

# The SHORT WAVE Magazine

VOL. XXXV

JUNE 1977

NUMBER 4

## TRIO R-300

Eavesdrop on the world



### LISTEN TO THE WORLD

Short wave radio is by far the fastest and most convenient type of communications for spreading the news about what is going on in the world. And for this reason TRIO's R300 is the right rig for those who'd like to listen to a live report of the Indianapolis Grand Prix, to Radio Peking or to follow the progress of an Himalayan expedition. The R-300 is the invisible bridge to other countries and continents and the bridge to the home country for most journalists, engineers and technical representatives working abroad. They all want a reliable and sturdy multiband receiver for home use and travel, a receiver working from mains voltage or batteries. And just such a receiver is TRIO's new R-300

Six Wavebands—LW (170-410 kHz), BC (525-1250 kHz), 4 x SW (160-10m). The four shortwave bands continuously cover the frequency range from 1.25—30 MHz with separate calibration for the commercial (75—11m.) and radio amateur bands (80—10m.) of the large drum-type main tuning bandspread dials.

Outstanding Input Sensitivity—The dual-gate MOSFET front end assures excellent cross-modulation and spurious characteristics, as well as high input sensitivity. Between 18 and 30 MHz the R-300 operates as a double superhet, giving sensitivity of  $1\mu\text{V}$  for AM and  $0.5\mu\text{V}$  for SSB. For full details, contact the sole importers of the TRIO range.

R300 £184.50 inc. VAT

Sole Importers; LOWE ELECTRONICS  
Cavendish Road, Matlock, Derbyshire  
Tel.: Matlock 2817 or 2430

# LOWE ELECTRONICS LTD

## PRICE LIST JUNE 1977

	Price incl. VAT £	Carr. £	Price incl. VAT £	Carr. £
<b>TRIO EQUIPMENT</b>				
TS820 HF transceiver ... ..	625.00	3.00		
VF820 external VFO ... ..	108.00	3.00		
DGI digital readout ... ..	126.00	3.00		
DS1 12V inverter ... ..	40.50	.70		
YG88 CW filter ... ..	36.00	.25		
TS520 transceiver 12v. dc/240v. ac	432.00	3.00		
SP520 matching loudspeaker ... ..	18.00	.70		
VF0520 external VFO ... ..	72.00	3.00		
TV502 matching 2m. transverter ...	171.00	3.00		
CW520 CW filter ... ..	36.00	.25		
TS700G 2m. all mode transceiver*	392.62	3.00		
VOX-3 matching VOX unit (free with TS700G)	19.80	.85		
TR7200G 10W car transceiver with 10-channels*		3.00		
*on offer at	175.00			
VF030G remote VFO with repeater shift ...	90.00	3.00		
PS5 mains power supply/digital clock ...	58.50	3.00		
TR7400A 25W digital FM transceiver ...	299.25	3.00		
TR2200GX 2m. hand portable. Fitted 3 channels	130.50	3.00		
Fitted 12 channels ... ..	160.00	3.00		
VB2200GX 10W amplifier ... ..	45.00	.70		
Ni-cad battery pack ... ..	9.72	.36		
RA1 helical antenna ... ..	6.30	.15		
R599D receiver ... ..	369.00	3.00		
S599 matching loudspeaker ... ..	17.00	.70		
TS99S de-luxe transmitter ... ..	369.00	3.00		
SP599 (to match early JR599) ... ..	10.00	.70		
R300 general coverage receiver ... ..	184.50	3.00		
TR7010 2m. SSB transceiver* ... ..		3.00		
*on offer at	175.00			
PS5 mains power supply/digital clock ...	58.50	3.00		
HC-2 ham clock ... ..	13.50	.55		
MC10 hand microphone ... ..	9.00	.25		
MC50 table microphone ... ..	23.00	.70		
LF30A low pass filter ... ..	15.75	.57		
BPF2A 2m. band pass filter ... ..	27.00	.57		
TR3200 70cm. handy transceiver ... ..	171.00	3.00		
Ni-cad battery pack ... ..	9.72	.36		
MBI mobile mounting bracket for				
TR2200GX/TR7200G/TR3200 ... ..	9.45	.56		
<b>NIHON DENGYO</b>				
Belcom 70A. FM, SSB, CW, AM for 70 cm. to be announced				
Liner 430 70cm. SSB transceiver ... ..	290.25	3.00		
RI15E regulated psu for Liner 430 ... ..	31.50	3.00		
<b>RECENT PRODUCTS</b>				
KF-430 10W 70 cm. mobile fitted 9 channels ...	180.00	3.00		
<b>UNIDEN EQUIPMENT</b>				
2020 HF transceiver ... ..	495.00	3.00		
8010 external VFO ... ..	106.87	3.00		
8120 matching speaker ... ..	31.50	.70		
2030 2m. mobile 10W FM				
fitted 1 channel ... ..	140.62	3.00		
fitted 3 channels ... ..	148.50	3.00		
fitted 5 channels ... ..	156.37	3.00		
fitted 8 channels ... ..	167.62	3.00		
fitted 11 channels ... ..	178.87	3.00		
<b>RTTY VIDEO DISPLAY</b>				
TD224 display unit ... ..	209.25	3.00		
DM170 terminal unit with UHF mod. ... ..	105.30	3.00		
UHF mod. battery powered ... ..	16.87	.25		
<b>CRYSTALS</b>				
We stock FM channels S0, S16 to S24, S32 (145-80) and all current repeater and reverse repeater channels for the equipment we sell.				
<b>VHF MARINE RECEIVERS</b>				
SR-9 tunable/crystal monitor ... ..	58.50	.70		
*NEW* AMR217B scanner with 8 crystals ...	106.87	.85		
Seiwa MR-2 monitor less crystals ... ..	63.00	.57		
Seiwa MS-2 scanner less crystals ... ..	67.50	.75		
Crystals for the above—each ... ..	2.70	.15		
<b>VHF AMATEUR RECEIVERS</b>				
NR-56 tunable/crystal 2m. FM receiver ...	54.00	.70		
Seiwa MR-2 less crystals ... ..	63.00	.57		
Seiwa MS-2 scanner less crystals ... ..	67.50	.57		
*NEW* AMR217B scanner with 8 channels ...	106.87	.85		
Crystals for the above—each ... ..	2.40	.15		
<b>CATRONICS PRODUCTS</b>				
DFM 5V 180 MHz digital counter ... ..	135.00	3.00		
500 MHz prescaler above ... ..	27.00	.25		
<b>MICROWAVE MODULES EQUIPMENT</b>				
MMC70 4m. converter ... ..	20.25			
MMC144/28 LO 2m. converter ... ..	22.50			
MMC432/28 70cm. converter ... ..	24.75			
MMC432/144 70cm. converter ... ..	24.75			
MMC1296/28 23cm. converter ... ..	28.12			
MMC1296/144 23cm. converter ... ..	28.12			
MMV432 70cm. tripler ... ..	19.80			
MMV1296 23cm. tripler ... ..	33.75			
MMD050 50 MHz counter ... ..	66.96			
MMD500P 500MHz prescaler ... ..	27.00			
MMD050/5000 500MHz counter ... ..	85.32			
MMT432/28 70 cm. transverter ... ..	109.12			
MMT432/144 70 cm. transverter ... ..	149.62			
MT144/28 2m. transverter ... ..	88.87			
<b>FILTERS</b>				
Trio LT30A low pass filter ... ..	13.50	.57		
Trio BPF2A 2m. band pass filter ... ..	27.00	.57		
Shinwa 1110 2m. band pass filter ... ..	13.72	.57		
Shinwa 1006 2m. low pass filter ... ..	11.48	.57		
Shinwa 1140 28 MHz transverter filter ...	13.72	.57		
Shinwa 1005 H.F. low pass filter ... ..	10.80	.57		
<b>VHF/UHF "J" BEAMS</b>				
5Y/2M ... ..	6.97	3.00		
8Y/2M ... ..	9.11	3.00		
10Y/2M ... ..	19.35	3.00		
PBM14/2M ... ..	28.35	3.00		
5XY/2M ... ..	14.51	3.00		
8XY/2M ... ..	18.11	3.00		
10XY/2M ... ..	23.96	3.00		
Q4/2M ... ..	14.85	3.00		
Q6/2M ... ..	19.80	3.00		
D5/2M ... ..	12.37	3.00		
D8/2M ... ..	16.59	3.00		
XD/2M ... ..	8.94	3.00		
UGP/2M ... ..	6.41	3.00		
MBM48/70cm ... ..	19.68	3.00		
MBM88/70cm. ... ..	26.32	3.00		
I2XY/70cm ... ..	27.00	3.00		
2m. Colinear C5/2m ... ..	28.12	3.00		
<b>PHASING HARNESES</b>				
PMH/2C for 2m. circular polarisation ...	4.61	.57		
PMH2/70 for 70cm. ... ..	5.34	.57		
PMH4/70 for 70cm. ... ..	11.13	.57		

All  
Micro-  
wave  
modules  
post  
paid

# LOWE ELECTRONICS LTD

	Price incl. VAT £	Carr. £
<b>H.F. MOBILE ANTENNAS</b>		
'G' Whip tribander helical	18-11	1-00
'G' Whip multimobile	21-37	1-00
L.F. coils for the above whips	5-48	.55
Telescopic whips for the above	2-08	.55
Base mount for all 'G' whips	2-47	.55
Extendard 40' booster	9-22	1-00

<b>RAK ANTENNAS</b>		
A-8XL 80m. dipole	12-15	.70
AL-48DXN 80/40m. trap dipole	25-43	.85
Midy VN 80m. to 10m. trap dipole	40-50	1-00
Listener III SWL antenna	25-43	.70
Listener I SWL antenna	9-45	.55
HD-26A extendable dipole	6-75	.36

	Price incl. VAT £	Carr. £
<b>HY-GAIN ANTENNAS</b>		
<b>HIF. Beams</b>		
TH2Mk3	105-75	3-00
TH3Jnr	108-00	3-00
TH3Mk3	154-12	3-00
TH6DXX (carriage by B.R.S.)	185-06	3-00
Hyquad 2 element	170-77	3-00

<b>H.F. Verticals</b>		
12AVQ	36-63	3-00
14AVQ/WB	51-97	3-00
18AVT/WB	72-45	3-00

<b>V.H.F. MOBILE WHIPS</b>		
Bantex B5/GF 2m. 1/2 whip	8-16	3-00
Magnetic mount	10-40	.55
Bantex UCL 70cm. colinear	9-62	3-00
Bantex BUG 2m. colinear	29-53	3-00
'J' Beam TAS 2m. 1/2 whip	11-81	3-00
Daiwa MA-41 2m. 1/2 wave gutter mounting	8-44	.70
Gutter clamp. Accepts most whips	2-81	.57

<b>C.D.E. ROTATORS</b>		
AR40	48-09	3-00
CD44	100-12	3-00
Ham-2	133-87	3-00

<b>CABLE (prices per metre)</b>		
5 core rotator cable	.20	} Please add VAT at 8% to cable prices
8 core rotator cable	.32	
12 core rotator cable	.25	
UR43 50 ohm coaxial cable	.15	
UR67 50 ohm coaxial cable	.38	
RG8AU 50 ohm coaxial cable	.38	
Twin feeder 300 ohm	.08	
Twin feeder 75 ohm	.08	£1-00
Twin feeder 75 ohm heavy duty	.22	

<b>ACCESSORIES</b>		
Morse keys	8-10	.57
Katsumi Keyers EK150	60-75	.55
Low impedance padded headsets	4-68	.57
Trio MC10 hand microphone	9-00	.25
Trio MC50 dual impedance table microphone	23-00	.70
Kuranishi wattmeter/dummy lead RW151D	75-60	.70
Trio Ham clock HC-2	13-50	.85
Microphone plugs 4 pin	.67	.15
Microphone sockets 4 pin	.67	.15
Maiden accessory speakers	2-52	.25
PL259 plugs	.51	.15
Reducers for PL259 plugs	.17	.15
SO239 sockets	.51	.15
PL259 in-line connectors	.82	.15
PL259 angle connectors	1-03	.15
Hu-Gain CI centre dipole insulator	3-82	.36
Hu-Gain BN86 balun	13-33	.57

<b>DAIWA ACCESSORIES</b>		
CL-22 SWL ATU	13-50	.55
CSW-216 ATU with built in SWR meter	103-50	3-00
CL-666 high power ATU	175-50	3-00
CL-65 ATU	54-00	3-00

	Price incl. VAT £	Carr. £
AT-400X stepped attenuator	41-04	.70
CS-201 coax switch (SO239 sockets)	11-25	.36
CS-201N coax switch (N type sockets)	15-76	.36

<b>SWR/POWER METERS</b>		
<b>Daiwa</b>		
SWX-777 In line power/swr meter. 1-8-30 MHz Up to 1kW FSD	110-16	.85
SW410 In line power/swr. meter. 140-450 MHz. Up to 120W FSD	48-60	.70
SW110 In line power/swr. meter. 1-8-150 MHz. Up to 200W FSD	25-92	.70

<b>Hansen</b>		
PM2000 In line peak reading power meter. 3-5-30 MHz. Up to 2kW FSD	48-60	.70
FS301 In line power/swr. meter. 1-5-30 MHz Up to 1kW FSD	32-00	.70
FS302 In line power/swr. meter. 50-150 MHz. Up to 200W FSD	32-00	.70
SWR-3 In line single meter SWR bridge. 1-8-150 MHz	9-50	.57
SWR-25 In line twin meter SWR bridge. 3-5-150 MHz	10-80	.57

<b>VALVES</b>		
6AH6, 6CB6A, 6CL6, 6U8A, 6BM8, 12BY7A, 6EV6 each	.90	.25
6GK6 (RCA)	2-70	.25
6J56C, 6KD6 per matched pair	6-03	.36
6LQ6 per matched pair	7-02	.36
6146B/S2001 each	6-30	.36

**PLEASE ADDRESS ALL MAIL ORDERS TO MATLOCK  
LOWE ELECTRONICS LTD**

HEAD OFFICE AND SERVICE DEPARTMENT  
119 CAVENDISH ROAD, MATLOCK, DERBYSHIRE  
DE4 3HE

Telephone: 9 a.m. to 9 p.m. Matlock (0629) 2817 or 2430  
Telex: 377482 Lowelec, Matlock

**Southern Sales** Peter, G3ZPB, Communications House, 20 Wallington Square, Wallington, Surrey. Tel. 01 669 6700.

**Midland Sales** Peter, G3XWX, Soho House, 362-364 Soho Road, Handsworth, Birmingham. Tel. 021 554 0708.

**Northern Sales** Tom, G4DVZ, 27 Cookridge Street, Leeds. Tel. 0532 452657.

In addition to the above shops which are open from 9 to 5.30 Tuesday to Saturday (Wallington shop closed Saturday afternoon) we have part-time agents who are available at evenings and weekends:

**John, G3JYG** 16 Harvard Road, Ringmer, Lewes, Sussex. Tel. Ringmer 812071.

**Sim, GM3SAN** 19 Ellismuir Road, Baillieston, Nr. Glasgow. Tel. 041 771 0364.

**Alan, GW3YSA** 35 Pen Y Waun, Efail Isaf, Nr. Pontypridd, Glamorgan. Tel. Newtown Llantwit 3809.

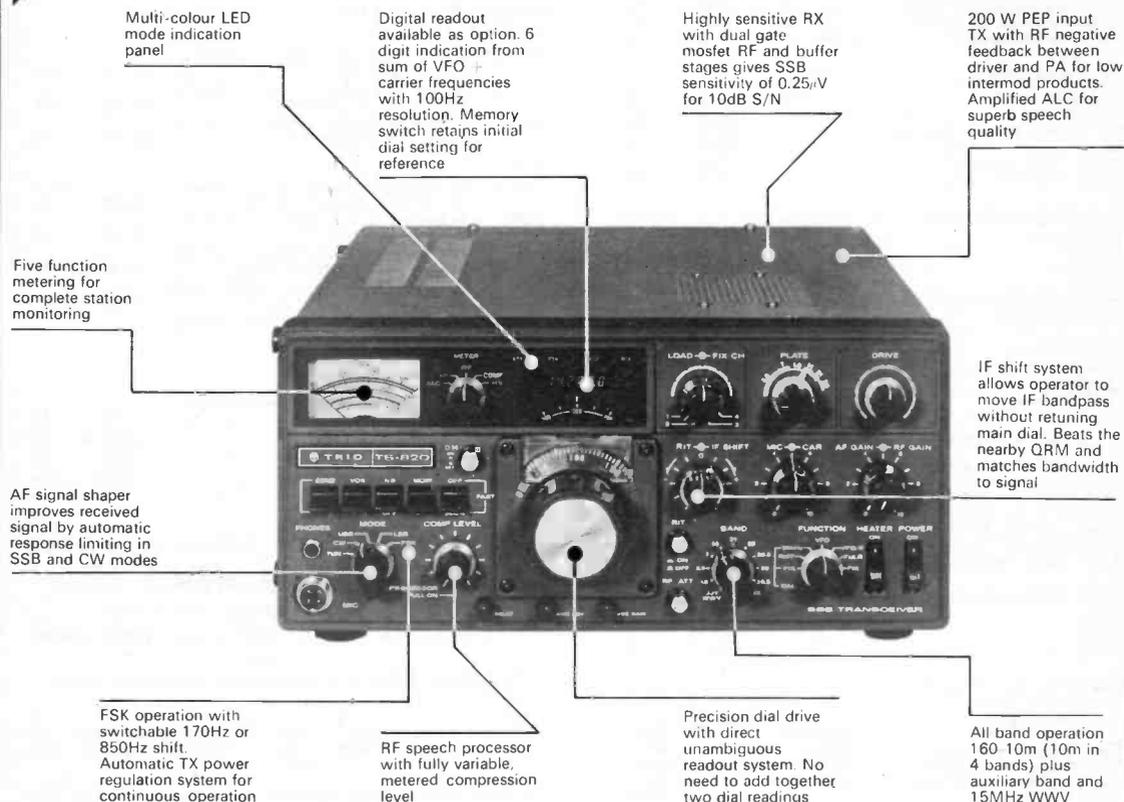
So, wherever you are, we have a branch or part-time agent not too far away. At Matlock, the branches, or our agents you will see can try out the very best in new and secondhand HF or VHF equipment, together with every conceivable aid or accessory for the complete station.

With new products coming along all the time, it is difficult to keep a price list up to date. If you send 50p, you will receive all current brochures, catalogues, prices and the antenna booklet that everyone is talking about.

**NEW**

# The DXpert

An all-new big brother for the TS520  
TS820 from TRIO



The all new TS820 from Trio completes their HF transceiver range. This is the top-of-the-line transceiver which offers a significant advance in design and construction over all others. This is the "DXpert" from Trio.

- Full transceiver operation on all amateur bands from 160-10 metres (28-30MHz) on SSB, CW and RTTY; optional 2 metre transverter; optional external VFO for full split Tx/Rx operation.
- Outstanding performance on both transmitter and receiver due to fully balanced mixing combined with latest PLL techniques.
- First class frequency stability and large signal handling characteristics.
- All new precision dial drive mechanism with unambiguous mechanical readout. Optional digital frequency readout with memory facility.
- Fixed station or mobile operation with a complete line of matched system accessories for building the best possible complete station.
- RF speech processor with fully metered adjustable compression is built-in.



SP-520 TS-820 VFO-820 TV-502

- IF pass band tuning allows the IF to be tuned across a signal without resetting the main dial.
- Five function metering system together with LED monitoring of all important functions gives unparalleled operator control.

This brief advertisement can only touch upon the main details of the TS820. You have to handle it to appreciate its performance. See it soon at your local branch of Lowe Electronics.

**Sole Importers**  
**LOWE ELECTRONICS**  
 Cavendish Road  
 Matlock Derbyshire  
 Tel: Matlock 2817/2430

 **TRIO**

# FOR 144MHz ALL MODE OPERATION ... THE QUALITY TRANSVERTER FROM THE PEOPLE WHO KNOW!

As you may already know, we are now manufacturing a 144 MHz all mode solid-state linear transverter, MMT144/28 as pictured below.

This 144 MHz unit is fully compatible with any 28 MHz drive source and provides 10 watts continuous power output from power transistors capable of withstanding severe mismatch.

An internal aerial changeover relay of the PIN diode type is incorporated which has a through-loss of less than 0.2 dB. The combination of a low distortion balanced transmit mixer incorporating protected dual gate MOSFETS, to produce a spurious-free linear signal and a low noise receive converter, makes the unit ideal for all modes of transmission at 144 MHz, particularly where a high degree of stability, linearity and sensitivity are of prime importance.

The use of high Q circuitry throughout ensures an extremely good spurious rejection and selectivity.

The unit is housed in a highly durable black diecast case and all circuitry is constructed on high quality glass-fibre printed circuit board. The high power linear amplifier stages are housed in a separate internal compartment, thus ensuring excellent electrical and thermal stability. If you have an H.F. Bands rig and you're thinking of moving onto 2 metres, the MMT144/28 must be the transverter for **YOU**.



## SPECIFICATION

Frequency range : 144-146 MHz  
Input modes : SSB, FM, AM or CW  
Input frequency range : 28-30 MHz  
DC power requirements : 12 volts nominal  
Current consumption : 2.2 Amps peak

Power output : 10 watts continuous rating

Drive requirements at 28 MHz : 500 mW or 5 mW

Relative 146 MHz output : -65 dB

Other spurious outputs : -65 dB

Receive converter gain : 30 dB

Receive converter noise figure : Better than 2.5 dB

Power connector : 5 pin DIN

RF input/output connectors : 50 ohm BNC

Size : 187 x 120 x 53 mm.

Weight : 800 g

Price : £88.88 inc. VAT

Any further information on this product and others from our extensive range may be obtained by contacting our sales department, who will be only too pleased to help.

Incidentally, we are now on telex. Should you require any information urgently, our number appears below.

**MICROWAVE MODULES LIMITED**  
**BROOKFIELD DRIVE, AINTREE, LIVERPOOL**  
**L9 7AN** **TEL.: 051 523 4011**  
**TELEX: 628608 MICRO G.**



# YAESU MUSEN

## FINEST VALUE IN THE WORLD

### FRG7 Synthesised General Coverage Communications Receiver.



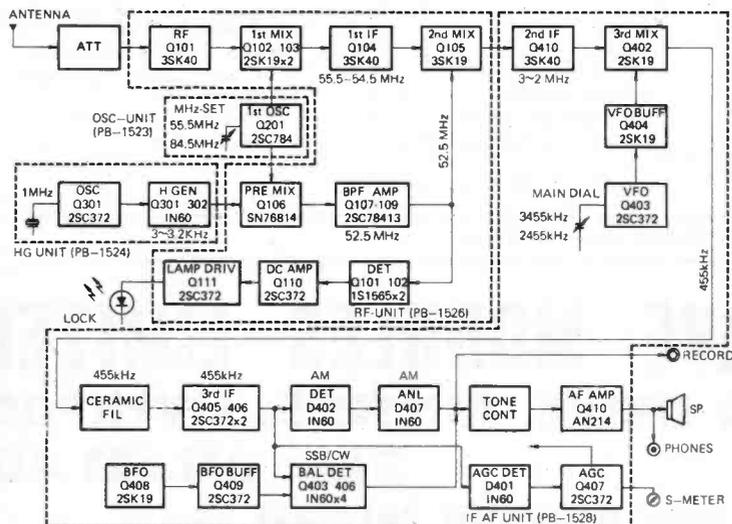
The FRG7 is a solid state mains and 12v. receiver offering continuous coverage 0.5-30 MHz with specifications unparalleled in its price range.

Its advanced circuitry provides superb performance either as a standby receiver or for SWL's (Broadcast and Amateur Bands alike)

The use of a Wadley loop (using the same VHF oscillator to mix up, then after pre-mixing with a stable crystal source down again (this cancelling all drift from the variable oscillator)). It provides equivalent performance to 30 crystal controlled converters feeding a low IF, but without the image problems of such an arrangement.

The signal path starts with the choice of 3 antenna connectors : for 1-6-30 MHz, a 50/75 ohm feed (to a SO239 (UHF) coax socket and a binding post) and for 0.5-1.6 MHz (medium wave) a separate high impedance binding post. A 3 position 0-40dB switchable attenuator aids reception of very strong signals and reduces adjacent channel interference. The low noise MOSFET RF amplifier provides a SSB sensitivity of 0.25 $\mu$ V (for 10dB N+ S/N at 10.5 MHz) and is sharply tuned by a well calibrated "pre-selector" capacitor with 4 band switched coils. Its output is low pass filtered (fc = 35 MHz) removing VHF image problems from the following mixer. This comprises a pair of JFETs, driven by the "MHz set" 55.5-84.5 MHz, oscillator, which upconverts the signal to the band pass first IF to 55 MHz  $\pm$  500 kHz where it is MOSFET amplified. The second IF of 2-3 MHz is produced by a FET mixer by heterodyning with the synthesiser derived 52.5 MHz signal. A 1 MHz crystal oscillator and diode harmonic generator produces a 3-32 MHz comb spectrum. This, with the first heterodyne oscillator (MHz set) is fed to a dual balanced i.c. pre-mixer. The output is expurgated by a multiple stage selective amplifier producing the 52.5 MHz second oscillator. A small fraction of this is rectified, DC amplified and lights the "lock" LED (saving power) when the MHz oscillator is locked. The 2-3 MHz signal is MOSFET amplified and fed to the third mixer (a JFET whose input and output are tuned by capacitors ganged to the main tuning control) where it is heterodyned to the final IF by the main VFO which covers a 1 MHz range (2.455-3.455), is clearly calibrated, to 5 kHz (or better), well buffered, and highly stable. The third (455 kHz) IF starts with the ceramic selectivity element and is followed by two stages of bipolar (the first in the

signal path) amplification before the choice of detectors; twin diodes for AM, or a 4 diode product detector, with well buffered switched frequency (for selectable sidebands) B.F.O. A diode rectifies, a fraction of the output from the final IFT, this is boosted to drive the illuminated "S" meter and automatically gain control the MOSFET amplifier in the RF, second and third IF stages, reducing fading and distortion. Immediately following the demodulator is an automatic noise limiter, highly effective in suppressing pulse type interference on AM signals, and a three position "tone" switch a (high, low or band pass) audio filter, reducing the bandwidth to that required. A transformerless AF amplifier ; delivers a generous 2W to the internal 5" x 3", or external speaker, drives a phone jack, and a "volume" independent output for tape recorder. The receiver is, mains (234VAC), external (12v. DC) or internal dry cell powered, the most economic source being automatically chosen. This is reduced to a stable regulated 10v. (or 9v. for oscillator and the harmonic generator). A dial lamp switch is provided to conserve power on battery operation.



# YAESU MUSEN

## FR-101 SOLID STATE RECEIVER



FR-101DD

The FR-101D(D) is a wide coverage communications receiver (Mains and 12v.) for amateur and SW. BC. use. Four switched crystal filters provide optimum bandwidths for A.M., SSB, FM, CW, and RTTY. The receiver accepts external VFO control from the FL-101 or the FT-101E transceiver. It is constructed using plug in boards, has an adjustable noise blanker and fixed channel crystal control operation facilities LED's indicate VFO and clarifier ( $\pm 5$  kHz) status and 100/25 kHz switchable crystal calibrator is standard.

- FR101DD the digital de luxe ;
- other equally superb versions :
- FR101D de luxe with all extras less digital readout.
- FR101DS digital standard.
- FR101S standard non digital version.

**COVERAGE (metres)**

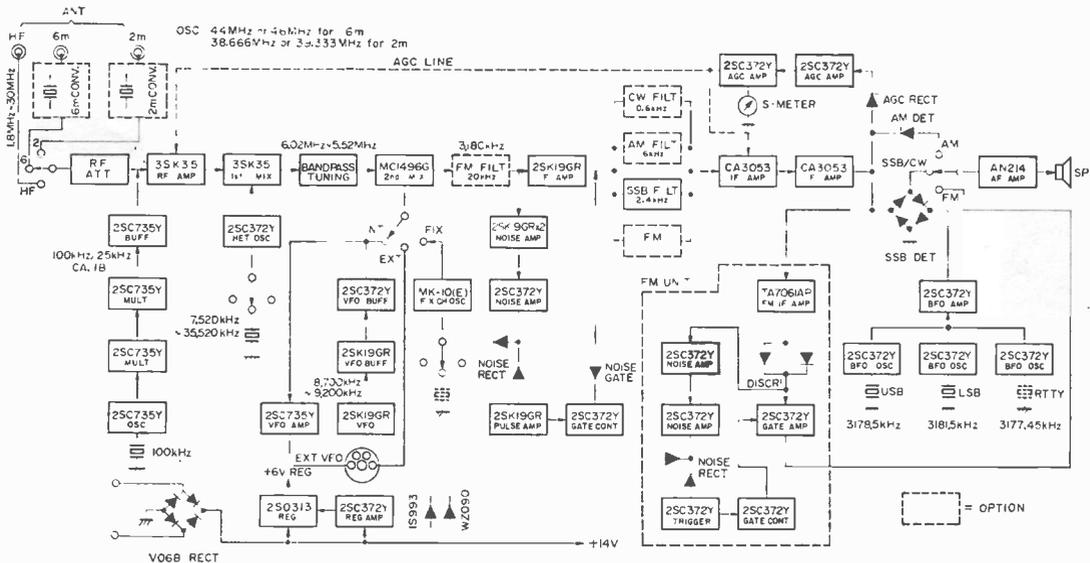
30(+500 kHz Segments  
160, 80, 40, 20, 15, 10, 4, 2  
60, 31, 25, 19, 16, 13, 11, CB  
4 Bands around 4, 5, 8, 25 MHz  
AGC Threshold  $1\mu\text{V}$  Attack  
3 or 4 m.S. Release .5 or 2 S  
AF Output 2W (10% D)

**SENSITIVITY (at 14 MHz)**

CW 0.2 $\mu\text{V}$  10dB N+S/N  
SSB 0.3 $\mu\text{V}$  10dB N+S/N  
AM 1 $\mu\text{V}$  10dB N+S/N  
FM 1 $\mu\text{V}$  12dB SINAD  
Stability 100Hz/30 mins.  
Linearity 1kHz. Backlash 50Hz.  
image -60dB

**SELECTIVITY (at 6dB)**

CW 600Hz (2.5 : 1)  
SSB 2.4kHz (1.67 : 1)  
AM 6kHz (2 : 1)  
FM 20kHz (2.25 : 1)  
12 FET 20 BIP 33 DIO 4 IC's  
6 Tubes. 5 BIP 88 DIO. 23 IC's  
13"W x 6(7") H x 1 1/2 (14") D



**OUR AGENTS**

Amateur Electronics,  
508-514 Alum Rock Road  
Alum Rock,  
Birmingham B8 3HX

South Midlands Communications Ltd.  
S.M. House, Osborne Road,  
Totton,  
Southampton, Hampshire SO4 4DN

Western Electronics (UK) Ltd.,  
Fairfield Estate,  
Louth,  
Lincolnshire LN11 0JH



# South Midlands

TOTTON (HANTS) NO. 1 DERBYSHIRE

## YAESU 2 YEAR GUARANTEE ONLY FROM SMC

S.M.C.'s guarantee. Confidence in Yaesu quality, is until further notice, extended to 2 years, covering both labour and free components (excluding valves, semi conductors and carriage).

**FREE SECURICOR '24 HOUR' B SERVICE**

For Yaesu items over £55  
Over £5 post free.

**THE LARGEST RANGE EX-STOCK IN THE UK, FROM SMC**

**FT101E, EE or EX from S.M.C. for SERVICE**

The FT101E a complete mains or 12v. DC station contained in a compact 30 lb. package, 260W., PIP of 55B (with in-built RF speech processor) 180W, CW and 80W. or AM 10 to 160m. (inc. 10 MHz RX). The sensitive and selective (permeability tuned RF stages and 8 pole crystal filter) receiver offers : threshold adjustable noise blanker, switchable 25 and 100 kHz calibrator,  $\pm 5k$  clarifier (with separate on/off switch), etc., etc.

The VFO is stable and linear (readout to 1 kHz), external VFO or crystal control can be selected, with LED indicators illuminated accordingly. Carrier level is adjustable for : tune up, AM and for CW operation, whose performance with the semi break-in keying, with side tone, and the optional 600 Hz filter installed is of high order. Linear and transmitter provisions are made with sockets for : relay contacts, ALC output, all internal HT supplies, low level RF, heater links and switches, etc., etc.



**FT200 from S.M.C. for VALUE !!**

**FT200B £249 + VAT**

**FP200B £54 + VAT**

The FT200B. The "Best Buy"—260W. PIP (A3), A1) 75W (A3), 80 to 10m. (28.5–29 MHz, 3 other crystals optional) Sensitive and selective 2.3 kHz at 6 dB (1.75 : ISF). Solid state, stable, linear (readout to 1 kHz), gear driven VFO. 100 kHz calibrator. VOX/PPT, clarifier ( $\pm 5$  kHz). Semi break in CW with sidetone, etc., etc. The pre mix oscillator system used, yields : low spurious outputs on transmit, and the good signal handling and low noise capability of a single conversion superhet (whilst retaining a 9 MHz IF with high image rejection) and single range VFO stability.



**SPECIAL YAESU — S.M.C. BARGAIN : SIGMASIZER 80R £195 + VAT**

**THE VERSATILE ONE—SIGMASIZER 80R**

The Sigmasizer 80R offers 80 (25 kHz increments) channels on 2m. The received frequency is always indicated on the dial, either transceive (simplex) or for repeaters, the transmitter is automatically shifted down 600Hz. When the receiver is tuned to repeater input channel, the transmitter is automatically shifted upwards thus offering full, simplex, normal repeater or inverse repeater. The built-in tone burst functions only in repeater mode. A further channel may be programmed for instant selection of a local net or RAEN frequency. Automatic final protection, 10W or RF and a generous 2W of audio are available from the unit which draws only 2.2A on 12v. DC.



SIG80R

**V.H.F. PORTABLES**

**KP202 TRANCEIVER**

6 channel 144 MHz handheld fully crystallized up

The handheld KP202 with its 2W of RF and  $\frac{1}{2}$ W of audio immunity to image and IF break-through, offers performance to rival all walkie-talkies and many mobile 10W sets. The KP202 is supplied with telescopic whip, leather handle/whip case and F type plug. Accessories include automatic (R channels only) crystal tone burst £10.00, flexi stubby antenna (£5.80), leather case (£4.90), base charger KCP2s (£11.75), set of 10 ni-cads (£8.50), F to UHF adaptors (£1.65), F plugs, spare whips, spare hods, etc.

**SIX CHANNELS** fitted S20 and S22 and any 4 of SO, S21, S23, S24, R3, R4, R5, R6, R7  
**ONLY £109.50 (+ VAT).**

**NEW SEIWA RECEIVERS**

**Seiwa MR2 and MS2**

This tiny yet well engineered sensitive Rx is ideal for the SWL, XYL or as a monitor Rx. The MR2 has 12 switched channels, (2 or 4 metre models are available). The MS2 automatically scans 4 channels on 2m.

All are double conversion, with 12kHz bandwidth, automatic squelch, good audio output and will fit into your top pocket, or on a belt (with optional case). Complete with ni cads, mains charger, speaker, earpiece, aerial Wt. 7 ozs. Size : 122 x 69 x 33 mm. Price only MR2 £53 + VAT, MR2 (4m.) £53 + VAT, MS2 £62 + VAT, leather case £1.90. Crystals £2 + VAT.



**SOUTH MIDLANDS COMMUNICATIONS LTD.**  
Head Office : SHOWROOMS AND MAIL ORDER  
OSBORNE RD., TOTTON, SOUTHAMPTON SO4 4DN  
Tel.: Totton (04216) 7333 (3 lines) Telex: 477351 SMCMM G  
Hours of business : 9-5.30 : 9-12.30 Saturday.

**SMC (JACK TWEEDY) LTD**  
79 CHATSWORTH ROAD, CHESTERFIELD,  
DERBYSHIRE. Tel.: Chesterfield (0246) 34982  
Open : Tuesday-Saturday 9-5 p.m.

**HAM SHACK, ROUGHTON LANE,**  
WOODHALL SPA, LINCOLNSHIRE  
Open : Tuesday-Saturday 9-5 p.m.  
Tel.: Woodhall Spa (0526) 52793  
Weekends and Evenings by appointment.

# Communications Ltd

LINCS. BIRMINGHAM. Agents : N.I., SCOTLAND, WALES



## UK MAIN DISTRIBUTOR ★ MASTS ★ ANTENNAS

VERSATOWERS COPIED BUT UNEQUALLED ARE ALSO CHEAPER THAN THEIR COMPETITORS THANKS TO LARGE SCALE PRODUCTION SAVINGS. NEW EXTRA HEAVY DUTY MODELS are now available for the discerning user.

