prove what can be done with *Forty*, G3UOF mentions that he has been using a vertical tuned against about thirty ground radials —by no means a spectacular array when one compares it with the two-element beams used on high poles by some of the "big boys" and certainly well within the compass of the average garden. Mike offers ZL, VK3, VK4, all W call areas, UL7, KP4UW, EA, PY1, 2, 3, and 7, UH8DC, UM8FM, G6ZY/CN/M, DL7NS/OH0, UA9, HK7UL, VE1, 2, 3, and 7, 8P6CG, CO2VQ, ZB2BO, TF2WLW, TF2WLQ, CE8AA, VO1AW, XE1AAG, and HC2GG/1 worked on CW—to add to SSB contacts with 9Y4KR, GB3YS and GD3TNS. Pretty fair for what some people claim to be a "useless" band. *Eighty* did not produce such good rewards, although brass-pounding brought in PY1, VE1, W1, 2, 3, and 4, OH2BR/MM, UL7GW, EA2CR, to fill the gaps in the log.

Serious operations on *Forty* and *Eighty* can now be regarded as having quite definitely started at G3XYP,

David having lashed out on an 18-AVQ, which has been put up, together with assorted radials, and appears to be doing its stuff quite well. However, G3XYP was ever a perfectionist, even as an SWL, and so he has hopes of making it deliver the goods to an even greater extent. SSB has so far booked in CR6IS, VP8KO, 3V8AA, 5Z4KL/A on *Forty*, along with CP1GN, CN8AW, JW1CI, TF5TP, and 5A2TR on *Eighty*; not bad for the first fortnight of operations.

G2DC reckons that he was a bit of an optimist to spend much time on the air in August, although for September things should have been much better. Static has made both *Eighty* and *Forty* pretty rough, although 6W8XX gave a new one on 3-5 mc and PY7AWD in Fernando de Noronha did similarly for 7 mc. The actual bookings in the log show, for *Eighty*, CW with W1-4, VE1-3, UA9KAG, ZL3GQ, CT3/DJ6JK and 6W8XX. *Forty*, also CW, produced CT3/DJ6JK, PY4BQ, PY7ALQ, PY7PO, PY7AWD, UL7BG, UA9CM, VK2EO, VK3AUT, VK4SS, ZL3GQ, ZL4BO, 3V8AA, 3V8NC, 4Z4FH, 4X4WN, 6W8XX and 9Y4AA.

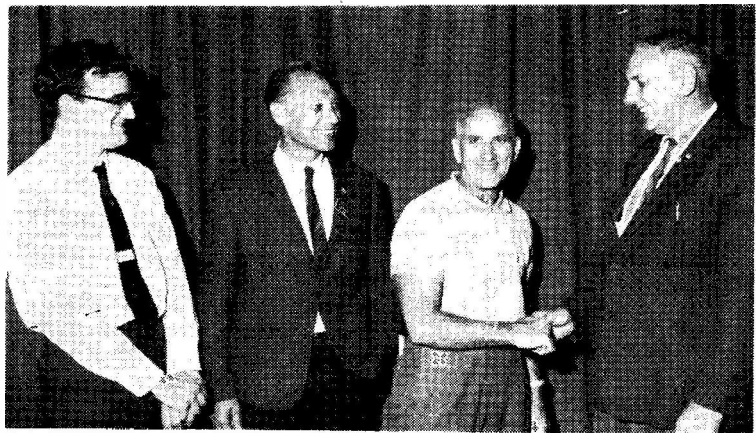
Loggings at G2HKU were down during the month, due to the amount of time spent rag-chewing but even so Ted rang the bell with 3V8AA, LX1MK, and OH1AA, all on *Sideband Eighty*. *Forty* on the other hand gave HB0XFE and ON5RH

/LX on SSB, with UA9CM booked in on CW.

### Top Band

As usual of late years, much of the clip refers to operations on this band. Already, this early, international DX is about. An interesting report has come in from G3TSL which indicates that while he was working GM3YCB/M *en route* to Selkirk a net developed with about four stations. When GM3YCB/M had changed to using GM3WDF/P on arrival, a pause was left between ovals, and both stations were somewhat startled to have a call-in from MP4TAF, at around 0130; G3TSL received RS56 on SSB and gave MP4TAF 579. Although the Selkirk crew heard MP4TAF, as did others in the QSO, it seems that only G3TSL actually made the two-way. This was confirmed later on in the same week by a QSO with MP4TDA, who reported the G stations as audible for some time after they had lost contact with MP4TAF.

On the other side of the pond W1BB writes to say that W3DPJ worked VK3KO, VK3ACA and VK3APN on August 31, followed on September 1 by KL7IR, for a 50th State and 30th country. On the debit side, the JD1YAB expedition did not raise anyone on 160m., due mainly to the extremely heavy QRN level both in W8 and W1BB/1. On a more personal note, it is pleasing to hear that W1BB, after



Some overseas visitors seen together at the recent Derby Rally—left to right: ZD8RB/G3VSW, VE7KC, VK2AMD and ZL2MZ. All from far away, they had a good time on August 17.



no less than four spells in hospitals and three operations, is now out and well on the mend—well enough indeed to work G3VMW and VP9GJ between 0300 and 0630 GMT!

On a more domestic note, things were well and truly stirred up by G3SVK and G3VUE on their recent trip to Scotland. Sad to say, although they came back first try every time your scribe called them, he did *not* make it a two-way for Cumberland.

G13WSS (Holywood, Co. Down) worked the boys in West Lothian for his 92nd county, and also hooked them on the other stops in Cumberland, Kirkcudbrightshire, Angus and Nairn. GW3XMP/A was in Pembroke; GM3LHZ/P twenty-five miles north of Lerwick in the Shetlands; and Rutland was worked in the form of G3YPB/P. All these were Sidebanders; the key was responsible for GC3LDH/A in Guernsey and GM3CRJ/P in Argyll appearing in the log.

Having actually remembered to write in this month the letter from G3WP0 (Burgess Hill) ran to a couple of pages. Having parted with the Vespa, Tony now has his home-built SSB rig as the only tackle in the station, but the remaining three watts of RF are as potent as ever. As regards TVI, G3WP0 says that at his particular location there is 10  $\mu$ V *peak* of TV signal, and the only local who seems to be able to operate in TV hours is G5RV, at least as far as the HF bands are concerned.

Sad to say, G8HX (Mansfield) has had more than usual time in the shack, for the *worst* possible reason—off work with lumbago! However, it's an ill wind that blows nobody good, and Frank has used the time to investigate the GDX possibilities of Top Band around noon. Contacts were made, all at about the R5, S5/6 mark, with G3XHI at 108 miles; G3ORY/A in Lowestoft at 136 miles; and G3VFA, who was of course using a Joystick, at 168 miles. About an hour before lighting-up time there have been



At the Derby Mobile Rally on August 17, the HF-band station was provided by the Nunsfield House club group, signing G3EEO. They run the modern K.W. gear all through, and have an enthusiastic following. Operators when this picture was taken were G3ALA and G3VKH.

QSO's with G3EFC at 112 miles and G3ISV at 104 miles. All this on an aerial about 150 feet long bent into an L-shape, 35 feet high at one end and sloping down to 15ft. at the other. It is used with an ATU and a counterpoise, and work has been done to make sure the RF is in fact put into the aerial and radiated, which is precisely the reason why some people succeed on Top Band with relatively poor aerials and others just fail to get out of their own back gardens.

G3VLX (Sidcup) seems to have used CW for nearly all of his EU and GDX QSO's—except, oddly enough, for those with GM3LGN/P for Dumfriesshire and GM3VUE/P in Kirkcudbrightshire, which took the score up to 95C worked. Among the others one notes PA, DJ and EI, and just about anything that was around on CW *to* be worked—G3VLX doesn't seem to miss much!

G3XTJ (Palmer's Green) has been looking sorrowfully at the decline in his activity in the last few months

of his first year, and draws the conclusion that it happens to most amateurs. Apart from this, however, there is also the sad conclusion that Ed's indoor dipoles, which did so well in the winter, were just not good enough to compete when the going got rough in summer. That's life!

Elsewhere it has been noted that G3UOF made one QSO on Ten to make it a six-band report—and we notice that he only mentions OL2A10 on Top Band CW at the other end of our frame of reference!

#### Deadline

So, there it is for another month. It has had to be squeezed a bit because of the amount of news, and views, in the mail. But next month, if all goes well, things will be even tighter as the bands all open up. So let's have your reports, the deadline for which is **October 13**, addressed as always to "CDXN," SHORT WAVE MAGAZINE, BUCKINGHAM. Till then, 73 *es DX*.

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**Our regular Book Lists include all titles of general Amateur Radio interest and cover the whole field for specialised texts.**

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# VHF BANDS

A. H. DORMER, G3DAH

ON a personal note: May I thank those many friends who sent kind messages during my recent enforced absence from the VHF scene, and assure them that A.H.D. is now fit, willing and able to take over again from A.J.D.—to whom thanks for standing-in.

## Band Planning

As indicated in "VHF Bands" for August last, the IARU Region I Conference in Brussels in May took several decisions, the adoption of which has engendered changes in the Band Plan for the United Kingdom.

Following a meeting between representatives of SHORT WAVE MAGAZINE and the RSGB, it was agreed that a joint announcement should be made in the October issues of the two Journals. This is reproduced on p.506—and you are adjured to read all the small print!

## Narrow Band FM

Several correspondents have raised recently the question of the relative merits of NBFM and AM for communication at VHF, and it might be useful to look into this and to include SSB in the comparison. The factor that really counts is the signal/noise ratio at the receiver end, and this in turn is related to the detection method used. Perfect detectors are assumed initially in the discussion following:

It can be shown that an SSB transmitter at equal rated power compared with a 100% modulated AM transmitter will produce a

S/N ratio 3 dB better than for the AM case, and that this relationship holds good down to the lowest levels of receiver input signal. If the SSB transmitter peak power is made equal to the AM transmitter peak output at full modulation, then the improvement in S/N ratio becomes 9 dB. With conventional detector systems this ratio sets the level of usable signal. The best results will be achieved when the receiver bandwidth is just great enough to pass the signal, and the transmitter power is concentrated within that bandwidth.

The FM case is rather different. A signal centred on the nominal carrier frequency produces *no* output, and it is only as the frequency moves away from centre that any voltage is developed at the detector, and this voltage is proportional to the difference between the centre frequency and the incoming frequency. A signal at the limit of the detector passband produces maximum output, and this applies equally to noise. The noise in an AM system is distributed in a uniform pattern over the spectrum, while the FM receiver has what is termed a "Triangular Noise Spectrum." As a result of the way in which the noise is distributed, the noise output of a FM detector will be 4.8 dB less than an AM detector of equivalent bandwidth. This figure can be improved further by the use of high deviation ratios. For example, with an audio passband limited to 3 kc and a deviation ratio of 2, there will be a further increase in the S/N ratio of 6 dB, since the swing of  $\pm 6$  kc will produce a useful *signal* output, while the *noise* output will be limited to that in the audio passband.

What have we now got? Using AM as a basis, an SSB transmitter of equal rated power will give an improvement of 3 dB in the S/N ratio, and the FM transmitter of equal carrier power and a deviation ratio of 2, will give an improvement of 4.8 dB + 6 dB or 10.8 dB. But there are snags. To achieve the gain of 10.8 dB over an AM system, the NBFM signal must be above the limiter threshold of the receiver. Below a S/N ratio of about 15 dB, and a relative signal input level of around 8 dB, the performance of the FM system begins to fall off

rapidly with decreasing signal strength. At about 6 dB S/N ratio, the FM system with a 12 kc bandwidth just about equals the performance of a 3 kc SSB system, and at 3 dB S/N, the AM and FM systems are equal. For lower signal levels, FM is inferior to both. In the worst case, with very low signal inputs, SSB always yields the best S/N ratio. To take advantage of the better S/N ratios which the NBFM system can provide, the signal input must be high, but this condition also produces good intelligibility in AM and SSB systems, and the improvement in the ratio does not materially increase the readability.

Other factors to be considered in an overall evaluation of the three systems are (a) Fading on the transmission path will degrade AM and FM more than it will SSB, and (b) The bandwidth required for effective FM is greater than that required for either SSB or AM systems of comparable audio performance. Against these disadvantages must be set the fact that, in certain cases, NBFM seems to offer a reduction in TVI, and that the audio system is less costly and complex than that required for either SSB or AM, although some efficiency-modulation systems applied to AM transmitters are comparable. At the receiving end, the use of limiters and FM detectors significantly reduces impulsive electrical noise generated, for example, by car ignition systems or rotating electrical machinery.

In the opening paragraph, perfect detectors were assumed in the development of the arguments for the relative merits of the three systems, but it is a hard fact of life that, while pretty well all amateur VHF receiving stations are equipped to receive AM signals, and most to receive SSB signals (even if only by the imperfect method of using the BFO to produce an injection voltage) every few have FM detectors *per se*, but rely upon IF slope detection for resolution of the audio. Considerable losses are introduced in this way. With a Modulation Index of 1, the first sidebands are about 50% of the amplitude of the unmodulated FM carrier, the same as for a 100% modulated AM transmitter, but only one sideband is contributing to the detector output, so immediately there is a 6 dB loss compared with

coherent detection used for AM. With an Index of 0.6, the first sidebands have an amplitude of only about 25% of the carrier, and so reception of the FM signal on an AM Rx in this case produces an audio output equivalent to that which would be generated by a 100% modulated AM transmitter running at only one quarter of the FM carrier power—and therein

lies the biggest snag.

To sum up, under conditions of high signal level, NBFM can produce better results than either AM or SSB, even with the detector limitations mentioned above; it is simple and cheap, and may show a side benefit in the reduction of TVI. Speech compression and peak limiting at the transmitting end will also help—as witness the excellent NBFM to be heard from G3OGX, who has incorporated these refinements in his gear. Against this, at low signal levels, the results are worse than those achieved by use of the other two systems, while inefficient FM detection (which is preponderant in the amateur context) degrade the system still further, as do susceptibility to fading and the creation of QRM due to the presence of a carrier, although these two factors apply equally to the AM case. In addition, the system is wasteful in terms of bandwidth. For local VHF working, therefore, NBFM has considerable advantages, but compares unfavourably with either SSB or AM when it comes to DX contacts.