Sample prices : W40, £170.50 ; P40, £212.50 ; HDP40, £286.50 ; P60, £252.00, HDP60, £333.00. Also guyed masts 50ft. height for only £42 or £74.50 with complete comprehensive rigging kit. All plus carriage and VAT.

**THE VERSATOWER** (illustrated right) Price increases have been kept to a minimum. Contact SMC (HQ) for technical advice regarding models, installation, etc. We have commercial manufacturing experience in antennas and masts over 19 years which we gladly use for the benefit of amateurs and commercial applications

### CUSHCRAFT VHF OMNI (Carriage 95p) VAT 12½%

**RINGO RANGER ARX** 6dB gain (over ¼) ultra low angle radiation, excellent 50 ohm match uses 3 x ¼ in phase and ¼ stub. 145 MHz version approx. 9' 6" (¾ lbs.) 432 MHz approx. 3' 6" (illustrated).  
 ARX2 Ringo Ranger ARX450 Ringo Ranger  
 145 MHz ... £21.50 432 MHz ... £21.50  
 AE2 3 dB Ringo Vert. ... £12.75 ABW144 2m. Big Wheel £14.50  
 AR25 QRO AR2 ... £15.00 ABW125 ABW harness £7.30  
 CX1000 29 MHz Ringo ... £25.75 ASQ22m. Squalo ... £11.75

### JAYBEAM 70 (4m), 144 (2m), 432 (70) (Carr. £1) VAT 12½%

D5/2m. 5 over 5 slot feed ... £11.00	PBM10/2m 10 ele. Para ... £20.50
D8/2m over 8 slot feed ... £14.75	PBM14/2m 14 ele. Para ... £25.20
5XY/2m 5 ele. crossed ... £12.90	D8/70 8 over 8 slot feed ... £12.57
5XY/2m 8 element crossed ... £16.10	PBM18/70 18 ele. Para ... £15.00
10X/2m 10 ele. crossed ... £21.50	MBM48/70 46 ele. Multi ... £17.50
5Y/2m 5 ele. yagi ... £6.20	MBM68/70 88 ele. Multi ... £23.00
4Y/2m 8 ele. yagi ... £8.10	12XY/70 12 ele. crossed ... £24.00
10Y/2m 10 ele. long yagi ... £17.20	4Y/4m element yagi ... £10.20
14Y/2m 14 ele. long yagi ... £22.00	PMH/70 2 way harness ... £4.75
Q4/2m 4 ele. yagi ... £13.20	PMH2/Circ. phasing ... £4.10
Q6/2m 6 ele. quad ... £17.60	PMH2/2m 2 way harness ... £5.50

### SMC TRAPPED DIPOLES (Post 45p) VAT 12½%

S 500W P.I.P. 14 SWG ... £19.60 PS50W. P.I.P. Cu/Terylene  
 HP 1K P.I.P. 14 SWG ... £21.75 braid c/w 75' feeder, etc. £21.75

### MOSLEY TRI-BAND BEAMS (Carriage 2.50) VAT 12½%

TA33 3 ele. 200W R.M.S. £70.00 TA32 2 ele. 300W A.M. £49.00  
 MUSTANG 3 ele. ... £90.00 MUSTANG 2 ele. ... £73.00

### GEM QUAD FIBREGLASS (Carriage £2) VAT 12½%

GQ2E 2 element ... £119.00 GQ4E 4 element ... £238.00  
 GQ3E 3 element ... £178.00 CKIQ 1 ele. Conv. kit ... £60.00

### G WHIP HF MOBILE (Carriage 90p) VAT 12½%

Tribander 10-20m. (+LF) £16.10 LF40, 80 or 160 ... £4.87  
 Multimobile 10/20 +MM £19.00 MM40, 80 or 160 ... £4.87  
 Flexiwhip 10m. (+FF) ... £13.35 FF15, 20, 40, 80 or 160 ... £5.04  
 Basemount ¼" hole mount £2.20 Telescopic whip for coils ... £1.85

### ROTATORS

Ex-Stock in Totton for fast delivery  
 VAT-Rotators 12½%. Cable and delv. 8%  
 Carriage (BR5 or post) FREE. Securicor delivery £1 extra (mainland)  
 All rotators supplied complete with appropriate control box and instrs.

AR30 (illus. right near and centre ...	£39.50
AR40 (illus. right centre and far) ...	£46.00
AR33 (De-luxe control AR40) ...	£57.00
CD44 med. duty ...	£95.00
Ham II hy. duty ...	£129.00
2010/220 Stolle through Rotator type ...	£41.25
5 core—AR30/40/44 2030 per yd.	22p
8 core—CD44, Ham II per yd.	35p

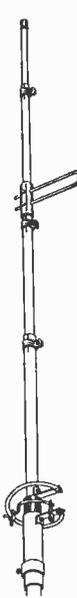
SEND A LARGE (10 x 12) S.A.E. OR 15p STAMPS FOR YAESU CATALOGUE, STOCK/PRICE/S-H LISTS Etc.

ALL SMC BRANCHES HAVE ON LOCATION SERVICING AND CAN OFFER SECURICOR DELIVERY FACILITIES

**NORTHERN (LEEDS) BRANCH**  
 THE CHAMBERS, NO. 3 THE PARADE,  
 NORTH LANE, HEADINGLEY, LEEDS  
 Leeds (0532) 78232  
 Open : 9-5 p.m. Tuesday-Saturday, 9-8 Thursday

**AMATEUR RADIO**  
 (Chas. H. Young Ltd.)  
 170/172 CORPORATION ST., BIRMINGHAM  
 Tel.: Birmingham (021) 236 1635  
 Open : Monday-Saturday 9-5.30 p.m.  
 Multi Storey Car Park at rear of shop now open

**AGENTS EVENINGS. ALL OTHR**  
 G3ZUL Stourbridge (03843) 5917 Brian Kennedy  
 GMBDOX Bridge of Allan (078683) 3223  
 Ian McKechnie  
 GW3TMP Pontybodkin (035287) 846  
 Howarth Jones  
 G13WVY Tandragee 840656 Mervyn Anderson



### HY GAIN HF RANGE (Carr. £1-£2.50) VAT 12½%

BN86 1 : 1 ferrite Balun ... £12.00	TH2MKW 10-20m. 2 ele. ... £96.00
103BA 10m. 3 element ... £43.50	TH3JNR 10-20m. 3 ele. ... £97.50
153BA 15m. 3 element ... £54.50	TH3MKW 10-20m. 3 ele. ... £147.00
203BA 20m. 4 element ... £103.00	TH6DXK 10-20m. 6 ele. ... £175.50
402BA 40m. 2 element ... £146.00	HY-QUAD 10-20m. 2 ele. ... £151.80
18V 10-80 Load Vert. ... £26.50	DB1015A. 10-15m. 3 ele. ... £99.00
12AVQ 10-20m. Trap Vert. ... £35.50	LA1 Lightning arrestor gas £20.30
14AVQ 10-40m. Trap Vert. ... £49.50	LA2 Lightning arrestor ... £3.30
18AVT/WB 10-80m. Vert. ... £67.50	HY TOWER Vert. ... £162.80

### BANTEX VHF WHIPS (Carriage 90p) VAT 12½%

BGA FG 2m. fibreglass ... £8.75	BSU ¼ 432 MHz ... £5.00
70¼ ¼ 70 MHz fibreglass ... £4.00	UCL Mid loaded ... £8.00
144¼ ¼, 145 FG or SS ... £3.50	TLB Trunk lip mount ... £5.75
B5 ¼ 145 MHz FG ... £6.35	MB Magnetic base ... £8.50
BGA SS 2m. s/less steel ... £8.50	Unwanted base deduct ... 50p

### COAX PLUGS (Post and Packing 30p) VAT 8%

PL259 Standard UHF plug	UR43 or 70 ...	12p
UHF fixed reducer ...	258 back to back (female)	80p
"Solderless" UHF RGBU	"T" Adaptor (2F + 1M)	£1.20
"Solderless" UHF UR43	Rt. angle (1M + 1F)	90p
UG* reducers state	Phone/car to SO239	55p
	SO239 2 hole socket	37p

### ROPES (Carriage Extra) VAT 8%

3mm. HT steel ... yd.	13p	X150 Rustproof 150m.	£10.85
3mm. HT steel ... yd.	20p	7 x 18g. Galvanised 100'	£2.20

### AERIAL INSULATORS (Post Extra) VAT 12½%

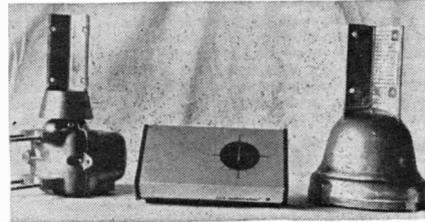
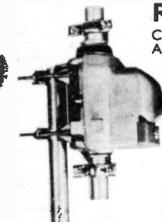
2½ Polyprop ribbed ...	14p	SMCPI 8" carbon polyprop	85p
NT1 4½" polyprop ribbed ...	45p	3" porcelain ribbed	33p

### AERIAL WIRE (Carriage Extra) VAT 8%

14 SWG hard drawn Cu. yd.	19p	7/-036 cad cu standard yd.	13p
Cu terylene braid yd.	13p	7/-044 cad cu standard yd.	17p

### CABLES (Carriage Extra) VAT 8%

UR67 50 ohm Heavy yd.	36p	UR39 75 ohm Medium yd.	24p
UR57 75 ohm Heavy yd.	42p	T3278 75 ohm Distrib. yd.	20p
75 ohm Flat Twin yd.	10p	UR43 50 ohm Solid Ct. yd.	16p
300 ohm ribbon yd.	12p	UR76 50 ohm Strand Ct. yd.	16p





**PRODUCE THE LATEST IN FM MOBILES  
10 WATTS 22 CHANNELS (15 ALREADY WIRED)  
AND YOU NEED NEVER BUY ANOTHER CRYSTAL!!**



introductory  
price **STILL**  
**£198** inc. VAT.

The IC-240 is the start of a revolution in 2 metre transceivers. It has all the advantages of the highly popular IC-22A, with its easily selected 22 Channel capability, but does it all with a phase locked synthesised system. Hence you can programme it for all 22 channels *WITHOUT HAVING TO BUY ANY CRYSTALS*. Channels are hand wired using diodes according to clearly described instructions. We supply the UK version with 15 channels already wired in, these being 10 simplex and 5 repeater. Thus there are 7 more frequencies for you to programme at your own whim—ideal for RAYNET and local net use. You can programme for any of the 80 channels at 25 kHz spacing between 144 and 146 MHz.

Duplex (for repeater use) operates by shifting the RECEIVE frequency. This means that by switching to SIMPLEX when using repeater channel you will automatically be listening on the INPUT channel of the repeater without having to wire in special "Reverse Repeater" channels.

The main advantage over other more expensive synthesised rigs is that by not having some 400 selectable channels, at 5 kHz spacing (most of which are redundant as they don't fit into the UK 25 kHz channel spacing system), you are relieved of multiple knob twiddling to change from one popular channel to another. 22 channels are ample for UK national simplex, repeater and local net channels and these are selected by one knob which is easier, quicker and safer than "trying to open a combination safe while driving."

As an optional extra, a built-in scanning system will be available which will scan all 22 channels.

The IC-240 has the same excellent FM performance as the well known and highly popular IC-22A. Consider these points which all contribute to providing optimum communication either direct or through the ever-growing number of repeaters in the UK :

- \* Low noise dual-gate mosfet in the front end of the receiver.
- \* 5-section helical filter after the front end to provide high rejection of unwanted out-of-band signals.
- \* Dual conversion with IFs of 10.7 MHz and 455 kHz for excellent image rejection and selectivity, with filters at each IF frequency.
- \* Narrow filter giving high rejection of adjacent channel signals 25 kHz away.
- \* Hard IF limiting using an IC.
- \* A sensitive, temperature compensated, adjustable squelch circuit with front panel indicator to show when the squelch is open should the gain control be turned back to please the XYL.
- \* 1.5 Watts of audio from its built-in speaker giving ample volume for copy on the move.
- \* Line voltages are filtered and regulated for reduction of interference from the dynamo or alternator.
- \* A full 10W output from a sturdy PA transistor.
- \* Built-in 1750Hz tune burst for repeater use.
- \* Automatic PA protection.

The channels already programmed are :

SIMPLEX S0, S16, S17, S18, S19, S20, S21, S22, S23, S24

REPEATER R3, R4, R5, R6, R7.

Accessories supplied with the rig :

- Microphone
- Quick release mobile mounting bracket
- Fixing screws
- Spare Fuse
- DC power cord



**FOR UK ENQUIRIES  
THANET ELECTRONICS  
HERNE BAY**

Leave your callsign on our  
Ansafone (02273) 63850 during  
the evening for more details  
of ICOM equipment.




## IC215 HANDY FM PORTABLE 15 channels 3 watts

Fitted with 7 channels (S20, S22, R3, R4, R5, R6, R7,)  
£162.00 INC. VAT

(There are still a few left with the special introductory offer of 12 channels fitted for the same price)

ICOM are pleased to introduce their first FM portable and a careful look at the features will soon show how popular it's going to be. You can use it ANYWHERE. Change vehicles, use it in the shack or take it for a walk to the local high spot and you have the high quality FM communication, for which ICOM are so famous available all the time. The batteries are larger than those of its competitors, thus giving considerably longer life. The 3 watt output and high sensitivity receiver makes it a useful main station set, where it can be operated from an external power supply and a good antenna system. Thus the IC-215 can be a good starting point for the man who has just obtained his licence and wants to get on the air without having to spend too much money.

#### LOOK AT THE MAIN FEATURES :

**Aluminium Die-cast Frame** The IC-215 chassis and main frame are integrated into an aluminium die-casting rendering it light but resistant to vibration or shock when carried.

**15 Channels** The unit incorporates 15 channels to select from : 12 by the main channel selector and a further 3 by the function switch. All crystals are plug-in-type HC-25/U and are the same as the crystals used in the popular IC-22A. Being fundamental crystals, they are tunable over a reasonably wide range and a separate trimmer is supplied for each crystal making accurate frequency adjustment possible. This is very important for optimum results with minimum interference.

**Dual Power Mode** The output power can be switched to 3W on HI for long distance work or 0.5W on LOW for short distance contacts or working a nearby repeater. Battery consumption is minimised in the LOW power mode.

**Dial Illumination** The dial can be illuminated to facilitate night operation. This is controlled by a selector switch on the front panel.

**Power Pilot Lamp** If the power voltage falls below the required value a red LED power indicator goes out as an indication that the batteries are almost exhausted or the external power is inadequate.

**External Power and Antenna Sockets** Sockets for external power and antenna are provided on the rear. The antenna socket takes a standard PL259 plug.

**Whip Antenna** A fully collapsible antenna is built into the top of the rig. This can be unscrewed and removed to provide a screw socket for a flexible helical antenna. We have had an Antenna Specialist flexible antenna specially made and tuned to suit the IC-215.

**Meter** The meter indicates receive signal strength during reception and relative output level during transmission.

**Squelch** A sensitive squelch control is fitted rendering the set silent when no signal is being received.

**External Speaker Jack** An external jack is fitted to the front panel for a larger speaker or an earpiece. The internal speaker is muted when this is used.

**Discriminator Meter Jack** By removing a rubber grommet on the side of the transceiver a jack socket is available for connection of a 50 microamp centre-zero meter. This is very useful when tuning extra receive crystals.

**Tone Burst** A 1750Hz tone burst is fitted for opening UK repeaters.

**Shoulder Belt** A shoulder belt is supplied and is fixed to clips on the top of the rig. There is also a microphone hook. The side panels of the set itself are covered in leather simulated vinyl.

**Excellent FM Audio Tailoring and Clipping** This feature, already well known from the excellent quality produced by the IC-22A, ensures clear optimum talk power without over deviation. This makes the IC-215 a far better rig for use with repeaters and gives an optimum range, for the power used, on simplex contacts.

#### ACCESSORIES INCLUDED :

Dynamic microphone	External Speaker plug
Microphone Case	Discriminator socket plug
Shoulder strap	Earphone
Power supply plug	9 x Dry cells type C (U11)
Comprehensive English handbook	

#### OPTIONAL EXTRAS :

IC-3PS Power supply which doubles as a holder for the IC-20L linear and supplies power for both the 215 and the linear.  
IC-20L 10 watt linear amplifier  
IC-SM2 Desk type condenser microphone with built-in amplifier.  
Ni-Cad Batteries.  
Charger for charging the Ni-Cads in situ  
Helical stub antenna.

#### HIRE PURCHASE TERMS AVAILABLE

See ICOM at your nearest agents by telephoned appointments :-

LONDON—Terry, G8BAM  
01 556 9366

WALES—Tony, GW3FKO  
0222 702982

NORTH—Peter, G3TPX  
022678 2517

MIDLANDS—Tony, G8AVH  
021 329 2305

SCOTLAND—Ian, GM3DOX  
078683 3223

CHESHIRE—Gordon, G3LEQ  
Knutsford (0565) 4040

HULL—Tony, 0482 886392

DEVON—Bob, G3 PQH qthr.

AUTHORISED IMPORTER OF ICOM AMATEUR RADIO EQUIPMENT IN THE UNITED KINGDOM  
FREE SECURICOR DELIVERY ON ALL TRANSCEIVERS  
NOTE OUR CHANGED ADDRESS



**THANET ELECTRONICS**  
143 Reculver Road, Beltinge, Herne Bay, Kent  
(02273) 63859 — 2 lines  
Direct Ansafone line 63850





# Western

## FIRST WITH —

Never mind the pretty  
**PICTURES**  
(you can see them on other ads.)

—just take a look at our  
**PRICES . . .**  
that's what counts!



## — STILL IN FRONT

### FT101E

The latest of a long line of successful transceivers, unbeatable value at our price of—

**£448.87** INC. VAT

FREE SECURICOR DELIVERY

—as pioneered by us—

—still the “only way to go”

### FT301D

The “Rolls Royce” of solid-state transceivers. 200W. p.e.p. input, digital readout, all options for—

**£606.37** INC. VAT

### FT221R

There's a lot of 'em about, and with good reason. Join the multimode set on 2m. for—

**£336.37** INC. VAT

GUARANTEED DESPATCH of “in-stock” items on day order received (Monday–Friday)

### FRG-7

You want accurate general coverage? This is the best value for money we know. Only—

**£162.00** INC. VAT

CAST-IRON 1 YEAR GUARANTEE includes PARTS, LABOUR, CARRIAGE

FIRST-CLASS AFTER-SALES SERVICE at our centralised service facility

**SECOND  
HAND  
EQUIPMENT**

FDK Multi 8 with VFO ...	£191.25	NDK200 SWR meter ...	£27.00
Drake SPR4 (with NB and extra crystals) ...	£421.88	Belcom 12v. PSU for Liner or similar ...	2 at £14.63
Yaesu FR101D—as new ...	£295.00	Standard SY200 synthesizer—details available	2 at £84.37
Standard C430, 70 cm. FM ...	£140.63	Yaesu FR50B receiver ...	£84.37
EC10 Mk. 1, AC PSU ...	£100.13	Collins KWM-2, VFO and mains PSU (240v.) ...	£400.00
Yaesu FR400 SDX ...	£190.13		
Heath HW202 + PSU ...	£180.00		

— ALL PRICES INCLUDE VAT —

Carriage extra  
Securicor £4.86  
Roadline £2.16

★ SOUTHAMPTON HOLIDAY CLOSURE—28 June to 12 July inclusive ★

# Electronics (UK) Ltd

## MEET THE NEW EMOTATOR FAMILY

Posing for you (left to right) are :

**103LBX**—for lighter HF and medium to large VHF arrays.

**502CXX**—the really new boy for medium HF and larger VHF/UHF arrays.

**1102MXX** — for the largest tribanders and monobanders.



**ALSO** . . . the powerful **1103MXX** (not shown)—a geared down 1102—greater torque, slower rotation for the really big stuff . . .

. . . . AND TO MAKE THEM EASIER TO LIVE WITH . . . . .



### MB300

#### MAST BEARING

The best answer to your rotary mast problems. Robust, ball-bearing fitted unit with stainless hardware. Complete with 4 lugs for guying rotary masts up to 62mm. dia.—or can be bolted to flat tower plate as an alignment bearing.

### I213 BRACKET

A unique 3-piece mounting bracket for fixing your rotor to a mast or for exact centring of antenna stub masts. All stainless hardware—takes masts from 40 to 62mm. dia.—fits 502CXX and 1102/1103MXX rotors. Standard as top bracket on 502CXX.



**I211 BRACKET** available for mast-top mounting of 103LBX, same as top bracket (see photo).

### 450 FLEXIBLE COUPLER

Fits between 103LBX and tower mounting plate or mast bracket (I211) to compensate for slight misalignment between rotor mounting and upper alignment bearing.

Rotor "floats" in the 450 and thus allows the upper stub mast to align within bearing, to avoid excessive wear and possible rotor damage.



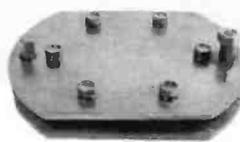
### PRICES

103LBX	...	£78.75
502CXX	...	£111.38
1102MXX	...	£163.13
1103MXX	...	£168.75
450	...	£5.63
451	...	£10.69
I213	...	£14.06
I211	...	£8.44
MB300	...	£14.06

All include carriage/VAT

### 451 FLEXIBLE COUPLER

Fits between tower mounting plate or mast bracket (I213) to provide same facility as 450 flexible coupler—but to fit 502CXX or 1102/1103MXX type rotors. A worth-while adjunct to your system to avoid wear and tear through slight bearing misalignment.



## Western Electronics (UK) Ltd

HEAD OFFICE (All Mail/Enquiries)

FAIRFIELD ESTATE  
LOUTH, LINCS, LN11 0JH  
(Tel. Louth (0507) 4955/6)

Agents : LES LYSKE, G13CDF, NEWTOWNARDS (0247) 812449  
ALAN CAMERON, G130GJ, ALLOA (0259) 214653  
DAVID SMITH, G4DAX, WATFORD 2619

OPENING HOURS —

LOUTH : Open 9-12, 1-5 p.m. Mon.-Fri. Sat. by appointment.  
SOUTHAMPTON : 1 WEST PARK ROAD, Tel. 0703 27464. Open  
Tues.-Fri. 9-11, 2-5.30 p.m. Sat. 9-4 p.m.  
LEICESTER : MAY'S HI-FI, CHURCHGATE. Tel. 58662. Open  
Mon.-Sat. 9-6 p.m. Closed Thurs.





# WATERS & STANTON

TELEPHONE HOCKLEY (03 704) 6835 (2 LINES)



## QUARTZ-16! HIGH PERFORMANCE—LOW COST

THE RIG YOU HAVE BEEN ASKING FOR!

### 2 METRE FM MOBILE

- ★ 25 CHANNELS (10 Fitted)
- ★ OVER 10 WATTS OUTPUT
- ★ AUTOMATIC TONE-BURST
- NEW ★ DUAL CONVERSION RECEIVER
- ★ 10.7 MHz CRYSTAL IF FILTER
- NEW ★ CHANNELS FITTED INDICATOR
- ★ REMOTE VFO SOCKET
- NEW ★ CENTRE ZERO/S-METER
- ★ 2 PRIORITY CHANNELS

The Quartz-16 is yet another new model to leave the production line of the fast expanding range of FDK products. Continuous liaison with our factory in Japan enables us to bring to you the very latest in price competitive technology. This is the rig many of you have asked for. Advanced design ensures high performance from this straightforward, functional 2 metre FM transceiver based on the tried and tested Multi-11 chassis. Yet despite its unquestionable high performance, this transceiver has a down-to-earth price tag! A mere £169 inclusive of VAT.

In 1977 you might be forgiven for thinking that such a low price means a sacrifice in performance and facilities. It is therefore all the more pleasing to confirm that after exhaustive tests and comparison with other rigs there is only one rig better than the Quartz-16—the Multi-11—and we import both of them!

IN STOCK NOW



10 CHANNELS FITTED

£169 inc. VAT

Full descriptive literature is available on the Quartz-16 but here are a few of its main features. 23 channels plus 2 additional priority positions, quartz crystal control for very low spurious transmitter output (and we supply 20 crystals inclusive in the purchase price), dual conversion receiver with 10.7 MHz crystal filter and 455 kHz ceramic filter, 3 watts of received audio, combined S-meter and centre-zero meter, remote vfo socket and of course the transceiver comes with a complete set of accessories including quick release mobile bracket, microphone, DC cable, desk stand, plugs, fuses and English Manual. And last but by no means least you have the combined backing of FDK/WSE to ensure an efficient back-up service and stock of spares in the unlikely event that you may need them.

**SOME MAY MATCH ITS PERFORMANCE—NONE CAN MATCH ITS PRICE!**



FOR 70cms FM  
MULTI-U11



IN STOCK NOW £249 inc. VAT

Every few years a rig is produced that becomes the standard by which all others are judged. The FDK-U11 is such a rig. It stands above all others whether you compare its performance or facilities. Its beautiful lines and superb construction yet diminutive size have made it a winner. Little wonder that the "U-11" has outsold all other 70 cms. rigs put together. 70 cms. is a challenging band full of new call signs and S9+ contacts from the numerous repeaters dotted around the country. Undoubtedly 70 cms. is the action-packed band of the 80's but make sure you choose a rig man enough for the job! The FDK U-11 is one—the only One!



FOR 2M FM  
THE MULTI-11



Fitted 7 Channels + Autoscan + Toneburst £209 inc. VAT  
Special Offer: S21, 22 and 23 £10 inc. VAT if ordered at the same time as Multi-11.

This is the ultimate in 2 metre FM performance. The autoscan facility means safer driving and more qso's. It doesn't scan every channel, just the 4 priority ones, this prevents it locking on to the local repeater or beacon. The receiver sensitivity is better than any other model because of the built-in, RF pre-amp. Additional features such as receiver IRT, tx monitor switch, vfo socket, 13 watts output of clean RF, good receiver selectivity and superb audio quality all add up to the finest buy in 2 metre FM today. When a rig meets commercial specifications it has to be good!

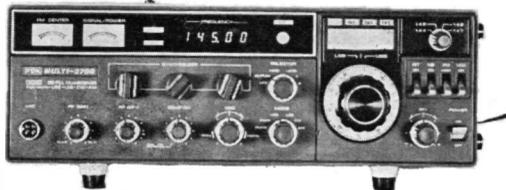
# ELECTRONICS FAST MAIL ORDER SERVICE



TELEX 897406

## MULTI-2700 THE FAST SELLING 2 METRE RIG MULTIMODE WITH 'OSCAR' FACILITY USB/LSB/FM<sub>N</sub>/FM<sub>w</sub>/CW/AM/'OSCAR'

- Normal/Reverse Repeat
- VOX/IRT/Calibrator
- DX Speech Clipper
- High/Low Power
- Noise Blanker



- 10W/1W Output
- 12v./230v. Supply
- Dual VFO Control
- Digital or Analogue PLL for Stability

AMAZING VALUE **£449 inc. VAT! IN STOCK NOW**

Send for 4-page Brochure Today



LARGE STOCKS — FAST SERVICE

FDK YAESU TRIO MINI-PRODUCTS HY-GAIN JAYBEAM CDE MICROWAVE SOLID STATE QM-70 NIHON DENGYO POLAR ELECTRONICS SAGANT STOLLE MFJ DRAKE SHURE G-WHIPS BANTEX SEIWA N-SEIKI KEN MARC.

### JUST PART OF OUR EXTENSIVE STOCKS

#### MICROWAVE MODULES

MMC 2m, conv. IF 2-4 4-6 28-30	£20.25	(36p)
MMC 70 MHz conv. 28-30	£22.50	(36p)
MMMC 70 MHz conv. 28-30 + local osc.	£22.50	(36p)
MMC 2m, conv. 28-30 + local osc.	£24.75	(36p)
MMC 70cm, conv. 28-30 or 144-146	£22.50	(36p)
MMC 1296/144 or 28-30	£28.12	(36p)
MDDO 50 50 MHz counter	£86.95	(36p)
MMD 500P 500 MHz pre-scaler	£27.00	(36p)
MMT 432/28 70cm. transverter	£109.00	(36p)
MMT 432/144 2m. transverter	£149.62	(36p)
MMT 144/28 2m. transverter	£88.87	(36p)

#### NIHON DENGYO

Linear-2 Mk. II 2m. sbb tcvr. 12v. DC	£184.50	(£2.50)
Linear-430 70m. tcvr. 12v. DC	£296.25	(£2.50)
LA-106 2m. 100W. linear	£200.25	(£2.50)
RI15E reg. p.s.u. for linear-2 and 430	£31.50	(£2.50)

#### SOLID STATE MODULES

2m, or 4m, Europa transverter		
200W pip	£109.15	(n.c.)
2 or 4m. converters IF 2-4/4-6/28-30	£18.00	(n.c.)
70cm. converter IF 144-146	£18.00	(n.c.)
2m. boxed pre-amp	£8.72	(n.c.)
PA3 2m. miniature pre-amp board	£6.27	(n.c.)

#### WATERS

Stable tone-burst modules	£3.93	(25p)
---------------------------	-------	-------

#### POLAR ELECTRONIC DEVELOPMENTS

Magnum 2m. transverter	£151.90	(£1.50)
Wavemeter 65-230 MHz	£19.00	(50p)
432 MHz linear 230v. AC	£151.90	(£1.00)
Magnum 2m. linear 230v. AC	£151.90	(£1.50)

#### QM70 PRODUCTS

2 & 4 converters 28-30	£18.00	(36p)
70cm. converters 28-30 IF	£19.50	(36p)
1296 MHz converters	£14.00	(36p)
Cobra 70cm. transverter	£86.00	(75p)
Solid state amplifier	£49.50	(50p)

#### VHF ANTENNAS BY JAYBEAM

4Y/4M 4 element yagi	£11.45	(£1.75)
5Y/2M element yagi	£6.96	(£1.00)
8Y/2M 8 element yagi	£9.10	(£1.00)
10Y/2M 10 element yagi	£19.35	(£1.50)
PBM10/2M 10 ele. parabeam	£23.00	(£1.50)
PBM14/2M 14 ele. parabeam	£28.35	(£1.75)
5XY/2M 5 ele. crossed yagi	£14.50	(£1.25)
8XY/2M 8 ele. crossed yagi	£18.10	(£1.50)
10XY/2M 10 ele. crossed yagi	£23.95	(£1.75)
Q4/2M 4 ele. quad	£14.85	(£1.50)
Q6/2M 6 ele. quad	£19.80	(£1.75)
D5/2M 5 ele. slot fed	£12.35	(£1.25)
D8/2M 8 ele. slot fed	£16.55	(£1.50)
XD/2M crossed dipoles	£6.40	(£1.00)
UGP/2M ground plane vertical	£6.95	(£1.00)
HQ/2M Mobile halo head only	£3.55	(50p)
HM/2M Mobile halo with mast	£3.09	(£2.75)
PMH/2C 2 way phasing harness circular polarisation	£4.60	(75p)

#### NEW

C5 2m. Co-linear 5db	£28.00	(£2.00)
C8 70 cm. Co-linear 7-8db	£26.50	(£2.00)
23 cm. D15 yagi 15db	£20.95	(£1.25)

#### UHF ANTENNAS BY JAYBEAM

D8/70cm. 8 ele. slot fed	£14.05	(£1.25)
PBM18/70cm. 18 ele. parabeam	£16.95	(£1.50)
MBM48/70cm. 48 ele. multi-beam	£19.65	(£1.50)
MBM88/70 cm. 88 ele. multi-beam	£26.30	(£1.75)
12XY/70cm. 12 ele. crossed yagi	£27.00	(£1.50)
PMH2/70cm., 2 way phasing harness	£5.30	(75p)
PMH4/70cm. 4 way phasing harness	£11.10	(£1.00)

#### MOBILE ANTENNAS BY JAYBEAM

TAS 2m. 5/8th glass fibre whip with 4m. of cable	£11.80	(£1.00)
U5 70cm. colinear 5-6dB gain and 4m. of cable	£18.90	(£1.00)

#### TESTED TRADE-INS

Multi-8 230v/12v Fm tcvr	£130.00
Trio JR310 Rx immaculate	£95.00
Yaesu FT200 + PSU + LLC clipper	£290.00
Belcom Linear-11	£125.00
Drake SPR4 Rx Superb	£350.00

#### MINI-PRODUCTS

HQ-11. 10-20m. compact 1-2W. yagi	£84.37	(£2.00)
C4 10-20m. compact 1-2kW vertical	£38.25	(£1.50)

#### ROTATORS

AR30 antenna rotator	£44.40	(£1.50)
AR40 antenna rotator	£51.70	(£1.50)
CD44 antenna rotator	£106.85	(£1.75)
Ham II antenna rotator	£145.00	(£2.00)
CD bearing	£4.21	(50p)
Stolle 2010 antenna rotator	£46.50	(£1.50)
Stolle 2030 antenna rotator	£51.05	(£1.50)
Stolle alignment bearing	£11.25	(50p)

#### HY-GAIN ANTENNAS

12AVQ 10-20m, vertical 2kW.	£37.60	(£1.50)
14AVQ 10-40m, vertical 2kW.	£53.40	(£1.50)
18AVT/WB 10-80m, vertical 2kW	£72.45	(£2.00)
TH3 JNR 10-20m. yagi 600W.	£108.00	(£2.00)
TH3 Mk3 10-20m. yagi 2mW.	£154.12	(£2.50)
BN86 balun 2kW.	£13.50	(50p)

#### STATION ACCESSORIES

MFJ audio filter boards 80/110/180 Hz	£14.62	(50p)
Shure 44 table microphone	£21.95	(£1.00)
Shure 201 hand microphone	£9.95	(50p)
SWR single meter	£9.85	(50p)
SWR dual meter	£12.63	(50p)
Telegraph key	£9.75	(50p)
Drake low pass filter	£18.00	(75p)
Ferrite rings 1 1/4" for a.f.c.	30p	(8p)
HP3A high pass tv filters	£2.53	(15p)
Set of 10 HP7 ni-cads	£9.72	(75p)
2 way coax switch	£5.30	(30p)
Balun insulator 50 ohm (beams or dipole)	£8.43	(50p)

MAIL ORDER & HEAD OFFICE : Hockley Audio, 31 Spa Road, Hockley, Essex. Tel.: 03-704 6835 (2 lines)

ALL PRICES INCLUDE VAT

CARRIAGE AT COST

AGENTS : G3XTX J.R. Electronics, 198 Collier Row Lane, Romford, Essex.

Tel.: Romford (0708) 68956

G3OQT Bredhurst Electronics, Willowbrook, School Lane, Bunbury.

Cheshire. Tel.: (Bunbury) 0829 267078

GM3GRX Eric Simpson, 6 Drossie Road, Falkirk, Stirlingshire. Tel.: 0324 24428

Monday to Saturday 9 a.m.-5.30 p.m.

Early closing Wednesday



**G3MCM**

# STEPHENS-JAMES LTD.

## 47 WARRINGTON ROAD, LEIGH, LANCS. WN7 3EA

Please note new telephone number  
**TEL. 0942 - 676790**

The North West's leading supplier for all your requirements. EASY ACCESS FROM THE M61-62.63—we're 5m. from M6, turn at the Greyhound Motel on the A580 (East Lincs. Road). OPEN 9.30 to 5.30, MONDAY TO SATURDAY.

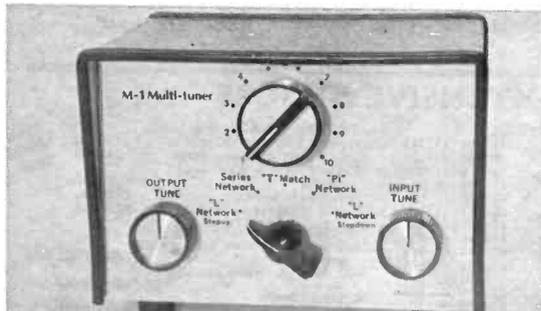


Midland and North West distributors for the XCR30 unique crystal controlled receiver. This receiver is designed to provide precision frequency tuning over the full short wave spectrum up to 30 MHz with exceptional frequency stability for both AM and SSB. Separate tuned whip antenna.

£145.00 inc. VAT  
XCR-30 FM Receiver with FM band 87-5 to 101 MHz.  
£170.00 inc. VAT



**UNIDEN 2030.** 144-146 MHz FM Transceiver. 12 channels. 12v. DC operation. 10 watt or 1 watt output. Antenna impedance 50 ohm. Complete with microphone and mounting bracket. Price £178.74



**Mk. 1 MULTI TUNER.** Designed and manufactured by us. 50 tunable switched positions for antenna lengths over 5 metres in the 2-30 MHz range. Five different circuits to give an excellent match between your receiver and antenna. Now in use in over 35 countries. Price £17.50. Including VAT and Postage.  
**Mk. 2 VERSION, £23.00.** Covering 550 kHz to 30 MHz. Send S.A.E. for full information and Test Report.



**YAESU FRG-7 RECEIVER.** Mains and battery operated receiver 0.5 to 30 MHz. Solid state. Advance circuitry offers excellent performance for the DX listener at a moderate price.

### CALLETTI

Introducing a new range of VHF mobile and static antennas. All these were exhibited at the Leicestershire Exhibition.

5/8" Gutter mounted whip ... £12.00  
1/2 wave standard mount ... £11.50  
5/8" Standard mobile base mount ... £12.00  
Base station ground plane 4 radials ... £13.59  
Professional antennas at an Amateur Price

### Accessories

Morse Keys ... £7.85  
Auto-Cq-Sender ... (post free) £41.11  
Eddystone 898 Dial Assembly ... (post 75p) £15.00  
Drake Low Pass Filter ... (post 50p) £18.00  
Omega TE-701 Antenna Noise Bridge ... (post 25p) £21.00  
Omega TE-702 Antenna Noise Bridge ... (post 25p) £24.00  
Whip antenna gutter bracket ... (post 25p) £2.81  
UR43 Co-ax 18p metre; UR76 45p metre, post 2p metre; 75 and 300 ohm twin feeder 10p metre, post 1p metre; Heavy duty 75 ohm twin feeder 26p metre. PL269 5p  
SO239 46p, Cable reducers 16p

We carry a substantial stock of equipment and probably a larger variety of models than most dealers. Having established ourselves as the North Wests leading supplier of Amateur Radio equipment for over 11 years. We are a totally independent company and have no retail outlets through any agents or any other establishment in the North West. We can supply and mostly from stock, equipment from the worlds leading manufacturers. We import some items direct, and we export and manufacture equipment of our own design.

DRAKE-YAESU-UNIDEN-S.T.E.-CALLETTI-JAYBEAM - MICROWAVE MODULES - G-WHIPS - TECHNICAL ASSOCIATES - SWAN - ATLAS - BARLOW WADLEY - C.D.E. - BELCOM - SPACEMARK - DECCA

Send us a large S.A.E. or 20p in stamps and we will forward you all the latest details and prices. All our prices include VAT at the current rate at the time of going to Press.

S.A.E. with all general enquiries please, H.P. and Credit facilities. Barclaycard and Access facilities. Trade-ins always welcome. We would be pleased to sell your unwanted equipment on a commission basis.

For the caller we have wide range of cabinets (up to 200 sizes available) chassis, valves, plugs, sockets, cable, test equipment, etc.

### Secondhand Equipment (available at the time of going to press)

Yaesu FL101 Transmitter	£300.00
Yaesu FR101D Receiver	£335.00
Swan 1200X Linear Amplifier	£200.00
Sentinel HF Pre-amplifier	£9.00
Heathkit SB104 Transceiver	£525.00
Heathkit IB 1100 Frequency Counter	£70.00
Yaesu FR101D Receiver	£375.00
Collins KWM 2 Noise Blanker	£28.00
Eddystone EC10 MK2 Receiver	£120.00
ARAC 102 Receiver	£85.00
Uniden 2030 Transceiver	£150.00
FT75B Transceiver with AC and DC PSU	£185.00
IC20 Transceiver	£120.00
KW202 Receiver	£185.00
Heathkit HW202 Transceiver	£120.00
Drake SSR1 Receiver	£120.00
Barlow Wadley XCR 30 Receiver	£100.00
Belcom AMR 104H Receiver	£55.00
KW107 Matching Unit	£75.00
Collins KWM2 Transceiver	£450.00
Trio TSS10 Transceiver	£180.00

As you can see we have a substantial turn over in secondhand equipment. If you require a specific model let us know and we will inform you when we have it available.

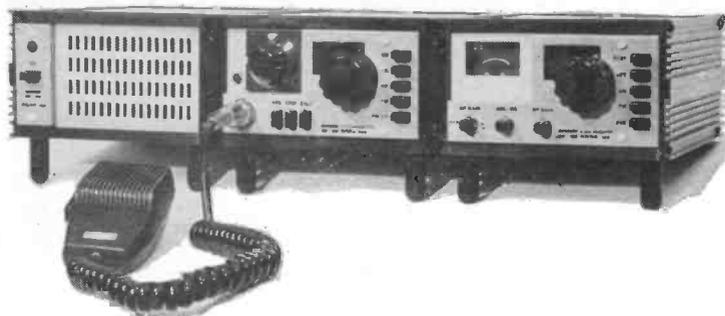
# S.T.E. MILAN VHF EQUIPMENT

We enter our third year as sole distributors for the S.T.E. range in the U.K. The popularity of this equipment is growing all the time. With the kind help of the Directors of S.T.E. we have managed to keep the prices stable for the past three years. This equipment sell for about 20% in some of the ECC countries and to keep cost to the customer down we have not sold to the trade and therefore you get the benefit of lower prices. The quality of these P.C.B's are the finest we have ever seen. Following on from the ARAC 102 receiver for 28-30 MHz and 144-146 MHz fully tunable we now have the ARAC 107 28-30 and 430-440 MHz with AM FM and SSB Facilities. The base station AK20 transceiver is now supplied with mobile mount and also available in kit form. We also look forward to many new models from S.T.E. in the next year.

ASP 154

ATAL 228

ARAC 102



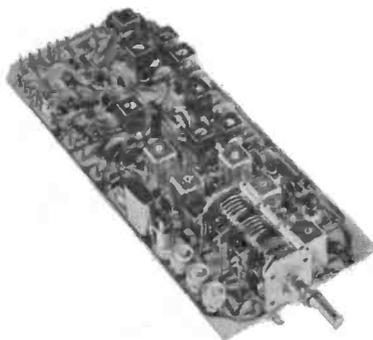
**SPEAKER  
AC POWER SUPPLY UNIT**

**144 - 146 MHz  
AM FM TRANSMITTER  
with Microphone**

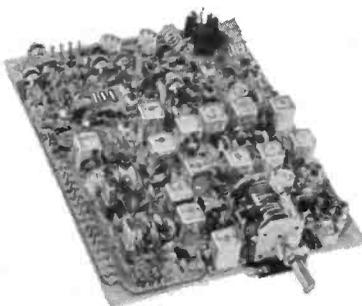
**28-30 MHz 144-146 MHz  
AM-FM-SSB RECEIVER**

## Price List (including postage)

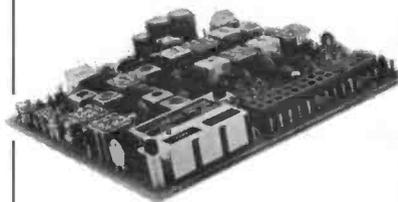
AK20 FM Transceiver	... ..	£170-00
ARAC 102 Receiver	... ..	£100-00
Atal 228 Transmitter	... ..	£126-00
ASAP 154 AC PSU with speaker	... ..	£35-00
AR10 Receiver Module	... ..	£37-50
AAL Audio Amplifier	... ..	£4-10
AD4 FM Discriminator	... ..	£5-00
AL8 Linear Amplifier	... ..	£27-00
AT22 Transmitter	... ..	£50-00
AR20 C.C. Receiver	... ..	£50-00
AT23 C.C. Transmitter	... ..	£36-00
AS 15 Stabilised psu D.C.	... ..	£10-00
AG 10 Tone Generator	... ..	£4-50
AC2A Converter 28-30 MHz	... ..	£20-00
AK20 Transceiver Kit	... ..	£110-00



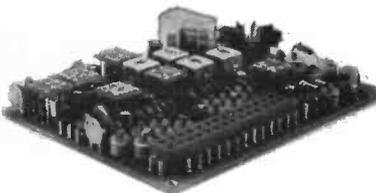
**AR10 Mosfet receiver. 28-30 MHz Double conversion superhet. RF and amplifiers stages are gate protected mosfets for good sensitivity and low intermodulation. Noise limiter and squelch circuit. AM, SSB and CW reception. 12v. DC.**



**AT 222. A complete transmitter exciter unit for 144-146 MHz on AM or FM. VFO controlled or fixed channel operation. Complete with microphone pre-amp, speech processor including active audio filter. 1 watt output. FM. .25 watt AM. Output impedance 50-75 ohm adjustable. Frequency deviation 3-10 kHz adjustable.**



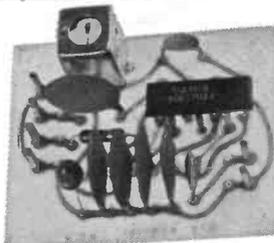
**AR20. 12 channel FM receiver 144-146 MHz. Input impedance 50-75 ohm. AM-FM modes. Sensitivity 0.2uV AF output 3 watts. 12v. DC operation.**



**AT23. 12 Channel FM Transmitter. 3 watts. 144-146 MHz. Frequency deviation 3-10 kHz adjustable. 12v. DC operated AF input sensitivity 2mV adjustable to 50 mV.**



**AK20, STE.** Latest model from the famous STE Milan range of equipment. 12 channel operation in the 144-146 MHz range. 11-15v. DC operation. 8 watt output. Sensitivity 0.2 uV R.I.T. tone burst. Complete with microphone, and mobile bracket.  
**Price £170-00**



**455 kHz FM Discriminator Amplifier.** Limiting threshold 100uV. Amplitude modulation rejection 40dB. Audio output voltage at 1 kHz 200-300mV frequency deviation + or - 3 kHz.



**NEW MODEL ELECTRONIC KEYSER**  
Jambic operation—Weighed transmission—Three memory lengths up to 1024 bits. Internal monitor. Transmitter keyed through internal relay. Silver plated contacts. 220v. AC operation. **Price £106-00**

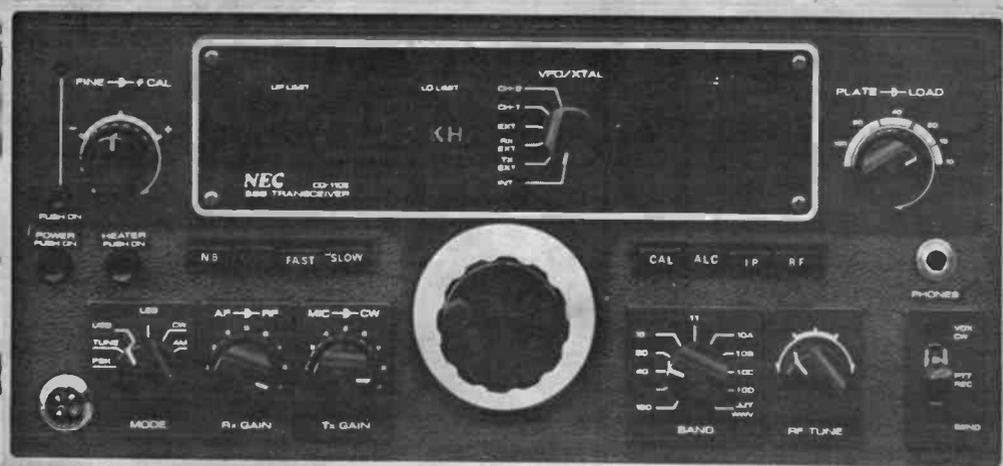
## STEPHENS-JAMES LTD.

### 47 WARRINGTON ROAD, LEIGH, LANCs. WN7 3EA

Please note new telephone number **0942 - 676790**

# CQ110E

FURTHER IMPROVED IN MORE THAN 60 DETAILS



**CEC** SOLE DISTRIBUTOR FOR EUROPE OF **NEC** RADIO AMATEUR EQUIPMENT

CH 18830 Chiasso

Via Valdani, 1

Telefono (091) 442651

Telex 79959 CH

# SHORT WAVE MAGAZINE

## ADVERTISERS' INDEX

	Page
Argus Books Ltd. ....	245
Amateur Electronics UK .....	210
Amateur Radio Exchange .....	242
Amateur Radio Retailers Association ....	245
Amcomm Services .....	251
Baginton Electronics .....	255
B. Bamber Electronics <i>back cover</i>	
J. Birkett ... ..	243
C. & C. Electronics .....	252
Cambridge Kits .....	255
Catronics Ltd. ....	241
C.B. Electronics .....	244
C.E.C. ....	208
Colomor Electronics Ltd. ....	254
Com-Tek (Mids.) Ltd. ....	255
Crayford Electronics .....	247
Datong Electronics Ltd. ....	241
G3HSC (Rhythm Morse Courses) ....	254
G2DYM Aerials .....	254
G.W.M. Radio Ltd. ....	250
Hamgear Electronics .....	247
Ham-Spares .....	251
D. P. Hobbs Ltd. ....	250
J. Yu .....	242
K.W. Communications Ltd. ....	239
Lee Electronics Ltd. ....	240
Lowe Electronics <i>Front cover, inside front cover, 193, 194</i>	
S. May Ltd. ....	255
M.H. Electronics .....	255
Microwave Modules Ltd. ....	195
Mosley Electronics Ltd. ....	252
William Munro Ltd. ....	238
Partridge Electronics Ltd. ....	246
P.M. Electronic Services .....	247
Radio Shack Ltd. ....	236, 237
R.T. & I. Electronics Ltd. ....	239
Small Advertisements ...	250-254
Solid State Modules .....	244
South Midland Communications Ltd. ....	198, 199
Spacemark Ltd. ....	253
S.S.B. Products .....	255
Stephens-James .....	206, 207
S.W.M. Publications <i>Inside back cover, 248, 249, 256</i>	
Tape Talk ... ..	254
Technical Associates .....	246
Thanet Electronics .....	200, 201
Reg Ward & Co. Ltd. ....	253
Waters & Stanton Electronics .....	204, 205
Geoff Watts .....	254
Western Electronics (UK) Ltd. ....	202, 203
W. H. Westlake .....	254
Yaesu-Musen Co. Ltd. ....	196, 197

(GB3SWM)

ISSN: 0037-4261

Vol. XXXV

JUNE, 1977

No. 404

## CONTENTS

	Page
Editorial— <i>Jubilee</i> ... ..	211
Communication and DX News, by E. P. Essery, G3KFE ... ..	212
Electronic Keyer, by A. V. Kenyon, GW4DOO ... ..	216
A 21 MHz Attic Array for The Short Wave Listener, by E. J. Williams, B.Sc. ... ..	218
Aspects of Radio Communications Receivers, Part II by N. H. Sedgwick, G8WV ... ..	222
A Simple Tone Modulator for a GDO by E. Chicken, B.Sc., M.Sc., C.Eng., F.I.E.R.E., M.I.E.R.E., G3BIK ... ..	224
A Phase Lock Loop Morse Decoder, by G. C. Dobbs, G3RJV ... ..	225
New QTH's ... ..	227
VHF Bands by N. A. S. Fitch, G3FPK ... ..	228
The Month with The Clubs— <i>From Reports</i> ... ..	232

Editor: PAUL ESSERY, G3KFE/G3SWM

Advertising: Charles Forsyth

Published at 34 High Street, Welwyn, Herts., AL6 9EQ, on the last Friday of the month, dated the month following. Telephone: 04-3871 5206 & 5207

Annual Subscription: Home: £4·80, 12 issues, post paid  
Overseas: £4·80 (\$10·00 U.S.), post free surface mail

Editorial Address: Short Wave Magazine, 34 High Street, Welwyn Herts. AL6 9EQ, England.

Prices shown in advertising in this issue do not necessarily constitute a contract and may be subject to change.

### AUTHORS' MSS

Articles submitted for Editorial consideration must be typed double-spaced with wide margins on one side only of quarto or foolscap sheets. Photographs should be lightly identified in pencil on the back with details on a separate sheet. All drawings and diagrams should also be shown separately, and tables of values prepared in accordance with our normal setting convention—see any issue. Payment is made for all material used, and it is a condition of acceptance that full copyright passes to the Short Wave Magazine, Ltd.. on publication.

© Short Wave Magazine Ltd.

E. & O. E.

VAT Reg. No. 239 4864 25

209

# AMATEUR ELECTRONICS UK

MAIN  
AGENT



ATLAS SOLE  
RADIO INC. AGENT



SWAN PLUS—  
ELECTRONICS

**YOUR BEST BUY FOR YAESU MUSEN!**



**AS DIRECT  
IMPORTERS  
WE OFFER  
YOU ...**

1. KEENEST PRICES
2. LARGEST RANGE
3. HIGHEST STOCKS
4. TOP AFTER-SALES SERVICE
5. BEST DEMONSTRATION FACILITIES



**FT-221R—JUST ONE OF  
MANY MODELS—EX STOCK!**

**HOW TO REACH US (EASY PRIVATE PARKING ON OUR 70ft. FORECOURT)**

**FROM SOUTH AND EAST.** We are located approximately two miles from Junction 5 of the M6 from which follow signposts to Birmingham. Within ½ mile turn right at Clock Garage and proceed towards city. After one mile look for traffic lights at Fox & Goose and immediately over the lights take minor left fork into Alum Rock Road. We are located one mile from this point.  
**FROM NORTH.** Leave M6 at Junction 6 (Spaghetti) and follow left fork down to traffic island beneath motorway complex. Take third turning off to Lichfield. One mile further on follow A4040 to the right and within 100 yds. veer again to the right, approximately one mile further on brings you to the Fox & Goose. Turn right and see preceding directions.  
**FROM THE WEST AND SOUTH/WEST.** Follow M5 then M6 to Spaghetti Junction (see above). Alternatively, leave M5 at Junction 4 or 3 and proceed to inner ring road. Turn South on ring road and leave on A47 (East). We are located three miles from this point.

**Hours : 9.30-5.30 Continuous including Saturdays—Early closing Wednesday, 1 p.m.**  
Or if you are unable to make it, we will ship your order free of charge per Securicor.



**Sensational ATLAS-210/215X**

◀ **Now at the new low price of  
£395 plus VAT**

**£2.50 FOR 25 PENCE!!**

25 pence brings the latest Yaesu catalogue with our Credit Voucher for £2.50 against eventual purchase. A couple of stamps brings the Atlas leaflet or our used equipment list.

**BRANCH: AMATEUR ELECTRONICS, UK—COASTAL, CLIFTONVILLE,  
KENT. KEN McINNES, G3FTE, THANET (0843) 291297.**

**BRANCH: AMATEUR ELECTRONICS UK—SCOTLAND 287 MAIN STREET,  
WISHAW, LANARKSHIRE. GORDON McCALLUM, GM3UCI.  
TELEPHONE WISHAW 71382.**

**(BRANCHES AT YOUR SERVICE DURING NORMAL  
BUSINESS HOURS.)**

**AGENT: WALES & WEST—ROSS CLARE, GW3NWS, CAERLEON 422232.**

**508-514 ALUM ROCK ROAD  
BIRMINGHAM 8**

**021-327 1497  
Telex 337045 6313**



*The*  
**SHORT-WAVE**  
*Magazine*

EDITORIAL

***Jubilee***

Within a few days of this reaching you, amateurs in the U.K. will be, in their own personal way, celebrating the Silver Jubilee of Her Majesty Queen Elizabeth II by their use of the GE callsign between June 4 and 12; we hope everyone who is on the air and working a station outside U.K. will take the opportunity to use the GE prefix.

The unique brand of personal leadership she and her Consort, the Duke of Edinburgh, have evolved has brought them significantly nearer the man-in-the-street than any other monarch in the recorded history of these islands, and through a traumatic quarter-century of change in our life-style.

Likewise, in our hobby, we have seen equally great change; from a world in which Russian amateurs could not work those of the Western World save by stealth; from a phone section in which, on any band, one could only work the S9 locals through the heterodyne whistles; from a world in which British radio amateurs had virtually no commercial equipment market; from a savagely restrictive licence structure— from all these things we have been delivered in 1977. Nonetheless, our daily lives are plagued with violence, largely a backlash of the fall in moral standards in both public and private life, and there is room for grave doubt as to the future of the basic freedom of our country.

However, it is to be hoped that politicians, regardless of party can be persuaded to follow the good example set by the Royal Family. Long may their reign continue.

*Ed Stacey*  
G3KFE

# COMMUNICATION and DX NEWS

THERE will be, among the "regulars", some noting that mentions have not been taken in here and there; and unfortunately it must be admitted that last month the charge was true. It was, sad to say, a simple matter of mathematics, in that we generated a couple of columns-worth of surplus. As this piece is, from the practical point of view, the finale to the month's efforts, it has a space allocated to it, and a requirement that it be so contrived as to fit nicely into its slot. If we mis-cue, in the way of an overshoot, there just isn't time to do "another circuit and landing" and the only thing to do is to swing the axe.

## The Bands

One looks at them all, one by one, and wonders—where is the DX? Not dead, but most definitely taking a rest while the sun grows a few spots! The evening before this was started for instance, we had a receiver running around the CW end of Twenty and the band was full of noise, with just the odd disturbed area where some minor DX was causing some W's signals to be copiable, among them at least one well over the S9; and not far away this evening, we have one Italian signal at well over the nine, and with the most grotesque bug-key Morse one has heard for a long time, with the dashes at fives and the dots at around 55 w.p.m. However, as this paragraph continues, he gets his come-uppance by way of a comeback with both the dots and the dashes at above forty, beautifully spaced and controlled! But, while this episode cheers the scene it doesn't show much sign of DX after dinner which is what the poor old working amateur wants—DX in working hours just isn't any good! All this being said, we do scent a trend for a slight increase in the amount of traffic being carried on 21 MHz to the relief of the lower band, and of course if you have the courage to dig, you can find long-distance contacts on 7 MHz at reasonable hours, while for the night-owls there is

something to be said for Eighty. As it always has been, the morning session is the best in general terms, although rather too late for those who have to brave a shop-floor starting-hour to get much benefit.

## What's Gone

TT8SM has been noted, from Lake Chad, crystal controlled around 14237 kHz, doing a couple of days and then indicating a return visit to the bands a few days later.

4Z4TT had moved from VR8 (Tuvalu) and should be showing around the time this is being written from Tonga; No need to bust a blood-vessel though as we have it that he will be probably staying for some weeks. Another one there is no need to panic over is Marion Is. as the new operator of ZS2MI is hoping to have the weather-station situation sewn up so as to leave a bit of spare time for contacts—ZS6AGV, Gordon, this is, and he will be noted often to have ZS5PG feeding the contacts with him on ZS2MI in regular order. The favoured spot, or so we understand will be the general area 14220-14225 kHz.

Now for the Clanger of the Year—the recent operation of WA7VVU from Wake Is. was conducted from the dockside moorings, no one having indicated to Del what the proper way to do this was and he not being particularly DX-orientated. However, the cards going out for the contacts will be clearly marked as from aboard the ship, and the chances are good for Del to be able to go to Wake again and do the exercise the "proper" way, as the container-ship on which he is the R.O. calls at Wake about three times a year.

Another one to appear was Pitcairn, where W6YO showed up for 24 hours of CW operation—but the word seems to be that there was quite a lot of rag-chewing during the operating; some of the 'chasers getting quite steamed up about it—which sound to me like hard luck, as if the DX wants to have a ragchew he is quite entitled

## E. P. Essery, G3KFE

to do so!

## The Pipeline

Seems at this writing to be rather like the Ekofisk well—well bunged up with mud! However, rumours there are of a VU signal from Laccadives, and we understand a mid-October date is projected for the Kermadec operation by five ZL's, who will of necessity be there for a fortnight, while the ship goes on to its terminus and turns round to pick 'em up on the return run.

## Top Band

The first letter with a mention of the band this time is from G2HKU (Sheppey) who seems to have been quite active, with SSB to DL7HZ, OH2BQL, PAØHIP, PAØPN and YU2HDE and CW for OLØCFI, YU3TJA, OL9CCL, GM3TMK, OK2KOD, OL5ATZ, OL3CTE, OK1DCF, HB9CM/P, and HB9KC.

Now to G2NJ (Peterborough) who stuck to the key; Nick mentions G4CQF near St. Albans who was using an input of 97 milliwatts for a QSO which lasted 45 minutes around the evening-meal time; G3IOI of Wickford was another QRP contact with a nice way of obtaining his drive—a frequency-meter into a single transistor output stage. In addition there was a lunch-time contact from PAØINA who was operating from *chez* PAØPN while the latter was ill; signals 579 both ways around noon.

Now we have one of the mammoth W1BB "Bulletins" to pick over; Stew mentions the difference in noise level between his Boston city QTH and the farm QTH at which he spends a couple of months each summer. W1BB is of the opinion that noise is rapidly becoming the limiting factor on what can be done and compares his summer situation on the farm—summer static against winter QRM. For himself, this season has been pretty good for W1BB, who worked 66 countries this last winter as against 63 the previous one. Another point of interest in the W1BB Bulletin is the persistent rumours of Russian

activity on the band as being likely in the near future.

Still with the W1BB Bulletin, and skimming through it, we noted one of the more hilarious moments: VE3EK, it would seem, was aware that his International truck silencer was specially organised to filter out the higher-frequency put-put noise, from which he reasoned that maybe a vehicle silencer might help with getting rid of Loran signals. Round to a freindly local trader and borrowed a selection of different silencers, put phones at one end and listened through the other, sorting out finally one that knocked out the Loran best. Found it rather uncomfortable though, with one ear at the silencer end, phones on floor, and leaning sideways. The experiment went QRT when he over-balanced and fell on the deck, clouting his head on the silencer and the floor in the process!

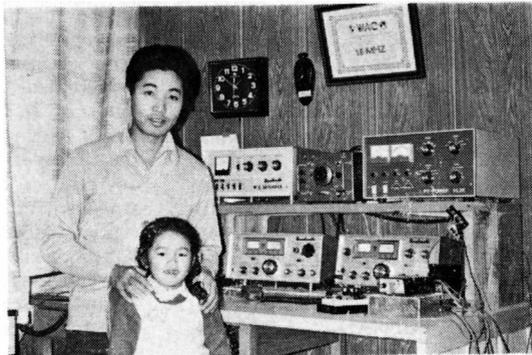
If anyone has noted the absence of Snowy, VK3MR from Top Band and everywhere else, W1BB has the up-to-date news; it seems the problem is heart trouble and VK3MR has to take it easy for a while; let's hope he will soon be back at full power again. Another who has been rather less noticeable than previously on Top Band is ZE7JX, although his problem was lightning—a direct hit *twice* wiped out his inverted-vee and the 275-foot Windom aerials which simply *disappeared*—not so much as a little ball of metal found to remember it by. The vertical escaped, although at one point the coaxial cable was damaged; but a splice was soon to put that right. Like so many others, ZE7JX has been quite surprised at the effectiveness of short, loaded, verticals on Top Band, when given an adequacy of radials and properly fed.

### Eighty

Another place where there aren't many reports but DX can be found by those with the will to look for it.

G4EDG (Newton Abbot) seems to have concentrated on 7 MHz, but he did spend a little time on 3.5 MHz, where CW yielded DF4GV/HBØ, EA8BF, OD5EX and U6ØA, while SSB managed to get to VP2SAG, DK5XN/OHØ, HV3SJ, and VP8OW.

On to G3CED/G3VFA, who



The neat 160-metre station of Kuny Togashi JA7NI, Akita, Japan (with YL Jr. Op!). This was the top Japanese station in the 1976 CQ/160 test.

seems to have confined his eighty-metre activities to working G4EVO and F9UO on sked, with a single contact to G4EYE at Dovercourt, using two watts to an end-fed wire.

Also in Broadstairs is G4EVO, who paid a little more attention to the band with his QRP CW—G3CED and G4EVO seem to be having a little private QRP war of results with almost identical systems and powers. ON4IE was a little upset when he discovered G4EVO was at five watts input while he himself was running 300 watts! For the rest, it was largely a matter of covering most of U.K. and nearer Europe at the sort of times when G4EVO was operating, which explains why he also went up to the higher bands.

At the time of writing, GM3CFS (East Mey, Caithness) was still being hit by the gale-force winds, and also suffering from much "quack-quack" from the fishbone and oil rigs in the CW bit of Eighty; but Jim was not deterred (much!) and carried on to work C31MN, EA8BF, UA9CM, KV4JY, VEXEOH and VP9HP.

Another operator on Eighty with QRP is G2HKU; this month Ted has made no mention of the stations worked, but confined himself solely to the comment that he never ceases to be amazed at the performance of the little Ten-Tec PM2B. As he says, there is nothing he can hear on his two "big" receivers—the KW2000 and the 888—which isn't audible on the Ten-Tec as well. As for the transmitter, no comment is needed, as we all know how well and how far these QRP rigs can radiate.

QRP is also the theme at G2NJ, and particularly around the noon time. Among the stations worked on Eighty Nick picks out G3KZR with 480 milliwatts, G2CP with 800 milliwatts, G8SI down at Fareham with one watt, G3OSJ of Glastonbury with two watts, and GW2FWA/P out with the HW8 and a whip, and F5DM near Paris with two watts; Nick used his HW8 for all these contacts. On a different tack, the term "flea-power" has inspired G3OSJ to draw a special QRP QSL card using this as the theme—a flea sitting at the rig with phones on and anxious look while tuning the rig, and the caption "Watts" not up to scratch? Flea-power—we'll tickle the transmitter."

### Forty

GM3CFS seems to have stuck to CW, and the bottom of the band, where he found HC1LT, VP9HP, PT2UF, PY5AAR, PY6AVY, PY9VO, N7XX in Washington, U5ØSP, YV5EYX, ZL2UV, ZL3VW and ZS5A.

7 MHz for G3CED was a matter of two or three contacts round Europe to pass the time away when there wasn't much doing on the HF bands; so we see a quickie with a French station, another with a DK, and a long ragchew with DL1CN for nearly an hour—since they both have been on the air since the days of spark and arc, we can guess the hour was spent in reminiscence.

G4EVO also covered the Europeans, and we noted one very meaningful *blank* entry in the log—where G4EVO heard the elusive

DX prefix but try as he would over the next seven minutes the rest of the call remained buried under the rumpus.

The log of G4EDG indicates that the VK/ZL path in the mornings has not been so good as last year, although the W6 and W7 stations were there for the taking. To work the following, all the CW stops were pulled out in the receiver, and the MFJ filter also in circuit as well, pulled to its maximum selectivity: CM2HB, CN8AD, CR3AGD, HV3SJ, JA2CG, JA4BCW, JA4FGS, K7UR, K6KII, KV4CI, OH9TH/SU, PY1NEW, PY1FB, PY4BUT, TA1ZB, TF5TP, UI8ACP, UA0AG, UA0SGJ, VP9HP, VK3MR, VK5FH, VS5MC, W6ASH, W0RCS (Kansas), ZS1HF, ZS1XR, ZL2VS, 4Z4KX and 5B4CD.

G3ZGC/MM reports from Esso Scotia again, this time near ZS, after a pleasant leave. A group of his buddies decided to see just how well a 7 MHz sked could be kept in the morning period. G4EMM (I.o.W.), G4EXY (Newbury), and GW3EMZ (Milford Haven) and G3ZGC/NN were the participants, and the time 0645z. The sked was 100% solid until just north of the Equator, and it was noticeable that when the contact was at good strength in one direction it was invariably weak in the other! Others worked on Forty included G4AYO, from about 500 miles seaward of the Angolan coast, and "G4GA" was a Gotaway from Walvis Bay—so he should have been too; that must have made old Joe want to come back and haunt the offender!

A new reporter to this piece is G4CLN (Ashby-de-la-Zouch) who has been pretty well QRT for a couple of years but recently put up 190 feet of wire with a Top Band end in view, and the revival of enthusiasm resulted in the aerial being tuned up on other bands. Forty yielded country number 106 in the shape of 7X0BI, an event which could only help to preserve the keenness.

#### Odd Items

We have already mentioned the SEANET Convention, but since then we have a letter from HS1WR which gives all the vital details. One point does seem important, and that

is that visitors must not take any radio gear into Thailand without the prior approval of the Royal Thai Government; apart from the possibility of it being confiscated, the Radio Society of Thailand itself specifically asks that no-one brings any gear in. For those thinking of a stopover for longer than the convention, HS1WR mentions the Loy Krathong (Festival of Lights) on November 6, and the Elephant Round-up at Surin on November 20, and the reservation form provides for those who wish to see such items. Reservations should go to RAST, P.O. Box 2008, Bangkok, Thailand.

Early warning of a contest—the TOPS CW Contest over December 3-4. All the details can be obtained from Peter Lumb, G3IRM, 14 Linton Gardens, Bury St. Edmunds, Suffolk IP33 2DZ, which is also the address for Logs. We also have a note of the winners of the 1976 affair, of whom G4BUE was the winner and SP8ECV the runner-up—our congratulations to both.

From PY1RO we have a note of the Trans-Equatorial Tests on Top Band. Throughout June, monitor from 0000 to 0030z, and extend into July or stay up later if conditions seem to indicate these. The usual frequencies apply, Europeans around 1825 kHz, South America on 1800 to 1808 kHz; other DX to use whichever area is appropriate in terms of their location, save that there will be ZS stations listening around 1965-1970 kHz.

A rather off-putting coincidence hit G3FWI just recently; he was signing with a KP4 station when he was called by I2FWI, or so he thought; however, when he went back to I2FWI and pointed out that he was G3FWI there was a stunned silence—until it was realised that the QSO in fact included G2FWI, G3FWI and I2FWI!

#### Vale

We have, with great regret, to write of the death of G5LO, of Oxford, on April 20, just two days after the death of his mother; she was 98, G5LO 75. Howard was confined to a wheelchair after an accident in his teens with a motorcycle, but that did not stop his interest in Amateur Radio which dated back to his hearing the opening of the Wembley Exhibition by

King George V in 1924 from a radio at the hospital bedside. Howard was also a long-time member of RAIBC and Oxford club, and did much to encourage newcomers to the hobby.

#### "CDXN" deadlines for the next three months:—

July issue—June 3rd  
August issue—June 30th  
September issue—August 4th  
*Please be sure to note these dates!*

#### Twenty

Your scribe has not been all that able to listen round on 14 MHz this month, but he did enough to note just how variable conditions were this month.

For G2HKU it was all CW, giving VK3BZ, ZL4NH, ZL2ANV/MM, KV4AA, YV4AHU, VK2BJL, VK3MR, YV5DEK and ZP5AC.

G4DJY (St. Annes) normally seems to run around 100 watts to a Joystick in the VW mode; but lately he has been known to go over to SSB or to change to another band. Twenty CW showed with 5V7AR, VP9HT, VP2MAQ, ZS4MG, VO1AW, VE5DX, PY1NEW, another VP2MAW contact, while the SSB was used for the ARRL Contest, in which reams of W's were worked in all call areas, but not so much in the way of multipliers.

G4CCQ (Tunbridge Wells) has returned to the fold with a new aerial; CW is noted as having managed JR6RRD, VU2YK, AP2P, 5Z4NI, JH6IMI, 9M2FK, A9XBC, U60A, VS6AF, K9PNT/DU2, 4Z10TD, OH2BDA/OH0, KH6IJ, JA8AA, VK2CX, JG1HND and lots of Asian Russians.

Nice to hear from G3NOF again, after a lay-off for several months; first the beam started to play up and had to be taken down, then the linear played up; add to that replacing all the coaxial cable and a dose of 'flu, and you have several months of non-operation! However, Don re-appeared on April 22, and since then has found 14 MHz very patchy and with a high noise level. A few VK/ZL contacts in the mornings were followed by KL7's! around 1600z the West Coast W's and the Far East have been heard. Contacts were as usual all SSB, and

cluded VU2BEJ, VU2HI, YS1GMV, and East Coast W's.

G4EAN (Nottingham) continues to struggle for time to operate; this month he has tried getting up a little earlier, but has been rather put-off by a cold shack, not to mention that his 18AVT won't load on three bands; however some time has been spent on getting the /M installation going albeit Ian reckons the /M whip is not as good as the TH3 at sixty feet! On the matter of QSO shortage, G4EAN has booked himself a period of leave to coincide with the GE prefix period, and he intends to see just how much he can do with it!

G4CLN started the career of his new Top Band aerial by a QSO with PY2ELZ on Twenty, followed by ZL3GQ, CT4WT, UB5WE OK2BBB, and OF1AA all before setting off to work on a Saturday morning.

GM3CFS keyed with HC1BU, HI8MOG, HP1SI, JA8UI/PZ, KP4CLB, VP9GD, WB6FPE/SJ (who said "QSL via KP4USN"), XE1RV, 8P6AK, 8P6DW and 9Y4VU.