As if to prove all the foregoing to be wrong, an interesting letter has just been received from G3TNO, giving details of his NBFM detection system. He uses a 6BN6 preceded by an EF184 limiter, the gain of which is adjusted so that his detector is just out of limit on noise. During a marginal QSO with G3BA, who was on NBFM at the time, they both switched to SSB and found no improvement in the received signal. G3TNO claims that he can give S2 Q5 reports with his system. These results will depend, of course, on the audio passband of the receiver, the deviation ratio at the transmitter and propagation conditions prevailing at the time.

first project is the launch of *Australis Oscar A*, and to this end they are discussing with NASA the possibility of placing this satellite into orbit using the second stage of a two-stage Thor-Delta rocket. The exact date of launch is not at present known, but is likely to be before the end of this year, and may be as early as October. *Oscar A* will carry two beacon transmitters, one on 144.05 mc and the other on 29.45 mc, but will have no transponder facilities as was the case with previous Oscars. Amateur activity will therefore be limited to tracking practice and the resolution of telemetry data. Co-ordination in this country is by Bill Browning, G2AOX (who else?), who has published some information on tracking parameters already, and who will be coming up with detailed gen. on *Australis*.

VHFCC Awards

Your scribe regrets that his recent absence from normal circulation has delayed the processing of claims for VHFCC. Applications are held for: G8AYN, G8AUN, G3OHC, G8CEA, G8BKR, G3MCS, G3WQG and G8CJU. Awards this month go to Ron Howe, G3PLB, and Derek Poulter, G3WHK. Congratulations.

Ron gets his Award for operation on two metres from Basildon in Essex. He runs fairly low power, the transmitter being a TW2 with 15 watts to the QVQ02-20 PA. Reception is with a TW2 converter tuning 4-6 mc on a CR-100 receiver. The antenna is an 8-ele Yagi at 20 feet a.s.l.

G3WHK also runs low power with a TW Communicator at 12 watts input to the PA. The associated converter has been modified, and an S-meter and Q-multiplier have been added to the receiver. The beam is a 10-element *J-Beam* Skybeam at 40 feet above ground, at Morden, Surrey, which is 100 feet a.s.l.

Hibernian Highlights

A copy of his *EI-VHF'er* has just been received from EI5BH. It contains information of interest to VHF workers in this country as well as Eire, news of VHF activity in the Republic and elsewhere, and the suggestion that the EI's might run their own VHF Contest next year.

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THREE BAND ANNUAL VHF TABLES

January to August — 1969

Placings by Bands

FOUR METRES

Station	Counties	Countries	Total
G3TDH	35	5	40
G3EKP	23	6	29
G3DAH	22	3	25
G3LAS	20	1	21
EI6AS	13	7	20
G2AXI	15	2	17
G3COJ	11	2	13
G3KMI	12	1	13
G15ALP	8	3	11

TWO METRES

Station	Counties	Countries	Total
G3DAH	62	14	76
G2JF	55	11	66
G3COJ	52	11	63
G8BMD	51	9	60
G3EHM	45	10	55
EI6AS	38	12	50
G8AUE	44	4	48
G8APZ	36	8	44
G8ADP/A	36	5	41
G3LAS	36	4	40
GD2HDZ	35	5	40
G8BJK	34	6	40
G2AXI	32	5	37
G8ASR	32	4	36
G8AUN	29	6	35
G8BJC	28	5	33
G8APJ	26	6	32
GWSNF	24	5	29
G3BYV	21	7	28
G3AHB	24	4	28
GW8CGN	23	4	27
GC8AAZ/P	22	4	26
G3EKP	19	6	25
G8BDJ	18	6	24
G15ALP	17	5	22
G8AYN	14	4	18
G3KMI	14	3	17
G8BKR	12	2	14

SEVENTY CENTIMETRES

Station	Counties	Countries	Total
G8AUE	32	4	36
G2JF	28	7	35
G8BMD	29	4	33
G8ARM	23	5	28
G3COJ	19	6	25
G3BYV	15	6	21
G8AYN	16	5	21
G3DAH	16	4	20
G8APZ	16	4	20
G8ADP/A	16	3	19
G3EHM	11	2	13
G8APJ	8	2	10
G8BKR	8	2	10
G3AHB	8	1	9
G3EKP	5	3	8
G2AXI	4	1	5
G8BDJ	3	2	5

Satellites

A group of American amateurs has recently been formed with the object of correlating the design, building and launch of communications satellites to operate in the VHF and UHF amateur bands. From the list of the officials of AMSAT (Radio Amateur Satellite Corporation), and their appointments in NASA and other commercial organisations, it looks to be a fairly high-powered body. Their

Still in EI/GI, the night of August 31 produced some fairly phenomenal DX over there. For G15ALP, Londonderry, the band suddenly came to life at 1930z when DJ9YE appeared apparently from nowhere with an S5/6 signal, and from then until after midnight it was one long Ball. Jack worked 30 Continental stations, including 4 SM, 15 D and 10 OZ, and finished up with PA0CML, who had been his first Continental contact last July just after he had come on Two. The opening resembled that of June last, since ducting over England was again in evidence. Few G stations got in on it, although G3CCH (Scunthorpe) was heard working OZ, and GD2HDZ worked an OZ, but heard nothing else. In both cases, reports exchanged were well below the level recorded in Ireland. A plot of the DX showed that it was concentrated in a fairly limited area in North Germany up to Southern Sweden, and this followed closely the previous pattern. A notable signal was that from OZ6OL, who runs maximum power and a 40-element array at 90ft. and is invariably to be heard during

an aurora—but even OZ9NI, who was running five watts only, was at good strength. A note of irony was that G13GXP, who is very active on Two with SSB, missed the opening altogether since he had spent the early evening with G15ALP lining up a four-metre rig, and after the three-hour drive back home, arrived there when it was all over! For the record, G15ALP now has 126 different stations on Two, using an NCX-200 and Swan TV-2B transverter to a 20-element colinear stack. He is also QRV on Four with fifteen watts.

E16AS (Co. Dublin) was also in on the DX with contacts in SM, OZ and D, and this on a temporary antenna at 20 feet while the main beam was down for overhaul in preparation for the recent Contest. All DX was between 5/7 and 5/9, and the beacon stations OZ7IGY and DL0PR were RST-589 at the time. By the next morning they were inaudible, but GB3ANG was still to be heard. There appeared also to be a geographical limit to the opening in Eire, as EI5BH (Athlone) and EI7AF (Birr) were not hearing the Continentals.

The following night also saw good conditions into England. G13GXP, G15ALP, G13SUM, EI5BH and EI6AS were all audible in the south of the country at around the 5/5 mark.

#### Gallie Gallivant

The Verulam Radio Society's trip to Wales, where they operated on two metres as GW3VER/P, seems to have been a great success, with most pre-arranged skeds completed and many other QSO's made with all parts of the country. They were on from Flint, Caernavon, Denbigh, Merioneth, Montgomery, Cardigan, Pembroke and Carmarthen. Operators were G8BNR, G3XMP and G8ATO, with SWL Tilling. Congratulations and thanks, chaps.

#### Caledonian Congress

The Scottish VHF Convention will be held this year on October 26 at the Carlton Hotel, North Bridge, Edinburgh. The programme includes an exhibition of equipment by the members of the Lothians Radio Society, and lectures by G3BA and G3FZL. Tickets, Convention and tea only, are 7s. 6d., and for the

### VHF AND UHF BAND PLANNING FOR THE SEVENTIES

In May of this year, delegates from IARU Member Societies in the Region 1 area (approximately Europe and Africa) met in conference in Brussels. Several decisions which were reached in respect of the future International planning of the VHF and UHF amateur spectrum were taken back by delegates for ratification by their own national groups.

Implementing these decisions in Great Britain provides the opportunity to introduce a number of modifications to our domestic Band Plans that will have the effect of bringing them up-to-date and so help to shape the pattern of metre-wave operation in the Seventies.

Accordingly, a meeting was convened in London between SHORT WAVE MAGAZINE (which sponsored the first-ever two-metre Band Plan twenty years ago) and the VHF Committee of the RSGB, under the chairmanship of Geoff Stone, G3FZL, to formulate a mutually agreed policy.

Following these discussions, the present announcement was prepared, to appear jointly in SHORT WAVE MAGAZINE and RADIO COMMUNICATION for October in order to give those concerned ample time to prepare for the revised U.K. Band Plan changes, to become effective on January 1, 1970. These are as follows:

<b>Four-Metre Band</b>		<b>Special Services in the Two-Metre band</b>			
70-025 to 70-1 mc	CW only.	144-05 to 144-10 mc	CW for random M/S contacts, but not held exclusively for this.		
70-1 to 70-7 mc	All modes including SSB.	144-1 to 144-15	Single sideband <i>only</i> when artificial satellites or translators are operational.		
70-675 to 70-7 mc	Beacons.	145-85 to 145-95 mc	<i>Ditto.</i>		
70-26 mc	National Mobile Calling frequency.	145-00 mc	Mobile calling channel (international).		
70-56 mc	RTTY.	145-30 mc	RTTY international and U.K. North.		
<b>Two-Metre Band</b>		144-60 mc	RTTY U.K. South.		
144-00 to 144-15 mc	CW.	145-41 mc	SSB calling channel (international).		
144-15 to 144-5 mc	Zone A, the South West. This combines old Zones 2, 3.	<b>Seventy-Centimetre Band</b>			
144-5 to 144-1 mc	Zone B, the South East. This combines old Zones 4, 5.	432 to 432-10 mc	CW.		
145-1 to 145-5 mc	Zone C, the Midlands. This combines old Zones 6, 7.	432-10 to 432-20 mc	Zone 1 (Old Zone 2)		
145-5 to 145-95 mc	Zone D, the North, Scotland and Northern Ireland. This combines old Zones 8, 9.	432-20 to 432-30 mc	Zone 2 (Old Zone 3)		
145-95 to 146-00 mc	Beacons.	432-30 to 432-50 mc	Zone 3 (Old Zone 4)		
		432-50 to 432-70 mc	Zone 4 (Old Zone 5)		
		432-70 to 432-90 mc	Zone 5 (Old Zone 6)		
		432-90 to 433-10 mc	Zone 6 (Old Zone 7)		
		433-10 to 433-30 mc	Zone 7 (Old Zone 8)		
		433-30 to 433-45 mc	Zone 8 (Old Zone 9)		
		433-45 to 433-50 mc	Beacons.		
			433-50 to 434-00 mc	Television Sound.	
				434-00 to top of band	Video.
				<b>Special Services in the 70 cm Band</b>	
				433-30 mc	RTTY (international, and U.K. North).
				432-60 mc	RTTY (U.K. South).
				432-15 mc	SSB Calling Channel (international).
				425-00 to 429-00 mc	Self-excited transmissions.
				<b>Twenty-three Centimetre Band</b>	
				(Narrow-band communications segment)	
				1296 to 1296-15 mc	CW.
				1296-15 to 1297-95 mc	All modes (narrow band).
				1297-95 to 1298 mc	Beacons.
				<b>Narrow Band Frequency Modulation</b>	
				It was agreed at Brussels that the following standard should be adopted for the use of NBFM in the four-metre, two-metre and 70 cm. band:—	
				Modulation Index 1	
				Audio bandwidth restricted to 3 kc.	

whole event including the Dinner, 32s. 6d., and can be obtained from GM3OWU, QTHR. A two metre talk-in station will operate with the callsign GM3HAM/A.

### News Items

G2AIW (Twickenham, Middlesex) continues to pile up a good score on two metres with his low power NBFM rig, giving an output of about one watt only. Fred Lambeth has now worked six countries and thirty-one counties, a very creditable performance from a site which is not by any standard good for VHF. He has been re-elected secretary of the VHF Working Group for Region I IARU.

G3PMX has at last found a new QTH, this time at Great Waltham, Essex. The sometimes conflicting requirements of domestic bliss and a good VHF site have been very happily met, Roy says. The XYL and family are very pleased with their new home, and from the VHF

point of view there is every reason to suppose that Roy will be also, when he gets all the gear operational again and if the signal that he is putting out from a small battery operated job on a bench in the garage there is anything to go by. Both G3PMX and nephew Paul, G3YDY (ex-G8BGV) hope to be on 70 mc. shortly.

The reappearance of the Wrotham two-metre beacon, GB3VHF, is very welcome. The trouble has apparently been with the power supply, which necessitated a complete rebuild, and with the keyer which, at the time of writing, is still not operative. GB3CTC and GB3GW continue to function well and to provide reliable indications of propagation conditions, as does the French beacon in the Brest Penninsular, F3THF. The keying on the latter is a bit difficult to read as FSK is used, the mark being some 3 kc higher than the space frequency which, on a selective receiver, necessitates retuning.

DLØER in Essen is to be heard fairly regularly in the South and East these days, and GB3ANG has been received at good strength in the Midlands during the past week or so, although few DX GM contacts seem to have been made. The Northern Ireland beacon, GB3GI, on 145.99 mc is reported inoperative for the time being, and GB3GM in Thurso on 145.995 mc has not been heard in the South for many a month.

An interesting article in the August *Journal of the Institution of Electronic and Radio Engineers* discusses tropospheric radio refractivity and finds that the "four-thirds earth radius" model for propagation by this mode does not accord with observations, which show many trans-horizon contacts at greater distances than this theory would predict. The discrepancy appears to be in the previous assumption that the upper air refractive index is a linear function. It now appears that under certain circumstances it is linear up to

The following notes are intended to supplement the bare facts recorded opposite.