G4EDG says he gave Twenty a blast as the result of its being open after TV hours. The result, apparently on CW—Steve does not make it quite clear—included K7SS, KH6CF, VU2WP, WB70MW, VE4TC, W6EZM, VS5MC, FY7YE, JA1BWD, UA0LAU, XE1QW, JA7PL, 5Z4NI, JA8AA, JA8AYN and YV4AKK.

On to G3ZGC/MM, who kept a sked with G4EMM and G3LLK! it seems to have been very successful with the FT-75, and many other stations have joined in, from ZD7, ZS1JJ, ZS6 and a few G's.

0830z on May 2 saw G3FWI come down from the shack in disgust, after spending thirty minutes trying to work VP2LS—Bill reckons the noise of the pack chasing him sounded rather like a cross between the opening of the gates of hell and *music-concrete*! G3FWI was first licensed back in 1949, and operated from the present QTH for the past twenty years, originally on CW but over the past year SSB on 14 MHz using an FT401, and various other rigs, at the moment to a 14 MHz dipole. During the last month this has yielded contacts with ZL3LV, JAOAXV, IC8FHF.

VP9HT, a couple of "firsts" on the trot with HI8XBH, and TF3HP, plus putting these two together for their own respective "firsts," SV1IZ, KV4AA on CW, PY7APS/1, LU7DEZ, and a most disappointing Gotaway in the form of 7H1CT, who obviously heard G3FWI as he came back with "Thanks for the call the G3, but I only want to work non-Europeans." VR3AK was heard, but again the wolf-pack assembled and the dipole was just not able to cut through to DU6EBB, DU9FB, 5B4DG and ZD8AB that morning either, although it did produce a consolation-prize in the form of a nice long contact with VE1AYB. Then followed PY1PY whose father went to PY from Manchester back in 1927, a WB3 in Maryland, and the usual crop of Europeans and Russians.

G3RCA next, from Wigan, all SSB and 14 MHz. Before mentioning a few of Tom's QSO's, we should possibly mention some of his other news; for example that the current shortage of 9X5 is due to the authorities jacking up the licence fee level to the equivalent of one thousand U.S. dollars! On the VR1 situation, VR1X says he is the one-and-only at the moment since the departure of VR1AA and VR1AP/4Z4TT, as VR1AF and VR1AG are at the moment on leave but due back in a couple of months. The morning sessions seem to have been good, with KS6FO, KX6BU, FK8CP, ST2SA, 5W1AP, 5W1AT, HM0U, VR8N, 5W1AU, ZK1DR, VR1X; lunchtimes showed with YB2AK/3, VE7DIY/SU, VR4DH, KG6JFK, WA5EVX/KG6, KA6KJ, and afternoon/evening ones included such as FH0BKKZ, FR7AE, FR7AT, SU1MA, ZF1GC, VS5MC, UG6LQ, YN1WB, FL8FF, ZS3B, CN8MB, PJ3BW, KG4SC, VP8PJ, 9L1GA, VP5BIL, 5Z400, 3A2HB, SV1FT for Crete, ZK1DR, VP2LL and A4XGY as samples.

G3CED/G3VFA stuck to their QRP CW plus Joystick combination, with very few exceptions such as the odd contact with G4EVO. The CW worked all over Europe with two watts input, and out to UA9CES, UK6HAA, UW6DM, CT4HW, UM8MAD and lots of small fry.

Turning to G4EVO we find G2HLU(!), most of Europe, EA7TH,

UA9ADY, U60A.

## 21-28 MHz

Both bands have been open and "giving" always providing one can find the time to operate during the openings. G3NOF found skip to be short, but with some Far Eastern openings on Fifteen, and a few W's and South Americans in the early evening—QSO's with KP4CLB, WB4KSJ, 9V1SV, not to mention 28 MHz QSO's with G's assorted and a solitary Italian.

Our chief ten-metre watcher is G2ADZ (Chessington); Bill says that he listened every day during April, and on ten of those drew a blank. Of the remaining twenty, all produced QSO's outside the U.K., and fifteen produced long-distance contacts. For example ZS6AL, ZE3JJ, ZE3JO, ZD8DO, CN8AD, ZS6BQT, ZS6TZ, 9J2BO, ZD8TM, PY1BOA, 4X4GD, ZS1GK, LU3EX, 5Z4LW, LU6EF, A9XBC, 9J2WR, 9J2JR, LU6DGA, LU6KDX and a Gotaway in 5Z4JE. All these were CW contacts, and Bill says that often the Europeans are to be heard until quite late in the evenings.

G3VFA found UW6DM, UK9ADT and UK6AAE, plus a long rag-chew with IC8HGZ on Capri on a "dead" band; one feels that 21 MHz is a better band for QRP DX chasing than many, even of the QRP chaps, would believe.

G4EVO looked at both bands, raising an OK on Ten, and UK4WAR plus YO3CR on Fifteen.

## Tables

These have not been omitted for perverseness on our part, but rather lack of entries. One would think most of those who intend to have a go will by now have accumulated a few contacts on Top Band or Ten (or, better, both), so we are calling for entries to appear in this piece next month. If there aren't enough, we'll have to think of something else, and drop the 1977 Ladder.

## Finale

We are back at the bottom of the lists again, for another month; for next time the deadline will be June 3, addressed as usual to CDXN, SHORT WAVE MAGAZINE, 34 High Street, Welwyn, Herts. AL6 9EQ.

## ELECTRONIC KEYSER

A. V. KENYON, GW4DOO

A QUICK listen around the CW portions of the amateur bands will find the majority of QSO's being made with the use of some sort of keyer. Although the author can send quite comfortably at 20 w.p.m. on the old brass pounder it was found to become very tiring on the arm when operating for long periods in contests or when spending hours calling that much wanted DX station. Some form of electronic keyer was therefore deemed to be necessary, and a working circuit was evolved which has now been in use for several months without any problems. Even with all components purchased from new the total cost should not exceed about £6 which is considered to be very reasonable when compared with the price of commercial keyers.

The circuit will work with either a "squeeze" type paddle or the standard type "side-swiper" and, with the components shown, operate up to a speed of 30 w.p.m. Simply by altering the values of the timing components of the free running multivibrator the circuit will work up to about 100 w.p.m., but since very few people can read or send at such a speed the values chosen are considered to be quite adequate for the majority of users.

### Circuit Operation

Although circuit operation is quite complex a simple explanation is as follows; it should be remembered that a logical 0 is equal to 0v. and a logical 1 is equal to a positive voltage.

With either paddle pressed a logical 0 is applied to one of the inputs of gate G3 which then gives a logical 1 on its output. This switches VT3 on which then completes the path to earth for VT2 emitter. The multivibrator then starts switching at a rate dependent upon the setting of VR1, which is the speed control; the two outputs from the multivibrator are taken via the shaping components C3, R6 and C4, R7 respectively to drive gates G1 and G2. A positive going pulse is produced which has a sufficiently sharp leading edge to clock the flip flops FF1 and FF2. Dot size pulses are also present on the top input of gate G7.

With the dot paddle depressed a 0 appears on the input to gate G6 which then gives a 1 on the K input of the flip flop FF2. By flip flop action this 1 is passed to Q of FF2 putting a 1 on the other input of gate G7; G7 now has dot size pulses on all of its inputs thus giving a 0 on its output. This 0 is passed to G8 input giving a 0 on its output and thus a 1 on G9 output which then switches the driver transistor VT4 to operate the relay RLA1 or the keying transistor VT5.

When the paddle is made for a dash a 0 appears on G4 input and therefore a 1 on the J input of FF2. Upon

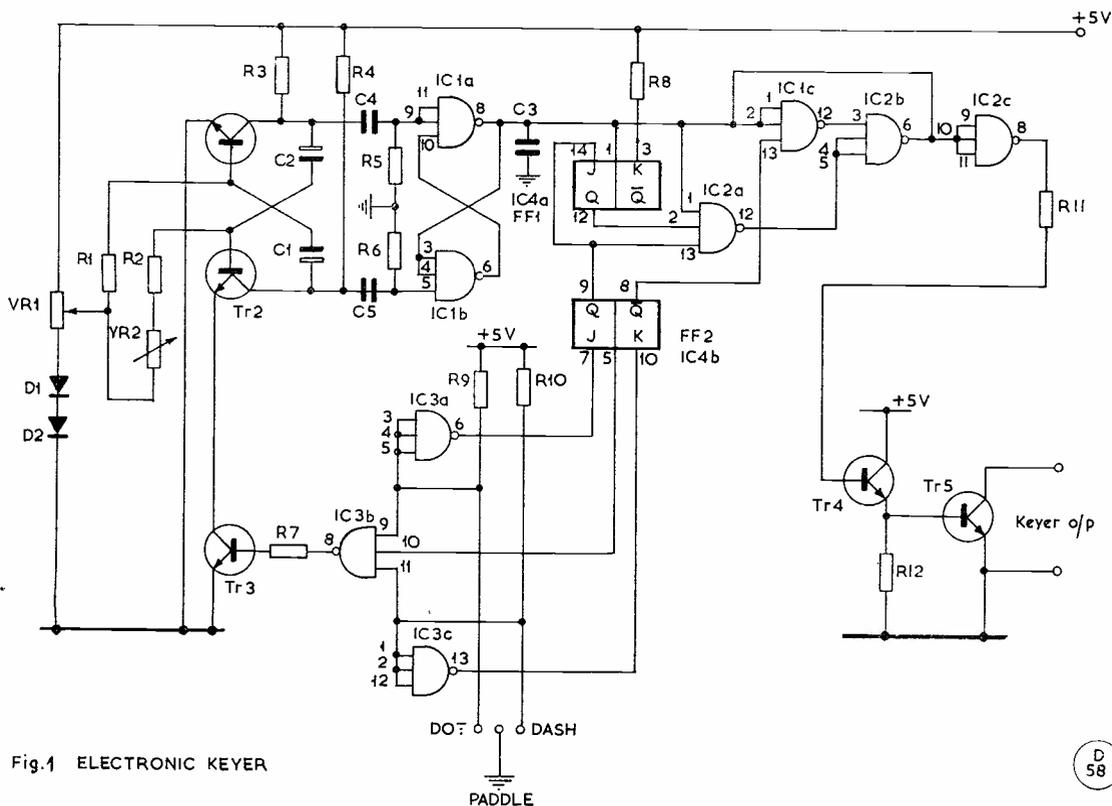


Fig.1 ELECTRONIC KEYSER

the arrival of the next clock pulse this 1 is passed to Q and a 0 appears at Q and thus on the lower input of G7 preventing the passage of dot size pulses to the output.

The 1 at Q of FF2 is passed via FF1 to G5 which then produces dash size pulses at G8 input operating the output stage as before.

Although the above explanation is very simplified it is hoped that those constructors who wish to explore the thinking behind the circuit will be able to do so from these basics.

The output stages shown in Figures 1 or 3 are optional depending upon the transmitter being keyed. Although

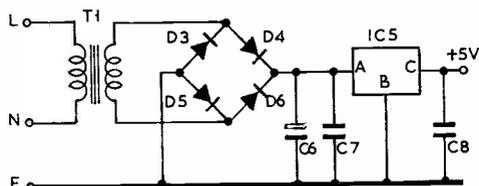


Fig. 2 Electronic Keyer Power Supply

D 59

reed relays can operate at very high speeds they have a disadvantage as to the amount of voltage and current they will switch. The author's transmitter is an old Heathkit DX-40 in which cathode keying is employed. The open circuit voltage across the key contacts was measured to be over 80v. and this was considered to be too high a voltage to be keyed by a reed relay so therefore a keying transistor was used. Any npn transistor can be used provided it has a Vceo of at least 100v. It should be noted that when a transistor is used in this stage the collector should always be positive with respect to its emitter. In the author's transmitter the keying

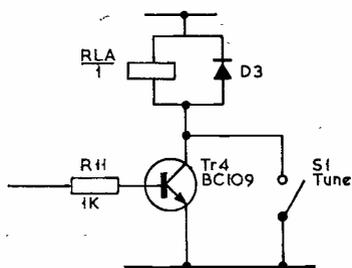


Fig. 3

D 24

that it is fully regulated, since the maximum allowable working voltage for the IC's is just over 5v. and any surges or spikes will damage the IC's beyond repair; initially it was intended to run the unit from a battery supply but the current consumption was measured and found to be 50mA.

The gates used are triple input *nand* gates of which three are contained in a 7410 package; therefore three such packages are required. The two flip flops are contained in a 7473 package; all four IC's are very cheap and easily obtainable. The three transistors shown in the multivibrator can be virtually any small silicon npn transistor.

Layout is not critical and can be constructed in any way the builder desires. The dot-dash ratio control, VR2, may either be on the front panel of the keyer or a preset on the circuit board, although having the control on the front panel allows the operator to adjust the ratio when sending at different speeds. Once the circuit has been completed it should be carefully checked for wiring errors and if all is well connect the keyer to the transmitter ensuring that if a keying transistor is used it is connected correctly since it will only key one way round. For those of you who are used to a keyer of this type there should be no difficulty when adjusting the dot-dash ratio; for those who have never used a keyer the easiest way to set the ratio is to connect an ohmmeter across the output and set the speed control to around 20 w.p.m. When the dash paddle is depressed the meter reading should be full scale whereas when the dot paddle is depressed the meter should stay around half scale deflection.

### COMPONENTS LIST

#### Electronic Keyer

- |                   |                                              |
|-------------------|----------------------------------------------|
| R1 = 1K           | D1, D2,                                      |
| R2 = 1.5K         | D3, D4,                                      |
| R3 = 150 ohm      | D5, D6 = 1N4002                              |
| R4 = 150 ohm      | TR1,                                         |
| R5 = 4.7K         | TR2,                                         |
| R6 = 4.7K         | TR3 = BC109 or similar                       |
| R7 = 270 ohm      | NPN transistor                               |
| R8 = 1K           | TR4 = BF337                                  |
| R9 = 1K           | TR5 = BU206 or similar                       |
| R10 = 1K          | NPN transistor                               |
| R11 = 1K          | with Vceo greater                            |
| R12 = 220 ohm     | than the voltage                             |
| C1 = 30µF         | to be keyed                                  |
| C2 = 30µF         | IC1,                                         |
| C3 = 0.01µF       | IC2,                                         |
| C4 = 0.002µF      | IC3 = 7410                                   |
| C5 = 0.002µF      | IC4 = 7473                                   |
| C6 = 2000µF, 12vw | IC5 = MVR-5V (obtainable from "Radiospares") |
| C7 = 0.22µF       | T1 = 12v. 150mA. secondary transformer       |
| C8 = 0.47µF       |                                              |
| VR1 = 10K         |                                              |
| VR2 = 1K          |                                              |

line was the positive side but in some of the newer transceivers it will be found that the keying line will be negative with respect to earth; in this case the earth should be connected to the collector and the keying line to the emitter. It is best to leave the collector and emitter connections floating so that the keyer can be used with any transmitter.

The power supply shown in Fig. 2 will provide a regulated 5v. supply for the keyer, using a "Radiospares" IC Regulator. If any other supply is used it is important

#### Errata

In the article by G4DHF on a Forty-watt Linear Amplifier for Two Metres, on pages 88 and 89 of the April issue, the value of C3 was omitted; C3 should be 47pF and, as the picture on p.89 shows, a mica type for preference.

## A 21 MHz ATTIC ARRAY FOR THE SHORT WAVE LISTENER

E. J. WILLIAMS, B.Sc.

THE short wave listener has no easy task when he attempts to assess the effects of any changes he makes to his aerial system, whether these be adjustments to an existing aerial or the complete replacement of one system by another. The main factor causing the difficulty is the rapid fluctuations in propagation conditions which occur on the HF bands, so that any comparison involving a separation in time between observations is unreliable. On occasion, when fading of signals is very rapid even a gap of a second or less may make the comparison void.

During the past few months the writer has replaced his previous aerial, a long wire of random length in the attic of his bungalow, with a W8JK-type array (also in the attic) for reception in the 21 MHz band, and carried out numerous measurements and adjustments to peak its performance. This article describes these activities and the methods employed to assess improvements, if any, at various stages of the exercise.

For some weeks before the change was made records had been kept of the signal strengths of ZS6CR who was running a regular schedule with a number of stations in the writer's locality. Also noted were the reports given to the South African by the various G's and a clear impression obtained of the difference in performance of the attic long wire and the variety of beams in use elsewhere. It should be mentioned that a long wire outdoors at about the same height as the attic aerial produced no noticeable improvement. The aim, let it be stated at this point, was not so much to make an S-meter reading of '7' into a 'nine', but rather to raise a weak (in the noise) signal up out of the noise so that it would be R5 instead of R2. A pre-amplifier could do the former easily, but not the latter. The aerial noise (thermal agitation, cosmic etc.) was audible on the receiver, and peaked up when the ATU was adjusted, so that a pre-amplifier would have amplified this as well as the desired signal and also added some noise of its own.

The W8JK is a fixed array which was popular back in the 1930's. It consists of two parallel half-wave elements in a horizontal plane, connected 180° out of phase, and usually spaced an eighth to ¼-wavelength; it is bi-directional, maximum gain being along a line joining the centres of the two elements. The problem with a W8JK has always been connecting it to the receiver, or transmitter, without serious mismatching. The spacing for greatest gain is ¼-wavelength, but the radiation resistance at the centre of each element is then, according to the aerial manuals, only 8 ohms. At ¼-wave spacing the resistance is around 30 ohms. The stated gains are 4½dB at ¼-wave, and 3dB at ½-wave spacing.

In the writer's attic anything much greater than ¼-wave spacing (about 5' 9" at 21 MHz) was impossible and it was obvious from the start that the sloping roof etc., would make it necessary to bend the ends of the elements; if this has to be done the arrangement should be symmetrical otherwise the electrical centre of the element may not coincide with the physical centre.

It was decided to connect the elements 180° out of phase by using quarter wavelengths (usually known as quarter-wave transformers) of 75 ohm flat twin lead as should in Fig. 1.

The formula relating the input and output impedances with the characteristic impedance ( $Z_0$ ) of a ¼-wave transformer is

$$Z_0 = \sqrt{Z_{in} \cdot Z_{out}}$$

so if  $Z_0 = 75$  ohms and  $Z_{in} = 8$  ohms, then  $Z_{out} = 700$  ohms approx. Thus, at the junction (AB) of the transformers where they are in parallel we have  $Z = 350$  ohms.

The length of the half-wave elements is given by the formula  $468/f$  feet, which comes to 22ft. for the centre of the 21 MHz band, while the length of the quarter-wave transformers is given by  $246V/f$ , where V is the velocity factor, which results from the lower rate of travel of electromagnetic fields through a material dielectric than in free space; for solid polythene this is given in the tables at 0.71 for 75 ohm flat lead. Thus, for 21.2 MHz the length of the transformer works out at 99 inches.

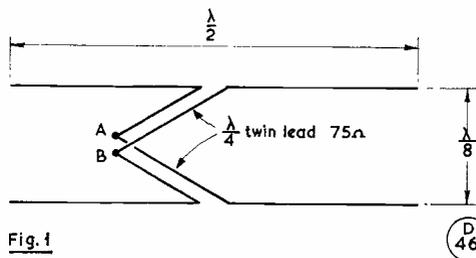


Fig. 1

The problem now was to convey the signal from AB, where the impedance is 350 ohms balanced to the receiver input which is "50 ohms nominal" unbalanced. A 4-to-1 Balun seemed to be the obvious answer here, producing 87.5 ohms unbalanced, and an ATU would complete the task.

Small Baluns are on the market for the purpose of connecting coaxial cables to the balanced input of some FM broadcast receivers, but it is unlikely that these will be effective at 21 MHz, so a coaxial type was constructed. This is shown in Fig. 2. The ¼-wave length of cable ( $492V/f$  feet) can be formed into a coil: the inner of this cable is connected at one end to A and the other to B. The braids at the two ends of the cable are soldered together and also to the braid of the 75-ohm onward transmission line; the inner of this line is connected to A. At the input of the Balun the ¼-wave cable and the onward transmission line are in series across AB and therefore each sees 175 ohms. A ¼-wave cable produces the same impedance at output as at input, so at the output end of the Balun we have again two impedances of 175 ohms but this time they are in parallel between A and the braid, giving 87.5 ohms. Moreover, whereas at the input to the Balun the RF currents at A and B were 180° out of phase, the ¼-wave delay imposed on that at B by its journey *via* the cable puts it in phase when it reaches A.

The velocity factor for 75-ohm coax with solid polythene dielectric is given as 0.66, which makes a half-wavelength at 21.2 MHz to be 186 inches.

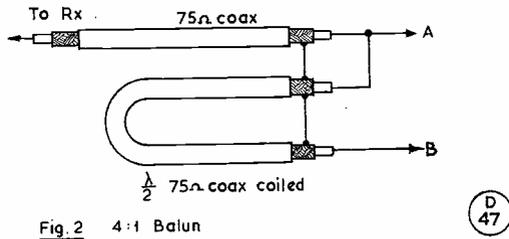


Fig. 2 4:1 Balun

D 47

Fig. 3 therefore shows the proposed layout of the system. The initial installation had the two  $\frac{1}{2}$ -wave elements running *E-W* for maximum gain *N-S*. This was about 25° off Pretoria, where our test signal source was located, but the structure of the attic prevented any closer approach to the correct direction. No 75-ohm twin lead was readily available and to avoid a delay in starting on the project it was decided to use flat twin lighting cable; on short lengths the loss was not likely to be increased significantly and it was hoped that differences in characteristic impedance and velocity factor would be slight.

Initial tests were encouraging and a second array at right-angles to the first was set up; a co-axial switch was inserted just ahead of the ATU so that quick changes were possible. The directional properties showed up readily and there were indications that the ZS6 signals were improved in readability. A disturbing feature, however, was that the two arrays were not tuning up at the same settings on the ATU and a general impression was formed that the *E-W* reception was not as good as *N-S*.

Possible causes were considered—the *E-W* array had one of its elements running over the top of a water tank—the wire used for the elements was not the same (7/22 with only a thin covering for the *N-S*, 28/30 with a thick plastic covering for the *E-W*)—the coaxial cable used was from odd lengths, some of it on hand since 1950—there might have been a mistake in the measurements—the electricity conduits in the attic and the metal gutters around the bungalow might be exerting some influence, etc. It was decided that for a thorough check a resonance indicating device was required and accordingly the Heathkit solid state dip-meter (HD-1250) was constructed and also the antennascopes, described in *SHORT WAVE MAGAZINE*, September 1976, to use in conjunction with it for impedance measurements. The 50 $\mu$ A range on a VOM was used as the meter in the antennascopes.

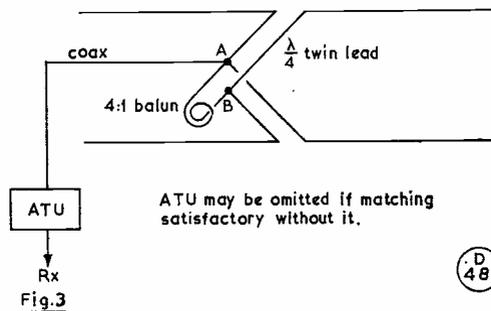


Fig. 3

D 48

The electrical lengths of the  $\frac{1}{4}$ -wave transformers, the  $\frac{1}{2}$ -wave cable in the Balun and the  $\frac{1}{2}$ -wave elements were all checked. The correct length for a  $\frac{1}{4}$ -wave of lighting lead was found to be 86 inches at 21.2 MHz, giving a velocity factor of 0.6; this would not affect the phasing as that it determined by the reverse connections of the transformers to their respective elements as shown in Fig. 1, but it would produce a different impedance at AB, including a reactive component. That, however, would ultimately be taken care of by the ATU and so it was considered unlikely that this error would have had any great effect on performance, but it was nevertheless corrected; it was also found, using the antennascopes, and further checking with a noise bridge (*SHORT WAVE MAGAZINE*, August 1975), that the characteristic impedance of the twin lighting lead was somewhat over 100 ohms.

A  $\frac{1}{2}$ -wave length of the 75-ohm coaxial cable used in the Balun was found to be rather shorter than that calculated—about 180 inches.

The most serious errors were found in the  $\frac{1}{2}$ -wave elements of the *E-W* array and these almost certainly accounted for the discrepancies between the performances of the two arrays: both elements were resonating below 20 MHz. It was at first thought that the dielectric constant of the thick plastic covering might be responsible as the *N-S* array was only slightly off resonance with the same length of wire, but further tests with the same elements out-of-doors showed that their resonant frequency was not greatly in error. It seemed therefore that the aberrations were due to the proximity of the various structures in the attic and a new set of elements were cut from 16 s.w.g. enamelled copper wire and arranged at a minimum distance of 4 inches from beams, rafters, chimney stacks etc., throughout their length. The direction was also modified so that they ran straight along the two arms of the L-shaped attic and not slightly askew as before. This meant that they were both well off the “line of fire” to ZS6. It was found difficult to get adequate coupling between the elements and the dip-meter without adding a two-turn coil at the centre of the element; this in itself would produce an error of unknown size. To overcome this trouble a twin lead was cut to a  $\frac{1}{2}$ -wavelength at 21.2 MHz and connected to the centre of the element being checked, the dip-meter being coupled to the far end of the lead: this made the task easy.

The dip-meter and the coil which coupled it to the lead were both fixed to a piece of board to maintain a constant degree of coupling, and the  $\frac{1}{2}$ -wave included the coil; dipole centre T-pieces (*Home Radio* Cat. No. AA35) were used at the centres of the elements and all feeders, and the  $\frac{1}{2}$ -wave test lead fitted with soldering tags for easy connection to the screw terminals on the T-piece. The tags were in position on all the leads when quarter or  $\frac{1}{2}$ -wavelengths were measured. Other devices can of course be used for the centres of the elements, such as Belling-Lee twin feeder plugs and sockets (L733/P and /J). It should be noted that in view of the low radiation resistance of the elements it is essential that all connections at their centres be low resistance.

At all important stages in the adjustment the frequency of the dip-meter was checked with the receiver to ensure it was in the band. When connected to an aerial element as described above, quite a strong signal

was radiated in the attic, sufficient in fact to put the S-meter needle on the receiver on to the peg; heavy loading of the receiver input will give rise to spurious responses and care must be taken in these circumstances to ensure that the signal heard is the genuine one.

It is, perhaps, worth noting that if the element is resonant a little too low in frequency and there is a fear of cutting off too much, bending the last inch or so of the aerial back along itself will raise the frequency of resonance, as also will zigzagging at the ends of the elements, but this should be done equally at both ends.

In the course of making the alterations it was decided to make the length of cable from the Balun output to the ATU (via the coaxial switch) an exact quarter-wave to facilitate impedance measurements (any multiple of  $\frac{1}{4}$ -wave would be satisfactory). Using the Cambridge Noise Bridge the impedance at this point was measured at around 50 ohms. Calculating back through the various quarter and  $\frac{1}{2}$ -wave sections, this gives 14 ohms for the resistance at the centre of the elements. It is interesting to note that had 75-ohm twin lead been used for the  $\frac{1}{2}$ -wave transformers then the impedance at AB would have been 200 ohms and a Balun made of 50 coax would have been ideal.

Initial tests with the arrays after their overhaul showed that the ATU had to be adjusted to minimum inductance and capacity for best results. Using the dip-meter at a suitable distance as a signal source, the S-meter reading was checked with and without the ATU and found to be the same in both cases, so the ATU was removed.

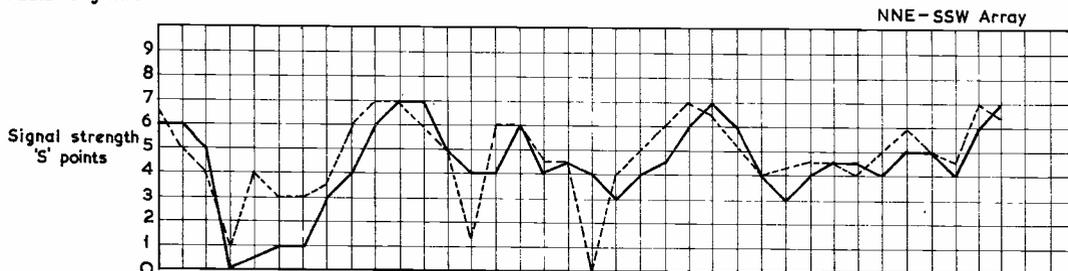
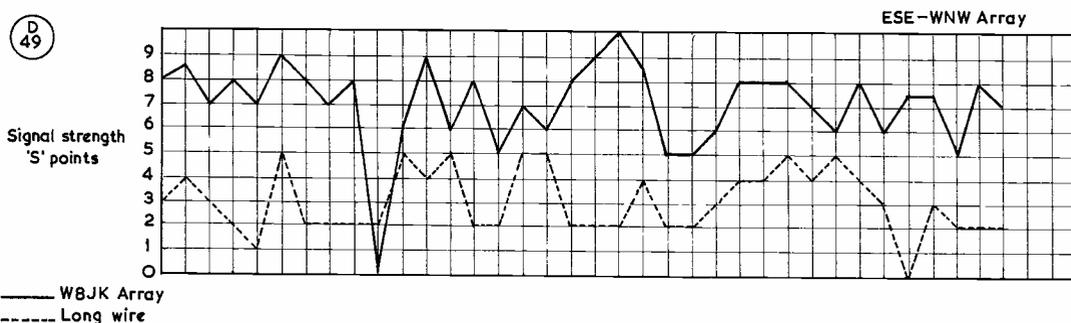
One of the first impressions gained in the initial session of listening on the new set-up was the unusually large number of signals pushing the S-meter needle beyond the '9' mark. Past experience had shown that sudden changes in conditions occur on this band of frequencies and it could well be that the sunspot number had taken a long-awaited upsurge. The ZS6CR schedule was un-

helpful: not only was his part of South Africa now well off the axes of both arrays, but also his signals persisted in being around the S6 to 7 mark, and what was required was a low-level signal to check readability.

The SB-303 receiver has three switchable aerial input sockets, two of these being intended to accept the outputs of VHF converters, but with the exception of a series filter at IF across the normal HF input, all three sockets have the same input characteristics. The W8JK arrays, including their own coaxial switch were connected to the HF socket, and it was decided to connect a vertical aerial in the loft to Socket 2 via its own ATU, and a long wire through another ATU to the remaining socket; the long wire was set up to be as far from the arrays as possible and about half of it was outdoors at the same height of about 15 feet. No particular attention was given to the provision of ground wires, but the receiver is earthed via the third wire of the electricity supply and the surrounding gardens at the time of the tests were very wet.

Using a VOM connected across the output of the SB-303, the dip-meter as a steady signal source and the RF attenuator control to vary the signal strength, S-meter readings were taken with AGC on, and then VOM decibel readings on the same signal but with AGC off. In this way a rough relationship was established between the S-units and decibels. S9 came to 45dB above the threshold of audibility and it was therefore decided to make one "amended S-unit" equal to 5dB and it is to these amended units that reference is made below.

Attention has already been drawn to the difficulties caused by fading of signals and it was necessary to be on guard against being misled by momentary peaking of signals, especially when comparing horizontal and vertical aerials, as there is little synchronisation of fading on these two components of polarisation. From the moment of switching on there was no doubt of the general superior performance of the two beams. In the directions

D  
49

of maximum gain the signals on the beams were often three S-units—sometimes more—better than on either of the other aeriels, and even along the bisectors of the beam birections, i.e. 45° off, the gain was at least one S-unit. It must, of course, be borne in mind that the long-wire and the vertical have their radiation patterns (or should one call it reception pattern?); in free space the latter should have a circular pattern, but there are firm indications that it is not so in the writer's attic. Thus the apparent good performance of one aerial in a particular direction may in fact be due to the bad performance of the comparison aerial in that direction; but in no direction have the beams been out-performed by either of the others except momentarily during severe fading conditions. The poorest aerial has been the vertical, largely due to its liability to pick up noise, especially from colour TV sets. Such interference can put the S-meter up to S7 when it is entirely inaudible on the W8JK's and only about S3 on the long-wire which has a short vertical section.

Examples of the performance on weak signals, for which the whole project was undertaken, are WIHWL SSB RS 52 on beam, VE1AUQ CW RST529 on beam, but both stations completely inaudible on either long-wire or vertical and ZS6BYL SSB RS54 on beam, RS 32 on long-wire, RS 11 on vertical (and ZS6 is 40° off the beam's direction). Other comparisons of reception on the W8JK's and the long-wire are given in the accompanying table.

It is not often that intruders into an amateur band are welcome, but a rather rough continuous hiss which often appears at about 21.3 MHz provided a useful test source. With the array switch set to the *ESE-WNW* W8JK, the receiver input was switched at about 2-second intervals to-and-fro between the array and the long-wire over a period of 2 or 3 minutes and the S-meter reading at each switching recorded. The results are shown in the graph. A similar test between the other array and the long wire was carried out, but it should be mentioned that due to the inopportune appearance of some local interference there was a delay of 30 minutes before this second test could be carried out and the two graphs for the long-wire suggest there was a slight improvement in conditions during that period. The average reading for the first W8JK was S7 against S4 for the long-wire, and for the second W8JK S4 against S5.5. Readers may make their own assessment of the bearing of the intruder!

Summing up, the two arrays are a marked improvement over the long-wire, but there appears to be a falling off of 5 to 10 decibels between the directions of maximum gain and 45° off those directions. This still gives signals slightly stronger than with the long-wire, but whereas in the optimum directions and for some 30° to 35° on either side the attic arrays offer a serious challenge to many a low-level outdoor Yagi, this may not be so over the remaining sectors.

Unfortunately in the writer's case the geography of the attic results in three of the four best directions lying down the middle of the South Atlantic, across the spaces of the Indian Ocean and over Northern Siberia! The remaining lobe embraces U.S.A. and Canada which is not exactly the most likely place to find rare call-signs. Perhaps someone else may have better luck.

### NOTES ON THE USE OF METERS

1. Always use the loosest possible coupling to a dip-meter to avoid frequency pulling, and if a precise reading is required check the frequency by tuning in the dip-meter signal on a calibrated receiver.
2. To find the velocity factor (V.F.) of a cable, connect at one end of it a one-turn coil just large enough for coupling to the dip-meter coil; leave the other end open circuit; couple to the meter and tune for a dip. At the frequency indicated on the meter scale the cable is  $\frac{1}{4}$ -wave long. The V.F. is likely to be between 0.6 and 0.85 so an idea of the frequency range in which to search for the dip can be obtained from the formula

$$\frac{1}{4}\text{-wave (ft)} = \frac{246V}{f}$$

Once the exact frequency has been obtained on the dip-meter the same formula can be used to obtain the exact value of the V.F. and further use of the formula will enable  $\frac{1}{4}$ -wave lengths of cable to be cut for any desired frequency, and these can, of course, be checked by the dip-meter.

To measure the frequency for which a length of cable is a  $\frac{1}{2}$ -wave long, the far end must be short circuited.

3. To use the antenoscope to measure the characteristic impedance of a cable, connect a short length of the cable (8 to 10 feet) to it. At the other end of the cable connect a resistor of known value in the 40 to 70 ohm range. Set dip-meter or other source of RF drive to a frequency near to that for which the cable is a  $\frac{1}{4}$ -wave. Adjust the antenoscope control and the dip-meter frequency control alternately for minimum reading on antenoscope meter until zero is obtained. The length of cable is then acting as a  $\frac{1}{4}$ -wave transformer and with  $Z_{out}$  given by the antenoscope reading and  $Z_{in}$  the 40 to 60 ohm resistor,  $Z_o$  can be calculated. If the value of  $Z_o$  is likely to be higher than, say, 150 ohms, it may be convenient to use a somewhat higher value resistor at the cable end.

The same principle can be used with a noise bridge.

STATION	DEGREES OFF ARRAY AXIS	ARRAY S	LONG-WIRE S
4Z4UH	0	7	3
ZC4IO	0	6	3
D4CBC	5	8	5
EL8F	5	8	3
VP8PL	5	5	2
WB4TLU	5	8	4
A9XBD	15	9+5dB	8
SZ4LW	20	6	3
KC4AN	20	4	2
KZ5UH	30	7	4
PJ3IDP	35	5	2
VU2DK	35	9	7
9M2DQ	40	8	7
ZS6FD	45	5	4



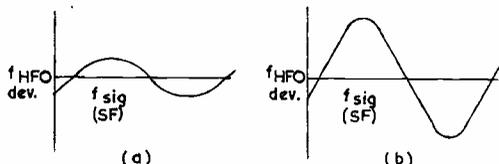
The formula for resonance in a tuned circuit is:—

$$f_o = \frac{1}{2\pi\sqrt{LC}}$$

It will be seen that  $f_o$  varies as the square root of a change of either L or C (inductance or capacity); but we are only concerned with changing C. To tune from 2 to 4 MHz we need to change C by a ratio of 4:1; C will have a minimum capacitance made up of trimmer capacitance plus circuit strays. Suppose we say this minimum is 50 pF: C must then be able to change to 200 pF, so the variable section of the ganged capacitors will have a maximum capacitance of 150 pF (assuming that its own minimum capacitance is zero, which of course it is not). If we were to manufacture the HFO section to change by a ratio of only 1.8<sup>2</sup> so that tracking is maintained we should be in trouble on the other wavebands. If the next is 4 to 8 MHz, the HFO must tune from 4.5 to 8.5 MHz, which is a ratio of 1.89:1, as compared with the previous waveband 1.8:1. We must therefore be able to switch in our tracking correction with the wave-change switch.

Given that we cannot alter the variable capacitor mechanically, there are two ways in which we can vary the ratio of the capacitance swing:—

- (a) We can place a fixed capacitor in series with it. This will slightly reduce its minimum capacity, which is low anyway, but will reduce the maximum capacity by a much greater degree since the fixed capacity will be more comparable to the variable capacity in value and thus have greater effect on the total capacity in circuit.



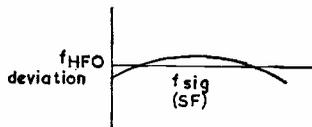
(a) Shows 3 point tracking when IF is low compared with SF  
 (b) Shows 3 point tracking when IF approaches SF min

Fig. 5

D 51

- (b) We can increase the minimum capacity across the circuit by tightening up the trimmer, and the minimum to maximum circuit capacity ratio will then be reduced because the minimum will be a greater proportion of the total capacity.

Both methods have the disadvantage that they modify the rate of change more at one end than at the other, but since they do it at different ends of the scale, a combination of both methods provides a workable compromise. Thus, an HFO tuned circuit normally includes higher minimum capacitance plus a fixed capacitor limiting maximum capacitance. This method produces what is known as "three point tracking," which means that signal circuits and HFO can be com-



2 point tracking when HFO capacitance change ratio is very little different from RF capacitance

Fig. 6

D 52

pletely accurately tuned in relation to each other at three spot frequencies in the tuning range. The deviation from total accuracy between these points depends on the relationship between IF and signal frequencies; the higher the IF, the greater the disparity between the capacitance change required for signal and HFO tuning in any particular waveband, and therefore the greater the deviation from ideal tracking between the cross-over points, see Fig. 5. The amount of deviation from accurate tuning in practice determines the selectivity that can be used in the RF signal stages. These cannot be made so selective that they are attenuating the signals at the maximum tracking deviation points; this problem seldom arises in single superhets tuning HF bands, but it can on MF sets, and on double superhets on the HF bands. On single superhets covering HF bands the higher wavebands commonly use no series tracking capacitance as the IF becomes low in relation to the SF, and then two point tracking results, see Fig. 6.

It will be noted from Figs. 5 and 6 that the tracking error is split either side of ideal tracking by arranging for the upper and lower cross-over points to fall a little way inside the band limits. This is particularly important in the case of two point tracking; if the cross-over points were set at the band edges all the error would be on one side of the ideal straight line, and maximum deviation from ideal would thus be doubled.

It is normal practice for the HFO always to operate on the frequency above SF rather than below; if this were not the case all the SF tuned circuits would need to be tracked to the HFO and there would be several circuits instead of one to track. Reversing the HFO frequency relative to SF reverses the sidebands of the received signal, and this is important in the cases of SSB and FSK reception. If the HFO is above SF and the modulation causes the SF to decrease frequency, then the difference between HFO and SF<sup>2</sup> (which is the IF frequency) increases. If the HFO is below SF and the modulation causes SF to decrease frequency, then the difference between HFO and SF decreases. Image signals therefore always have sidebands reversed from normal signals. Amateurs transmitting SSB signals do not need upper and lower sideband filters to change from one mode to another; all they need is a facility to switch one of the various HFO's in the frequency conversion chain following the sideband filter to the opposite side of the filter, so reversing the sideband *en route*.

to be continued

# A SIMPLE TONE-MODULATOR FOR A GDO

E. CHICKEN, B.Sc., M.Sc., C.Eng., F.I.E.R.E., M.I.E.R.E., G3BIK

THE grid or transistor dip-oscillator is an invaluable aid both to the radio experimenter and professional engineer, in that it can be used:—

- (a) to determine the resonant frequency of an L.C. tuned circuit,
- (b) to indicate the presence and approximate frequency of radiated radio-frequency at its fundamental and/or harmonics (useful when checking transmitter output or multiplier stages in transmitter or receiver oscillator circuits),
- (c) as a modulation monitor for radiated RF,
- (d) as a signal generator for the tuning and adjustment of receivers or converters.

In the latter role, the dip-oscillator is particularly helpful, for example, when modifying ex-service radio equipment, where the presence of a strong signal at the required frequency greatly simplifies the peaking of RF amplifier, mixer, and crystal oscillator circuits. However, to be really effective for receiver work, the dip-oscillator should be able to radiate a tone-modulated signal, yet not many of the commercially available oscillators have such a facility.

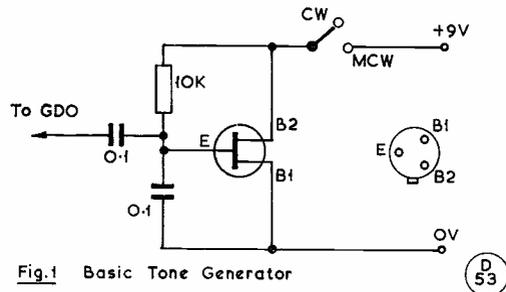


Fig. 1 Basic Tone Generator

The simple tone generator described here can effectively amplitude-modulate most dip-oscillators by superimposing an audio tone of approximately 1 kHz onto the battery supply line; in particular, the diagrams show how it can very conveniently be mounted and wired into the well known "Tradiper" commercially built dip-oscillator. In that example, the modulating tone is coupled *via* a capacitor onto the centre tag of the "sensitivity" control, which is a potentiometer by which the battery supply voltage to the oscillator can be varied.

For modulation purposes, that potentiometer acts also as a resistance across which the modulating voltage is developed, although sufficient depth of modulation may be obtained by coupling the output from the tone-generator, *via* its isolating capacitor, to the battery supply rail of the dip-oscillator. If the dip-oscillator does not have a sensitivity control in its supply line, the addition of a low value resistor (say 1 kilohm) between the battery and the supply rail would enhance the depth of modulation, *see* fig. 2. Whilst the tone generator is primarily intended to amplitude modulate a dip-oscillator, it does also impart some degree of frequency modulation, since

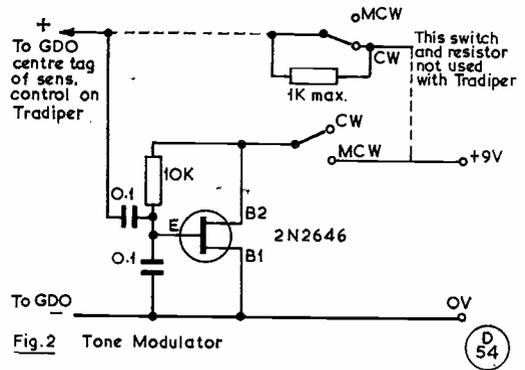


Fig. 2 Tone Modulator

the dipper is a free running oscillator the frequency of which is inherently influenced by variations in supply voltage.

This renders the modulated output even more useful, in that it can also be used with F.M. receivers.

### Tone Generator

This is a unijunction transistor simply connected to operate as a relaxation type of resistance/capacitance oscillator, to produce a saw-tooth waveform at an audio frequency determined by the values of one capacitor and one resistor.

$$\text{Frequency approx.} = \frac{1}{CR} = \frac{1}{0.1 \times 10^{-6} \times 10 \times 10^3} = 1 \text{ kHz}$$

The basic oscillator consists of three components only i.e. one transistor, one capacitor, and one resistor.

Additional components are one output coupling capacitor and one miniature toggle switch. The switch allows the modulator to be switched off when not required. A double-pole type is specified, although only one of the poles is used for the "Tradiper" modification. The other may be required to switch a modulating resistor in and out of circuit for other types of dip-oscillator; the switch positions can be identified on the panel as CW and MCW, meaning continuous-wave and modulated continuous-wave respectively.

Whether or not the additional modulating resistor is required is most easily determined by listening to the

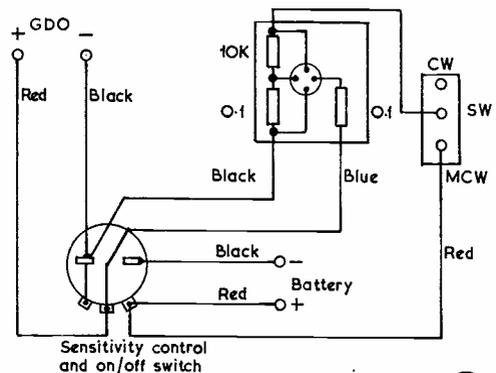


Fig. 3 Modulator added to Tradiper

modulated signal on a receiver. If the level of the audio tone is adequate without the resistor, omit both it and the second pole of the switch.

All of the components can be accommodated on a one-inch square piece of stripboard, to be conveniently mounted within the dip-oscillator housing. In the "Tradiper," it was mounted on the two terminals of the meter, care being taken to remove the copper strip from the stripboard in the vicinity of the mounting holes to avoid accidental electrical contact with the terminals. The toggle switch was located in a single hole on the

panel above the meter.

### Results

The project was completed in less than one hour, at negligible cost; in transforming an elementary dip-oscillator into a modulated signal generator, this simple modulator has proved to be so useful in practice, particularly for aerial adjustments and on receiver modification and alignment, that one wonders how one managed without it.

Note that all components used are obtainable from *R.S. Components Ltd.*

## A PHASE LOCK LOOP MORSE DECODER

### AN EXPERIMENTAL CIRCUIT FOR MORSE RECEPTION

G. C. DOBBS, G3RJV

OVER the years there have been many circuits for aiding Morse reception, ranging from the simplicity of the "T5er" to complete processing units. This circuit is offered as a possible new line for investigation. From the start it must be said that the circuit will not be everyone's cup of tea, but within its limitations, it proves to be a useful little unit for a certain type of CW reception; it may require a little tailoring to suit individual needs, and does rely on the cheap availability of a particular integrated circuit. Perhaps this can be best explained with a simple "potted-history" leading up to my building of this circuit.

I had been attempting to build a FM IF strip using the LM565 phase lock loop IC for demodulation (perhaps more of that some other time). Much to my surprise, I found the cheapest source for this IC was a pack of four phase lock loop IC's sold by Tandy Stores for just over a pound. The 565 at under the usual price and three more IC's thrown in! My other three IC's included a LM567, which is described as a phase lock loop tone decoder; this IC, with its "bedfellows" the LM566, is frequently used for ultrasonic remote switching applications. I believe that the 566 is beloved of "Phone Phreaks" who use it to send whistles down telephone lines in the U.S.A. to gain free access!

The data on the 567 looked very interesting: it is a general purpose tone decoder which is designed to provide a saturated transistor switch to ground when an input signal is present within the passband. The makers claim a highly stable centre frequency, adjustable from 0.01 Hz to 500 kHz, high rejection of out-of-bandpass signals and noise, immunity to false signals and an adjustable bandwidth from 0-14%. This seemed to suggest possibilities for CW reception, so an experimental circuit was built up.

It may be useful, at this stage to briefly describe the basic action of a phase lock loop. Fig. 1 shows a very simple block diagram of the technique. It is really a form of automatic compensating feedback; the input signal and the output from a Voltage Controlled

Oscillator (VCO) are fed into a phase detector. This produces an output voltage dependent upon the difference between the input signal and the VCO. In most PLL's this voltage is used to change the frequency of the VCO until it locks onto the input signal. In the 567, the frequency of the VCO is controlled by a few external components and the VCO drives a phase detector which controls the centre frequency of the decoder. External components also control the bandwidth and the output delay.

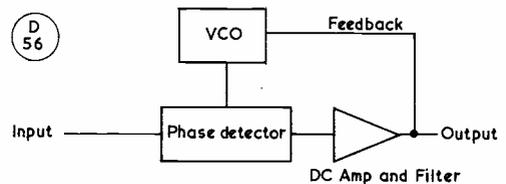


Fig. 1 basic Phase Lock Loop

Fig. 2 shows the final circuit, but just for a moment consider the section marked *PLL Tone Decoder*. This shows the basic circuit arrangement set to decode signals in the range approx. 500 to 1,000 Hz. The audio input is fed into pin 3. The R/C combination R5, C5, VR2, controls the bandpass frequency within the required range. When a signal is present at the required frequency, pin 8 goes to ground through a saturated transistor stage. In this circuit it has been arranged to switch on the LED. C6 determines the bandwidth through the loop filter. The 567 can detect a signal as low as 20mV within 14% of the set frequency, but C6 has to be a compromise between sensitivity and bandwidth; C7 controls the noise immunity through the output filter. Once again this is a compromise choice since a low value for C7 may cause unwanted signals to trigger the switch, and a high value has a charge time which slows down the circuit response. Already we are meeting restrictions for its application in CW work, but more of this later.

When this portion of the circuit is set up, it is possible to test it with the audio output from a receiver. Connect a couple of leads from the speaker between the input of C4 and ground. It should now be possible to get CW signals, whose audio frequency is within the bandpass to switch the LED on and off. VR2 controls the frequency of the signals which will light the LED. This is quite an amusing little circuit in itself! The triggering of the LED can be controlled by tuning signals to the correct fre-

quency, or by adjusting the control VR2 to match the CW tone. The LED should be seen to follow the keying of the signal.

It is now that the compromise values of C6 and C7 will be seen to limit the working of the circuit; with the values shown the selectivity of the decoder is in the order of 200 Hz or so, according to the manufacturers specifications. With C7 at 2.2 $\mu$ F the rejection characteristics are good, but the response time limits the circuit to signals with a keying speed of no more than about 20 w.p.m. This obviously limits the usefulness of the circuit, but C7 is open to individual experimentation. The bandwidth is such, that even on a crowded band, it should be possible to get the LED to respond to only one signal.

Amusing though it is, a light switching on and off in time to a CW signal is not what we are really hoping to achieve; the switching must be used to trigger an audio oscillator, so that the decoded CW can be heard. This is the function of the section of the circuit marked *Audio Oscillator* in Fig. 2.

The audio oscillator is required to give an output tone when the output on pin 8 of the 567 IC goes down to ground. The circuit used here is perhaps one of the simplest possible, based on a 7400 IC. IC 3a is used to gate a simple audio oscillator, IC 3b and IC 3c. The spare gate, IC 3d, is used to provide a drive for a small low impedance loudspeaker. When pin 12 of IC 3a goes to ground a tone of some 800 Hz should be heard in the speaker. The 6-volt supply used for the 7400 and the 567 is on the high side for a TTL IC so a diode D2 is put in series with the Vcc pin 14, to give a small voltage drop.

As the circuit now stands, a CW signal in the pass-band of the tone decoder should give an audio output which should follow the keying, within the limitations of the 567 response time; it is quite possible to use the circuit in the form described. The main receiver loudspeaker may be replaced with a resistor load, Rx and the output taken to C4 and ground. Although the LED is not really required for the operation of the circuit, it is better left in as a tuning guide to indicate that the decoder has locked onto the signal. I used the circuit in this form for some weeks, but found that weak signals or QSB

could cause the decoder to miss bits of information in the signal. The 567 appeared to work best with a reasonably constant level of signal, so the next thought was to drive it with a constant level audio amplifier.

This is shown in the portion of Fig. 2 marked *Constant Level Amplifier*. The circuit provides a form of audio AGC. This circuit provides an almost constant signal output for input changes in the range of about 30 dB. The circuit uses a 741 op. amp. and utilises variable feedback from the output at pin 6 to the inverting input at pin 2. A rectified sample of the output produces a proportional amount of negative feedback through TR1.

Audio AGC is worth thinking about as an idea in its own right. A simple form like this used at the output of a receiver can help to stop those earsplitting experiences often encountered on a crowded band. It can certainly help to save the eardrums when doing routine operating on 40m. and 80m. Naturally it is not much good for copying weak DX stations, since the loudest available signal will set the level.

Now the completed circuit has been outlined, a word about construction. I built my prototype onto a piece of 0.1" perforated board using holders for all the IC's. It is worth noting that three power sources are required for the full circuit. A single 6-volt source will supply both the 567 and 7400, but a dual 9-volt source is required for the 741 op. amp. This is the sort of circuit that is at its best when it can be switched in and out of operation to suit the conditions of the moment. I connected a single pole switch between C1 and C4, to short out the constant volume amplifier when not required; I also connected a similar shorting switch between C4 and the loudspeaker. This was a double-pole change over switch, so that the output from C4 could either go to the 567 IC or directly across the loudspeaker. With these switches, it is possible to use the whole circuit, the tone decoder and audio oscillator alone, the audio AGC of the constant volume amplifier alone, or just the loudspeaker.

What about results? Well—with a flexible in-out switching arrangement, the unit has been very useful. Its limitations with very weak signals and fast keyed

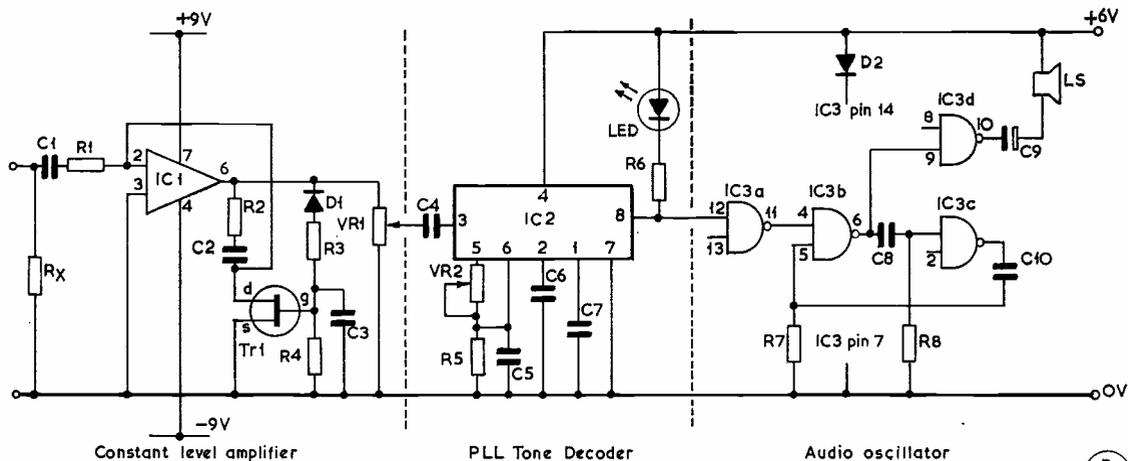


Fig.2 PHASE LOCK LOOP MORSE DECODER

signals obviously impose limitations, but the unit is very useful for normal CW working on the "messy" bands. For average CW QSO's on 80m. and 40m. it aids pleasant listening. If you want a decent CW QSO on these bands without adjacent channel rubbish, then this is a circuit worth considering. It is a real joy to listen to a clear CW note without any background sounds at all; because the note is produced by the 567 switching the tone oscillator, not even receiver background noise is present. Its a bit uncanny at first!

The cost of the unit is reasonable if use is made of the Tandy phase lock loop pack. The first practical step in the construction is therefore to find one of these assorted packs which contains a 567. The packs are encased in a plastic bubble, so it is quite simple to check through a few in the shop by shaking the pack and reading the IC markings to find a 567; the manager of my local branch even helped me do this, although I was looking for a 565 at the time. A pack will only contain one 567, but you will have the added advantage of three other PLL IC's to play with for less than the usual cost of one. If the pack also contains a 565, you have a good little

FM PLL IC as well. The 567 is 8-pin DIL and the 565 is 16-pin DIL.

It may be that this little article will prompt someone better versed in PLL techniques to produce a more sophisticated circuit with a faster response time.

## TABLE OF VALUES

### Phase Lock Loop Morse Decoder

C1 = 1 $\mu$ F Tant	R5 = 10K
C2 = 1 $\mu$ F Tant	R6 = 510 ohms
C3 = 1 $\mu$ F Tant	R7 = 22K
C4 = 0.1 $\mu$ F	R8 = 22K
C5 = 0.1 $\mu$ F	VR1 = 10K Lin.
C6 = 1 $\mu$ F Tant	VR2 = 5K Lin.
C7 = 2.2 $\mu$ F Tant	D1 = 1N914
C8 = 0.1 $\mu$ F	D2 = 1N914
C9 = 100 $\mu$ F 16v. Elect.	LED = General purpose
C10 = 1 $\mu$ F Tant	RedLED
Rx = Equal to Receiver output Imp.	TR1 = 2N3819
R1 = 560K	IC1 = 741C
R2 = 330K	IC2 = LM567
R3 = 100K	IC3 = SN7400
R4 = 1M	LS = 8-16 ohms

## NEW QTH's

This space is for the publication of the addresses of holders of new call signs, or changes of address, in EI, G, GC, GD, GI, GM and GW of stations not already listed. All addresses published here will appear in the U.K. section of the American "CALL BOOK" in preparation. Please write clearly and address on a separate slip to QTH Section. Be sure to give correct County designation and post-code. In the case of direct subscribers needing Change of Address, please state for card index adjustment. Address items for this space to: "New QTH Page," *SHORT WAVE MAGAZINE*, 34 HIGH STREET, WELWYN, HERTS., AL6 9EQ.

EI1CD, D. G. Fitzgibbon, 18 Gilford Park, Sandymount, Dublin 4.  
 EI9DA, K. Daly, Granarogue, Carrickmacross P.O., Co. Monaghan. (Tel.: 042 61026.) (correction)  
 EI0DA, V. Rafter, 6 Whitebeam Avenue, Ballymahon Road, Athlone, Co. Westmeath. (Tel.: 0902 4237.)  
 G4FIO, C. U. Fisher, Tudor Cottage, 2-A Bycullah Road, Enfield, Middlesex EN2 8EE.  
 G4FJU, B. Follows, 1 Avon Road, Bloxwich, Walsall, West Midlands WS3 1PA.  
 G4FKN, L. A. S. Poole, 50 Warren Road, St. Ives, Huntingdon, Camb. PE17 4NW. (Tel.: St. Ives, Camb. 65308.)  
 G4FNZ, D. J. Bannister, The Off License, 144 Wolverhampton Street, Darlaston, West Midlands WS10 8TX. (Tel.: 021 526 2571.)  
 G4FOD, T. C. Yeomans, 15 Turner Road, Woodfield, Dursley, Glos.  
 G4FPA, J. Shorthouse, 159 Marsland Road, Brooklands, Sale, Cheshire M33 3WE. (Tel.: 061-962 2769.)  
 G4FPJ R. P. Rawle, MPS (ex-G8JER), 8 Derwent Close, off Shadewood Road, Macclesfield, Cheshire SK11 7XS.  
 G4FPM E. G. Keeler, 18 Clyde Road, Worthing, West Sussex BN13 3LG.  
 G4FQH, B. Nelmes (ex-G8KWZ), 17 Woodfield Road, Woodfield, Dursley, Glos. GL11 6HB.  
 G4FLK, Dr. J. F. Fraser (ex-G8IAH), 35 Carleton Road, Pontefract, West Yorkshire WF8 3ND.

GW4FQU, Dr. W. Jones (ex-GW8CWP), Rhandirmwyn, Bryn Dymchwl, Llandegai, Bangor, Gwynedd LL57 4LD. (Tel.: Bangor 4594.)  
 G4FRG, B. L. Goddard (ex-G8JBR), 2 Greenfield Park, Portishead, Bristol BS20 8NQ. (Tel.: 0272 848140.)  
 G4FSN, E. C. M. Walton (ex-G8LXD), 4 Oakfield Close, Horwich, Bolton BL6 6JR. (Tel.: 0204 691536.)  
 G4FSW, F. V. Woodward, 18 Tewkesbury Road, Longford, Gloucester GL2 9DT. (Tel.: Glos. 25311.)  
 G4FUP, N. Braeman, 9 Millfield, Southwater, Horsham, Sussex RH13 7HU.  
 G4FVN, T. V. Wharton (ex-G8IPE), 79 Clavell Road, Liverpool L19 4TS.  
 G5BTZ, Jean-Jacques Bernard (F6CWB), 179 Callington Road, Saltash, Cornwall. (pse QSL via F6CWB.)  
 G8MCD, B. E. Akhurst, 41 Bedmond Road, Leverstock Green, Hemel Hempstead, Herts.  
 G8MDI, Dr. R. J. Nash, 135 Farren Road, Wyken, Coventry CV2 5EH.  
 G18MNA, S. J. Sherrard, OBE, Carmen, Cherry Hill, Rostrevor, Co. Down BT34 3BD. (Tel.: Rostrevor 714.)  
 GM8MOI, C. G. Stirling, 1 New Edinburgh Road, Uddington, Strathclyde G71 6BT.  
 G8MQS, A. Siemienioga, 25 Dover Street, Swindon, Wilts. SN1 3JP.  
 G8MUZ, E. G. Cresney, C.Eng.M.I.C.E., F.I.P.H.E., 5 Heronsgate, Frinton-on-Sea, Essex CO13 9AW.

G8MZM, E. Fielding, The Hawthorns, 12 Moorland Avenue, Baglatsle, Rochdale OL11 5XS. (Tel.: Rochdale 40877.)  
 G8MZO, C. J. Stagg, 1 Victoria Road, Haywards Heath, Sussex RH16 3LZ. (Tel.: Haywards Heath 52889.)  
 G8NAK, R. G. Nilan, 15 Enfield Street, Beeston, Nottingham NG9 1DN. (Tel.: Nottingham 258448.)

### CHANGE OF ADDRESS

G2DZ, A. B. G. Hall, Sundial Cottage, Westhorpe Lane, Byfield, Daventry, Northants.  
 G3COQ, D. Oswald (ZD8DO), Two Boats Village, Ascension Island, South Atlantic Ocean.  
 G3ILO, S. G. Spencer, 49 Rosebery Road, Dursley, Glos.  
 G3JAO, G. E. Simonite, 72 Southfield Avenue, Preston, Paighton, S. Devon TQ3 1LQ. (Tel.: 0803 521298.)  
 G3PCX, B. J. Dodge (ex-GM3PCX), 34 Downs Road, Penenden Heath, Maidstone, Kent ME14 2JN.  
 G3RIR, N. Ackerley, 129 Margards Lane, Verwood, Wimbourne, Dorset.  
 G3TFM, R. Scadden, 16 Clopton Court, Clopton Road, Stratford-on-Avon, Warks. CV37 6TP.  
 G3UOU, J. W. Dudbridge, 24 Woodlands Green, Upton St. Leonards, Gloucester GL4 8BE.  
 G3WMK, Standard Telephones and Cables Amateur Radio Club, c/o G. E. Simonite, 72 Southfield Avenue, Preston, Paighton, S. Devon TQ3 1LQ.  
 G3WSA, D. J. S. Allen, Bellever, Carnmarth Cove, Carharrack, Redruth, Cornwall TR16 5SA.  
 G3WVY, P. G. Beecroft, 12 Ifield Road, West Green, Crawley, West Sussex. (correction)  
 G3WYF, C. W. Heigh, 156 The Stour, The Grange, Daventry, Northants. NN11 4PT. (correction)  
 G13ZKT, T. E. Harding, 15 Rutherglen Park, Bangor, Co. Down BT19 1DX.  
 G3ZYQ, A. L. Robinson, 112 First Avenue, Bush Hill Park, Enfield, Middlesex EN1 1BP.

# VHF BANDS

NORMAN FITCH, G3FPK

## VHFCC Awards

FOUR more readers have been elected to the VHF Century Club this month, all for 2m. operation. No. 278 goes to Roy Thomas, G8KKX, from Rushden in Northants. An interesting claim inasmuch as no G cards were listed in the eleven countries represented. Roy reveals he was "Shanghaied" as a National Service radar mechanic, taking the R.A.E. ten years later. After a further fourteen years, the radio bug bit again and he applied for his call. The next step is to take the Morse test. The station comprises a *Trio* TS-700 plus pre-amp, with an 8-ele. X-Y aerial at 20ft. The QTH is a "hole-in-the-ground" 200ft. a.s.l. but hemmed in on three sides by rising ground. Best DX so far the Isle of Capri.

The next three members all belong to the Doncaster College of Technology Amateur Radio Club. Bob Lane, G4AWU, from Bawtry in S. Yorkshire, receives no. 279. His station comprises a *Belcom* Liner-2 for SSB with a *Datong* RF speech processor and AM is achieved with a *Pye* base station using an *Eddystone* 888A with converter for reception. The aerial is a *Jaybeam* 10-ele. Parabeam.

Award no. 280 goes to Kevin McMahon, G8JJR, from Tickhill in S. Yorkshire, who also runs a *Liner-2* on SSB. Kevin runs AM, again using a *Pye* base station, the receiver being an *Eddystone* EC-10. His aerial is another *Jaybeam* product, a 6-ele. Quad. The most recently licensed member of the trio is Ian Harwood from Woodlands, Doncaster, to whom Certificate no. 281 has been issued. Ian has a *Liner-2* but also runs a *Yaesu* FT-101E transceiver with a solid state "Europa" transverter from *Solid State Modules*. His aerial is

Roy Thomas operating his station G8KKX from Rushden, Northants. On the left is the *Trio* TS-700 2m. transceiver; on the right the *Yaesu* FT-101, and remote VFO for when the G4 ticket is obtained.



a 4-ele. Quad.

G8JJR mentions that their club is a very popular one in S. Yorks., with the call G3UER. It is very well supported and many members have obtained their licences by attending its R.A.E. classes. Perhaps the secretary might like to send regular reports to the "Club Secretary" each month.

## Iberian Notes

From Roger Thorn, G3CHN (Devon) comes news that, during the prolonged spell of high pressure over the Bay of Biscay in April, Gérard Le Falchier, F1COF (Brest) worked some 80 Spanish 2m. stations via four repeaters in the north and northwest of Spain. The output QRG's are: Vigo 145.500 MHz; Orense 145.575 MHz; Santander on RØ, 145.600 MHz and La Coruña on R2, 145.650 MHz. Gérard says that all the EA's seem to use vertical polarisation for all modes. He mentioned that EA1AM, EA1MZ and EA1QJ are all on SSB, but that EA1CR is QRT.

## Sporadic E—Be Prepared

It would be surprising if, by the time this is read, there have not been reports of *E's* in Europe. It is understood that G4CZP (Lancs.) heard a few seconds transmission from afi IW2 station at 1745 on April 9. The nature of this event is such that other modes can be ruled out.

Propagation by *E's* can build up quite quickly and it is certainly very worth while to monitor the 10m. and 4m. bands, listening for short skip Europeans on 10m. and east European broadcast signals on 4m. Band 2 FM broadcast in the 88-108 MHz band is very useful to monitor as are the Spanish TV stations in Band 1. Peak times for

2m. *E's* would appear to be from around 0800 GMT in the mornings and from about 1730 GMT in the early evening. This is the one mode where one can work over incredible distances with one watt from a *handie-talkie*.

## Alexandra Palace

For your scribe, the most interesting part of the RSGB's three day exhibition and convention held at the Alexandra Palace in North London was the series of lectures. Unfortunately, it was only possible to attend three sessions due to other commitments. It was a very great pleasure to meet Ed Tilton, W1HDQ, whose "World Above 50 Mc." column in "QST" has been running for decades. He gave a very interesting account of the amateurs' role in pioneering work and studies on the VHF bands and mentioned the cases where the amateurs' ideas and theories often conflicted with those of the experts of the day.

In a second, unscheduled talk on Sunday, Ed outlined the detailed study of the Sun he has commenced. Now that he has retired, he is able to make frequent observations of the Sun both in normal light and, by looking down into the star through a Hydrogen-*Alpha* filter, to correlate what is going on deeper down with what we see happening on the surface. In a brief paragraph here, it is quite impossible to cover the painstaking work W1HDQ is putting into this personal project, something he has always wanted to do.

One fascinating discovery of major interest to VHF addicts is a persistent occurrence of much increased sunspot activity following an eclipse of either the Sun or the Moon, when also the massive planet Jupiter is in

line with the Earth, Moon and Sun and with another massive planet, Saturn, 90° away. Even in "Quiet Sun" conditions, otherwise inexplicable upsurges in sunspot activity seem to occur, quite unrelated to any 27/28 day cycle. The results of this are the coming to life of a "dead" 15m. band and auroral events at VHF.

As with so many phenomena in physics, it is the *rate of change* of something which is spectacular in its results. Sunspots which remain the same shape and size for several days, suffering only slight changes, seem almost benign, producing little, if any, effect on propagation on Earth. By contrast, if a spot or group of spots should undergo very quick changes, it seems almost certain that this will be accompanied by considerable ionospheric disturbances.

Detailed recording of solar events is something likely not thought about by the majority of readers. Even a cheap telescope projecting the Sun's image onto a white screen will enable anyone to compile an ongoing record of sunspot activity. G8JJR reports using the pinhole camera technique to project the Sun's image—at nil cost.

The above is reported primarily to acknowledge W1HDQ's research but also to encourage others to consider following this path. This is just the real pioneering work an amateur can do at no cost to anyone and which could lead to a whole new understanding of propagation, of ultimate benefit to amateur and professional communicators at large.

#### Beacon News

GB3UOS has been operational since April 25 on 3456 MHz. Situated 4 kms. northwest of Sheffield, 400m. *a.s.l.* the Tx is one watt, omni-directional into a 10 dB gain slotted waveguide. Reception reports to G8AGN (*QTHR*). From Peter Burden, G3UBX, a request to mention that GB3WRN is now on from the Wrekin in south Shropshire on a QRG of 1296.91 MHz. This one is beaming north with about 2w. *e.r.p.* and all reports would be welcomed—but not QSL-ed! On 2m., the Lannon beacon on 144.905 MHz (Y113d) is now signing FX3THF.

The Alexandra Palace affair afforded an opportunity for your conductor to meet Serge Canivenc,

F8SH, and to discuss in detail, *Project VESNA*. Due to a misunderstanding, it seems that the 50 MHz aerial has been installed on the wrong platform of the water tower. Consequently, the 6m. beacon will not be operational as soon as had been planned, as it will have to be moved and tests carried out to ensure there is no interference with many other services.

The comments in the April column from Henry Souchet, 9H1CD, concerning the proposed 2m. beacon on the island of Malta, have elicited letters from two members of the Malta Amateur Radio League, Walter Gatt, 9H1DU, and Joseph Brincat, 9H1CG. Both state that members of the MARL are fully aware of the beacon proposal. 9H1DU wrote that all Maltese VHF enthusiasts were invited to discuss the idea and 9H1CG suggests that 9H1CD's views are not those of the majority of the VHF fraternity. Well, your scribe is certainly not getting drawn into any purely local arguments. The purpose of coverage of events far away is simply to record and acknowledge the achievements of those seeking to push VHF communication to the limits.

#### Satellite News

A fourth cell has failed in the battery of *Oscar 6* and the switch-off telemetry count on channel 3A is now 328. Surrey Telecommand is keeping 0.6 off most of the time now. On the DX front, I5TDJ will be operating MIC between 1000 GMT on June 18 and 1600 GMT on the 19th on all available orbits, modes "A" and "B." As Peter's "window" to the U.S.A. is very short, European stations are asked *not* to call on the more westerly passes. From Oman, A4XFW is now on Mode "B" and from Surinam, PZ1AP is on 29.48 MHz downlink. At the end of July/beginning of August, F6BEG plans operation from C31KZ in Andorra. Hopefully Gérard can be persuaded to operate direct for possible DX when the satellites are out of range? Jerry Goldsmith, G4CJG, plans some *-/MM* operation through the satellites on both modes, using crossed dipoles and 100 watts input.

#### Contests

*Results:*—From GB2RS News Ser-

vice was learnt that the Fixed section of the 144 MHz March "Open" was won by Vikki Menday, G8HCL with 3412 points from 464 QSO's. Runner up was G3UKC, The University of Kent ARC station, with 2869 point from 356 contacts, whilst Julian Niman, G8GAJ, scored 2684 points from his 328 QSO's. As expected, the Portable section was won by the GW8BHH team with 14649 points from 801 contacts. GW3UCB were second with 12585 points from 841 exchanges and GW3OXD came third with 12004 points from 759 QSO's. In this section, the first five places were taken by Welsh portables. First place in the Fixed section of the March 432 MHz "Open" went to G3VPK with G3XDY runner-up. The Portable half was won by G3UBX with G4BRA second.