#### Four-Metre Band

Although not an IARU matter, this seemed to be an appropriate opportunity to introduce a Band Plan of sorts for 70 mc. In view of the restricted frequency range in the four-metre band, it was not considered necessary to introduce Zoning. A division by function was all that was required, and accordingly, CW and Phone sections have been established on the same general lines as for other VHF bands. Beacons go to the HF end to avoid possible QRM with weak CW DX. The new Sussex beacon, GB3SX (for which the GPO have now given approval) will operate there and not on 70.26 mc as originally proposed. The frequency redeployment of ZB2VHF, 9H1MB and TF3VHF will obviously be a matter for local arrangement. A discrete frequency of 70.56 mc has been established for RTTY transmission, and this has the approval of B.A.R.T.G.

#### Two-Metre Band

Several changes here, the most important of which is the re-Zoning made necessary by the extension of the CW allocation to 144.15 mc. This brings the U.K. into line with other countries in Region 1, but cuts into the Zone allocation for the South-West. Rather than leave operators there with a truncated Zone, and a possible feeling of frustration (since this follows a previous cut) it was decided to amalgamate Zones 2 and 3. From the observed traffic, there is plenty of elbow room in the new Zone. This done, it was a natural follow-up to see if the existing plan could be simplified, and it soon became apparent that this was possible without involving a large number of operators in a spate of crystal changing, and without sacrificing the geographical advantages of Zoning. True, there are those who regularly use a frequency between 144.1 and 144.15 mc for 'phone working. They are asked to regard the new Plan as a serious attempt to ensure the maximum benefit for the maximum number, and to go along with it.

The introduction of specific frequencies for special services follows international agreement, as does the operation of beacons at the top end of the band. Arrangements are in hand to move U.K. sited services to that region after a careful study has been made of the QRM problem, with recommendations for frequency allocations.

#### Seventy Centimetres

Of immediate impact here is the loss to 'phone operators, from the Midlands northwards, of the segment 433.5-434 mc to A/TV sound. This is perhaps not as serious as it may seem, since it must be obvious to users of the band that the current Zone Plan was more honoured in the breach than in the observance, in that, particularly during a contest, most operating took place within the bottom (LF) 500 kc anyway. Further, it is also painfully obvious to users that the band occupancy is such (and is likely to continue as such) that to confine voice and CW communication to 1.5 mc instead of

spreading it over 2 mc is no real hardship, and in fact accelerates and facilitates tuning. That said, the question of Zoning was considered and the conclusion reached that, in view of the high gain and high horizontal directivity of antennae systems on these frequencies, a geographical plan should be retained. With the loss of 500 kc, some rearrangement was inevitable, and the new allocations have been made to inconvenience operators as little as possible while retaining the directional features of the old plan.

Beacons go to the HF end, and here it may be noted that the BBC have approved the operation of GB3SC from their site at Sutton Coldfield, and that the grant of the licence by the GPO is awaited. GB3GEC is under commercial control, and it is not known what action, if any, will be taken in regard to this facility. The SSB (National) calling channel on 433.41 mc is replaced by 432.15 mc, and becomes an International calling channel, separate allocations having been made for RTTY operation.

This Column makes no apology for stressing once again the warning "Use or Lose" these frequencies.

#### Twenty-three Centimetres

This Section is probably self-explanatory. It may be noted that the pattern for CW and beacon allocations follow those for the lower frequency bands.

#### Narrow Band FM

Some clarification may be needed here. Firstly, the adoption of a Modulation Index of 1. Since the Modulation Index of an FM transmitter is defined as the ratio of the frequency deviation to the modulating frequency, it is obvious that it cannot be a constant. However, when the limiting values are considered—that is, the maximum deviation allowable over the maximum audio frequency permitted, it does become a constant and is then equal in value to the deviation ratio. In the case of the HF bands, the deviation ratio, defined by GPO regulations, is 2.5 kc over 4 kc, or .625. On VHF, it will be 3 kc over 3 kc, to give an Index of unity with an audio band restricted to 3 kc. The deviation swing is then 6 kc and so is comparable with a communications-quality AM transmission. It is mathematically convenient to regard an FM transmission as consisting of a carrier and sidebands spaced from it on either side at intervals equal to the modulating frequency. In theory, these side bands can extend to infinity, but obviously in practice are restricted, and an acceptable compromise is to adjust the audio gain, using a single tone of frequency equal to the maximum permitted (in this case 3 kc) to the point where the second pair of sidebands is just audible on a selective receiver, and then back it off slightly. Hence the references one hears to total swing of  $\pm 6$  kc. The object of the new standards is (a) To define a standard for VHF, and (b) To ensure that NBFM really is narrow-band.

"VHF Bands" for August last gave details of other decisions which, in the main, affect Contests, and these will become apparent in due course.

about 1,500 metres above the surface of the earth, but that thereafter it rises exponentially, so giving a greater bending effect to radio waves in the VHF spectrum. One learns every day.

Mullards have a new n-p-n silicon planar RF power transistor which sounds just the job for the 70 cm. Tx. It is Type BLY53A, and is a development from the BLY53, but uses a new chip design to obtain greater gain with a higher power rating. Under normal operating conditions, with a supply voltage of 13.8v. and a drive of two watts, it gives an output of 7 watts compared with the 6 watts for the BLY53. The  $F_t$  is stated to be 470 mc.

The Dutch are trying out a new scheme for their VHF/UHF Contest during October 18/19 next. Scores will be based not on distance, but on the number of contacts made. Should stir up some activity.

A new QRA Locator Map, based on the ON4IB version now available, but extended northward to cover Scotland and eastward to Norway and Sweden will be available shortly. Also available will be a booklet (produced by IARU Region 1) listing all known beacons in Europe and Africa, with details of exact locations, beam headings and QTH for reports.

### Short Ones

*G6OX* has now got a log-periodic antenna and parabola on 23 cm. *G8AYC* is preparing for colour A/TV. *PA0CML* has now worked 922 different U.K. stations! *G8AXY* is on 70 cm. and plans to come on 23 cm. with a 4ft. dish. *G3THW/M* near Buxton, has been putting in a good 2m. signal to the South with only two watts of RF and from the height at which he operates is a good bet for Derbyshire. Newcomer on two metres from G3BA territory is *G8CVC* (Sutton Coldfield); he hopes to be on 70 cm. shortly. *G8CRI* (Welton, Lincs.) is another newcomer and is busy with the construction of solid-state equipment for Two. *G3PEQ* (Hassocks, Sussex) runs five milliwatts to a whip on Four and is shortly going QRO with the whole of one watt! *G8CJU* (Markfield, Leicester) now has 150 watts of series-gate modulated signal available and got 32



John Liversidge, G8BNW, 54 Boston Road, Horncastle, Lincs. runs RTTY on two metres, his T/P gear being Creed 7B printer, 7TR reperfector and 6S auto-Tx, 850 c/s FSK, at 50 bauds. The on-the-air Tx is 30-watt, into an 8/8 at 45ft., and the Rx an FET converter (to a recent "Magazine" design), with an AR88D. A year's two-metre RTTY activity has so far produced contacts only with G6CW, G8BBB, G8BLG and G8CUO. However, John says that while searching for other 2m. RTTY stations—for whom he is always looking—he gets out quite well on straight two-metre phone.

QSO's non-stop from one CQ call, giving a Leicestershire contact to many for the first time. Most interesting contact was with G2AIW (Twickenham, Middlesex) with his one watt of NBFM. *GW8ACG/P* will shortly be QRT from Flint for the winter. He thanks all those who called him so regularly during the summer for their support. Thanks to you, too, OM.

**Late Flash:** Wx and propagation conditions were good for the VHF/NFD event over the weekend Sept. 6/7. Activity was high, with EI/GI and EU DX to be heard across the country for most of the time. Several GW portables were giving numbers over 200 towards the end. In view of the increasing

interest in the coincidental IARU Region I Contest—and conditions at the time happening to be right for European DX working—it seems a pity that the duration differed!

### Contests

The 432 mc Open and the 1296 mc Open contests are scheduled for October 5, with the next two-metre SSB event on November 3. A PA0 VHF/UHF contest takes place over October 18/19.

### Deadline

Deadline for the next issue is **October 11**, and the address for news, claims and comment is "VHF Bands," SHORT WAVE MAGAZINE, BUCKINGHAM. Cheers for now, and 73 de G3DAH.

# THE MONTH WITH THE CLUBS

By "Club Secretary"

(Deadline for November issue: October 10)

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

THE weekend for MCC is approaching. All the necessary information is given in the pages following. We look forward to the usual well-fought Contest, probably with some new Club names appearing in the final listings. We would again remind all concerned that this is a "friendly" as distinct from a "pot-hunting" event. Of course, the lead stations have to be good, very good. In all its 20 years, MCC has never been won by a casual or sloppy approach. No holds, providing they are clean and in accordance with the letter and the spirit of the Rules, are barred! MCC is an unique opportunity for bringing together the membership of any Club for a competitive event. Clubs compete mainly with others in their own Zone. At the same time, useful lessons can be learnt and valuable experience gained in the context of radio amateur operating.

## ACTIVITY REPORTS

Turning now to the reports, we are this time going straight down the pile, regardless of regional considerations.

There are probably quite a few people who would like to see a Club formed in their area, where one does not already exist. All that is needed to get a start is the initiative to make prospective members known to some one individual—the local paper would accept a short notice as a paragraph item—so that an inaugural meeting can be set up. As a case in point, this month there is a proposal to form—or, rather, re-establish—a group in the Wanstead/Woodford area of London. If anyone is interested, perhaps they would care to contact G3JIX, either at his home address (which for the moment we have put into the Panel) or at the Electronics Laboratories, The University, Canterbury, Kent.

At Verulam they are really publicity-conscious, to the point where at least two copies of the *Newsletter* reach this desk each month, in case the mails go astray. This keenness for advertising themselves has, over the

years, paid handsome dividends in that now the group is one of the strongest and best in the country. During the summer the informals are taken out at Salisbury Hall, London Colney; the main meetings are in the Council Chamber, Town Hall, St. Peter's Street, St. Albans, and on October 15 George Eddowes, G3NOH, is to discuss the techniques used on 432 mc and above.

Purley next, at 58 Whytecliffe Road, which is also known as the Railwaymen's Hall. Here there is a booking of the small hall for the first meeting each month and the large room for the other session. October 3 is a Natter Nite, and the Autumn Junk Sale will occupy the evening of October 17.

At Dorking there are two meetings on the calendar for October, and two venues. October 14 is the informal session, as the "Wheatseaf," and the 28th is down for a Technical Forum, both in terms of theory and practice, this time at the "Surrey Yeoman."

The Bromsgrove mobile event recently seems to have benefited considerably from the change of location to Hartlebury Castle. However, the hon. sec. forgot to mention where the normal get-togethers are held. We can say that they are always on the second Friday each month, which places the Surplus Sale on to October 10. For the rest, a line to the hon. sec.—see Panel p.513—seems to be indicated.

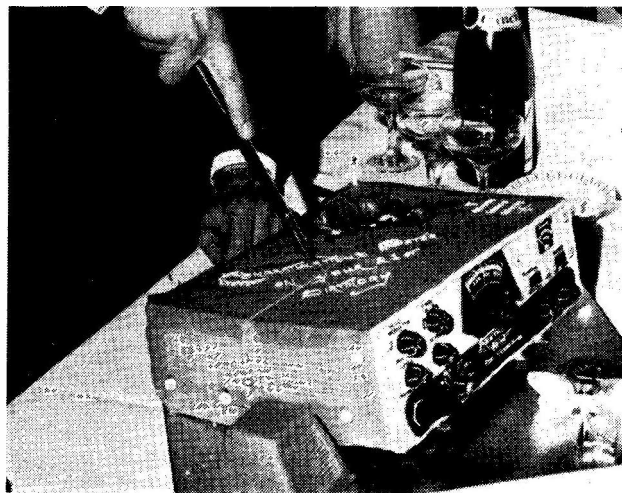
Your conductor has been wondering what had happened to the Wimbledon news-sheet, *QRK-5*, of late; all is explained by the letter this month from the new Secretary, to the effect that their previous sheet-anchor, G3EPU, has had to give up his commitment due to the pressures elsewhere, as has G8BVT on his moving out of the area. However, *QRK-5* is back in circulation and the group itself is as healthy as ever. Second and last Fridays each month is the pattern, at St. John Ambulance Hall, 124 Kingston Road, Wimbledon, S.W.19. The main meeting is on October 10, when the BBC are to talk about Transmitters and Aerials.

One of the best newsletters currently around is the one from Mid-Sussex, which they rather aptly call *Mid-Sussex Matters*. From it can be gleaned all the essential information about the group, which is so important to a prospective member seeing one for the first time, and so rarely appears in the average sheet. Thus we see that G3RXJ is the hon. sec. (address all same our Panel) that the address to head for is Marle Place, Leylands Road, Burgess Hill, and the October dates are 9th and 23rd. The former sees the lads entertaining some of the Southdown gang at a Quiz, and the

### THE 24th MCC — NOVEMBER 8-9

Full details in this issue. The big event of the year for Clubs. Keen CW operating on Top Band. Clubs wishing to enter and not already included in List of Identification Codes should apply immediately to: "MCC," Short Wave Magazine, Buckingham. Supplementary List of Identifications will appear in November issue.





Something a bit unusual, and a fine example of the confectioner's art. On the left, the celebration for the 21st birthday party of G3UHN (Northwood, Middx.), with his YL, Miss Catherine Hill, of Harrow, who baked the cake, a replica of an HW-100 transceiver! That it is a cake, cuttable and eatable, is shown by the picture on the right—seems a pity to have destroyed such a masterpiece! Among others present on this radio amateur occasion were G3UFP and G3XYD.

latter a "Journey into Sound" which is to be given by members of the Brighton Tape Recording Club.

Wirral have October 1, programme arrangements in hand at the time of writing but not confirmed finally, and October 15, the Annual General Meeting. To find them, look for the old Civil Defence Hq., Upton Road, Bidston, Birkenhead.

\* \* \*

Quite a crowded month is in prospect for the Coventry chaps, with the W1BB Mark 2 tape-and-slide lecture on October 3, followed a day later by the club outing to London. October 10 is for Mr. J. R. Tipple to come along and lecture about the GPO Tower in Birmingham; October 17 is a Night-on-the-Air, with supplementary lecture for R.A.E. candidates also fixed up; and on October 24 Mr. Tipple's lecture is to be supplemented by a visit to the Tower itself.

The old mill at the back of the Peacock Inn, on the London Road, is the home of the Peterborough chaps; a far cry from the "dusty miller" of bygone days! Each Friday evening they have a meeting, with, in addition, the Mobile Rally coming on October 12, and the AGM on November 7, as important forward dates.

Weekly on Mondays is the idea for Mid-Warwickshire, who have three Open Evenings and a talk on the Heath HW-32A transceiver; the latter demonstration is down for October 20. Incidentally, looking a little further into the future these chaps have a "calibration evening" laid on; a useful idea, this, as many amateurs have no means of checking the accuracy of their test-gear at regular intervals—quite definitely a good thing.

Now to Cray Valley, where Lyell Herdman, G6HD, will be talking about Class-C Amplifiers on October 2, with a Surplus Sale to follow on October 16. Both these are at the Congregational Church Hall, Court Road, Eltham, S.E.9.

#### Letting People Know

This is a major aim at Reading, who feel that they could well rope in more members, if only they could contact them through various publicity media, particularly the SWL's, who cannot be met with over the air. They have Hq. at the "Victory" public-house, in Meadway Precinct, and are in session on October 7 and 21. On the former date they have a speaker from A.R.M.S. to talk about "Mobile in 1970," while the second date is allotted to G3PWU, who will take as his theme "CW through the Ages."

It rather looks as though the members of the Wirral DX Association get together in each other's homes. The last Wednesday in each month is the date, and for October G3AKW is the host, with a showing of slides of radio interest. In view of the method of meeting these chaps adopt, while they surely would welcome new members it would be courteous to contact the hon. sec. first—his address appears in our Panel, p.513.

A change of Hq. is reported by the Bradford chaps—to Bradford Liberal Federation, 10 Southbrook Terrace, Great Horton Road, Bradford 7. As the syllabus for the autumn and winter is not yet completely prepared, get in touch with G3WTF—see Panel.

For the first lecture evening of the season, on October 21, Civil Service have obtained the services of Mr. Lee, to talk about the "Early Days of Radio." This one should be a real draw, as it is understood the speaker (who is now retired) had a lot to do with the various experimenters, including Marconi, and his collection of



exhibits is extensive and in many cases unique. YL's and XYL's will also be interested in this one, which is at the Civil Service Sports Centre, Monck Street, where after 6 p.m. there are no parking problems, and both solid and liquid refreshment are available on the premises. Non-member visitors are also welcome at this lecture which should be well worth the trip.

**Cornwall** is a large area, and so the Cornish club has quite a problem in serving all of its membership. They do it by way of a main meeting, at the SWEB Club-room, Pool, Camborne on the first Thursday of each month, with business, a "potted talk," refreshments, and then the main lecture to fill out the evening. In addition there are sections in Falmouth, who have October 16, at the Labour Clubroom, Penryn, near the "Seven Stars" Hotel, and Newquay, where the first Wednesday seems to be the preferred date, at Treviglas School. No details are to hand for the programme for either of these sub-groups, but doubtless G3UCQ will have it all at his fingertips if you contact him.

Over at **Reigate**, October 1 is booked for G3MFB to give a talk on RAEN and its aim and functions. Venue for this is, as ever, the "George and Dragon," Cromwell Road, Redhill.

\* \* \*

**North Kent** next, and here we find that October 9 is down for a "Donated Junk Sale," the implication here being that all the proceeds are to go to the Club kitty—not a bad idea at that! Communications within the LEB will be discussed by Cliff Leal on October 23. For the remaining details, contact G3WZL, as in Panel.

Quite an interesting point cropped up in the **Echelford News Letter** this month. It seems that a certain member who had TVI on his /M gear spent some time operating and caused a wipe-out of the caretaker's picture. This sort of thing is sometimes accidental, but there is no shadow of doubt that it could have caused the loss of the Hq., and in any case caused some considerable embarrassment to whoever had to deal with the complaint. However, all has ended happily, and the lads will be in session as usual on October 13, at St. Martins Hall, St. Martins Court, Kingston Crescent, Woodthorpe Road, Ashford, Middlesex.

The Annual General Meeting of the **Solihull** group takes place on October 21, at the conclusion of a very successful year with an average attendance of 30 members. They meet on the third Tuesday in every month at the Old Manor House, 126 High Street, Solihull.

Sad to say, we have full details on the **September** doings from **Nunfield House** Community Association Radio group, Derby, which is rather sad since these will already have been played off by the time this piece comes to print; but if the October programme is as good, the lads will be well occupied each Friday evening. Hq., by the way is in Boulton Lane, Alvaston.

Redditch is the home-town of the **East Worcester-shire** group, who get together at the Old People's Centre, Park Road. October 9 should be a rather special one, as Bob Palmer, G5PP, will be showing slides and talking about his visit to U.S.A., including his trip to ARRL Hq.

At **Crystal Palace** they have their meetings on a Saturday each month; quite an unusual idea which on reflection has much to commend it. October 18 it is this time, for a demonstration of RTTY which will be

### MCC—TWENTY-FOURTH ANNUAL TOP BAND CLUB TRANSMITTING CONTEST RULES

- Duration** : Saturday, November 8 and Sunday, November 9; on both days between the hours of 1700 and 2100 GMT (eight operating hours in all).
- Frequency and Power** : All contacts to be made in the 1800-2000 kc band, using CW only, with a power input not exceeding 10 watts to the final stage. All reasonable precautions will be taken to avoid interference to other services using the band.
- Call Signs** : Where a Club has its own transmitting licence and callsign, that callsign is to be used. Clubs without their own call may nominate a member's station as their official entry.
- Calling** : Clubs will call "CQ MCC," using the "three times three" procedure. Infringement of this rule by the use of long CQ calls may entail disqualification.
- Scoring** : Other Club stations may be worked on each of the two days, and these contacts will count for three points each time. Non-club stations may be worked once only, and will count for one point only. Inter-Club contacts will take the form of an exchange of six-character groups comprising RST and the Club identification letters. (See pp.512-513.)
- Non-Club Contacts** : Contacts with non-Club stations, counting for one point, will take the form of logging the RST and the QTH of the other station. The Club's own QTH, not the identification letters, should be sent to complete the QSO.
- Logs** : Contest logs are to be legibly set out as follows: One side only of quarto or foolscap sheets should be ruled into eight columns with *name and callsign of Club station on each sheet*, headed thus: Col. 1, *Date and Time*. Col. 2, *Callsign of station worked*. Col. 3, *Outgoing six-character group*. Col. 4, *Incoming six-character group*. Col. 5, *RST outgoing* (to a non-Club station). Col. 6, *RST Incoming* (from a non-Club station). Col. 7, *QTH of Non-Club station*. Col. 8, *Points claimed* for contact. Col. 8 is to be totalled at the foot of each page, and the running totals brought forward. The last page of the log should contain the following summary:  
Total score for Club contacts at three points per contact; this figure then to be multiplied by the Zone Multiplier (see p.512), e.g. a station in the GW Zone making 150 contacts would give the figure 450 and then apply the Zone Multiplier of 1.1, giving a total Club score of 495; add the total of non-Club contacts; total score. Add a declaration that the station was operated in accordance with the Rules and spirit of the Contest. Comments on the equipment, the number of operators, experiences, and impressions are invited, and should be added at the end of the Log.
- Any Club station radiating a note consistently worse than T9 will be liable to disqualification.
- Logs, addressed to "Club Secretary," **SHORT WAVE MAGAZINE**, BUCKINGHAM, must be posted to reach us not later than Friday, November 21, 1969. The Editor's decision on the results will be final, and will be published in the January, 1970 issue of **SHORT WAVE MAGAZINE**, due on December 24.

## THE MCC ZONES

Although, under the rules, all Club contacts count for the same score of three points, and there is thus no need to know the Zone in which the station worked is located, it is necessary for each Club to know the Zone in which it is itself located, for the purpose of applying the multiplier to its own final score of Club contacts. The Zones are as follows:

<b>GM Zone:</b>	All Scottish counties.
<b>Northern Zone:</b>	Northumberland, Durham, Cumberland, Westmorland, Lancashire, and Yorkshire.
<b>Midland Zone:</b>	Cheshire, Derby, Shropshire, Stafford, Hereford, Worcester, Warwick, Nottingham, Lincoln, Leicester, Rutland, Northampton, Bedford, Huntingdon, Cambridge, Norfolk, Suffolk.
<b>Southern Zone:</b>	Somerset, Dorset, Gloucester, Wilts., Berks., Hants., Oxford, Bucks., Herts., Middlesex, Surrey, Sussex, Kent, Essex, London.
<b>South-Western Zone:</b>	Cornwall and Devon.

<b>GW Zone:</b>	All Welsh counties.
<b>GI/GD Zone:</b>	All GI counties and the Isle of Man.
<b>GC Zone:</b>	Channel Islands.

### Scoring

The score for Club contacts only will be arrived at by counting three points per contact (irrespective of Zone) and then applying to the total the following multiplier:

<b>GM Zone:</b>	2-0
<b>Northern Zone:</b>	1-25
<b>Midland and GW Zones:</b>	1-1
<b>South-Western Zone:</b>	1-5
<b>GI/GD Zone:</b>	1-6
<b>GC Zone:</b>	1-3
<b>Southern Zone:</b>	1-0

### IDENTIFICATION CODES FOR CLUBS IN "MCC"

A01 Aberdeen	C16 Clifton	H05 Haverfordwest	M05 Manchester
A01 Acton, Brentford & Chiswick	C17 Colchester	H06 Havering	University
A03 Addiscombe	C18 Conway Valley	H07 Hemel Hempstead	M06 Mansfield
A04 A.E.R.E. (Harwell)	C19 Cornish	H08 Henley-in-Arden	M07 Marconi Apprentices (Chelmsford)
A05 Ainsdale	C20 Coventry	H09 Hereford	M08 Medway
A06 Ampfield Contest	C21 Crawley	H10 Heriot-Watt University	M09 Melton Mowbray
A07 Ardeer (I.C.I.)	C22 Cray Valley	H11 High Wycombe	M10 Mid-Cheshire
A08 Ashton-under-Lyne	C23 Crystal Palace	H12 Hillingdon	M11 Mid-Herts.
B01 Baden-Powell House	C24 Culceth	H13 Hull	M12 Midland
B02 Ballymena	C25 Cumberland	I01 Ipswich	M13 Mid-Sussex
B03 Bangor, Co. Down	D01 Derby	I02 Isle of Man	M14 Mid-Warwickshire
B04 University College Bangor	D07 Derby (Nunsfield House)	I03 Isle of Wight	M15 Moray Firth
B05 Barry College of Further Education	D03 Dial House	J01 Jersey	M16 Morpeth
B06 Basildon	D04 Dorking	K01 Keele University	N01 Nailsworth
B07 Basingstoke	D05 Dudley	K02 Kingston	N02 Newark
B08 Bedford	D06 Dundee Kingsway Technical College	L01 Leeds	N03 Newcastle-on-Tyne University
B09 Bishops Stortford	D07 Dunstable Downs	L02 Leicester	N04 Newham
B10 Blackpool & Fylde	D08 Durham City	L03 Leyton & Walthamstow	N05 Norfolk
B11 Blackwood	D09 Dursley	L04 Lichfield	N06 Northampton (Radio Amateur Social Club)
B12 Bradford	E01 Ealing	L05 Lincoln	N07 Northampton (Short Wave Radio Club)
B13 Border Counties	E02 East Kent	L06 Lindholme RAF	N08 Northern Heights
B14 Brighton (College of Technology)	E03 East Lancs.	L07 Liverpool	N09 Northern Polytechnic
B15 Brighton (Technical College)	E04 East Worcs.	L08 Liverpool University	N10 North Kent
B16 Bristol A.R.C.	E05 Eccles	L09 Lothians	N11 North Liverpool
B17 Bristol Group	E06 Echelford	L10 Loughton	N12 North Staffs.
B18 Bristol University	E07 Edgware	L11 Luton	N13 Nottingham
B19 Bromsgrove	E08 Exeter	M01 Macclesfield	
B20 Burnham-on-Sea	F01 Fareham	M02 Maidenhead	
B21 Bury & Rossendale	F02 Farnborough	M03 Maidstone YMCA	
B22 Bury St. Edmunds	F03 Fawley	M04 Manchester	
C01 Cambridge	F04 Flint		
C02 Cambridge University	F05 Fulford		
C03 Cardiff	F06 Fylingdales (E.W. Station)		
C04 Chelmsford	G01 Glasgow University		
C05 Cheltenham	G02 Glenrothes		
C06 Cheltenham Group	G03 Gosport		
C07 Chepstow	G04 Government Communications (Cheltenham)		
C08 Chesham	G05 Grafton		
C09 Cheshunt	G06 Greenford		
C10 Chester	G07 Greenock		
C11 Chiltern	G08 Grimsby		
C12 Chippenham	G09 Guernsey		
C13 City of Belfast YMCA	G10 Guildford		
C14 City University	H01 Halifax		
C15 Cleveland	H02 Harlow		
	H03 Harrow		
	H04 Hartlepool		

(NOTE: This list includes all Clubs entering MCC at any time in the last three years. Other Clubs desiring to enter this year's event should write in, immediately, for identification codes, enclosing a stamped addressed envelope. Letters should be addressed "MCC" SHORT WAVE MAGAZINE, BUCKINGHAM.)

### EXAMPLES FOR OPERATING

Coventry works Derby, sends 579C20; Derby replies 569D01. Or Racial works Paddington, receiving 589P01 and sending 589R01.