*Forthcoming attractions:*—The 144 MHz Portable affair occurs at publication weekend, 1600-1600 GMT, May 28/29. The weekend June 18/19 is the Microwave event, 3.4-24 GHz (presumably 1600-1600 GMT as last year?) with the second leg of the 10 GHz *Cumulatives* on the 19th from 1100-2000 GMT. This year's VHF NFD is July 2/3 over the usual 1600-1600 GMT period. Again single band 2m. entries will not be accepted. Usual radial ring scoring on 70, 144 and 432 MHz and one point per kilometre on 1.3 GHz.

#### Twenty-three Centimetres

Glen Ross, G8MWR (Coventry) reports interesting test: with G8AIM on May 1, the latter operating on Cleve Hill, near Cheltenham. 2 watts of FM using a trough aerial produced good signals at G8MWR over the 42 mile path. On the way back, G8AIM/P stopped off at Broadway Hill, 35 miles away and put in an S9-plus-20 dB signal. After that, the rig was used mobile with the aerial on the passenger seat and this signal was copied as G8AIM/M descended into Broadway village. The intriguing point of this is that Glen copied nothing on 145.0 MHz! G8MWR reports the formation of the Coventry Microwave Group whose immediate goal is the 10 GHz, cross band repeater.

Arthur Bréese, GD2HDZ (Laxey) has made it 11 counties thanks to G3BW in Cumbria and John Tye,

G4BYV (Norfolk) reveals he is "... knee deep in brass drilling ..." trying to get going on 13 cm. SSB.

### Seventy Centimetres

As if to underline recent poor conditions generally, G4BYV remarks that his 0600 GMT daily sked with G8BAV in Derby has produced the poorest conditions since they began four years ago. John Woodham, G8BKR (Bristol) managed an SSB contact with GD8EXI for a new country and QTH square and says he is always willing to arrange SSB skeds on the band, Wednesday, Thursday and Friday evenings.

On a more exotic note, Keith Naylor, G8FUF (Essex) plans to be indulging in *E-M-E* work with the G4FUF group by the end of the summer. All the gear is ready but mounting the sixteen, 20-ele. *Yagis* at least 10 metres up to clear surrounding obstacles is a bit of a problem! They are using copper tubing construction for the power splitters.

Finally, mention must be made of the 432 MHz Worked All Continents achieved by Peter Blair, G3LTF, a truly remarkable feat made possible by *E-M-E* contacts, of course. Who will do it on two metres from U.K.?

### Two Metres

Just as this was being compiled, Bob Lane, G4AWU (S. Yorks.) told your conductor that he heard IØDLP (GB03f) calling "CQ" at 1140 GMT on 144.28 MHz during the IARU contest on May 8. G8CTV also heard this. The event was only of a few seconds duration and was probably *E's*, since a QRB of 1700 kms. would have been unlikely *via* any other mode under the prevailing conditions.

Richard Diamond, G4CVI, and John Regnault, G8FQO, took gear for 4m., 2m. and 70 cm. to Scotland for portable operation from various sites. They were in YP36e near Selkirk for the 2m. CW contest and Richard, using GM4CVI/P, made 54 QSO's. Later, they operated from the rare ZR QTH square on April 26 using GM8FQO/P from a site some 8 miles southwest of Peterhead. London area stations worked included G3JXN, G3OSS, G3POI, G4FCD and G3FPPK, all subject to considerable fading. They were operating from the GM8FFX

site during the fine *aurora* of May 2. In over 70 CW QSO's 14 countries and 28 squares were worked including an OH in LU square, with SP, DM, LA, OZ and SM's. Although no second phase was noted at G3FPPK up to 2300 GMT, there was one in Aberdeen from 2130 to 0230 GMT.

Derrick Dance, GM4CXP (Borders) reports the May 2 event commencing at 1630 lasting about three hours with G, GM, DL, EI, PA and ON worked. The QTF's were mainly between 070 and 090 degrees but the PA/ON stations peaked at 315°. Around 1915 GMT, GB3NEE was auroral peaking to the *southwest*. The second phase produced unworkable Scandinavians from 2150 until the small hours. At 1928

GMT, Derrick had a *tropo.* contact at RST 529 with LA6HL in CSO9g. He was audible for 10 mins. at some 400 miles with a cold east wind, rain and the pressure falling from 1012 mb. The same station was worked on CW the following evening in even worse conditions, his signals *peaking* when a rain shower occurred. On May 1, GM4CXP heard some auroral bursts on Radio Gdansk on 70.31 MHz sort of heralding the 27 day repeat of the April 6/7 event.

During the April 6/7 affair, Derrick worked two new countries and squares, UQ2IV (KQ36f) at 0045 GMT and at 0131, UP2BBC in LP07j. Both QTF's were 050°. Other countries worked included G, GD, LA, SM and the year's first

### THREE BAND ANNUAL VHF TABLE

January to December 1977

Station	FOUR METRES		TWO METRES		70 CENTIMETRES		TOTAL Points
	Counties	Countries	Counties	Countries	Counties	Countries	
G3OHC	26	3	48	10	17	4	108
G8HQJ	—	—	56	14	21	8	99
G3FIJ	26	2	44	9	15	2	98
G2AXI	18	2	37	9	20	2	88
G4ECQ	20	2	53	10	—	—	85
GD2HDZ	14	3	30	9	21	6	83
G8GML	—	—	52	8	14	4	78
GM4CXP	13	2	44	13	4	1	77
G4FOR	—	—	57	11	7	2	77
G4FCD	—	—	62	9	3	1	75
G8BKR	—	—	49	10	13	3	75
G3FPPK	—	—	62	13	—	—	75
G4CMV	—	—	62	12	—	—	74
G4DKX	7	1	37	9	13	4	71
G4BYP	—	—	43	9	13	6	71
G8GII	—	—	31	5	28	6	70
G8JHX	—	—	52	11	—	—	63
G8LHT	—	—	51	9	—	—	60
G4DEZ	—	—	49	9	—	—	58
G8JJR	—	—	47	8	—	—	55
G8ITS	—	—	38	6	9	1	54
G8KSS	—	—	42	8	—	—	50
G8HAF	—	—	40	7	—	—	47
G4AEZ	2	1	24	6	12	1	46
G8KXX	—	—	36	6	—	—	42
G4ERX	—	—	26	6	—	—	32
G4FKI	—	—	12	1	4	1	18

German, DK5LA (EO29h), QTF being 090°. In this event, GB3GI, GB3VHF, DLØPR, SK4MPI, LA4VHF beacons, plus some FM stations were heard aurorally. Finally, Derrick mentions another 15 minute *aurora* on April 8 when he only worked LA6HL at 1645 GMT.

In the south of England, the May 2 *aurora* produced about eight countries. G3FPK was alerted by a phone call from G2FKZ's wife at 1630 GMT, just as a meal was served. The event fizzled out at 1937, a most consistent signal throughout being EI6AS in Dublin (WN59c). All the British Isles signals peaked in London around 020° but OZ6OL and OZ1ABE were loudest at 340°.

Conditions during the CW Contest on April 24 were only average with no real DX. However, activity was

G8HHI	—	7	71	78
GJ8AAZ	—	15	55	70
G8HAF	—	—	69	69
G3BW	—	21	47	68
G8JJR	—	—	68	68
G4DEZ	—	—	66	66
G8KLN	—	1	62	63
G4CIK	—	—	62	62
G3KPU	—	—	60	60
G8JHX	—	—	60	60
G8KSP	—	—	60	60
G4AEZ	—	15	44	59
G8KXX	—	—	59	59
GW4FJK	—	—	57	57
G8LHT	—	—	55	55
OZ9IY	—	—	53	53
GD3YEO	—	—	52	52
G8ITS	—	3	44	47
G8JEF	—	—	44	44
G4EYL	—	—	41	41
G8LLG	—	1	38	39
G8JAH	—	1	35	36
G8KSS	—	—	31	31
G4CIK/A	—	1	23	24
G8JAJ	—	—	24	24
G8JKA	—	—	21	21

Starting Date January 1, 1975. No satellite or repeater QSO's. "Band of the Month" 23 cm.

QTH LOCATOR SQUARES TABLE

Station	23 cm.	70 cm.	2 m.	Total
G3JXN	18	53	69	140
G3COJ	15	50	64	129
GD2HDZ	9	24	50	83
G8EOP	8	36	38	82
G8IFT	5	16	35	56
G4DKX	3	25	68	96
G8FUF	1	80	176	257
G8GML	1	34	75	110
G2AXI	1	36	59	96
G8BKR	1	9	81	91
G3POI	—	—	177	177
G4BWG	—	23	110	133
G3CHN	—	—	131	131
GM4CXP	—	21	110	131
G8HVY	—	33	93	126
G3FPK	—	—	125	125
G4BAH	—	32	92	124
G3OHC	—	27	94	121
9H1CD	—	5	110	115
G4CDF	—	—	109	109
G3XCS	—	18	87	105
G4FCD	—	22	69	91
G8IWA	—	17	74	91
G8GII	—	22	63	85
G6UW	—	—	85	85
G3FIJ	—	25	57	82

high and G3POI (Kent) concluded 91 contacts. Clive, whose operating procedure is exemplary as is to be expected from an FOC member, thought there were a few terrible signals about and mentioned that some operators do not seem to understand the standard "Q" signals. At G3FPK, one station heard was sending virtually unreadable stuff and another seemed to be keying three carriers spaced a few hundred Hertz apart. It was also noticed that the keying from *Yaesu* FT-221's is very hard, resulting in bad key clicks. GM4CXP was only on for the first three hours making 10 contacts. Derrick's best DX was G3WSN (Essex) and QSB was very deep, resulting in many "half-QSO's."

Those looking for a GI contact should listen for GI8KIA who seems to be on quite a lot. Peter told your scribe he runs an FT-221 to an 80

watts amplifier with a 14-ele. *Parabeam* 50ft. a.g.l. His Carrickfergus site is at sea level. He often pops up on the SSB calling frequency and often answers "CQ" calls.

Four Metres

GM4CXP has modified an old *Magnum 2* for 4m. and now has 70 watts PEP output, plus CW available, into a 3-ele. *Yagi* at 24ft. During the May 1 *Aurora*, Derrick tried a crossband contact with DK2ZF who heard nothing of GM4CXP. During the Scottish trip, G4CVI said he only made one 4m. contact. GD2HDZ added 13 counties and a couple of countries to his 1977 score during the Open contest on April 3 and Peter Gamble, G4ECQ (Birmingham) appears to have followed suit.

DX-Peditions

Chris Rycroft, G3FES, reveals that the Cambridge University Wireless Society will be making its annual trip to Scotland from June 13 to 22. QRO operation on 2m. and 4m. CW/SSB is proposed, GM6UW/P and GM4CIK/P respectively, with medium power operation on 70 cm. under GM4CDF/P. Depending upon conditions, it is hoped to activate a few of the rarer QTH squares. This year they are going to try MS at up to 100 w.p.m. They will be on from 8 p.m. on 2m. plus 70 cm. or 4m., i.e. two bands, no waiting! Skeds can be arranged through Martin Philips, G4CIO, by telephone at work, after 2 p.m. on 01-253 0661, Ext. 18 or at home between 9 and 10 p.m. on 01-318 3050.

Ray Caws, G3BRL, advises he will be in the Isle of Skye, based on Borge in WR square from June 21 to July 5. He will take an IC-202 SSB transceiver and 10 watt amplifier and a TR-2200G for FM with a 2-ele. aerial. Times of operation variable.

Deadlines

All your notes, views, claims, photos, and moans for the July issue no later than June 2, and for the August column, by July 7 to:— "VHF Bands," SHORT WAVE MAGAZINE, 34 High Street, WELWYN, Herts., AL6 9EQ. 73 de G3FPK.

## THE MONTH WITH THE CLUBS

By "Club Secretary"

(Deadline for July issue: June 1)

THOSE of you among the regular readers of this piece will have noted that the deadline pattern has altered from that which has prevailed for so many years. May's editorial gave an indication of the problem, which is basically no more than our printer's desire to obtain better utilisation from his machines in order to cope with his ever-decreasing profit margins in real terms. So: this is being started well before the incoming deadline and will be dealt with as and when the letters arrive, so as to enable us to avoid passing on to you the full change.

### The Reports

It seems only right this month that our first stop should be at **Derby**, where the Hon. Sec. for the past twenty-plus years has finally laid down the burden of that office, although he continues as Treasurer. In G2CVV's case, he not only continued as Hon. Sec. all those years, but fitted it in with membership of Council of RSGB, a year as President of that society in which he did more than his fair share of "showing the flag," and various other things beside, without ever, so far as this writer was aware, being other than the good Club Secretary that he was. His replacement, G4EYM, was, we suspect, not even born when G2CVV took up his task—but we wish her luck in following his footsteps. The June dates are allocated as to: June 1 for a Junk Sale, a talk on June 8, a night on the air on 15th, Films for 22nd, and to round off Technical Topics on June 29.

Next we come to **BATC**, the grouping of amateur television enthusiasts, both of the fast and slow scan persuasions; they have all sorts of things of interest to ATV enthusiasts, and all of the latter should be members without doubt. Details from the Hon. Sec.—see Panel.

A good idea for cutting the costs of distribution of Newsletters is mentioned by **Cheltenham RSGB**—in the Newsletter there is a list of members who are to receive newsletter copies for onward distribution, and against each of these the calls of those who are to receive their copies from each distributor. It splits the load, and would certainly save club funds a few shillings on postage. The gang, incidentally, get together at the Old Bakery, Chester Walk, Cheltenham, on the first Thursday of each month.

At **Peterborough** the Radio and Electronics Society foregather at the Scout Hut, Occupation Road, on June 17, for a final briefing on VHF NFD.

G3IGM has the floor at **Acton, Brentford & Chiswick** on June 21, and his subject will be the 144 MHz aerial tests he has been carrying out.

Now to **Cornish**, where they had an AGM on April 7, when the office of Hon. Sec. was bandied around—for the final victim's name and address, see Panel. The next calendar date is June 2, and on this date G3VWK will talk about "Marconi—Cornwall and the New World."

At **Verulam** the group get together on the second and fourth Thursdays of each month; the former date being an informal at Salisbury Hall, London Colney, while the

latter date is the main one, and is booked at the Market Hall, St. Albans.

It looks like June 22 for **Chiltern**, at 42 Castle Street, with parking at the rear. At the time of printing their Newsletter, it was not known for certain just what would happen on which night—but something was definitely going to happen! Just for the record, that Castle Street mentioned earlier in the paragraph is the one in High Wycombe.

**Cray Valley** have their place at Eltham United Reformed Church, 1 Court Road, London SE9; we do not, at the time of writing, have the full details, but we can say the dates are the first and third Thursday—formal and ragchew in that order.

**South-East Kent (YMCA)** have a keen new Hon. Sec. who is realist enough to wonder if he'll be as keen in a year's time; a good point, but of course as in so much of life the keenness gives the individual pleasure in the task, whereas the rest of the Club are more interested in the *reliability* of the chap when his personal path gets a bit rough and his enthusiasm for the moment is zero. However, to our business. June 1 sees preparations being made for a Jubilee station, for HF NFD, and Maidstone Rally, and on 5th there is the Maidstone Rally. June 6 is the Hawkinge Fete, Jubilee station, while NFD is on June 11-12. June 15 is an Open Evening at which they will probably be talking about the future programme and on June 22 preparation for VHF NFD takes over; this is rounded off by a Project Evening—nice and relaxing before VHF NFD. The Hq. is at the YMCA, Godwyn Road, Dover, and they are to be found there on Wednesday evenings.

June 13 is the **Southdown** date, at Chaseley Home, South Cliff, Eastbourne, for a talk on Radio Controlled Models. That gives them just enough time for completing the preparations for the visit of the Radio Club de Normandie over June 18/19. Looking forward a little further than usual, on July 4, the programmed event is "Barry's Bangers and Beer on Butt's Brow."

The **G-QRP Club** is the one for all those who like to play with QRP—and, indeed, one is a little inclined to say that it is also mandatory for those who like the activity of home-construction, as each issue of the News letter seems to be crammed with interesting bits and complete circuits, for QRP transmitters and aids to the winking-out of weak signals. For details, get in touch with the Hon. Sec.—as in the Panel. It is of interest to note that this group is one of the few "special-interest" groups to have a specifically SWL element.

The **Stourbridge** Newsletter seems to have a new Editor who is a little worried about being able to match the performance of his predecessor—he needn't worry if he keeps up his present standard. The group gets together at Longlands School, Brook Street on the third Monday in each month for the "proper" meeting; the informal one is at the Shrubbery Cottage, Heath Lane, Oldswinford on the first Tuesday of each month.

The **East Lincs.** crowd want to make sure we get the details right—it has been written in with felt-tip pen on the front cover to make *sure*. The first Thursday in each month, at Blackburn YMCA it is. An additional activity during June is a station and display at the Mellor Festival on 11th—an afternoon with the theme of "Communication."

A rather interesting activity went on at **Edinburgh** when the group played host to a set of American students, over here on a choral tour. It appears they hold GM5BFX, and both in London and Edinburgh they were able to "make it" back to the home school in W2. For more details on the club itself, contact the Hon. Sec. at the address in the Panel.

**R.A.I.B.C.** come next, and already it is interesting to note how the new Secretary/Editor has stamped himself and his personality on to the Newsletter; for a group comprised of the invalid and bedfast members this is the main interest, outside the net contacts. Incidentally, the nets are on a nominal 3750 kHz—but it is dependent on QRM, and so members often have to search for net-control G3WJT. If you should hear a member on the hunt for the RAIBC net and know their actual frequency it would be a kindly thought to home the searcher on to G3WJT. Tuesday at 1000, or 2 p.m. on Wednesday.

At **Southgate** the Newsletter occasionally tells us where they meet; but of one thing it is determined, and that is that their dates and doings will not be allowed to waste printspace. Thus, while we can tell you that Hq. is at the Scout Hut, Wilson Street, Winchmore Hill, and that that in turn is just off the Winchmore Hill Green, we can't tell you the date of the meeting or what they intend to do for which last information you must get in touch with the Hon. Sec.—see Panel.

**UK FM Group (London)** have a meeting at Grove Park Hotel, Chiswick, of which we have neither date nor details. Thus, if you want to join you will have to get in touch with the Hon. Sec. at the address in the Panel. On a different tack they have in their April issue a rather interesting article by a "Mr. M. Orpower, G2JGY," an

eminent gentleman in the art of scientific legpulling—but we wonder how many people are still trying to get one of these wonder devices! On a different tack altogether, the same issue remarks on the absence of GB3LO since March 17, but gives no indication that they were aware that the repeater was QRT due to an infringement of the licence. RSGB hold the licence—as they do all repeater licences—but the GB3LO machine is in the care of UK FM Group London, and so if there was a licence infringement proven, we hope they will toss the offender out and publish his name and the details. After all, the offender, whoever he was, was enough of a clown not to realise the harm he was doing to this club, and through them RSGB and through them the entire amateur radio fraternity in this country, if only in killing trust built up between amateurs and the authorities over the years. A sad affair.

Now to **Crystal Palace** we understand that the June meeting is to be on the topic of Aerial Design and Construction, although the Hon. Sec. is honest and says he doesn't know who he is going to ask to give the talk! However, on the third Saturday in the month, if you care to roll up to Emmanuel Church Hall, Barry Road, doubtless you will find out who has had his arm twisted!

The **Farnborough** Newsletter must be pretty fair, as somebody at the office nicked it for themselves! No matter though, this "small" society of some 53 members has its Hq. at the Railway Enthusiasts Hq. (the local sub-aqua group are also in the act), where they have a bar, and an aerial tower due to go up ere long. Hq. is off Hawley Lane in Farnborough on the second and fourth Wednesday in each month.

**Sutton & Cheam** alternate between Rays Social

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

#### NAMES AND ADDRESSES OF CLUB SECRETARIES REPORTING IN THIS ISSUE:

- ACTON, BRENTFORD & CHISWICK:** W. G. Dyer, G3GEH, 188 Gunnersbury Avenue, Acton, London W3 8LB.  
**BARTG:** J. P. G. Jones, GW31GG, Heywood, 40 Lower Quay Road, Hook, Haverfordwest, Dyfed SA62 4LR.  
**BTAC:** M. Cox, G8HUA, 13 Dane Close, Broughton, Brigg, South Humberside.  
**BISHOPS STORTFORD:** H. Allison, G3XSE, 89 Birchanger Lane, Birchanger, nr. Bishops Stortford, Herts.  
**BOURNEMOUTH (Wessex ARG):** G. D. Cole, G4EMN, St. Anthony's Road, Bournemouth BH2 6PD.  
**BRISTOL CITY (RSGB):** B. L. Goddard, G4FRG, 2 Greenfield Park, Portishead, BS20 8NQ. (*Bristol 848140.*)  
**CHELTENHAM (RSGB):** G. D. Lively, G3K11, 26 Priors Road, Cheltenham (34785), Glos.  
**CHILTERN:** N. C. Ambridge, G4FRL, 53 The Avenue, Chinnor, Oxon. OX9 4PE.  
**CORNISH:** H. F. Adcock, 1 Bowglas Close, Castle Road, Penzance TR20 8HD.  
**CRAWLEY:** G. C. Reid, G3OUX, 11 Coombe Close, Langley Green, Crawley RH11 7TP, West Sussex.  
**CRAY VALLEY:** J. M. B. Tripp, G3YWO, 57 Cathcart Drive, Orpington (38199), Kent.  
**CRYSTAL PALACE:** G. Cluer, G4AVV, 24 Patterson Road, Upper Norwood, London SE19 2LD. (*01-653 4340.*)  
**DERBY:** Mrs. J. Shardlow, G4EYM, 19 Portreath Drive, Darley Abbey, Derby DE3 2BJ.  
**EAST LANCs:** E. A. Lomax, G4DGR/5N2ABG, West End Post Office, Accrington (34012), BB5 4NQ.  
**ECHELFORD:** R. S. Hewes, G3TDR, 24 Brightside Avenue, Laleham, Staines, Middx.  
**EDINBURGH:** J. Martin, 22 Ross Gardens, Edinburgh, EH9 3BR. (*031-667 8707.*)  
**FARNBOROUGH:** C. J. Beezley, G4FEA, 152 West Heath Road, Farnborough (49481), Hants GU14 8PL.  
**GUILDFORD:** L. Bright, G4BHQ, 4 Dagley Farm, Shalford, Guildford, Surrey.  
**MID-SUSSEX:** R. Bellerby, G3ZYE, 104 High Street, Lindfield (3187), Haywards Heath, West Sussex.  
**MILTON KEYNES:** D. Stimson, G3THC, 108 Cambridge Street, Wolverton, Milton Keynes (316730) MK12 5AH.  
**NEWBURY:** M. Vasset, G8LTD, "Heatherlea," Adbury Holt, Newtown, Newbury RG15 9BN. (*0635 46078.*)  
**NORTHAMPTON:** S. J. Purser, G8GHZ, 2 Dobson Close, Great Houghton, Northampton (61794).  
**PETERBOROUGH:** L. Critchley, G3EEL, 36 Waterloo Road, Peterborough, Cambs.  
**RAIBC:** H. Boutle, G2CLP, 14 Queens Drive, Bedford MK41 9BQ.  
**REIGATE:** F. H. Mundy, G3XSZ, 2 Conifer Close, Reigate (43130), Surrey.  
**SOUTHDOWN:** B. Chuter, G8CVV, 15 Coopers Hill, Willingdon, Eastbourne, East Sussex BN20 9JG.  
**S. E. KENT YMCA:** P. Wharton, G4DCV, 21 High Street, Dover, Kent CT16 1EB. (*0304 206230.*)  
**SOUTHGATE:** B. Oughton, G4AEZ, 48 Morley Hill, Enfield. (*01-366 7166.*)  
**SOUTH MANCHESTER:** W. L. Seddon, G3V1W, 12 Barwell Road, Sale, Cheshire M33 5FF. (*061-973 3355.*)  
**STOURBRIDGE:** A. Dewsbury, G4CLX, 10 Rectory Road, Oldswinford, Stourbridge (3530), West Midlands.  
**SURREY:** S. A. Morley, G3FWR, 22 Old Farleigh Road, Selsdon, South Croydon, CR2 8PB. (*01-657 3258.*)  
**SUTTON & CHEAM:** A. Keech, G4BOX, 26 St. Albans Road, Cheam, Sutton, Surrey. (*01-644 4157.*)  
**SWINDON:** A. D. Bettley, G8KWC, 17 Centurion Way, Stratton-St.-Margaret (2860), Swindon, Wilts. SN3 4BT.  
**TORBAY:** M. Yates, G3UIQ, Top Flat, 23 Waverley Road, Newton Abbot (3025), Devon.  
**UK FM GROUP (London):** R. G. Street, G3TJA, 3 White Ledges, St. Stephens Road, London W13.  
**UK FM GROUP (Western):** G. L. Adams, G3LEQ, 2 Ash Grove, Knutsford, Cheshire, WA16 8BB.  
**VERULAM:** B. Pickford, G4DUS, "Netherwood," 130 The Drive, Rickmansworth, Herts.  
**YORK:** K. R. Cass, G3WVO, 4 Heworth Village, York.

Club, London Road, North Cheam, and Sutton College of Liberal Arts, Cheam Road, Sutton; which one is to be used on June 16, when G8AAI is to come along and give his talk on Amateur Television is not certain to the writer, but he believes it to be the College. No, don't blame it on the Newsletter editor, he was fighting the problem of printing problems on the one hand, leading to a wish for the shortest possible issue, at a time when his news would have covered double the space.

There can be no doubt at all, **Bournemouth (Wessex)** are very much on the upsurge; the Hon. Sec. now has to ask us to request that any intending visitor give him a ring (G4EMN, Bournemouth 20027) so that he can get more chairs organised—the 45 normally put out have all been filled at the last few meetings at the Dolphin Hotel, Holdenhurst Road, Bournemouth. June 3 sees a talk on the GB3SN repeater at Four Marks, Alton, which is the nearest two-metre repeater; G8BIH and G8CKN are the speakers. The other meeting, on June 17 is down for the club's Auction and Junk Sale, and also for a progress report on the RAEN group being set up in the county.

It's been quite a while since last we heard from the **Guildford** group, apologises G3BHQ. June 10 is, not very surprisingly, last-minute preparations for NFD; and on June 24 comes the last chance to do the same office for VHF NFD. The site appears to be Ranmore Common, but as our copy is a bit "thin" at this area of the Newsletter, perhaps it would be best to check with the Hon. Sec. as to just where they will all be.

**Milton Keynes** have their session on June 13 at the Loyal Hall, Newport Pagnell, and the subject is a talk on Electro-Medical techniques; we can't give you the name of the Company, as two places quote two different names—whether Cambridge Medical Instruments or Gould Advance, their speakers are going to travel a long way so we hope they get good support.

At **Reigate** June 7 is the Natter session, and June 21 the main meeting at which the talk will be by G3HFO. For the first, the venue is the Marquis of Granby, Hooley Lane, while the talk is at the upstairs meeting room of the Constitutional Centre, Warwick Road, Redhill, Surrey.

At **York** they recently had an evening on which members displayed their home-brew gear, G4EMA had a whole table to himself—busy chap! They are now entering the "season" for special-event stations, one of which will be the Great Yorkshire Show at Harrogate in July. Each Friday evening (with the exception of the third one in each month) they may be found at the United Services Club, 61 Micklegate, York.

**Echelford** have just had an AGM and elected a new Newsletter Editor, who in his turn seems to be promising them that they will rue the day! However, his first try seems to this old scribe to be most acceptable. The group get together at St. Martins Court, Kingston Crescent, Ashford, Middx., on the second Monday and the last Thursday of each month.

It seems quite a while since we heard from **Crawley** but they still are doing quite nicely according to the "grapevine." However, a new Hon. Sec. has decided it is about time they reported, and he advises they are still at Trinity United Reformed Church Hall, Ifield Drive, Ifield, Crawley (they have had the same Hq. for as long

as your conductor can recall, which is longer than the time he has been writing this piece!) on June 22, when they will welcome as their speaker Commander Hatfield, who will be talking about Solar Spectroscopy.

Another new signature, appropriately enough writes on behalf of **Newbury**; he says that they are still getting the programme sorted out, but they are to be found on the second Tuesday of each month at Newbury College of Further Education, at 7 p.m.

---

#### Deadlines for "Clubs" for the next three months:—

For July issue—June 1st  
 For August issue—June 24th  
 For September issue—July 29th

*Please be sure to note these dates!*

---

**South Manchester** have their usual crowded programme; every Monday evening the VHF gang at the shack, "Greeba," Shady Lane, Baguley, Manchester, and Fridays at Sale Moor Community Centre, Norris Road, Sale. June 3 is down for G3SVW to talk about "Radio Communication in Antarctica—Sights and Sounds." As a follow-up, G8KUP has June 10, his subject being "Navigation"—he in turn is followed by G3JIS talking about "FETs and their uses," on June 17, while 24th should be of particular interest as J. Osler is talking about "Return to Amateur Radio, its problems and pleasures." And, to round it off, we hear the gang gained the award for the best Club stand at the Northern Radio Societies Convention.

**UK FM Group (Western)** is the new name for the club which used to be known as the Western FM group. They have an informal gathering at the Legh Arms, Knutsford, on June 2, with visitors and guests as welcome as ever.

Oddly enough June 2 is also on the calendar at **Mid-Sussex**, when G4DQS will be talking about "Topography." June 16 is down to G3GDU, who will be talking about "The Development of a Navigational Aid." That covers the activities of a Navigational Aid." That covers the activities at Marle Place Further Education Centre, but on June 30 they have their annual Windmills evening.

It is not very often that we hear from the **Oxford** chaps, but this month a sad note advises us of the death of their Vice-President Howard Long G5LO at the age of 75, only two days after that of his mother at the age of 98. Confined to a wheel-chair though he was for most of his life, he won a BEM for his wartime work of monitoring of German radio transmissions. Indeed a sad loss to the club, and to RAIBC of which he was a long-time member, and, not least, to those newcomers to the hobby to whom he gave such help and encouragement. G4BHR of the Oxford group passed on this information; his address appears in the Panel.

For all the details of the **Torbay** meetings we must refer you to the Hon. Sec.—see Panel—as we know that in addition to their monthly formal session they have informals each week at the Hq. in Bath Lane, rear of 94 Belgrave Road, Torquay. One of their many summer "special-activity" stations will be at the Teignbridge Newton Abbot District Jubilee Trades Fair over July 21-24 at Newton Abbot racecourse.

A dangerous precedent was set by the Hon. Sec. of **Swindon**; much as we appreciate the Hon. Sec.'s problems, we must say that we can't accept telephoned data for this piece save in the *most* exceptional circumstances! the risk of error in transcription is too great on the one hand, and our lines already hard-pressed at times into the bargain. However, the Swindon Hon. Sec. says the AGM is on June 8, and a Junk Sale on 22nd, both at the Coldharbour public house at Blunston which is five miles north of Swindon itself. In between, on June 15, they have a Barbecue evening at Savernake Forest—doubtless more details could be obtained from the Hon. Sec.—see Panel.

The Hon. Sec. of **BARTG** says that in the past year the total membership rose to no less than 502 members; but we would guess there are still some folk operating, as SWL or transmitting amateur, on RTTY who are still to be brought into the fold. Any such, dare we say, are making a grave error if they don't join the group and make use of the services it offers.

The **Surrey** group seem to foregather on the first Wednesday in each month, if past meetings are any guide, which would give June 1. The Hq. address is T. S. Terra Nova, 34 The Waldrons, Croydon; if you miss the formal already mentioned, you can also look them up at the alternate meeting on the third Wednesday.

At **Bishops Stortford** the form is to book the third Monday in each month, which gives Monday, June 20, at the British Legion Club, Windhill, Bishops Stortford.

The **Northampton** chaps have their Hq. place at the Spencer Dallington Community Centre, Tintern Avenue, which is off Gladstone Road; June 16 is down for D/F Hunting so if you intend to visit, perhaps it would be best to contact the Hon. Sec. to see if the start is from Hq.—see Panel.

**City of Bristol (RSGB Group)** write to advise of the activities for June. The meeting first—this is at the Small Lecture Theatre, Queens Building, University Walk, Clifton, Bristol 8, and timed for 7-9.30 on the last Monday in the month. Over June 4-11 they have a special Jubilee station set up at Wick, near Bristol covering 3.5 to 144 MHz. Then there is NFD, from Stockwood Lane, using G6YB over the weekend June 11-12, and, also on June 12, the Longleat Mobile Rally, for which they have a rather delightful whimsical poster. June 24 sees them operating another Jubilee station, this time from Portishead.

#### Closing

Which is where, once more, we say farewell for another month. The deadline will be June 1, addressed as ever to Club Secretary, **SHORT WAVE MAGAZINE**, 34 High Street, Welwyn, Herts., AL6 9EQ.



The Third Alton Scout Troop at JOTA, 1977: G8BIH at the mic., G3WNI standing extreme left; G4FOY second from right, rear. Senior Scouts Peter and Paul flank G8BIH. The gear (supplied by G3WNI) was a KW-2000B and KW-1000 linear, with an antenna trap dipole. This was the Troop's first attempt—and a great success. They will all be there next October!



# Radio Shack Ltd

## ★ STILL THE BEST VALUE & PERFORMANCE IN A TRANSCEIVER



£475 inc. VAT

## THE NEW DRAKE TR-4CW

With 500Hz Crystal Filter included

While operating CW you may receive with either the 2.1 KHz or the 500Hz Crystal Filter—They are front panel selectable!

The Drake TR-4CW is a product of years of transceiver experience and design improvements. The resulting performance makes it one of the finest transceivers available. Its operating handiness is not only evident in circuit design, but also in packaging. Compact and lightweight, it is ideal for mobile use, portable excursions, and vacations. USB, LSB, CW or AM operation is at your finger tips with 300 watts P.E.P. of communications power.

### INCLUDED FEATURES :

- 300 Watts PEP input on SSB, 260 watts input on CW.
- Complete Amateur Band Coverage; 80 through 15 metre bands complete and 28.5-29.1 MHz of 10 metres. Rest of 10 metre band obtained with accessory crystals.
- Separate Sideband Filters; separate USB and LSB filters eliminate oscillator shifting and insure long term carrier vs filter alignment.
- Nominal 1.7; 1 Filter Shape Factor; These filters stand among the industry's finest with 6 dB, bandwidth of 2.1 kHz (chosen to slice thru QRM), 60 dB bandwidth of only 3.6 kHz and 100 dB ultimate rejection.
- Provision for Highly Effective Accessory Noise Blanker.
- Heavy Irridited Cadmium Plated Chassis.
- CW Side Tone Oscillator for monitoring your CW transmission.
- Finish; scratch resistant epoxy paint.
- Crystal Calibrator built-in.
- VFO Indicator Light eliminates confusion of which main tuning knob controls the frequency when using an RV-4C remote VFO.
- Automatic CW Transmit Receive Switching sometimes called "semi" break-in.
- Full AGC with Drake dual time constant system confines a 60 dB signal change to a 3 dB audio change.
- Effective Transmitting AGC insures clean SSB output.
- Solid State Permeability Tuned VFO for low drift and accurate 1 kHz divisions on all bands. New easy to read dual concentric dials.
- VOX or PTT for use on AM or SSB.
- Receiver S-Meter automatically switches to indicate transmitting AGC on transit.
- Transmitter Plate Ammeter indicates Relative RF Output by depressing load control shaft.
- Adjustable Pi-Network output circuit.

SAE for details please

DRAKE ★ SALES ★ SERVICE

SECURICOR ★ BRS ★ ACCESS ★ BARCLAYCARD

## RADIO SHACK LTD.

188 BROADHURST GARDENS  
LONDON, NW6 3AY

OPEN 5 DAYS 9-5. CLOSED 1-2 p.m.

SATURDAY 9-12.30 p.m.

Giro Account No.: 588 7151

Just around the corner from West Hampstead Underground Station  
Telephone: 01-624 7174 Cables: Radio Shack, London N.W.6  
Telex: 23718

**DRAKE****Radio Shack Ltd**

# DRAKE SSR-1 COMMUNICATIONS RECEIVER



£149.85  
inc. VAT

**Built-in Telescopic Antenna**

- Synthesized    ● General Coverage    ● Low Cost
- All Solid State    ● Built-in AC Power Supply
- Selectable Sidebands    Excellent Performance

TRIED AND TESTED WITH MANY THOUSANDS ALREADY  
IN USE. (SAE FOR DETAILS).

## Models W-4 and WV4



2-30 MHz  
£54.00 inc.



20-200 MHz  
£62.64 inc.

## Directional RF Wattmeters

The new Drake directional, through line, wattmeters represent a significant advance in wattmeter design. The use of printed circuits, toroids, and state of the art techniques permits versatile performance and higher accuracy than units selling for more than twice the price.