### EXAMPLES FOR SCORING

Cornish (C19) in South-Western Zone makes 75 Club contacts and ten single-point (non-Club) QSOs. The score for Club contacts is  $75 \times 3$  (225) and the multiplier allowed is 1.5, bringing this up to 337. Total score is thus 337 plus 10 equals 347.

Glasgow University (G01) in GM Zone, makes 45 Club contacts and ten single-pointers. The score for Club contacts is  $45 \times 3$  (135) and subject to a multiplier of 2, bringing it up to 270. Total score of 270 plus 10 equals 280.

N14 Nottingham University	R08 Roding Boys	S21 Southend-on-Sea	T02 Thames Valley
N15 Nuneaton	R09 Rotherham	S22 South-East EI	T03 Thanet
O01 Otley	R10 Rugby	S23 Southgate	T04 Torbay
O02 Oxford Group	S01 St. Helens	S24 South Manchester	U01 University College of Wales
O03 Oxford University	S02 Salisbury	S25 Southport	V01 Verulam
P01 Paddington	S03 Salop	S26 South Shields	V02 Veteran Operators' Club
P02 Painton (Northampton)	S04 Saltash	S27 Spen Valley	W01 Wakefield
P03 Pembroke	S05 Scarborough	S28 Stafford College of Technology	W02 Wattisham RAF
P04 Peterborough	S06 Scottish Borders	S29 Stevenage	W03 Wessex
P05 Plymouth	S07 Scunthorpe	S30 Stockport	W04 West Kent
P06 Port Talbot	S08 Sealand RAF	S31 Stoke-on-Trent	W05 Westmorland
P07 Preston	S09 Sheffield	S32 Stourbridge	W06 Wimbledon
P08 Pudsey	S10 Sheffield University	S33 Stratford-on-Avon	W07 Wirral
P09 Purley	S11 Shefford	S34 Stroud	W08 Wirral (DX Association)
P10 Pye (Cambridge)	S12 Silverthorn	S35 Sully	W09 Wolverhampton
R01 Racal	S13 Skegness	S36 Sunderland	W10 Worcester
R02 Radio Club of Scotland	S14 Slade	S37 Surrey	W11 Worthing
R03 Reading	S15 Solihull	S38 Sussex University	Y01 Yeovil
R04 Redbridge	S16 Southampton	S39 Sutton & Cheam	Y02 York
R05 Reigate	S17 Southampton University	S40 Sutton Coldfield	
R06 Rhondda	S18 South Birmingham	S41 Swansea (Telephone Area)	
R07 Rhyl	S19 South Bucks. Contest	S42 Swindon	
	S20 Southdown	T01 Taunton	

For MCC Rules, see p.511

#### Names and Addresses of Club Secretaries reporting in this issue:

ACTON, BRENTFORD & CHISWICK: W. G. Dyer, G3GEH, 188 Gunnery Avenue, Acton, London, W.3.  
 BRADFORD: R. J. Cockerham, G3WTF, 56 Brantwood Road, Bradford, 9.  
 BRISTOL (University): C. G. Elliott, G8ADP, 148 Ashley Down Road, Bristol.  
 BRITISH RAILWAYS: H. A. J. Gray, Eleven, Swanton Drive, East Dereham, Norfolk.  
 BROMSGROVE: J. Dufrane, 44 Hazelton Road, Marlbrook, Bromsgrove, Worcs.  
 CIVIL SERVICE: D. McLennan, G3KGM, 52 Pinewood Avenue, Sidcup, Kent. (01-300 0767.)  
 COVENTRY: C. Jaynes, 20 Belgrave Road, Wyken, Coventry.  
 COLCHESTER: R. C. Greenleaf, G3VAG, 27 Ernest Road, Wivenhoe, Essex.  
 CORNISH: J. Farrar, G3UCQ, Elm Cottage, Ventonleague, Hayle, Cornwall.  
 CRAY VALLEY: D. Buckley, G3VLX, 234 Halfway Street, Sidcup, Kent. (01-850 6945.)  
 CRYSTAL PALACE: G. M. C. Stone, G3FZL, 11 Liphook Crescent, London, S.E.23. (01-699 6940.)  
 DERBY: F. C. Ward, G2CVV, 5 Uplands Avenue, Littleover, Derby (21931), DE3-7GE.  
 DERBY (Nunsheld House): N. J. Gregory, G3LCV, 21 Back Lane, Chellaston (3516), Derby.  
 DORKING: R. Greenwood, G3LBA, 8 Deacon Close, Downside, Cobham, Surrey.  
 EAST WORCS.: R. J. Mutton, G3EVT, Summerhayes, Mill Lane, Alcester (2041).  
 ECHELDFORD: M. Clift, G3UNV, 45 Fordbridge Road, Ashford (59628), Middx.  
 EX-G: F. W. Fletcher, G2FUX, 53 St. Ives Park, Ringwood (3561), Hants.  
 GUILDFORD: A. Coker, G3WHM, 48 Charlock Way, Burpham, Guildford, Surrey.  
 HEREFORD: S. H. Jesson (full QTH not given).  
 LOTHIAN: W. Marshall, GM8BPL, 15 Craigleith Hill, Edinburgh EH4-2EF.  
 MAIDENHEAD: E. C. Palmer, G3FVC, 37 Headington Road, Maidenhead (20107), Berks.  
 MID-SUSSEX: E. J. Letts, G3RXJ, 87 Meadow Lane, Burgess Hill (3532), Sussex.  
 MID-WARWICKSHIRE: J. F. Coggins, G3TFC, Market Corner, Coventry Road, Baginton, Warwickshire. (Toll Bar 3668.)

NORTHERN HEIGHTS: A. Robinson, G3MDW, Candy Cabin, Ogden, Halifax (44329).  
 NORTH KENT: A. Watt, G3WZJ, 67 Glenhurst Avenue, Bexley.  
 PETERBOROUGH: D. Byrne, G3KPO, Jersey House, Eye (351), Peterborough.  
 PLYMOUTH: J. Peters, G3YDU, 43 Holtwood Road, Plymouth (77878), Devon.  
 PUDSEY: P. Conway, G3XLV, 719 Scott Hall Road, Leeds, 17.  
 PURLEY: A. Frost, G3FTQ, 62 Gonville Road, Thornton Heath, Surrey, CR4-6DB.  
 R.A.I.B.C.: Mrs. F. Woolley, G3LWY, 331 Wigan Lane, Wigan.  
 READING: G. R. J. Addis, G3TEB, 13 Keats Close, Woodley, Reading, Berks.  
 REIGATE: D. Thorn, G3NKS, La Collinette, 6 Bracken Close, Copthorne (2163), Crawley, Sussex.  
 ROYAL NAVY: C/RS K. Randall, G3RFH, H.M.S. Mercury, Leydene, Petersfield, Hants.  
 SALOP: W. Lindsay-Smith, G3WNI, 22 Kingswood Crescent, Copthorne, Shrewsbury.  
 SALTASH: J. A. Ennis, G3XWA, 19 Coombe Road, Saltash, Cornwall.  
 SHEFFORD: C. W. Stedman, G3XWS, 10 Wychwood Avenue, Luton, Beds.  
 SILVERTHORN: D. Standley, G3XSA, 212 Westward Road, Chingford, London, E.4.  
 SOLIHULL: J. Lester, G3VXV, 173 Damson Lane, Solihull. (021-705 3060.)  
 SPEN VALLEY: N. Pride, G8BSC, 100 Raikes Lane, Birstall, Nr. Leeds. (Batley 3925.)  
 SURREY: R. Morrison, G3KGA, 33 Sefton Road, Croydon CRO-7HS, Surrey. (01-654 5982.)  
 WANSTEAD & WOODFORD: K. Smith, G3JIX, 82 Granville Road, London, E.17.  
 WIMBLEDON: W. Hardcastle, G3XQX, 13 Carlwell Street, Tooting, London, S.W.17.  
 WIRRAL: A. Seed, G3FOO, 31 Withert Avenue, Bebington, Wirral, Cheshire L63-5NE.  
 WIRRAL (DX Association): J. A. Share, G3OKA, Trelawney, 21 Curliender Close, Bidston, Birkenhead, L41-7BN.  
 WOLVERHAMPTON: J. P. H. Burden, G3UBX, 28 Coalway Road, Wolverhampton.  
 VERULAM: W. C. Dennis, G3NCK, 129 Colney Heath Lane, St. Albans, Herts.  
 W.A.M.R.A.C. (World Association of Methodist Radio Amateurs and Clubs): Rev. A. W. Shepherd, G3NGF, 52 Thanet Street, Clay Cross, Chesterfield, Derbyshire.

given by G8BMQ.

**British Railways** have an Amateur Radio group, which caters for the licensed and SWL members of the complex organisation of railways and ancillaries. They have a *Newsletter*, and regular net contacts through which they can make themselves known and join in with others in various countries in railway employment. For details, contact the Secretary—see Panel, p.513.

Just what is on in October for the **Wolverhampton** crowd is not known, apart from the AGM which comes on October 6—but it looks like every Monday at Hq., Neachells Cottage, Stockwell Road, Tettenhall, with possibly other activities as well.

The policy of the **Pudsey** chaps seems to be to arrange their talks at short notice, so that often there is no time for them to advertise them in these pages. However, we can say that every other meeting is given over to R.A.E. assistance to those in need of it; the intervening ones being left for lectures and other activities. Thus, to find them, all one has to do is wait till Wednesday, and then make an appearance at Bramley Liberal Club, Hough Lane, Bramley, Leeds 13. Incidentally, the White Rose Rally they laid on recently was such a success that they are already planning the details of an even better one next year!

It has often been asserted that a good honorary secretary is the making of a club, of any sort, and if that be the case then the **Lothians** crowd are lucky indeed—their hon. sec. took time out during his holiday to drop us a line and say that they will be foregathering as usual at the YMCA, South St. Andrews Street, Edinburgh, on October 9, when there is a “double menu” with something for beginners as well as the WIBB tape-and-slide talk. October 23 is the other date, when GM3TZS will be talking about “Electronics in Civil Aviation.”

\* \* \*

From Scotland we now come straight down into the West Country, to **Saltash** in fact, where the lads have a place at Burraton Toc H Hall, where they go on alternate weeks—October 3 for a talk by Bill Roberts; October 17, when they are entertaining Plymouth group in a Quiz; and October 23, when the evening will be devoted to Two Metres.

Bags of activity at **Northern Heights** again this month, starting with the trip to the exhibition on October 4. Mr. Craven gives his lecture on October 8, and over the weekend 18/19th there is the Jamboree-on-the-Air, for which they are to have two stations going at different locations. Colour TV will be the theme of the talk on October 22, by Mr. McCarthy of Baird, and on 29th there is the Annual Pea and Pie Supper. All the “home games” are at the Sportsman Inn, Ogdon, Halifax.

Not far away is **Spenn Valley**, where on October 2 it will be possible for you to bring along your crystals and check their accuracy; October 9 is down for G3KEP to talk about Low Power Transmitters, while the ins-and-outs of High Power Speaker Systems is to be the theme of Mr. Falkus of Fane Acoustics. October 23 sees the chairman, G3PXF, giving the lecture, his topic being Simple Receiver Construction.

Back again to the South now, to **Acton, Brentford and Chiswick** to be precise, where, on October 21, the lads are having a Two-Metre Night, to which all those

interested in the band are invited. 66 High Road, Chiswick is the spot to look for.

Every Wednesday from October 1 is the form for **Colchester**, in Room 41 of the North-East Essex Technical College, starting at 7 p.m., October 8, incidentally, will be the AGM, to which all members are particularly asked to attend.

One is not quite certain, but it rather looks as if the **Surrey** crowd will have as their October theme the BCC equipments which are being used by so many on VHF, and any useful modifications. This one is October 21 at the Swan and Sugarloaf, South Croydon.

One of the most appreciated Newsletters to come our way each month is *Radial* of the **Radio Amateur Invalid and Bedfast Club**—perhaps better known as RAIBC. The current one has a rather good account of his holiday by GW3AQW/M who seems to have got tangled up in the security arrangements for the Investiture ceremony of the Prince of Wales—not once, mark you, but twice! Invalid or blind amateurs and SWL's should all become members of this organisation, and those of us who are lucky enough to be fit and able should give serious thought to sparing a little time to helping in the work of RAIBC. Write to G3LWY (see Panel) and she will surely find you are just the man for a job that someone badly needs doing.

**Durham** is not a group we hear from frequently; but they have written to make a late mention of their R.A.E. course, which will have kicked off by the time this comes to print, but will nonetheless welcome late starters. Friday evenings, from 6.30 to 9.30, at Durham Technical College, Framwellgate Moor it is, with G3PDM passing on the knowledge; enrol on joining the course. Incidentally, this course covers both the theoretical aspects and the Morse.

**Guildford** get together on the second and fourth Fridays in each month, the meeting-place normally being the Model Engineering Hq. in Stoke Park. They also run joint meetings with the University of Surrey. At the time of writing we have no firm details of the October doings—possibly because the September programme was so crowded they are taking time to recover!

Two dates are booked for the **Plymouth** chaps, October 7 being down for a Film Show—the list of films it is hoped to show promises quite a variety. The other date, October 17, is the trip to Saltash to play out the Quiz. Normal meetings are on the first and third Tuesdays in each month at Virginia House, Bretonside, Plymouth.

For **Derby**, the coming month seems to be well filled. October 1 is a Surplus Sale, and on the 4th they are taking a trip to London for the exhibition. On the 8th, they are to have an inquest on the Mobile Rally, and the 15th is to be an Open Evening. Ladies Night is October 22, when Mr. H. R. Nuttall will be giving an illustrated talk on “The English Church through the Ages.” October 26 sees a D/F event, for the President's Trophy, and the month is ended on the 29th with a tape lecture “Conducted Tour of ARRL Hq.”

At **Bristol University** the radio group will be looking for new members at an event called “Freshers Squash” during Presco Week. Normally they foregather each Saturday at 2.30 in the Department of Physics, Royal Fort.



Bill Lowe, or Bandit Bill as he is known, characteristically came up with something unusual for the Pudsey Club's Rally event on July 27. This was his display, with the girls modelling lingerie (modelling lingerie!—oh, well!). (And now they call him "Tiger" Bill Lowe.) Incidentally, it may be of interest to present members of Pudsey that there was an amateur wireless club in the district as long ago as 1922. The hon. secretary was a Mr. W. Daniels, of Low Town, and the subject for their meeting on December 11 of that year was "The Reception of Telephony."

Victory Hall, Cox Green, is the Hq. of the Maidenhead group, who will be there on October 6 for a demonstration of the SB-34 transceiver by G3VMR. The 21st is the usual informal affair, and at both these light refreshments will be available.

October 2 and 16 are operating sessions for the Salop lads, with October 9 in between for the AGM. This leaves October 23, which is still open at the time of writing, and the 30th, when G3MBQ will be discussing RAEN. All these are at the Signals Hut, Shrewsbury School, which is the group's Hq.

Talking of AGM's, Silverthorn have theirs this month too, on October 10, at Friday Hill House, Simmons Lane, Chingford, London E.4. They hope that the recent summer camp will have stimulated some of the G8/3 chaps, who now outnumber the "A" licences in the club, into having a go at getting the full ticket.

We hear from the U.K. Hon. Sec. that the *Ex-G Club Bulletin* is now being printed at quarterly intervals and posted direct from the U.S. which will help to get the news out "hot from the presses." This group of course, caters for those who were born in the U.K. and now live elsewhere; the main strength is in America, but there are members spread all over the world.

Some particularly interesting lecture-meetings are in hand for Shefford—on October 2, "Ferrite and Toroids" and on October 30, "Transistor Transmitters." Both these are being given by professionals representing manufacturers, so should be of great interest to many outside the Shefford membership—visitors welcome, to the Church Hall, Amptmill Road, Shefford, Beds. There are also regular Club meetings on October 9, 16 and 23.

From an almost illegible piece of undated typescript, we get it that R.N.A.R.S. membership continues to

increase—now being at 188 holding tickets, plus more than 50 SWL's, with 17 countries represented. Activity on the weekly 80m. net continues at a high level, and R.N.A.R.S. members can often be found daily on 3720 kc. Following the success of their recent mini-Rally at Lymptstone, Devon, plans are in hand for a big event to be held next year at Leydene, Hants.

We are glad to hear again from W.A.M.R.A.C., and that they are having a get-together at the exhibition on October 4, 2-3.30 p.m. Then during October 17-19, there is the First Wamrac Conference, at Unstone Grange, Derbyshire, for which the theme is to be "Wamrac in the '70's." The inclusive charge is £2 12s. 6d., and all details can be obtained from the Rev. A. W. Shepherd, G3NGF.

They have been finding the going rather hard over in Hereford—too many natter-nights, and not enough forward planning?—so the committee is getting down to working out a really interesting programme to carry them through from October into the early part of next year. Details are to be circulated to all members in due course.

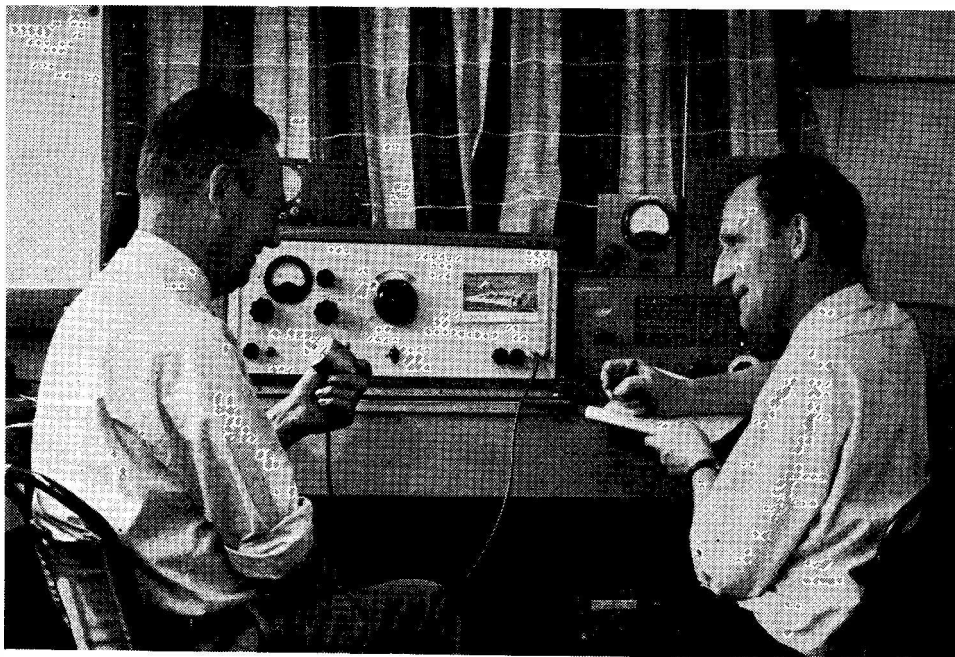
### Finally

Take a careful look through all the MCC dope spread out in these pages. Plan to enter; make sure your group has its identification code allotted in the lists on pp.512-513; if not, send in for one right away; for Clubs without their own station or callsign, note that the Rules (p.511) allow a member's station to be nominated as the Club's official entry—and remember that he should be given all the assistance possible; select a team of competent CW operators, with a back-up of those who want to learn a bit more about competitive Contest working, and they should get in as much CW practice as possible. For an event of this sort, it should not be a matter of having to "ask for volunteers," but of being able to appoint an operating team, glad to be selected as the Club's representatives. That's how it is with some Clubs, anyway!

Deadline for the November issue, due out on October 31, is **October 10**, latest, addressed: "Club Secretary," SHORT WAVE MAGAZINE, BUCKINGHAM.

### PLEASE HELP US A BIT, TOO!

When sending in a new callsign or a change-of-address for appearance in the "New QTH" page, *please* say whether you are, or are not, a direct subscriber (meaning that, if you are D/S, your address-plate will have to be altered). Many hours of office-time are being wasted in checking up, through the 1000's of callsign/addresses in our direct-subscriber card index, because people merely say "I wish to notify my change of address for publication"—giving us no lead at all. We are happy to accept new callsign registrations and changes-of-address from *all* U.K. amateurs who care to write in for the "New QTH" page — but, when doing so, *please* mention if you are a direct subscriber. And that means getting the *Magazine* monthly by post from us, by subscription paid in advance. (And to forestall the enquiries we get almost by every post, the cost of a direct-subscription is 45s., or 48s. "first class," for a year of 12 issues, post free in the U.K.)



## **THE OTHER MAN'S STATION**

**G3YAY**

**G**3YAY is the Club station run by the radio and electronics section of the Motor Industry Research Association (M.I.R.A.) Sports and Social Club, at Lindley near Nuneaton in Warwickshire. This establishment is situated on the A5 between Atherstone and Hinckley. The section was formed early in 1968 and the gear was installed in November when the building was completed.

The radio room is an annex built on to the sports club pavilion by the members themselves and is ideally situated for antennae, being in open ground with trees nearby.

Operations commenced on 40m. using a home-brew AM rig, an ex-Naval Rx of dubious origin and 99ft. of wire to a tree. The first thing that became obvious was that SSB was needed urgently. Construction of an all-band sideband transmitter using a pair of 6146's was commenced and this rig is now in operation and performing quite well. A 40ft. mast was erected and dipole antennae for the 10-80m. bands hoisted. These dipoles are fed through a common coax feeder line.

By this time members were suggesting in rather strong terms that the receiver was not up to the job it was required to do and so the quest for a new Rx began. Finally, a wrecked MR44 was purchased and re-built to such a high standard that additional RF gain control was required to hold signals down. Operation on all bands 160m. to 70 cm. is now possible and the station is usually on the air between 12.30 and 1.15 p.m. Monday to Friday, with evening activity when possible.

During the coming winter months there will be monthly meetings when it is hoped to invite local amateurs to film shows, lectures and such, and to organise visits to TV and radio stations. A course for members will also be run weekly on radio and the R.A.E., with Morse classes for those requiring practice. Four club members are licensed at present: G3OUQ, G3IRD, G3EHR and G8AFY. Next year it is hoped to enter field day and other contests. QSL cards have been printed showing an aerial view of M.I.R.A. and the shack is pinpointed with an arrow.

The two operators shown in the photograph are Tom Bowen, G3EHR (left), and Keith Smith, G8AFY.

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*Always mention "Short Wave Magazine" when writing to Advertisers — it helps you, helps them and helps us.*

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# 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.

- G3IQF**, R. A. Fowler, 85 Oxford Road, Marlow, Bucks. (*re-issue*.)
- G3YAX**, G. Moon, 28 Elm Road, Winwick, Warrington, Lancs.
- GW3YCD**, H. A. Griffiths, 39 Erw Faen, Tregarth, Bangor, Caerns.
- G3YCZ**, B. W. Forster, 16 Corva Road, Penbeagle, St. Ives, Cornwall.
- G3YEE**, R. Short, 10 Tyersal Grove, Tyersal, Bradford 4, Yorkshire. (*Tel. 64220.*)
- G3YJS**, M. P. St. E. Roche, 16 Norrington Road, Maidstone, Kent.
- G3YKS/A**, Amateur Radio Club, The Grammar School, Burnmill Road, Market Harborough, Leics.
- G3YNB**, H. Clayton, 251 Oxbridge Lane, Stockton, Tees-side.
- G3YNL**, F. C. Price, 32, St. Hilda's Road, Harrogate, Yorkshire. (*Tel. Harrogate 84568.*)
- G3YNP**, D. R. Shepherd, 27 Fairmead, Tolworth, Surrey. (*Tel. 01-399 2097.*)
- G3YNS**, Radio and Electronics Group, Kingston and Malden Scouts, Blagdon Road, New Malden, Surrey.
- G3YOY**, H. D. L. Clark, 222 Kington Green Road, Olton, Solihull, Warks. (*Tel. 021-706 0485.*)
- G3YPD**, P. S. Chester, 26 The Leasowe, Lichfield, Staffs. (*Tel. Lichfield 2589.*)
- GW3YPF**, O. J. Williams, 13 Bryn Rhedyn, Llanfairfechan, Caens. (*Tel. Llanfairfechan 630.*)
- G3YPM**, R. K. Moore, 241 High Street, Swanage, Dorset. BH19 2NG.
- G3YPS**, S. Atkinson, 7 Balfour Street, Gainsborough, Lincs.
- G3YPT**, P. W. Tomes, 104 Priests Road, Swanage, Dorset. BH19 2RR.
- G3YPV**, Finchley Amateur Radio Transmitting Society, c/o P. R. Cragg, Claregate School, Hatfield Road, Little Heath, Potters Bar, Herts.
- G3YQC**, J. L. Wood, 43 Douro Road, Canterbury, Kent.
- G8BXT**, B. C. Clowes, 21 Adderley Terrace, Sandford Hill, Longton, Stoke-on-Trent, Staffs. (*Tel. Stoke-on-Trent 33160.*)
- G8CMT**, H. L. Wilson, 23 Wadham Road, Woodthorpe, Nottingham. (*Tel. Nottingham 265948.*)
- G8CQB**, R. C. Barrett, 2-A Church Street, Great Shelford, Cambs. CB2 5EL.
- G8CQH**, P. J. Best, 116 Waterloo Road, Hillside, Southport, Lancs.
- G8CTF**, R. E. Wilkinson, 182 Lonsdale Drive North, Enfield, Middlesex.
- GW8CTI**, A. O. Buss, 106 Corporation Avenue, Llanelli, Carm. (*Tel. Llanelli 4207.*)
- G8CTL**, M. D. Julian, 31 Carter Avenue, Shanklin, Isle of Wight.
- G8CTM**, D. Pick, 9-A Long Lane, Billesdon, Leicester. LE7 9AL. (*Tel. Billesdon 229.*)
- G8CUB**, R. V. Ray, 73 Markland Road, Dover, Kent. (*Tel. Dover 1482.*)
- G8CUE**, A. Corker, 5 West Crescent, Sunnyside, Rotherham, Yorkshire.
- G8CUI**, T. Lockwood, 105 Moorland Road, Goole, Yorkshire.
- G8CWA**, F. Lee, 100 Mayswood Road, Solihull, Warks. (*Tel. 021-743 8578.*)