In contrast to VSWR measuring devices employed in the past (VSWR bridges, ratimeters, and moni-match), the new wattmeters are frequency insensitive throughout their specified range, requiring no adjustments for power or VSWR measurements.

The wattmeters negligible insertion loss allows continuous monitoring of either forward or reflected power for fast accurate tune up, as well as continuous checking of transmitter-antenna performance.

*Send S.A.E. for more information on Drake products please.*

SECURICOR ★ DRAKE ★ SALES ★ SERVICE  
B.R.S. ★ ACCESS ★ BARCLAYCARD ★ HP

## RADIO SHACK LTD.

188 BROADHURST GARDENS  
LONDON, NW6 3AY

OPEN 5 DAYS 9-5. CLOSED 1-2 p.m.

SATURDAY 9-12.30 p.m.

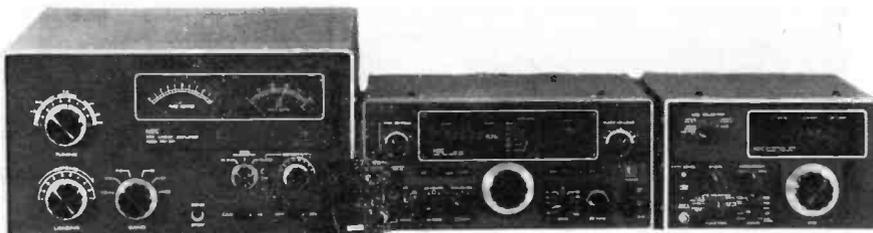
Giro Account No.: 568 7151

*Just around the corner from West Hampstead Underground Station*

Telephone: 01-624 7174 Cables: Radio Shack, London, N.W.6  
Telex: 23718

# WILLIAM MUNRO (INVERGORDON) LIMITED

DISTRIBUTORS FOR NEC AMATEUR RADIO EQUIPMENT FOR  
SCOTLAND, NORTHERN ENGLAND AND NORTHERN IRELAND

**CQ301****CQ110E****CQ201**

CQ110E (ex stock), £645 plus VAT £80.63, total £725.63  
(Price includes Securicor Delivery)

Frequency Range 10M — 15M — 20M — 40M — 80M — 160M  
and 11M and WWV 15 MHz on receive only.

Mode LSB — USB — CW — AM — FSK — FAX/SSTV.

Power Requirements 100/110/117/200/220/234 volts AC or 13.5 volts DC.

Input Power 280 watts PEP (240 watts on 28 MHz).

Digital Readout—Separate Crystal Filters for each of LSB, USB and CW.

AC and DC power units are built in. Switched metering for "S" meter, Relative Output, Plate Current and ALC for setting MIC Gain.

The following accessories are supplied with the Transceiver—Microphone, DC Power Cable, AC Power Cable 5 RCA Plugs, 2 Spare Fuses, 2 Jack Plugs, 2 Allen Keys and a 60-page instruction book. Built-in speaker with 3 watts output.

A hybrid design utilising the best features of valves and semiconductors is used to give a high performance. 7 Valves—49 Transistors—19 FETs—128 Diodes—25 ICs. The use of the RCA low noise beam deflection valve (7360) as receiver mixer gives the CQ110E high sensitivity combined with remarkable crossmodulation characteristics.

Available soon

CQ 201 External Digital VFO.

CQ 301 2 kW Linear Amplifier—10 to 160M with built-in power supply and 2 EIMAC 3-500Z Valves.

CQ-P-2200 12 Channel Portable/Mobile 2 Metre FM Transceiver.

We also stock Antennas and Accessories—Microwave Modules—Modular Communication Systems  
—Solid State Modules—Antex Products—Components etc.

TELEPHONE  
0349 852351

**100 HIGH STREET, INVERGORDON  
ROSS-SHIRE, IV18 0DN**

TELEX  
75265

ACCESS — BARCLAYCARD — HIRE PURCHASE — INSURANCE

# Get the Optimum from your Rig

**-STOP MISTREATING IT!**

Match your antenna system to the PA stage with a KW 107 - observe your TX 'Waveform' with a KW 108



**KW 107 ANTENNA TUNING SYSTEM**

Incorporates E-Z match, SWR/RF Power meter dummy load. Antenna switch. High power version KW 109 s available.

**KW 202 RECEIVER**

One of the finest Amateur Band Receivers on the market. SSB filter and "Q" multiplier. Excellent sensitivity and stability. Two speed tuning 10-160 metres.

Write or phone for catalogue.

## Optimum Performance Receiver



**KW 108 MONITOR SCOPE**  
Monitor your transmissions 10-160m. Two-tone test generator incorporated to ensure optimum linearity for SSB.



**Amateur Radio Products  
DECCA COMMUNICATIONS LTD**  
Crampton Road, Otford, Sevenoaks Kent,  
TN14 5EA. Tel.: Sevenoaks (0732) 50911

\*Easy terms on equipment available over 12, 18 or 24 months.

**OTHER KW FAVOURITES**  
KW E-Z match ATU ; KW 103 SWR/RF Power Meter ; KW Dummy Load ; KW Trap (The original and Best) ; KW Antenna Switch ; Balun Mk. 1 and Mk. 11 ; Stockists for Hy-Gain beams and verticals ; CDR Rotators, Shure Microphones, etc. KW Spares are normally stocked for a minimum of five years after manufacture of equipment.

## R. T. & I. ELECTRONICS LTD.

where equipment is fully overhauled

TRIO QR666 Receiver	£120.00 (£3.00)
TRIO JR310 B.S. Receiver	£90.00 (£3.00)
EDDYSTONE 680X Receiver	£140.00 (£4.00)
EDDYSTONE EC10 MK1 Receiver	£110.00 (£2.00)
G. E. C. BRT400 Receiver	£120.00 (£4.50)
KW77 B.S. Receiver	£90.00 (£4.00)
HEATHKIT RAI. B.S. Receiver	£65.00 (£2.00)
TRIO JR599. B.S. Receiver	£160.00 (£3.00)
HAMMARLUND HQ170A. B.S. Receiver	£180.00 (£4.00)
R.C.A. AR8516L Receiver	£240.00 (£4.50)
R.C.A. AR88D. Receiver	£90.00 (£4.50)
YAESU FRDX400. Receiver	£150.00 (£4.00)
KW.201. B.S. Receiver	£130.00 (£4.00)
Liner 2. Transceiver with mike	£120.00 (£1.50)

We are MAIN DISTRIBUTORS for AVO, MEGGER, TAYLOR and SULLIVAN INSTRUMENTS

All types of AVOMETERS and MEGGERS, normally in stock also accessories and spares

We also repair all types of instruments Trade and Educational enquiries invited

S. G. BROWN'S HEADPHONES. Type "F" 120 ohm, 2000 ohm, 4000 ohm, £12.65 (60p) ; Rubber Earpads for same, 85p per pr. (20p) ; Standard Jack plugs, 24p (4p).

EDDYSTONE EQUIPMENT. Please enquire.

YAESU MUSEN FRG-7 Receiver in stock	£145.00 (£3.00)
YAESU MUSEN FT-221-R Transceiver	£339.00 (£4.00)

In present conditions we regret that all prices are subject to alteration without notice.

NOTE: 12½% VAT must be added to all prices, new and secondhand, except Test Equipment which is 8½% inc. carr. and packing.

Carriage for England, Scotland and Wales shown in brackets, Terms: C.W.O., Approved Monthly Accounts, Hire Purchase and Part Exchange. Special facilities for export.

FREE SHURE MIC. WITH EVERY KW TRANSMITTER or TRANSCEIVER purchased

At R.T. & I.

- \* We have full H.P. facilities.
- \* Part exchanges are a pleasure.
- \* We purchase for cash.
- \* We offer a first-class overhaul service for your electronic equipment, whether you are an amateur or professional user.
- \* We have EASY Parking facilities.
- \* We welcome your enquiries for specific items which although not advertised, may very well be in stock.

PARTRIDGE "JOYSTICK" New improved VFA. £17.25. Joymatch 111A £17.75. Joymatch 111B, £15.76. LO-Z500X, £21.86. Joymatch A.T.U. Kit £7.17. A.T.U. Kit Assembled, £8.67. Artificial earth and bandswitch £7.17. Note—Partridge prices include postage, packing and VAT.

**TRIO EQUIPMENT.**

New Trio R-300 Receiver, in stock £164.00 (3.00) All Bands with xtal calibrator.

SHURE MICROPHONES, 526T, £27.80 (£1.00) ; 444, £23.00 (£1.00) ; 401A, £12.10 (£1.00) ; 202, £10.90 (£1.00) ; 201, £10.30 (£1.00) ; 414A, £18.00 (£1.00) ; 414B, £18.00 (£1.00). Full details on request.

KEYNECTORS, piano key mains connector units, £4.25 (40p). Trade enquiries welcome.

VALVES. Please state your requirements.

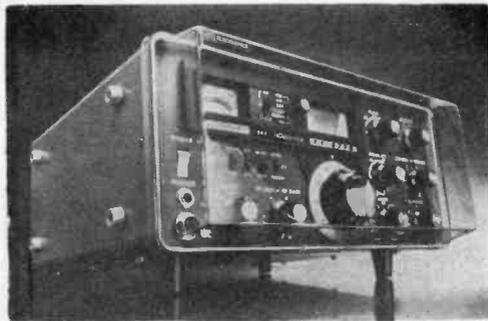
ADVANCE TEST EQUIPMENT—we are agents—your enquiries please. TNK METERS : TM500, £19.75 (75p), TW20CB, £25.75 (50p), TP55N, £14.50 (60p), Model 700, £43.00 (75p), also cases for same.

We also supply PHILIPS & LABGEAR COLOUR TV TEST EQUIPMENT, including Colour Bar Generators, Cross Hatch Generators, Degassing Coils, Oscilloscopes, CRT Testers, Transistor Testers, etc., etc.

**KW EQUIPMENT :** (Don't forget your FREE mic. with every Tx. and Tscr. 1) KW202, £210.00 (£2.50) ; KW204, £250.00 (£3.00) ; KW1000 Linear, £220.00 (£4.00) ; KW107, £78.00 (£1.50) ; KW E-Z MATCH, £26.00 (80p) ; KW109, £90.00 (£1.50) ; KW108 Monitor Scope, £85.00 (£3.00) ; Speaker for KW202, £18.00 (50p) KW103, £16.00 (50p) ; KW Antenna Switch, £6.00 (25p), etc.

## R. T. & I. ELECTRONICS LTD.

Ashville Old Hall, Ashville Road, London E11 4DX Tel. 01-539 4986  
NEAREST STATION: LEYTONSTONE (Central Line)



# LEE ELECTRONICS LTD.

01-723 5521 CLOSED THURSDAYS G8JVL  
400 EDGWARE RD., PADDINGTON, W.2

LONDON'S LARGEST STOCKISTS OF ● YAESU  
● ANTENNA SPECIALISTS ● STANDARD ● ICOM  
BANTEX ● JAYBEAM ● REVCO ● QM70 ● ETC.

## SPECIAL EXCLUSIVE OFFER

Perspic Dust Covers designed and manufactured by us to keep your Yaesu equipment in mint condition. Suitable for Models FT101, 101B, FL101, FR101, FT201, FT101E, FL2100, FT277, FT288A, FRG7, etc. Price £4.00 each inc. VAT. Carriage 45p.  
FT301, FT221, FT220, FT620, £3.00 each inc. VAT. Carriage 45p.

## YAESU MUSEN PRICES

FT301 T/Rx 1-8-30, 100W 12v. ....	£485-00
FT301D Digital Readout "301" ....	£585-00
FT301S 10W PEP "301" ....	£340-00
FV301 External VFO ....	£62-00
FP301 PSU/Speaker ....	£79-00
FP301D FP301 + Clock, Ident. ....	£125-00
FT200B T/Rx 3-5-30 ....	£249-00
FP200B AC PSU/Speaker ....	£54-00
FRG7 Rx 5-30 Cont. AC/DC ....	£145-00
FT221R T/Rx 2m. "All Mode". ....	£339-00
FT223 T/Rx 2m. FM 23 chnl. 12v. ....	£139-50

FT2Auto T/Rx 2m. FM Auto Scar ....	£215-00
Sig. 80R T/Rx. 2m. FM 80 x 25 kHz 12v. ....	£220-00
FTV250 Transverter 2m. 12/230v. ....	£139-00
YD844 Desk microphone ....	£18-00
YV500E 500 MHz 0-02 P.P.M. ....	£285-00
YC500S 500 MHz counter 1. P.P.M. ....	£225-00
YC500J 500 MHz counter 10 PPM/1. ....	£155-00
YV355D 220 MHz counter AC/DC ....	£139-00
YC355 35 MHz counter AC/DC ....	£105-00

YC601 Dig. Display 101 and 401 ....	£110-00
YC301 Monitor scope ....	£123-50
YO100 Monitor 2 tone osc. ....	£118-00
YP150 Dummy load/watt-meter ....	£44-00
FF50DX Low pass filter ....	£15-25
QRT24 World time clock ....	£13-00
YD846 Hand mic. ....	£7-50
FR101S Rx 1-8-30. 12/240v. ....	£299-00
FR101D De luxe "S" BC, FM ....	£390-00
FR101SD Digital readout "S" ....	£387-00

FR101DD Digital readout "D" ....	£480-00
SP101B External speaker ....	£15-50
FL101 Tx 1-8-30 MHz 230v. ....	£325-00
FL2100B Linear 1-2 KW PIP ....	£248-00
FT101EE T/Rx 1-8-30 AC/DC ....	£408-00
FT101E "EE" with RF Clipr. ....	£429-00
FT101EX "EE" less DC PSU etc. ....	£369-00
FV101B External VFO ....	£62-75

## ALL AVAILABLE FOR IMMEDIATE DELIVERY

### JAY-BEAM ANTENNAS

Full range in stock.

#### 2m. MONITOR RECEIVERS

NR56 2m. Monitor ....	£48-00
TM56 2m. Monitor. 12/230v. 12 ch. + Auto Scan. ....	£61-50

#### 2m. MOBILE 12v. LINEARS

QM70 50W P.A. ....	£46-20
KLM 160W P.A. ....	£155-00

#### G WHIPS. HF MOBILE ANTENNAS

Ttibander 10-15-20m. ....	£16-10
Multimobile 10-15-20m. ....	£19-00
Base mount, 1/2 hole ....	£2-30
LF Coils 40, 80 or 160m. ....	£4-87

Kyokuto SX11 144. 2m. digital mobile transceiver ....	£235-00
Uniden 2020 H.F. Transceiver ....	£428-00
Belcom 2m. transceiver, 12/250v. with auto-scan. Fitted 3 ch. model FS1007. ....	£125-00
Belcom Liner 2. 2m. SSB mobile transceiver ....	£160-00

Also available from stock: Morse and Bug Keys. UR43, UR67, PL259, plugs, B.N.C. plugs.

- ★ EXPORTS
- ★ ACCESS
- ★ BARCLAYCARD
- ★ SECURICOR
- ★ RED-STAR SERVICE
- ★ FREE PARKING AT REAR OF SHOP

Sé Habla Español  
FOR YAESU CATALOGUES Send 26p in stamps

## SUMMER HOLIDAYS:

Closed from 27th July, re-open 26th August

### MICROWAVE MODULES

MMC 2m. conv. IF 2-4, 4-6, 28-30 ....	£18-00
MMC 70 MHz con. 28-30 ....	£18-00
MMM 70 MHz conv. 28-30 + local osc. ....	£20-00
MMC 2m. conv. 28-30 + local osc. ....	£20-00
MMC 70cm. conv. 28-30 or 144-146 ....	£22-00
MMC 1296/144 or 28-30 ....	£25-00
MMD0 50 50MHz counter ....	£62-00
MMD 500P 500MHz pre-scaler ....	£25-00
MMT 432/28 70cm. transverter ....	£97-00
MMT 432/144 2m. transverter ....	£33-00
MMT 144/28 2m. transverter ....	£79-00
MMD050/500 Counter....	£79-00

### ASP ANTENNAS

ASP 201 1/4 W. mobile ....	£3-23
ASP 629 1/2 wave mobile ....	£7-60
ASP 677 3/4 wave mobile ....	£13-50
ASP 655 2m base antenna ....	£14-44
ASP 393 1/2 wave mobile ....	£17-10
ASP E667 70 cm. SD13 mobile ....	£16-90
ASP E462 70 cm. 3D13 mobile ....	£7-23
ASP. Mag. mount with cable ....	£9-19

### F.D.K. RANGE

MULTI UII 70 cm. 10W mobile ....	£219-00
MULTI 2700 2m. FM/SSB. ....	£399-00
MULTI II 2m. mobile ....	£177-50

## V.A.T. MUST BE ADDED TO ALL PRICES

### STANDARD RANGE

C8600, 10W, 12CH Mobile 2M. Transceiver  
Fitted Xtals 144-48, 144-60, 145-00 £105+VAT  
Extra Xtals £4 Per Pair+VAT. Extal T/Burst  
Fitted £10 Extra+VAT.

### ELECTRONIC DEVELOPMENTS

MAGNUM EDT 144/28 ....	£135-00
MAGNUM 2m. Linear EDL144 ....	£135-00
MAGNUM 70 cm. Linear EDL432P ....	£135-00
MAGNUM Wavemeter ....	£17-60
MAGNUM EDL432 ....	£50

### ICOM RANGE

IC22A. 12 channels 2m mobile ....	£150-00
IC 240. 22 channels 2m mobile ....	£176-00
IC 215. H/held ....	£144-00
IC 202. H/held. SSB 3W P.E.P. ....	£152-90

### SPECIAL OFFER

A.T.P. Electronics. Ex-Computer, fully stabilised. DC power supplies 6v. to 30v. DC at 7.5 amps (+8% VAT) £20-00  
Ideal for working your mobile rig at home. Carriage £1.95. 5 amp models at £18+VAT and carriage as above.

## THE FRG7 GENERAL COVERAGE RECEIVER — IMMEDIATE DELIVERY

## UNSURPASSED IN ITS CLASS! NOW DOWN TO £145 + VAT

The FRG7 is a general coverage solid state receiver with specifications unparalleled in its price range. It uses a Barlow Wadley Triple-mix, drill cancelling loop for continuous, spin-tuned inclusive coverage of 5 to 30 MHz with calibration accuracy better than 5 kHz. Frequency selection is accomplished by setting the RF (preselector and range switch), dialling up the required number of megahertz, then tuning the VFO knob as normal.

The receiver is sensitive (0.5µV for 10dB, S + N/N (SSB)) and stable (within 500Hz for any 30 minutes after warm up) with A.M., SSB and CW modes catered for. A 3 position audio filter, RF attenuator, dial lamp conservation switch, recorder and phone sockets are fitted. It is mains powered, but should the supply fail, or portable operation be required. 8 dry cells are automatically switched in.

# NEW PRODUCT UP-CONVERTER MODEL UC/1

SYNTHESISER CONTROLLED GENERAL COVERAGE RECEIVING ADAPTOR PLUS TWO-METRE CONVERTER FOR RECEIVERS COVERING 28-29 MHz AND/OR 144-145 MHz



Model UC/1 converts any existing amateur-bands-only receiver which has coverage of 28-29 MHz or 144-145 MHz (e.g. HF bands receivers or transceivers and 2-metre "all-mode" transceivers) into a general coverage receiver with equivalent high performance. Compared with the alternative of purchasing a separate receiver for general coverage, Model UC/1 avoids wasteful duplication and gives better performance for less outlay.

**FEATURES:**

- Gives complete no-gap coverage from 90 kHz to 30 MHz, in thirty switched 1 MHz bands.
- Also operates as a 2-metre converter with receivers covering 28-30 MHz.
- Two separate outputs are provided, one for 144-145 MHz and the other for 28-29 MHz receivers.
- No receiver modifications are required. Model UC/1 simply connects in series with the aerial feeder.

- Overall performance is limited primarily by that of the main receiver.
- Straightforward digital switch selection of the desired 1 MHz band segment eliminates critical adjustments such as "tuning for lock."
- Built-in aerial attenuator.
- Frequency synthesiser locked to 1 MHz crystal.

**PRICE £97.50 plus 12½% VAT, Total £109.69 (including delivery in UK)**

Data Sheet for UC/1 available free on request. Also available: Frequency-Agile Audio Filter Model FL1; Universal RF Speech Clipper; details on request, or refer to our advertisement in December's issue.

PLEASE NOTE OUR NEW ADDRESS!

## DATONG ELECTRONICS LTD.

SPENCE MILLS · MILL LANE · BRAMLEY · LEEDS LS13 3HE · TELEPHONE: PUDSEY (0532) 552461



announce  
their new

**VHF DFM with extended range**  
now covering 10MHz to 250MHz



**Model DFM 5**

The updated version of the Catronics Frequency Meter with extended frequency range covering 10Hz to 250 MHz. Size approx. 8½" x 7" x 3".

- ★ Full 7 digit 0.35" amber display.
- ★ I.C. memory giving a "non-blinking" display.
- ★ Automatic suppressed zeros on 3 leading digits to reduce power consumption.
- ★ TTL and ECL i.c.s. used to give maximum reliability.
- ★ 10 MHz master oscillator for high accuracy.
- ★ 12v. (-ve earth) d.c. input and 210-260v. mains psu fitted.

Price only £148.50 incl.VAT. (Add £1.50 for insured post)

**COMMUNICATIONS HOUSE (Dept. 716), 20 WALLINGTON SQUARE,  
WALLINGTON, SURREY, SM6 8RG**

Telephone: 01-669 6700

## AMATEUR RADIO BULK BUYING GROUP

### JAYBEAM VHF AERIALS

We generally have the full range of "Jaybeam" aerials in stock as follows:

<b>FOR 12M. BAND :</b>	<b>FOR 70 cms. BAND :</b>
C5/2M : 4 ele. Yagi ... £28-12	D8/70 : 8 over 8 slot ... £14-06
5Y/2 : 5 ele. Yagi ... £6-98	PB18/70 : 18 ele. parabeam ... £16-88
8Y/2 : 8 ele. Yagi ... £9-12	MBM48 : 48 ele. multi. £19-68
10Y/2 : 10 ele. Yagi ... £19-35	MBM88 : 88 ele. multi £26-32
PB14/2 : 14 ele. parabeam ... £28-35	12XY/70 : 12 ele. cross stacking Yagi ... £27-00
5XY/2 : 5 ele. cross Yagi ... £14-52	<b>PHASING HARNESS :</b>
8XY/2 : 8 ele. cross Yagi ... £18-12	PMH/2C : 2m. circular £4-62
10XY/2 : 10 ele. cross Yagi ... £23-96	PMH2/2 : 2m. stacking £6-18
Q4/2 : 4 ele. Quad ... £14-85	PMH2/70 : 70 cm. stacking £5-34
Q6/2 : 6 ele. Quad ... £19-80	MT75/50 : Transformer £2-48
D5/2 : 5 over 5 slot ... £12-38	<b>MASTS/ROTATORS etc.:</b>
D8/2 : 8 over 8 slot ... £16-60	SPM : 16ft. Portable mast £9-45
XD/2 : crossed dipoles £8-94	PME : 4ft. extension ... £1-58
UGP/2 : Unipole ... £6-42	SVMK : Vertical mount £3-48
HM/2 : Halo and Mast £3-54	AR40 Rotator ... £48-09
TAS : ½ wave whip ... £11-82	5 way cable ... £2p/1yd

Add CARRIAGE as follows: Harness, Halos and UGP 75p. Rotators and all other aerials, to: UK Mainland only, £1-50, Isle of Wight £2, N. Ireland, £3-50, elsewhere at cost. These prices include VAT.

### MICROWAVE MODULES Products

Large stocks of Converters and Transverters available — full details in our price list.

### VERO CABINETS Now Stocked!

See our new Price List for details.

**The Shop with  
the Smile!**

## AMATEUR RADIO EXCHANGE



PROPRIETORS: BRENDA APTAKER, BERNARD GODFREY (G4AOG)

The Aladdin's Cave for the enthusiast, with a secondhand selection that is second to none. Come and browse . . . Come and buy . . . Come and have a cup of Brenda's coffee either way!

★ SPECIAL THIS MONTH ★ FRG7 ★

Not only . . . the finest synthesised general coverage communications receiver on the market (basic price **£162.00** inc. VAT)

But also . . . now with Fine Tuning and special 2m. converter and accessories, all for only **£179.00** inc. VAT.

Phone for full details of current stocks—new and secondhand—and opening hours, or see us on our Stand at these Summer Rallies.



MAIDSTONE ELVASTON CASTLE PORTSMOUTH

2 NORTHFIELD ROAD, LONDON, W13 9SY . Tel.: 01-579 5311

# antenna specialists

## THE ULTIMATE CHOICE

ANTENNAS FOR EVERY REQUIREMENT FROM 27 - 512 MHz

Listed below are examples from their wide range of products

ASP201	½W, 108-512 MHz mobile ant. (plus 75p P.P.)	£3.23	ASP655	130-174 MHz ½W 3dB Gain DC grounded base station ant. Power capability 100W. Termination 50-239. Complete with mounting brackets for masts up to 1½" O.D. Available Now (plus £1 carr)	£14.44
ASP629	½W, 130-174 MHz 3 dB gain, DC grounded mobile ant. ....	£7.61	ASP659UK	425-440 MHz 5 dB gain base station collinear. Power capability 100W. Termination female "N" type connector. Complete with mounting brackets for masts up to 1½" O.D. Available now.	£15.49
ASP677	½W, 140-174 MHz 3 dB gain mobile ant. ....	£13.51	ASPA680UK	144-148 MHz 6 dB gain base station collinear. DC grounded, power capability 350W. Length approx. 12'. Weight approx. 4 lbs. Rated wind velocity 118 mph. Termination Male "N" type connector ....	£47.25
ASPE462	½W, 420-440 MHz 3dB gain mobile ant. (plus 75p P.P.)	£7.23	NEW!	430-440 MHz 9dB gain DC grounded base station collinear.	
ASPE667	425 440 MHz 5 dB gain Collinear mobile ant. ....	£16.91	ASP700UK	Power capability 250W. Length approx 13'. Weight approx 5lbs. Rated wind velocity 103 mph. Termination male "N" type connector available now. ....	£57.75
ASP749UK	½W, 144-174 MHz 3 dB gain, Disguise mobile ant.	£28.30	ASP701UK	430-440 MHz 12 dB gain DC grounded base station collinear. Power capability 250W. Length approx. 18'. Weight approx. 9.5 lbs. Rated wind velocity 128 mph. Termination male "N" type connector. Available now (plus £2.50 carr.)	£135.00
ASP619	Hi-Band Splitter ....	£16.45			
K-203	No hole boot mount, suitable for ASP201, ASP677, ASPE667, easily adaptable for ASP629 (plus 50p PP)	£3.70			
NEW II	Helical Ants. for the following portables: Trio TR2200GX .... (plus 40p P.P.)	£3.85			
	Trio TR3200 .... (plus 40p P.P.)	£3.35			
	Icom IC215 .... (plus 40p P.P.)	£3.85			
New Magnetic Mount	Fits ASP629, ASP393, ASP677 and ASPE667. Complete with 10' RG-58U cable (plus 50p P.P.)	£9.19			

Please add 12.5% to above prices for VAT

AVAILABLE FROM :-  
**LONDON**  
LEE ELECTRONICS LTD. 01-723 5521  
AMATEUR RADIO EXCHANGE 01-579 5311  
TERRY BARNETT, G8BAM 01-556 9366  
**KENT**  
THANET ELECTRONIC 02273 63859  
**AVON**  
D. G. SMITH, G3UUR 0225 833433

**BEDFORDSHIRE**  
ALAN R. MORRIS, G4ENS 0582 414179  
**CHESHIRE**  
BREDHURST ELECTRONICS 0829 260708  
**YORKSHIRE**  
THE AMATEUR RADIO SHOP 0484 20774  
LEEDS AMATEUR RADIO 0532 452657  
NICK SHEARD, G8KLY. 0274 51913

**SCOTLAND**  
IAN McKECHNIE, GM8DOX 078683 3223  
**S. WALES**  
J. J. DOYLE, GW4FOI 0639 294  
**N. WALES**  
BILL DAVIES, GW8AHI QTHR.  
**N. IRELAND**  
G.I. AMATEUR SUPPLIES ENNISKILLEN 2955



J. YU

21, LANGLEY AVENUE, SURBITON, SURREY, KT6 6QN

SOLE DISTRIBUTOR TO THE AMATEUR TRADE

# J. BIRKETT *Radio Component Suppliers*

## 25 THE STRAIT . LINCOLN . LN2 1JF

Telephone: 20767

**TUNING CAPACITORS.** With Direct Drive. 5pf at 75p, 30pf at 85p, 50pf at 85p, 125+125pf at 55p, 100+200pf at 55p, 180+180pf at 60p, 200+200+25+25pf at 55p, 500+500pf at 60p.

**TUNING CAPACITORS.** With S.M. Drive. 300+300pf at 55p, 300+400pf at 55p, 400+500pf at 55p, 500+500+25+25pf at 55p.

**MINIATURE BUTTERFLY PRE-SET TUNING CAPACITORS.** Spindle can be easily extended. 25 x 25pf at 50p, 25 x 25pf Wide Spaced at 55p, 38 x 38pf at 60p, 38 x 38pf Wide Spaced at 65p.

**TUBULAR TRIMMERS.** 3pf at 5p, 6pf at 5p, 8pf at 5p, 12pf at 5p, 18pf at 15p, 8 to 20pf at 22p.

**100 ASSORTED POLYSTYRENE CAPACITORS** for 57p.

**BCX 36 1 Amp 60 Volt PNP TRANSISTORS.** 80 MHz at 12p each.

**BCX 37 1 Amp 40 Volt PNP TRANSISTORS.** 80 MHz at 10p each.

**MULLARD. .15uf 400 v.w. CAPACITORS** at 20p doz.

**2N 2222 NPN TRANSISTORS** at 15p each.

**BTX 30-400 1 Amp 400 PIV S.C.R.** at 40p each.

**6 to 1 FRICTION DRIVE**  $\frac{1}{2}$ " Spindle at 55p.

**COMMUNICATION SERIES OF I.C.'s.** Untested with data. Consisting of 3 x R.F., 1 x I.F., 2 x VOGAD, 2 x AGC, 1 x Mike Amp, 2 x Double Balanced Modulator, 1 x Mixer. The 12 I.C.'s for £3.

**100 MULLARD C280 CAPACITORS.** Assorted for 57p.

**AR88 L.F. SMOOTHING CHOKES** at £1.

**10 Amp S.C.R.'s.** 100 PIV at 25p, 400 PIV at 50p, 800 PIV at 60p.

**FT 243 CRYSTALS.** 8040, 8100 kHz at 75p each, 7620, 7720, 7966-7, 8166-7, 8233-3, 8300, 8366-7, 8484-3, 8650, 8716-7 kHz. All at 40p each.

**200 ASSORTED  $\frac{1}{2}$ ,  $\frac{1}{4}$ , Watt RESISTORS** for 75p.

**DUAL GATE MOS FET's LIKE 40673** at 33p, 4 for £1.10.

**BFS 21 MATCHED PAIRS ON N CHANNEL FET's** at 60p pair.

**10pf SUB-MINIATURE DIFFERENTIAL AIRSPACED PRE-SET CAPACITORS** at 22p.

**SPECIAL JFD PISTON.** .8 to 28pf TRIMMERS at 33p each.

**X BAND GUNN DIODES** with data at £1.65.

**6 ASSORTED 80M CRYSTALS** for £2.16.

**2-5 GHz DUAL NPN TRANSISTORS** with data untested 4 Pair for 57p.

**ITT or STC 10-7 MHz CRYSTAL FILTER.** B.W.  $\pm$  6 kHz at £4.

**X BAND DETECTOR DIODES** like IN 23 at 25p, SIM 2 at 15p.

**LOW NOISE STRIP LINE TRANSISTOR AMPLIFIER.** Up to 1 GHz at £3.

**SOLDER-IN FEED THRO'S.** 6-8pf, 300pf, 1000pf. All 20p doz.

**TEXAS BF 256 800 MHz FET's** at 25p.

**SILICON SOLAR CELLS.** 0-5 Volt 5 mA. at 35p each.

**ZN 414 RADIO I.C.** with data at £1.

**ITT NPN 300 MHz TRANSISTORS TYPE TM11** at 24 for 60p.

**455 kHz CRYSTAL FILTERS.** B.W.  $\pm$  7 kHz at 55p.

**10-7 MHz CERAMIC FILTERS** with data at 27p.

**REGULATORS.** Ua 723 at 50p, LM 309K at £1.10, MC 7812CP at £1.12.

**GLASS WIRE ENDED CRYSTALS.** 28.5 kHz, 28 kHz. Both at 50p each.

**20 ASSORTED FT 241A CRYSTALS.** 96th Harmonic between 71 MHz to 98 MHz at £1.10.

**60 ASSORTED WIRE WOUND RESISTORS** at 57p.

**2N 3819 TYPE FET's** at 20p each, 6 for 75p.

**TANTALUM BEAD CAPACITORS.** .1 uf 35v.w., .15uf 35v.w., 1uf 35v.w., 2-2uf 35v.w., 3-3uf 16v.w., 4-7uf 10v.w., 4-7uf 35v.w., 5uf 25v.w., 6-8uf 25v.w., 6-8uf 35v.w., 10uf 25v.w., 15uf 20v.w., 20uf 6v.w., 22uf 16v.w., 33uf 25v.w., 47uf 6v.w. All at 9p each.

**600 MHz NPN TRANSISTORS TYPE BF 224** at 10 for 57p.

**DIVIDE BY 2 300 MHz COUNTERS** with data at 80p.

**WIDE BAND RADAR AMPLIFIERS.** 10 to 100 MHz. Untested with data, 5 for 57p.

**200+200+100uf 300v.w. ELECTROLYTICS** size  $2\frac{1}{2}$  x  $1\frac{1}{2}$ " at 25p, 10 for £1.80.

**VHF TRANSISTORS 2N 918** at 25p, BFY 90 at 50p.

**2 oz. of HEATSINK COMPOUND** at 75p Jar.

**STANDARD CO-AX PLUGS** at 15p, **CO-AX SOCKETS** at 15p.

**SILICON PHOTO SWITCHES, TTL.** Output with data at 50p each.

**2000 PIV 100mA SILICON DIODES** at 7 for £1.

**10 ASSORTED MULTI TURN TRIMPTS** for 60p.

**LM 3900 QUAD OP-AMP** at 60p.

**2N 706 UNMARKED GOOD NPN TRANSISTORS** at 10 for 57p.

**LOUDSPEAKERS.**  $1\frac{1}{2}$ " dia. 8 Ohm at 75p.

ITT 1 uf 220 Volt A.C.  
MAINS SUPPRESSION UNIT  
at 10p

MULLARD LP 1186  
VAR-CAP FM TUNER  
at £4.40 each

SPECIAL OFFER  
of  
**5 GANG VARIABLE  
CAPACITOR**  
250+250+20+20pf+20pf  
All 75p

**VHF TUNER UNIT**  
With FET R.F. Stage  
10-7 MHz out.  
at £3 each

**TBA 120S 14 Pin DiL I.F. AMPLIFIER.** Untested with data at 6 for 60p.

**TEXAS 2G 106 PNP 60 MHz TRANSISTORS** at 20 for 57p.

**20 ASSORTED VARI-CAP DIODES.** Untested for 45p.

**.0005uf 75 k.v.w. VISCONEL CAPACITORS** at 50p each.

**TRANSFORMERS.** 240 Volt AC Input Type 1, 22 Volt 1 Amp at 88p, Type 2, 22 Volt 300mA  $7\frac{1}{2}$  Volt 1 Amp at 88p, Type 3 18 Volt 500mA at 88p.

**AUDIBLE ALARM SYSTEM** with Transistors I.C. 12 Volt at 75p.

**BRANDED T092 TRANSISTORS LIKE BC 108 or BC 212** at 10 for 60p.

**38 MHz I.F. TRANSFORMER 3/16" FORMERS** in Can at 5 for 11p.

**BD 207 90 WATT PLASTIC NPN TRANSISTOR** at 35p each.

**DUAL TIMER I.C.** NE 556 at 80p.

**741 OP-AMPS.** 8 Lead DiL at 5 for £1.

**LEDS.** TIL 209 Red at 6 for 50p, 2" Red or Green, 15p each.

**COMPRESSION TRIMMERS.** 10pf, 30pf, 50pf, 1000pf. All at 6p each.

**SPECIAL MINIATURE 5 GANG VARIABLE CAPACITOR.** size  $2\frac{1}{2}$ " x  $1\frac{1}{2}$ " x 1", 250+250+20+20+20pf at 75p.