## CHANGE OF ADDRESS

- G2ATM**, S. Read, 44 Birkland Avenue, Plains Road, Mapperley, Nottingham. NG3 5LA.
- G2FFT**, J. Weaver, 6 Hilly Plantation, Thorpe St. Andrew, Norwich, Norfolk. NOR. 85-S. (*Tel. Norwich 33161.*)
- G3HNM**, C. E. Davies, 2 Enfield Cottages, Craigavad, Co. Down.
- GM3HTH**, J. N. Sinclair, 12 Lovers Loan, Lerwick, Shetland. AB3 OBA.
- GM3JFJ**, G. Racher, 3 Church Street, Glenrothes, Fife.
- G3MGY**, D. Mayers, 20 Elm Walk, Royston, Herts.
- GW3OIN**, J. G. Nicholas, 29 Coed Pella Road, Colwyn Bay, Denbighshire.
- G3PAZ**, S. W. Law, 130 Alexandra Road, Croydon, Surrey. CRO 6EW.
- GW3PEX**, L. France, 8 Conway Drive, Pant Farm Estate, Cwm-bach, Aberdare, Glam.
- G3PLP**, R. W. Cox, 57 Welford Road, Shirley, Solihull, Warks.
- GM3POK**, E. J. Kelly, 123 Moubray Grove, South Queensferry, West Lothian.
- G3PTU**, D. J. Long, Croesor, Iveston, Leadgate, Co. Durham.
- G3PZS**, F. B. Stanbridge, 12 Mayberry Walk, The Willows, Colchester, Essex.
- G3RFH**, K. J. Randall, 59 Lovedean Lane, Lovedean, Portsmouth, Hants.
- GM3TNT**, D. R. McArthur, 79/81 Millknowe, Campbeltown, Argyll.
- G3TRR**, A. M. Mills, 7 Kings Road, Great Totham (North), Essex. (*Tel. Wickham Bishops 8256.*)
- G3UPB**, H. N. Storey, East Smallburn, Ponteland, Newcastle-upon-Tyne.
- G3UYW**, H. J. Heath, 82 Bedford Road, Cranfield, Beds.
- GM3VEY**, F. Baxter, 25 Elmwood Road, Dundee. DD2 2DX. (*Tel. Dundee 66241.*)
- G3XFW**, G. L. Parris, 124 Chelston Avenue, Yeovil, Somerset.
- G3XFZ**, G. K. Laycock, Hall Place, Fen Ditton, Cambs.
- G3XLH**, Fulford and District Amateur Radio Society, c/o Scout Council Offices, 31 George Street, York.
- G3YJY**, J. P. Kealey, 16 Fox Hey Road, Wallasey, Cheshire.
- GW5NF**, C. L. Ward, Ynys-Y-Bont, Swyddffynnon, Ystrad-Meurig, Cards. (*Tel. Pontrhydfendigaid 665.*)
- G6ACH/T**, D. J. Long, Croesor, Iveston, Leadgate, Co. Durham.
- G8ADC**, J. O. Haile, 145 Dunstable Road, Caddington, Luton, Beds.
- GM8APX**, W. H. Jarvis, Rannoch School, Perthshire.
- G8AXC**, L. J. O'Loughlin, 4 Station Road, Snainton, Scarborough, Yorkshire. (*Tel. Snainton 252.*)



## OCTOBER SCOUT JAMBOREE—STATIONS

### “SPECIALLY ON THE AIR”

For the big international radio amateur event scheduled for October 18-19—when Scout stations, or those being operated in the Scout interest, will be active on all bands in every part of the world—we have already been notified of many U.K. stations being laid on specially for the Jamboree. It has been decided that rather than list these stations now—because there must be many others who have not thought of notifying their intended participation—we will, as in previous years, take them all into a full review of Jamboree-on-The-Air activity, to appear in the December issue of *SHORT WAVE MAGAZINE*. For this, we would want reports (with good photographs, where possible) *not later than* Friday, November 7, *latest*. Details given for the report should include (a) Name of local Scout group represented, (b) callsign and QTH of station operating, (c) Bands worked, with totals of QSO's achieved with Scout stations, (d) Noteworthy DX, in the Scout context, (e) Equipment used (Tx, Rx and Ae.), and (f) Any occurrences of particular interest or amusement, in the context of the operation. Reports on this year's J-O-T-A should be sent—as soon as possible after the event, and in any case not later than **November 7**, to: “Jamboree-on-The-Air,” Editor, *SHORT WAVE MAGAZINE*, BUCKINGHAM.

### SPILSBY JUNK SALE

This annual event will again take place at the Bull Hotel, Spilsby, Lincs., this year on Friday evening, October 17. Admission is 2s. 6d., and you are asked to bring not only your money but also some (good) surplus equipment to lay out on the tables. All details from: N. T. Hodgson, G2ABK, 53 Main Road, Hundleyby, Spilsby, Lincs.

### POSTAL CODE—“CHANGES OF ADDRESS”

With the gradual introduction of the Postal Code system—whereby we are all given yet another number—many “change of address” notifications are coming in which merely incorporate the addition of a postal code. While in the case of direct subscribers it is being taken into their address-plate, we are *not* proposing to publish them in the “New QTH” page as changes-of-address. This is because it would require pages of space to accommodate them all. However, *all* such codings are being notified to the publishers of the international *Radio Amateur Call Book*, for which we are the U.K. agents.

What it comes to is that all new callsign/QTH's involving a postal code will appear in “New QTH's” in the usual way. Any significant change-of-address with a postal code will also be printed—but C/A's showing just the addition of the postal code as part of an existing address will go only to the International *Call Book*, for appearance in the U.K. section.

Hence, it would help if when sending in your postal code to complete your current address, you would just mention “addition of postal code only. I am (or am not) a direct subscriber.” We then know the slot into which it should go for action.

## SMALL ADVERTISEMENTS

(“SITUATIONS” AND “TRADE”)

9d. per word, minimum charge 12/-. No series discount. All charges payable with order. Insertions of radio interest only accepted. Add 25% for Bold Face (Heavy Type). No responsibility accepted for errors. Replies to Box Numbers should be addressed to The Short Wave Magazine, 55 Victoria Street, London, S.W.1

### TRADE

**SWOP** your camera or hi-fi equipment for **Trio 9R-59DE**, h.p. or cash. — **Holdings Photo-Audio Centre**, 39/41 Mincing Lane, Blackburn (59595/6), **BB2-2AF, Lancs.**

**QSL** Samples, excellent range at the right price. Also Log Books at 7s.—**Bailey & Co., Greenfield Place, Weston-super-Mare, Somerset.**

**QSL** Cards: Two-colour, attractive design, variable features, from £3 3s. per 1,000 (inclusive). Send foolscap s.a.e. for samples.—**ARA Press**, 46 Moat Avenue, Green Lane, Coventry.

**NOVEMBER Issue: Appears October 31.** Single-copy orders, 4s. (4s. 3d. “first-class” mail) to reach us by **Wednesday 29th**, for posting on the **30th.**—**Circulation Dept., Short Wave Magazine, Ltd., 55 Victoria Street, London S.W.1.**

**QSL** Cards for Tx and SWL. Send s.a.e. for samples, stating which type required. Prices from 12s. 6d. per 100, purchase tax and post paid.—**Beaumont, G5YV, 8 Ashfield Avenue, Morley, Leeds.**

**UFO** Detector Circuits, with data, price 10s. refundable. — **Paraphysical Laboratory (UFO Observatory, Downton, Wiltshire.**

**QSL** Cards and Log Books, GPO approved, cheapest and best. Prompt delivery. — **Samples from Atkinson Bros., Printers, Looe, Cornwall.**

**LEICESTER, G3ACQ.** Secondhand: EC-10, Star SR-700A, SP-600JX, cabinet model. New: TS-510, JR-500, 9R-59DE, Codar CR-70A, CR-45 kit, A.T.5 with AC and mobile PSU's, Joysticks. Factory re-conditioned Avometers Models 7 & 8. Components: Garrard, Leak, Goldring, Aircraft-band transistor radios. **Part Exchanges Welcome.—May's, Churchgate, City Centre, Leicester.**

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### READERS ADVERTISEMENTS

3d. per word, minimum charge 5/-. payable with order. Add 25% for Bold Face (Heavy Type). Please write clearly, using full punctuation and recognised abbreviations. No responsibility accepted for transcription errors. Box Numbers 1/6 Extra. Replies to Box Numbers should be addressed to The Short Wave Magazine, 55 Victoria Street, London, S.W.1.

**OFFERING:** Ex-Army Communications Receiver, tuning 2.0 to 20 mc, in very good condition, with PSU. Offers?—**Elmer, 1 Heston Road, Earlswood, Redhill, Surrey.**

**SELLING:** Heathkit RA-1, in new condition, with crystal calibrator and manual, price £30.—**Kronquist, Tress, Rogate Road, Hill Brow, Liss, Hants.**

**WANTED:** Single-track tape recorder. Also small mains transformer, 100v. 50 mA on secondary.—**Parker, G3KH, 133 Station Road, Cropston, Leicester, LE7-7HH.**

**WANTED:** KW-2000A with mains PSU, must be perfect, please state age and price asked. (Scotland).—**Box No. 4830, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.**

**FOR SALE:** CR-100, fair condition, £10 plus carriage if necessary.—**Vest, 45 Edge Court, Durham.**



**SMALL ADVERTISEMENTS, READERS—continued**

**FOR SALE:** Minimitter 150-watt Tx, AM/CW, excellent condition and in regular use but owner now going SSB, price £30 with spare valves and accessories; delivery arranged up to 30 miles.—Hodges, G3KRT, 102 Torrington Road, Ruislip (38287), Middlesex.

**EXCHANGE or SELL:** Trio VFO-5, brand new, £20 or offer; Withers Topmobile 160m. Transceiver, with G3FIF whip Ae., £50 or near offer. Or EXCHANGE for Withers two-metre Transceiver, or W-H-Y? Lots of other gear going for callers only.—Jones, G5ZT, 3 Bircham View, Austin Crescent, Eggbuckland, Plymouth (76552), Devon.

**R.A.E. Correspondence Course**, with twelve sets past Exam. papers and model answers, first £5 secures.—Cockayne, 9 Foresters Terrace, Teignmouth, Devon.

**SELLING:** Heathkit SB-301E receiver, with AM filter (new price £181); Vespa Mk. I SSB Tx, with PSU, microphone and speaker (new £140), used 20 hours only—the two together for £220, delivered to 50 miles. Also Command receiver, 28 to 40 mc, 60s.; Transistor PSU, 12v., in to 300v. out, 60s.; Hunts Capacity/Resistance Analyzer, £8; "QST" in complete volumes 1955-65, 20s. per Vol. Carriage extra.—Martin, G6MN, QTHR, or ring Workspop 3415.

**WANTED:** Electroniques QP-166 Coilpak; Geloso or K.W. front end, preferably with dial and cabinet and ready to use. Pse state price, condition, etc. (Holland).—Box No. 4831, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

**WANTED:** Home-built Linear Amplifier, parts or part-built, W-H-Y? Thinking of 2/813 or similar; anything QRO considered. Details and price.—Johnson, G3MPN, 3 Folly Gardens, Wymondham (3382), Norfolk.

**FOR SALE:** Panda Cub Tx, with ATU, needs slight attention, price £10. K.W. Geloso converter for 10 to 80m., £10. K.W. ATU, £8. Buyers to collect.—Dewar, 16 Avon Road, R.A.F. Abingdon, Berks.

**SALE:** Minimitter Tx, coverage 10 to 80m., runs 150w. AM/CW, in good condition, with spare valves, £15. Also K.W. trap dipole antenna, mint, £6. (Kent).—Box No. 4832, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

**VHF Oddments to Clear:** Marconi Lo-Band mobiles, 110s. Tx/Rx units only 40s. Marconi Base Station, on rack, 130s. Tx only, 45s.; Rx only, 45s. Hudson Hi-Band mobiles, 90s. Tx/Rx units only 60s., with PSU, 70s. Carriage at cost; s.a.e. with enquiries.—McVicar, 31 Lochend Road North, Musselburgh, Midlothian, Scotland. (Tel. 031-665 2420.)

**SALE:** Complete RTTY station, comprising Creed 7B with silence cover, auto transmitter, 7TR perforator, FSY-1 terminal unit, FSK audio oscillator, with all power supplies, etc., ready to work, price £50, carriage paid.—Jones, G5ZT, 3 Bircham View, Eggbuckland, Plymouth (76552), Devon.

**SET of three Plastic Holders for 60 QSL cards**, 11s. 6d.—Shepherd, G3NGF, 52 Thanet Street, Clay Cross, Chesterfield, Derbyshire.

**EXCHANGE:** Pye "Ranger," six channel, converted for four metres, with 12v. solid-state PSU and new crystals for 70-26 mc; FOR good HF gear, mobile or fixed.—Vann, GM3TBV, 52 Urrdale Road, Glasgow, S.1.

**WANTED:** Eddystone S.504/S.640/S.740, in working order. Disposing home-built Tx, 25w. AM/CW, coverage 20 to 80m., complete, £8. HA-63 Rx, £15.—Marshall, 9 Colston Parade, Bristol, BS1-6RA.

**G4ZU Minibeam:** Rare opportunity to acquire, in perfect bright condition, with all bolts and element straps in new stainless steel, complete with 300-ohm feeder, tuning unit, manufacturer's assembly instructions and articles on tuning; excellent DX on 10, 15 and 20m. with 150 watts p.e.p., price £20.—Wyatt, G3BRW, 17 Harbour View Road, Parkstone (2368), Dorset.

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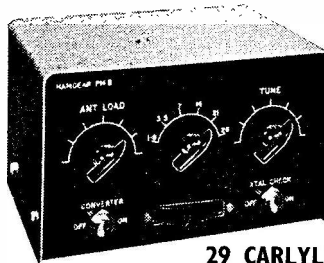
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CM70 Xtal Stick with Accessories, £2 7/6, post paid.  
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### SMALL ADVERTISEMENTS, READERS—continued

WANTED: Pye FM "Ranger" radiotelephone, 148 to 176 mc, in good condition. Also required Marine radiotelephone, in good or repairable condition. (South Wales).—Box No. 4833, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

WANTED: T.W. mains PSU for T.W.2, 6v. heaters; also Eddystone S.750 receiver. For Sale or Part Exchange: Trio 9R-59DE; Garex 12v. PSU, with relays. (S.W. London).—Box No. 4835, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

NEW Components surplus from recently completed Aero Project: BNC-series constant impedance connectors, 50-ohm 10,000 mc, in manufacturer's packing—elbow plugs, 8s.; free plugs, 3s.; front mounting receptacles, round, 3s.; bulkhead mounting receptacles, round, 2s. 6d. Welwyn high-stability resistors, 2%, mixed selection of useful values, 35 for 10s. All prices include packing and postage. Cash with order. Supplies limited to present stock, offer cannot be repeated.—Bickers, G3TIH, 192 Garretts Green Lane, Garretts Green, Birmingham, 26.

SELLING: Heathkit RA-1 receiver; TW2 Tx; TW2 PSU; OS-2 'scope; two-metre beam; rotorator; two-metre converter. All perfect.—Hooper, G3WEV, QTHR. (Tel. Bristol 683717.)

MANUALS: B.40, Collins, Cossor, Hammarlund, 35s. CR-100, CR-300, BC-348, S.27C, 25s. S.27, P.104, S.36, 206, 216, 19, 52 and 62, 15s.—Brooks, 5 Farrant House, Winstanley Road, London, S.W.11.

TOP quality polypropylene non-rot rope. Diameters: 1/4 in., 1300 lbs. breaking strain; 5/16 in., +1890 lbs. B/S; and 3/8 in. dia., 3100 lbs. B/S. Send s.a.e. for sample.—Powell, GW3HUM, 21 Tanybryn Estate, Valley, Anglesey.

WANTED: Pye Radiotelephones Type AM10B, AB10D and AM25T, also small quantity QQV03-10 valves.—Austen, 28 Valebridge Road, Burgess Hill (3409), Sussex.

SALE: Receivers: R.450/FRR.28, 540 kc to 54 mc; Hallcrafters 540 kc to 109 mc, 27 to 145 mc, 38 mc to 1000 mc, BC-348, £12 10s. R.1155, £5. Bendix, 30s. Receiver-Indicator, £5. R.C.A. 160-metre Tx, size 6 1/2 x 9 in., £8 10s. BC-221, £10. Multimeter, 35s. HRO coil pack, 20s., crystal 20s., dial 30s., PSU 50s. New Teleprinter. R.C.A. crystal multiplier, 70s. Marconi ATU, 25s. Valvetester and other items; send s.a.e. for list. Carriage extra.—Wright, 249 Sandy Lane, Hindley, Wigan (55948), Lancs.

FOR SALE: Heathkit DX-40U transmitter, £18; RME-69 receiver, £18. WANTED: Top Band transistor Tx, also Heathkit RA-1 receiver. (Berkshire).—Box No. 4834, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

NOVEMBER Issue "Short Wave Magazine" due out October 31. Single-copy orders, 4s. (or 4s. 3d. "first-class") post paid, to reach us by Wednesday, 29th, for despatch on Thursday 30th. These copies are sent flat in an envelope.—Orders, with remittance, to: Circulation Dept., Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SALE: National HRO with eight GC coil packs covering 100 kc to 30 mc, with PSU and speaker, price £17. WANTED: Eddystone EC-10. — Ring Sheard, Longworth (Berks.) 332.

SELLING: At £10, an immaculate 52 Set. Twenty shillings offered for AR88LF dial.—Maxfield, 40 Fegg Hayes Road, Fegg Hayes, Stoke-on-Trent, ST6-6RA, Staffs.

SELLING: Drake 2-B receiver, with Q-multiplier and speaker. £75. DX-60, just overhauled, £28. DX-40, £20. HG-10 VFO (matches either foregoing Tx), £10. Heathkit AR-3 receiver, needs repair to bandswitch, £6. All equipment for 110v. operation. Would consider offers.—Judy, WB6ADR, 29 Dryden Street, Swindon, Wilts.

## SMALL ADVERTISEMENTS, READERS—continued

**EXCHANGE:** Either complete Sommerkamp Line comprising FL-DX500 transmitter with FR-DX500 receiver and FL-1000 linear amplifier OR brand new Trio Model TS-510 with PSU FOR Dormobile or Volkswagen motor-caravan, cash adjustment either way according to value—or open to offers for the equipment.—Jones, 3 Bircham View, Egguckland, Plymouth (76552), Devon.

**WANTED:** To purchase, Heathkit QPM-16 Q-Multiplier.—Dickson, 10 Anderson Place, Hawick, Roxburghshire, Scotland.

**SALE:** Joystick de luxe, with ATU Type 4, £6 10s. Z-match for high power (s.a.e. for details), £8 10s. Tek Crystal Oven with 1 mc xtal, 30s. Diecast box (2 off), 4½ x 3½ x 3¼in., 10s. each. HC6-U xtal, 16 mc, 30s.—Kelly, GM3POK, 123 Moubray Grove, South Queensferry, West Lothian, Scotland.

**SELLING:** Transistor portable/car Radio, MW-LW, £7. New Avo Multimeter with leads, £8 10s. Gyroscope and motor, 18s. 6d. VHF Rx covering 100 to 180 mc, with PSU and speaker, £20. Wide-range Marconi valve voltmeter, £15. (All these items carriage extra; s.a.e. with enquiries). Manuals: R.208, 20s.; Rebecca. 40s.; Canadian Type 58 Tx, 25s.; VHF Calibrator 120. 30s.; VHF Calibrator 18, 20s. Circuits: BC-1000 (Rx 31), 5s.; Rebecca Tester 102, 20s. Postage and packing extra. — Hayward, Sunnyfields, Lighthouse Road, St. Margaret's Bay, Near Dover, Kent.

**WANTED:** Any information, especially modifications and circuit, applying to Trio 9R-59 (HE-30). Also require copies August '64 and January '65 issues of "Short Wave Magazine." Would settle for a reasonable number of issues to include these.—Lockhart, 2 Joint Relay Station, H.M.S. "Jufair," B.F.P.O.63.

**GOOD Home Wanted** for my Collins 75A-2 communications receiver, which is in mint condition. It tunes from 1.4 to 30 mc, and is complete with service manual and step-down transformer. A gift at £100, or near offer.—Lydon, 51 Long Lane, Hindley Green, Nr. Wigan, Lancs.

**FOR SALE:** Electroniques Coilpak HB166T, £9; also IF amplifier IFA/1.6/SSB, £4; both items unmodified and in excellent condition, with diagrams and instructions. Small 1½-in. S-meter, 15s.—Scott, 16 Tanyard Drive, Hale Barns, Altrincham, Cheshire.

**OFFERING:** Paper Condensers, T.C.C., 4 mF 12.5 kV working.—Ring Perkins, 0494 30043 (High Wycombe).

**SALE:** Electroniques Coilpak QP-166T, only a few weeks old, at £15.—Roberts, 18 Buckley Street West, Wigan (46109), Lancs.

**EXCHANGE or SELL:** Large quantity of brand new American components—knobs, handles, S/M drives, panel lamps, coax connectors, test instruments, etc., etc. Accept cash or would Exchange for antique guns, swords, Nazi daggers, other curios or antiques. Please send s.a.e. for details. (Midlands).—Box No. 4829, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

**SALE:** Codar 66, S-meter and PR-30X preselector, bargain at £15, buyer to collect (London).—Box No. 4836, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

**SELLING:** Vanguard, with 160m. conversion. In excellent condition, fitted new low-pass filter; seen working. Price £35, delivered Birmingham area.—Millman, G3PJY, QTHR. (Tel: 021-STE 6007.)

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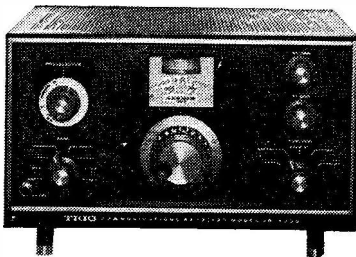
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**SALE:** Moving-coil meters, flush mounting, 3½in. diam., 0-200 mA, 0-500 mA, 11s. 6d. each. Also a National Type N dial, offers?—Beadle, 12 Cartmel Road, Keighley, Yorkshire.

**WANTED:** Electroniques valved-type amateur band Coilpak QP-166.—Smith, 46 Evington Parks Road, Leicester (37977), LE2-1PR.

**WANTED:** Faulty CR-100 or B.28 receiver; any condition acceptable, even incomplete; please state price.—Briscoe, 27 De Vere Gardens, Cranbrook, Ilford, Essex. (Tel: 01-544 6631.)

**WANTED:** Pair 7094 valves; state price.—Buckley, G3VLX, 234 Halfway Street, Sidcup, Kent. (Tel: 01-850 6945, evenings and weekends.)

**FOR SALE:** Eddystone 840C Rx in mint condition, bought July '68, only about 10 hours use. In original packing; price £40, or near offer. Reason for sale, increasing deafness.—Syons, 5 East Street, Leigh-on-Sea, Essex.

**SELLING:** Lafayette HA-350 receiver with Top Band modification and 100 kc calibrator, £48. Katsumi electronic bug key, 70s. **WANTED:** Two-metre equipment.—Dunford, G3XOF, 9 Pinfold Close, Tutbury, Burton-on-Trent, Staffs.

**WANTED:** Q-multiplier, priced £5 at most; condition not important, but should be in working order.—Bardsley, 2 Old Camp Road, Eastbourne, Sussex.

**SALE or EXCHANGE:** Hy-Gain 12-AVQ Vertical for 10-15-20m., £10; Mini-Ten 10-metre beam, £5. Both as new, carriage extra. Would exchange for 10-15-20m. beam, with cash adjustment.—Hulme, G3UJD, 78 York Road, Farnborough, Hants.

**FOR SALE:** At £18, or exchange for gear with cash adjustment either way, new 32-piece canteen of cutlery, silver, with 12 stainless-steel knives—Wanted: CW/SSB Tx. 10 to 80m., with Ae. c/o relay, maximum £70; HW-30; Codar fixed/mobile.—169 Browning Road, Milehouse, Plymouth, Devon.

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**SELLING:** Lafayette HA-700 Rx, price £25. Any offers for a two-thirds built SSB Tx ("Cornishman"), with Eddystone 110:1 9-inch dial mechanism, also majority of remaining components and 1100-0-1100v. 220 mA mains transformer? Buyer to collect London, S.W.6.—Ring Sroczyński, G3URY, 01-606 6941, office hours.

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**WANTED:** Heathkit PSU Type HP-23, in good condition.—Eckley, G3UFQ, QTHR. (Tel. 021-373 6642.)

SMALL ADVERTISEMENTS, READERS—continued

**REQUIRED:** "Radio Amateur's Handbook" (ARRL), also "Radio Handbook" (Jones) dated 1937 or earlier.—Litherland, G8CFB, 11 Birch Grove, Chippenham, Wiltshire.

**SELLING:** Sommerkamp FT-DX500 transceiver, £190. Hallicrafters SR-150 transceiver, showing its age (6 years), but still performing as new, £150. Further details on request—buyers collect only.—Finlay, Benvrackie, Primrose Lane, Cowdenbeath (3628), Fife, Scotland.

**FOR SALE:** Eddystone 680X general-coverage receiver, AM/SSB, four selectivity positions plus crystal phasing, etc. Also Eddystone 770U/2 VHF/UHF receiver, coverage 150 to 500 mc. Both in very good condition and complete with manuals, price £60 each if collected. **WANTED:** Sommerkamp FR-500 Rx, with two-metre coverage.—Heggs, 94 Cardinals Walk, Leicester.

**SALE:** National HRO receiver with 12 coil packs, PSU and vibrator supply, price £9 10s.—Haynes, Sans Nom, Fir Tree Road, Leatherhead, Surrey.

**WANTED:** R.1475 Rx, complete with PSU, and a good performer, reasonably priced. Details, please.—Goff, 25 Carey's Road, Pury End, Towcester, Northants.

**SELLING:** Modified DX-40U, external plate-screen modulator (2/EL34) and PSU, separate transistorised mic-amp.; also rebuilt TCS-12 VFO, with PSU, 12v. DC station control, AM/CW, single-switch changeover. All cables supplied, and delivery to 50 miles, price £35.—Morgan, GM3FQO, 52 St. James's Gardens, Penicuik (2636), Midlothian, Scotland.

**FOR SALE:** A.T.5 with AC/PSU, hardly used, £20. Eddystone 358X with all coils, £7. Hallicrafters Sky-Champion Rx, £5.—Ring Dobie, G3XWP, 397 5552 (home), or 636 3676, extn. 309 (office).

**SELLING:** Heathkit DX-40U with VF1U VFO, complete with three xtals, £17. Also National HRO Rx, with PSU, speaker, nine GC coils, BS coil-pack for 80m., and Heathkit Q-Multiplier, price £18. All items with their manuals.—Bona, G3SGX, 265 Yeading Lane, Hayes, Middlesex. (Tel. 01-845 7896.)

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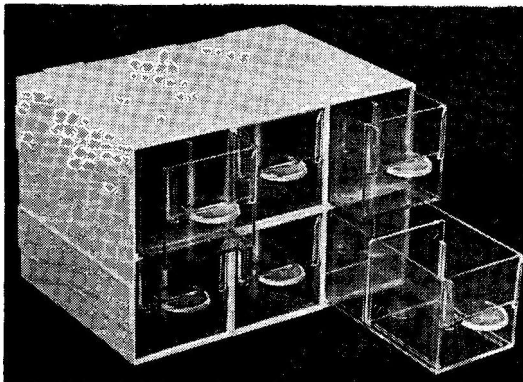
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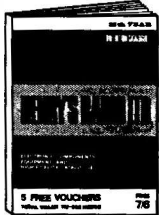
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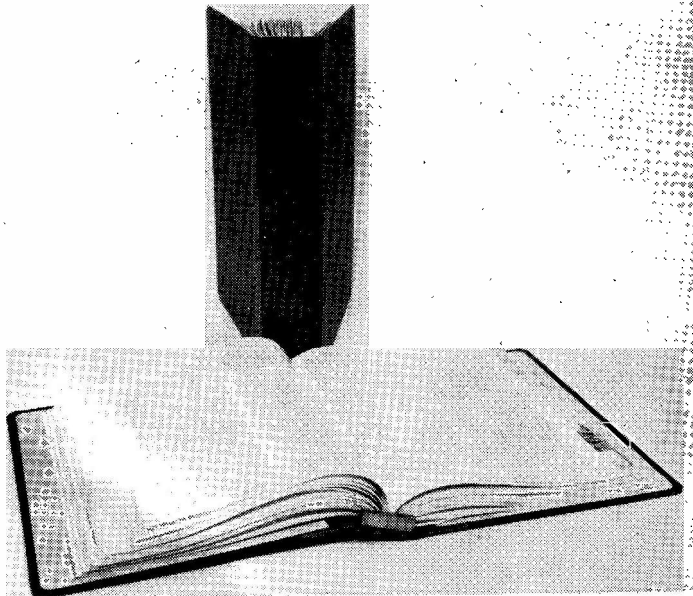
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