**0-5 VOLT 5mA SOLAR CELLS** at 35p each.

**VHF TUBULAR TRIMMERS.** 3pf at 5p, 6pf at 5p, 8pf at 8p, 12pf at 5p.

**TEXAS POWER DARLINGTONS PNP TIP 117** at 35p, 3 for £1.

**455 kHz VERS ON OF LP 1175 FILTER** with connections at 55p.

**SLIDE SWITCHES.** DPDT at 12p, Biased Type 1 Pole Break, 1 Pole C.O. at 12p.

**PRE-SET SUB-MINIATURE DIFFERENTIAL 10 x 10pf AIR SPACED VARIABLE** at 22p.

**10-7 MHz CERAMIC FILTERS** with data for 27p.

**BF 117 100 Volt NPN 600 mW TRANSISTORS** at 10p, 6 for 50p.

**20 PHOTO TRANSISTOR** and DARLINGTONS MIXED. Untested for £1.

**50 ASSORTED TRANSISTOR ELECTROLYTIC CAPACITORS** at 57p.

**$\frac{1}{4}$ " SOLID COUPLERS** at 15p each.

**Ua 709 OP-AMPS.** 8 Lead TO 5 at 3 for 60p.

**2N 3553 UNMARKED GOOD TRANSISTORS** at 3 for £1.10.

**CERAMIC TRIMMERS.** 3-5 to 10pf, 2-5 to 6pf, 2 to 8pf, 4-7 to 20pf, 0 to 30pf. All at 10p each.

**DIVIDE BY 2 300 MHz COUNTERS** with data at 80p.

**DIVIDE BY 4 150 MHz COUNTERS** with data at 80p.

**ELECTROLYTIC CAPACITORS.** 4700uf 16v.w. size 2" x 1" at 25p, 3300uf 16v.w. size 2" x  $\frac{3}{8}$ " at 25p, 7500+7500uf 16v.w. size  $3\frac{1}{2}$  x  $1\frac{1}{8}$ " at 55p.

**LARGE 0-2" RED or GREEN LEDS** at 15p each.

**RADIO I.C. ZN 414** with data at £1.

**250pf MIDGET SOLID DIELECTRIC VARIABLE CAPACITOR** at 33p.

**10 SINGLE POLE MAKE REED SWITCHES** for 50p.

**AUDIO I.C. TYPE LM 380** with data at 80p.

**200+200+100uf 300v.w. Size  $2\frac{1}{2}$  x  $1\frac{1}{2}$ "** at 25p, 10 for £1.90.

**VHF POWER TRANSISTORS UNMARKED GOOD 2N 4040** at £1.80, 2N 4041 at £1.95, 2N 4429 at £1.95, 2N 4440 at £1.95, BLV13 at £1.95, 8LY 84 at £1.95.

**BRANDED 10 WATT ZENERS.** 15, 18, 22, 33, 56, 100 Volts all at 30p each.

**MINIATURE SILICON DIODES.** Assorted 100 for 57p.

**10 AMP S.C.R.'s.** 100 PIV at 25p, 400 PIV at 50p, 800 PIV at 60p.

**10,000uf 16v.w.  $3\frac{1}{2}$  x  $1\frac{1}{8}$ "** at 15p, 4 for 50p.

**WIDE SPACED 80pf TRANSMITTING VARIABLE CAPACITOR** at £1.95.

**40 kHz TRANSDUCERS** at £1.50 each.

**500pf DISC** at 11 Kv at 3p, 1000pf 10Kv at 3p.

**2N 3819 Type FETS** at 20p each, 6 for 75p.

**GENERAL PURPOSE UNIJUNCTION TRANSISTOR** at 20p.

**GENERAL PURPOSE MICRO SWITCHES.** 10 for 60p.

**2N 3866 UNMARKED GOOD VHF POWER TRANSISTORS** at 3 for 75p.

**RCA CA3089Q FM I.F. AMP** at £1.40 each.

**30 ASSORTED 10xAJ CRYSTALS** from 5100 to 7900 kHz at £1.10.

Please add 20p for post and packing on orders under £2.  
Overseas orders at cost.

# SOLID STATE MODULES 63 WOODHEAD ROAD, SOLID, LOCKWOOD, HUDDERSFIELD, HD4 6ER TEL: 0484-23991

## TRANSVERTERS 2 METRE OR 4 METRE EUROPA B

★ 200W input 50% efficiency. 200mW drive.  
★ 2dB N.F. 30dB gain on receive.  
★ 80dB spurious responses.  
★ Price: £97.78 + VAT = £110.00 complete to plug into Yaesu equipment. **EX-STOCK.**  
EUROPA COMPLETE POWER SUPPLY TYPE CPS10, Price: £40.00 + VAT = £45.00.

## NEW SOLID STATE EUROPAS

EUROPA SS 2 metre transverter Price: £80.00 + VAT = £90.00 Ex-stock.  
EUROPA 70 70cm. transverter. Price: £84.45 + VAT = £95.00. Ex stock.  
★ Operates from 12v. AC or DC.  
★ 10W OUTPUT.  
★ 2dB N.F. for 2 metres, 3dB for 70 cms.; gain 30dB, IF 28-30 MHz.

## CONVERTERS SENTINAL DUAL GATE MOSFET CONVERTERS

2 metres, 4 metres, Marine Band, Satellite Band, other frequencies to order. 2 metre IFs, 2-4 MHz, 4-6 MHz, 28-30 MHz. 4 metres IF, 28-28.7 MHz. Performance cannot be bettered. Price: £18.00 + VAT = £20.25. Ex stock.

**SENTINEL 2 METRE CONVERTER KIT.** 28-30 MHz IF only. Price: £11.50 + VAT = £12.94. A well proven kit supplied with printed circuit board, drilled and with all coils mounted to make assembly easy. If it doesn't work, send it back with £2.25 and we will fix it.

## SENTINEL X 2 METRE CONVERTER

Contains a mains power supply and a front panel RF gain control. Stock IFs for 2 metres, 2-4 MHz, 4-6 MHz, 28-30 MHz. Price: £22.00 + VAT = £24.75.

**SENTINEL MF.** Another Dual Gate MOSFET 2 metre converter which converts to medium wave in two switched bands. Price: £18.00 + VAT = £20.25.

**70CMS SM70** 70 cms. to 2 metre FET converter. N.F. 3dB, gain 30dB. Price: £18.00 + VAT = £20.25. Ex stock.

ACCESS

BARCLAYCARD

CWO

Just phone your credit card number for same day service

If you require more detailed information or help, we are a telephone call or a letter away, so do not hesitate to ask. Paul, G3MXG.

Our products are in stock at The Amateur Radio Shop, 13 Chapel Hill, Huddersfield.

**SENTINEL 70** 70 cms. to 28-30 MHz converter. 3dB N.F. 30dB gain. Price: £20.00 + VAT = £22.50. Ex stock.

## PRE-AMPLIFIERS

### NEW! THE SENTINEL AUTO 2 METRE PRE-AMPLIFIER

Same outstanding and well known performance as our standard Sentinel Pre-amplifier but including an RF operated relay for connection direct to your transceiver or transmitter antenna. Price: £13.00 + VAT = £14.62.

**THE SENTINEL LOW NOISE FET PRE-AMPS.** The "Ultimate" performance. N.F. 1dB. Gain 18dB. Ex stock, 2 metres, 4 metres, Marine Band, Satellite Band. Other frequencies to order. Isolated supply rails, 12v. (9-15v.) at 5mA. Price: £7.75 + VAT = £8.72. Ex stock.

**PA3.** To fit inside your 2 metre transceiver, size 1 cubic inch, N.F. 2dB, gain 18dB supply 12v. (9-15) at 5mA. Price: £5.57 + VAT = £6.27. Ex stock.

**70cm SM71 FET pre-amplifier,** gain 18dB. Price: £8.89 + VAT = £10.00. Ex stock.

## THE SENTINEL H.F. PRE-AMPLIFIER

A wideband pre-amplifier covering 1-40 MHz, gain 15dB, N.F. 1dB. Input and output 750 Ohms, supply 12v. (9-15v.). The box size is 2½" x 3" x 1½" and an internal c/o relay allows the unit to be inserted in a transceiver aerial lead, and is also used to switch the pre-amp out of circuit. Price: £9.00 + VAT = £10.12. Ex stock.

**THE PA10** printed circuit board version of the above—less c/o relay. Size only 1 cubic inch. Price: £5.00 + VAT = £5.62. Ex stock.

**SSM Z MATCH** 80-10 metres matches 15-5000 ohms. 2kW at 50 Ohms. Size: 8½" x 4" front panel, 7" deep. Price: £28.00 + VAT = £31.50. Ex stock.

## SSM IAMBIC MORSE KEYS

CMOS circuitry for use with "Squeeze" or single paddle keys. Price: £30.00 + VAT = £33.75. Twin paddle key to complement our keyer, £10.00 + VAT = £11.25.

G3LRB

# C.B. ELECTRONICS

G3SMI

UNIT 3, 771 ORMSKIRK ROAD, PEMBERTON, WIGAN, WN5 8AT

Telephone: Wigan (0942) 216567

Without doubt the best in the NORTH WEST

Not just another new firm, but people with a wealth of technical experience and know how, relating to amateur radio techniques, requirements and servicing—who will always be pleased to advise and assist in all respects, whether it be Sales, Service or Information.

**HOW TO FIND US:—**From M6 junction 26 follow signs for Wigan A577 at first traffic lights (T junction) turn right towards Wigan. At next traffic lights you are there, BUT turn left and 10 yards further turn right by telephone kiosk. Premises are slightly to your right. Plenty of parking space. Mileage from motorway ½ mile. **From Wigan** follow the A577 for Skelmersdale to traffic lights at Pemberton (Swan Hotel on your left). Turn right then 10 yards right again. By telephone kiosk. Mileage from Wigan 2½ miles. Closed Wednesday.

YAESU :

UNIDEN :

ELECTRONIC DEVELOPMENTS:

HY GAIN :

C.D.E.:

BELCOM :

S.S.M.:

WESTERN ELECTRONICS :

HF and VHF Receivers, Transceivers, etc.

HF and VHF Transceivers.

VHF Transverter Linears, Wavemeters, etc.

HF Antennas

Rotators.

VHF Transceivers.

VHF Converters, Transvertors, etc.

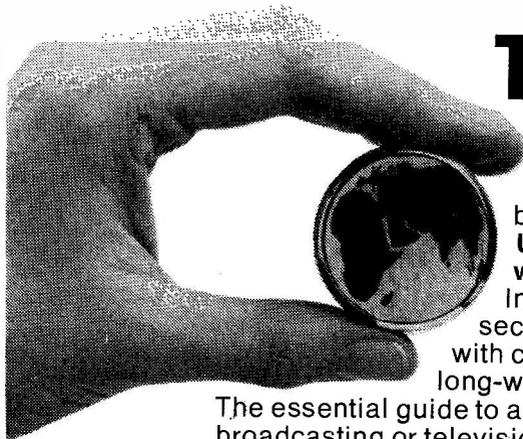
Antennas, Multiband Traps, Antenna Switch, Towers, etc.

PART EXCHANGES WELCOME

S.A.E. ALL ENQUIRIES

H.P. AND CREDIT TERMS

# Tune into the world...



The 31st edition of World Radio TV Handbook . . . the only complete directory of international broadcasting and TV stations . . . **endorsed by UNESCO, Eurovision, Intervision and the world's leading broadcasting organizations.** Includes 'Listen to the World', a special editorial section; the latest world time charts and tables; with comprehensive coverage of short-wave, long-wave and medium-wave.

The essential guide to anyone associated with broadcasting or television . . . national or international, professional or amateur DX-er.

Copies at £5 each can be obtained from Argus Books Limited, Station Road, Kings Langley, Herts.



Please send me \_\_\_\_\_ copies of World Radio TV Handbook at £5 each.

I enclose a cheque for £. \_\_\_\_\_

NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**LEICESTER**



**6<sup>th</sup>  
 NATIONAL  
 AMATEUR  
 RADIO  
 EXHIBITION**

**AMATEUR RADIO RETAILERS' ASSOCIATION**

make a note of the dates

**THURSDAY, FRIDAY and SATURDAY,**

**OCTOBER 27th, 28th, 29th**

at

**THE GRANBY HALLS, LEICESTER.**

**NEW OPENING TIMES — 10 a.m. to 6 p.m. DAILY**

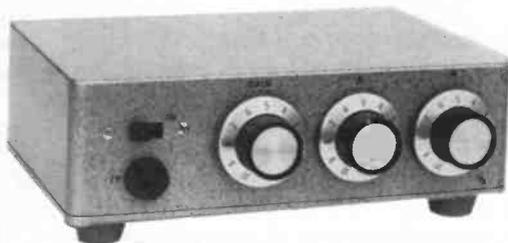
**NEW AND BETTER CATERING**

When all the leading Amateur Radio Dealers put on their own Exhibition.

**SPECIAL CONCESSIONARY TICKETS FOR SCHOOLS, COLLEGES AND RADIO CLUBS**

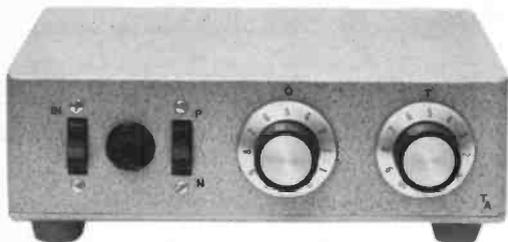
Any further details — TOM DARN, G3FGY QTHR

## TECHNICAL ASSOCIATES COMMUNICATION AIDS



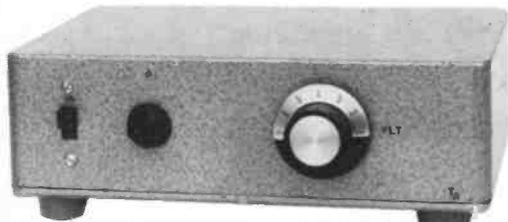
**AUDIO COMPRESSOR** ★ Suitable for SSB/AM/FM ★ pure compression, no clipping 1 ★ 24 to 26dBs of compression, with less than 1% distortion ★ variable decay time, on front panel ★ variable noise gate on front panel prevents ambient noise level tripping vox or being tx in pauses in speech ★ all functions routed to output in "off" position ★ goes between mic and tx no mods involved ★ these compressors have been tested alongside commercial rf clippers, the only difference at the receiving end was superior audio quality, £22.50 + VAT (12½%) + 50p P. & P.

**PRINTED CIRCUIT MODULE.** Supply your own case and knobs. Assembled and tested. Type A.C.1, £12.50 + 12½% VAT + 25p P. & P.



**RX PEAK AND NOTCH FILTER** ★ no gimmicks ★ all integrated circuits ★ will clear QRM in seconds ★ 1 watt o/p stage ★ headphone socket ★ goes between RX and loudspeaker ★ by-pass switch ★ notch-width control for optimum width of notch ★ tune control allows you to pu the notch or peak where you want it ★ runs from internal PP9 battery or any supply from 9v. to 15v. ★ will also peak up CW signals, £24.50 + VAT (12½%) + 50p P. & P.

**PRINTED CIRCUIT MODULE.** Including all pots and switch. Assembled and tested, £13.50 + VAT (12½%) + 25p P. & P. (Type P.N.I.)



**RX BAND PASS FILTER** ★ 9 integrated circuits ★ 1 watt O/P stage ★ headphone socket ★ 8 switched positions of filter ★ high pass—2.5 kHz-2.00 kHz-1.5 kHz-200 Hz-110Hz-80Hz ★ Bandwidths selected for optimum readability on AM, SSB, FM, CW ★ giving the operator total control over bandwidth and QRM conditions ★ makes the poor RX superb and che superb RX better ★ runs from internal PP9 battery or any supply from 9v. to 15v. £24.50 + VAT (12½%) + 50p P. & P.

**PRINTED CIRCUIT MODULE** including rotary switch, £13.50 + VAT (12½%) + 25p P. & P. (Type B.P.11).

**XTAL CALIBRATOR** ★ A deluxe unit with seven ranges down to 1 kHz ★ Switch selected from front panel ★ 1 MHz-500Hz-100 kHz-50kHz-10kHz-5kHz-1 kHz ★ Radiates from its own 8 inch ant. ★ Markers usable from 1 MHz to UHF ★ Complete with ant., ready to use, just connect a 9v. battery, £19.00 ★ VAT (8%) ★ 25p. P. & P.



64 CRIMPLE MEADOWS, PANNAL, HARROGATE,  
N. YORKS.  
TEL: HARROGATE 870248

## Can YOUR Antenna do all this?

A small selection from our huge file of testimonial letters on the JOYSTICK VARIABLE FREQUENCY ANTENNA (0.5-30.00 MHz).

G4DJY's COPY LOG shows 68 North Americans worked in the ARRL W/VE contest.

W6TYP worked WA6JPR over hundreds of miles on 40m. using the JOYSTICK VFA and MICROWATTS "equivalent to 1,000,000 MILES PER WATT"—A WORLD RECORD—we can supply conclusive evidence!

"I have used Rhombics, 4 x ½ waves in phase, centre fed dipoles, etc., but the success I have had with the V.F.A. has been AMAZING . . . only 20ft. high . . . in front of my mobile home, I NEVER RECEIVE LESS THAN R7 AND MOSTLY R9 ON CWDX WORKING—Bob Green, SUIKG/G3APH, W.B.E., W.A.C. Phone and CW.

W7OE, U.S.A. Government Electronics Engr. (retd.), claims "VFA 5ft. below ground, same as dipole, elevated 15ft., one "S" point UP on dipole."

IN USE BY AMATEUR TRANSMITTING AND SWL STATIONS WORLD-WIDE AND IN GOVERNMENT COMMUNICATION.

### SYSTEM 'A' £36.00

250w. p.e.p. OR for the SWL

### SYSTEM 'J' £42.60

500w. p.e.p. (improved 'Q' on receive)

## PARTRIDGE SUPER PACKAGES

COMPLETE RADIO STATION FOR ANY LOCATION

All packages feature the World Record Joystick Aerial (System "A"), with 8ft. feeder, all necessary cables, matching communication headphones. Delivery Securior our risk. ASSEMBLED IN SECONDS! — BIG CASH SAVINGS!

**PACKAGE No. 1** As above with R.300 RX. **£210.55**  
SAVE £17.28!

**PACKAGE No. 2** Is offered with the FRG7 RX. SAVE £12.21! **£193.11**

**PACKAGE No. 3**  
NEW — LOW PRICED PACKAGE. The all solid state SMC 73 with all the Partridge extras. SAVE £17.28! **£154.86**

RECEIVERS ONLY, inclusive delivery, etc

R.300 £184.50 FRG7 £162.00 SMC73 £128.81



Just telephone  
your  
card number



Phone 0843 62535 (or 62839 after office hours)  
or write for details—send 8½p stamp

NOTE: All prices are those current at time of closing for press, inclusive of then current VAT and carriage.

BOX 4, PARTRIDGE HOUSE, PROSPECT ROAD,  
BROADSTAIRS, CT10 1LD. (Callers by appointment).

G3CED  
G3VFA

**PARTRIDGE**  
BROADSTAIRS KENT ENGLAND  
**ELECTRONIC** Ltd

# P.M. ELECTRONIC SERVICES

N. B. NEW ADDRESS  
**2, ALEXANDER DRIVE, HESWALL  
 WIRRAL, MERSEYSIDE, L61 6XT**

Tel.: 051-342 4443 (4.30-7p.m.)  
 Cables: CRYSTAL BIRKENHEAD Telex 627371

**VAT—PRICES EXCLUDE VAT WHICH SHOULD BE ADDED AT THE HIGHER RATE (12½%) FOR ITEMS MARKED (H) AND AT THE LOWER RATE (8%) FOR ITEMS MARKED (L)—OVERSEAS ORDERS (inc. Eire and Channel Isles) NO VAT CHARGEABLE**

**2M TX & RX CRYSTAL AVAILABILITY & PRICE CHART**

CRYSTAL FREQUENCY RANGE USE (Tx or Rx) and HOLDER	OUTPUT FREQUENCY													
	4 MHz-TX-HC6/U	6 MHz-TX-HC25/U	8 MHz-TX-HC6/U	10 MHz-RX-HC6/U	11 MHz-RX-HC6/U	12 MHz-TX-HC25/U	14 MHz-RX-HC25/U	18 MHz-TX-HC25/U	36 MHz-TX-HC6 & 25/U	44 MHz-RX-HC6/U	44 MHz-RX-HC25/U	48 MHz-TX-HC6 & 25/U	52 MHz-RX-HC25/U	72 MHz-TX-HC25/U
144-030 ...	b	b	b	b	b	b	b	b	b	b	b	b	b	b
144-41433-2 ...	a	a	a	a	a	a	a	a	a	a	a	a	a	a
144-480 ...	a	a	a	a	a	a	a	a	a	a	a	a	a	a
144-800 ...	a	a	a	a	a	a	a	a	a	a	a	a	a	a
144-850 ...	b	b	b	b	b	b	b	b	b	b	b	b	b	b
145-000/SO ...	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145-050/R2T ...	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145-075/R3T ...	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145-100/R4T ...	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145-125/R5T ...	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145-150/R6T ...	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145-175/R7T ...	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145-200/R8T ...	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145-300/S12 ...	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145-350/S14 ...	b	b	b	b	b	b	b	b	b	b	b	b	b	b
145-400/S16 ...	b	b	b	b	b	b	b	b	b	b	b	b	b	b
145-500/S20 ...	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145-525/S21 ...	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145-550/S22 ...	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145-575/S23 ...	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145-600/S24 ...	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145-650/R2R ...	b	b	b	b	b	b	b	b	b	b	b	b	b	b
145-675/R3R ...	b	b	b	b	b	b	b	b	b	b	b	b	b	b
145-700/R4R ...	b	b	b	b	b	b	b	b	b	b	b	b	b	b
145-725/R5R ...	b	b	b	b	b	b	b	b	b	b	b	b	b	b
145-750/R6R ...	b	b	b	b	b	b	b	b	b	b	b	b	b	b
145-775/R7R ...	b	b	b	b	b	b	b	b	b	b	b	b	b	b
145-800/R8R ...	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145-950/S38 ...	a	a	a	a	a	a	a	a	a	a	a	a	a	a

**CRYSTALS FOR THE NEW BRITISH 70 cm. CHANNELS**  
 We are stocking the following channels:  
 RBO (434-60/433-00), RB2 (434-65/433-05), RB4 (434-70/433-10), RB6 (434-75/433-15), SUB (433-20), RB10 (434-85/433-25), RB14 (434-95/433-35), SU18 (433-45) and SU20 (433-50)—TX & RX for use with: PYE UHF Westminster (W15U), UHF Cambridge (U10B), Pocketfone (PF1) and STORNO CQL/CQM 662 all at £2.36 plus VAT (H). For the U450L Base Station we have the TX crystals for all the above channels plus the RX crystals for SUB and RB14 also at £2.36 plus VAT (H). The RX crystals for RB2, RB4, RB6, RB10, SU18 & SU20 for use in the U450L Base Station, together with the TX & RX crystals for the remaining SU channels (SU12-433-30-RTTY SU16-433-40 and SU22 433-55) for all the above equipments are available at £2.90 plus VAT (H) delivery as per class (b) 2m. items.

**4m. CRYSTALS FOR 70.26 MHz — HC6/U**  
 TX 8-7825 MHz and RX 29-7800 MHz ... at £2.96 each + VAT (H)  
 RX 6-7466 MHz ... at £2.90 each + VAT (H)

**10.245 MHz "ALTERNATIVE" IF CRYSTALS £2.36 + VAT (H)**  
 For use in PYE and other equipments with 10.7 MHz and 455 kHz IFs to get rid of the "birdy" just above 145.0 MHz. In HC6/U, HC18/U and HC25/U.

**CRYSTAL SOCKETS—HC6/U HC13/U and HC25/U (Low loss)**  
 16p + VAT (H) plus 10p P. & P. per order (P. & P. free if ordered with crystals)

**CONVERTER/TRANSVERTER CRYSTALS — HC18/U**  
 All at £3.00 + VAT (H). 38-6666 MHz (144/28), 42 MHz (70/28), 58 MHz (144/28), 70 MHz (144/4), 71 MHz (144/2), 95 MHz (432/52), 96 MHz (1296/42) 101 MHz (432/28) 101.50 MHz (434/28), 105-6666 MHz (1296/28) and 116 MHz (144/28).

**CRYSTALS SPECIALLY MANUFACTURED FOR AMATEUR USE TO CUSTOMERS REQUIREMENTS**

Now supplied to our new improved amateur specification (temp tol ± 30ppm 0-60°C, adj tol ± 30ppm) as follows: In HC6/U 1-5 to 2MHz, £3.95 + VAT (H) and HC6/U 2 to 105 MHz and HC18/U and HC25/U 4 to 105 MHz, £3.00 + VAT (H). Delivery usually 4-6 weeks. Please give circuit conditions (i.e. load in pf, etc.) when ordering. Fundamentals (1.5-21MHz) will be supplied to 30pf circuit conditions, and overtones (21-105 MHz) to series resonant conditions unless otherwise specified. For details of closer tolerance crystals please send S.A.E.

**TEST EQUIPMENT FREQUENCY STANDARD CRYSTALS—**  
 100 kHz in HC13/U, £2.95 + VAT (L). 1 MHz and 5 MHz in HC6/U and 10 MHz and 10.7 MHz in HC6/U and HC25/U. £2.80 + VAT (L).

**BURNS ELECTRONICS**

We are the Northern Appointed Agents for **BURNS KITS**, etc., and can supply most of their products from stock.

**MODULAR COMMUNICATIONS SYSTEMS**

For the RTTY enthusiast we can recommend and supply the "MCS" Range of products. This includes Terminal Units, AFS Keyers, Magnet Drivers for TTL interface, Telegraph Distortion Measuring Adaptor, RTTY Audio processor, Power units, etc., etc. For the CW MAN we have the "MCS" CW Filter which gives three stages of active filtering. Please send S.A.E. for full details of the "MCS" range.

**ANZAC MD-108 DOUBLE BALANCED MIXER**  
 5-500 MHz supplied with full details for only £5.95 plus VAT (L).

**CRYSTALS FOR PROFESSIONAL USE**

**CRYSTALS TO COMMERCIAL SPECIFICATIONS**  
 We can supply crystals to most commercial and MIL specifications, with an express service for that urgent order. Please send S.A.E. for details or telephone between 4.30-7 p.m and ask for Mr. Norcliffe.

**TERMS: CASH WITH ORDER—MAIL ORDER ONLY—S.A.E. WITH ALL ENQUIRIES—PRICES INCLUDE P. & P. (BRITISH ISLES) EXCEPT WHERE STATED—OVERSEAS CHARGED AT COST.**

**PRICES:** (a) £2.36 (b) and (c) £2.90 + VAT (H).  
**AVAILABILITY:** (a) and (c) Stock items, normally available by return (we have over 4,000 items in stock). (b) Four weeks normally but it is quite possible we could be able to supply from stock.  
**N.B.** Frequencies as listed above but in alternative holders and/or non stock loads are available as per code (b).

**ORDERING.** All we require to know is (1) Output frequency, (2) Crysta frequency range, (3) The Holder and, (4) Either the Load Capacitance (pfs) or equipment. It is not essential to give the exact frequency, though it would be of assistance to quote it if known.

**JAPANESE AND AMERICAN EQUIPMENTS**

With the ever increasing popularity of Japanese equipments we have further expanded our range of stock crystals. We can now supply for **YAESU** (FT2F, FT2FT, FT2 Auto, FT224), most of the **ICOM** range and the **TRIO-KENWOOD** range.  
 We can also supply from stock crystals for the **HEATHKIT** HW202+HW17A **YAESU** FT221 CRYSTALS NOW IN STOCK, ALL AT £2.90 + VAT (H). All popular channels—For repeater use advise xtal frequency required as earlier models have different shift xtals to later FT221R. We can also supply the crystal to give **NORMAL "tune to RX"** working (as FT221R) For 70 cm we can supply the 1.6 MHz shift xtal for direct use with a **MICROWAVE** MODULES MMT432/144 which we can supply for £133.00 + VAT (H) **SPECIAL OFFER!** If ordered with transverter 70cm shift crystal FREE!!

**G8AYN CRAYFORD ELECTRONICS G81WX**  
**JAYBEAM VHF/UHF AERIALS**

144 MHz	70 MHz
5Y 5 element ... £6.20	4Y 4 element ... £10.20
8Y 8 element ... £8.10	432 MHz
10Y 10 element ... £17.20	D8 8 over 8 slot ... £12.50
PBM10 10 ele. Parabeam £20.50	PBM18 18 ele. Parabeam £15.00
PBM14 14 ele. Parabeam £25.20	MBM48 48 ele. Multi-beam ... £17.50
Q6 6 ele. quad ... £17.60	MBM88 88 ele. Multi-beam ... £23.40
8XY 8 ele. crossed ... £16.10	12XY 12 ele. crossed £24.00
10XY 10 ele. crossed £21.30	

All harnesses, clamps, masts, etc. available, mostly ex-stock. Catalogues. S.A.E. please. VAT EXTRA 12½%. Carriage extra, £1.40 each.

ACCESS BARCLAYCARD  
 6 Lovelace Close, West Kingsdown, Sevenoaks, Kent, TN15 6DJ  
 Tel. 047485 2577

# HAMGEAR

We have a range of preselectors for the H.F. bands covering from 1.5 to 32 MHz in five ranges, all with a High gain/low noise characteristic and all with an Antenna tuning unit. Some have regeneration, one with a built in calibrator, one with a front end "Q" multiplier. Priced from £15.20 to £44.50. Also a very comprehensive calibrator from 1 MHz to 2.5 kHz with "Bleep" modulator, £62.00. Why not send for our seven large pages of information on these units plus Antenna experiments, talk on Calibrator use and A.T.U.'s. Please send three 8½p in stamps as part cost of this.

**2 CROMWELL ROAD, SPROWSTON, NORWICH NR7 8XH**

## CALL BOOKS

### INTERNATIONAL :

- RADIO AMATEUR CALL BOOKS (1977)**  
 "DX Listings" . . . . . £9.55  
 "U.S. Listings" . . . . . £10.20  
 U.K. Call Book, 1977 Edn. (RSGB) £2.10

## MAPS

- DX ZONE MAP (GREAT CIRCLE)**  
 In colour with Country/Prefix  
 Supplement . . . . . £1.50
- AMATEUR RADIO MAP OF WORLD**  
 Mercator Projection — Much DX  
 Information — in colour. Second  
 Edition . . . . . £1.00
- RADIO AMATEUR MAP OF THE  
 U.S.A. AND NORTH AMERICA**  
 State boundaries and prefixes, size  
 24" by 30", paper . . . . . 77p
- RADIO AMATEUR'S WORLD  
 ATLAS**  
 In booklet form, Mercator projec-  
 tion, for desk use. Gives Zones  
 and Prefixes (New Edition). . . . . £1.75

## LOG BOOKS

- Standard Log (New Glossy Cover) . . . . . £1.25**  
**Receiving Station Log . . . . . £1.30**  
**Minilog (New style) . . . . . 95p**  
*(The above prices include postage and packing).*

*Available from*

## SHORT WAVE MAGAZINE

Publications Dept., 34 High Street, Welwyn,  
 Herts. AL6 9EQ - Tel. Welwyn (043871) 5206/7

(Counter Service, 9.30-5.15, Mon. to Fri.)

(GIRO A/C No. 547 6151)

## BUTTERWORTH TITLES NOW IN STOCK . . .

The Practical Aerial Handbook, 2nd Edition

by Gordon J. King

232 pages (Hard Cover) £6.10 inc. post

Foundations of Wireless and Electronics, 9th Edition

by M. G. Scroggie

521 pages (Soft Cover) £4.40 inc. post

Radio and Electronic Laboratory Handbook, 8th Edition

by M. G. Scroggie

614 pages (Hard Cover) £8.65 inc. post

Available from Publication Dept.

Short Wave Magazine Ltd.

34 High Street, Welwyn, Herts., AL6 9EQ

# BETTER SHORT WAVE RECEPTION

by William I. Orr W6SAI and Stuart D. Cowan W2LX  
 New 4th Edition

In the latest edition of this excellent work for all those who own (or intend to own) a radio receiver, these two well-known and respected writers have produced chapters covering: the radio spectrum and what you can actually hear world-wide; the tuning of a shortwave receiver; the business of buying a receiver, both new and secondhand; a description of the SW Rx in non-technical terms, together with receiver adjustment and alignment; DX-ing above 30 MHz; a description of the VHF receiver; building and adjusting efficient aerials; reception techniques.

Thoroughly readable and "digestible," this book is without doubt a very valuable addition to the bookshelf of any SWL.

160 pages £3.30 inc. post  
 Order from:

Publications Dept.,  
**SHORT WAVE MAGAZINE LTD.,**  
 34 High Street, Welwyn, Herts., AL6 9EQ

# CALL BOOK 1977 DX LISTINGS £9.55 U.S. (only), £10.20

*The above prices include postage and packing*

Publications Dept.

## SHORT WAVE MAGAZINE

34 High Street, Welwyn, Herts., AL6 9EQ

Tel.: Welwyn (043871) 5206/7

# Have you got all these ARRL titles on your shelf? . . . .

ELECTRONICS DATA BOOK (new title)	... ..	£3.20
ANTENNA BOOK, 13th Edition	... ..	£3.38
UNDERSTANDING AMATEUR RADIO	... ..	£3.23
LEARNING THE RT CODE	... ..	70p
A COURSE IN RADIO FUNDAMENTALS	... ..	£2.13
FM AND REPEATERS FOR THE RADIO AMATEUR	... ..	£3.00
RADIO AMATEUR HANDBOOK 1977 (soft-cover)	... ..	£6.60
RADIO AMATEUR HANDBOOK 1977 (hard-cover)	... ..	£9.85
SPECIALISED COMMUNICATIONS TECHNIQUES FOR THE RADIO AMATEUR	... ..	£2.55
HINTS AND KINKS	... ..	£1.83
SINGLE SIDEBAND FOR THE RADIO AMATEUR	... ..	£3.25
VHF MANUAL	... ..	£3.15

(all prices include post/packing)

Available from **SHORT WAVE MAGAZINE**

Publications Dept.,

34 HIGH STREET, WELWYN, HERTS., AL6 9EQ. Telephone: Welwyn 5206/7

## RADIO AMATEUR HANDBOOK (ARRL 1977)

54th Edition

This HANDBOOK, the most widely used manual of communications theory, design, and construction, contains descriptions of the latest solid-state devices and their application. The construction projects included cover the entire field of Amateur Radio interest. Written in a no-nonsense style, the HANDBOOK appeals to beginners and advanced amateurs alike. This new edition contains nearly 700 pages, including index. Priced at **£6.60**, also available in a hard-covered cloth bound edition at **£9.85** (including postage).  
Order from

Publications Dept.  
**SHORT WAVE MAGAZINE LTD.**  
34 HIGH STREET, WELWYN  
HERTS., AL6 9EQ

SIMPLE, LOW-COST

## WIRE ANTENNAS

by William I. Orr, W6SAI

This excellent and thoroughly recommended handbook, is the publication on the practical approach to building aerials. After starting with aerial fundamentals there are discussions and descriptions of ground-plane, end-fed, DX dipole, vertical and wire beam antennas, plus coverage on a universal HF antenna system and working DX with an "invisible aerial"; the SWR meter and coaxial cable also have chapters to themselves.

The whole book is presented in an authoritative immensely clear, readable and enjoyable manner with the emphasis on the practical throughout—to the extent that even the chap who can hardly strip a piece of co-ax need not feel at all left out! Just as practical for the SWL, too!

192 pages

**£3.30** inc. post

Order from:

Publications Dept.

**SHORT WAVE MAGAZINE LTD.**

34 High Street, Welwyn, Herts. AL6 9EQ.

G4DSG

G3HEO

**D. P. HOBBS LTD.****THE COMPONENT SPECIALISTS**

Trio QR666 Communications Receiver ... ..	£145.00
Belcom Liner 2, Mk. 2, 2 metre Transceiver ... ..	£164.00
Uniden 2030 12 channel, 2 metre Transceiver, fitted five channels	£131.00
QM70, 28/144 Scorpion Transverter ... ..	£96.89
New Cobra 2m./70 cm. FM Transverter with Mic. Audio ... ..	£76.45
2 metre Solid State Linear Amp ... ..	£46.23
28/144 Solid State Transverter ... ..	£53.34
2FM70 2m. to 70 cms. FM Transverter ... ..	£48.89
144-28 Converter ... ..	£16.00
432-28 Converter ... ..	£17.34
1296-28 Converter ... ..	£21.34
Microwave Modules 2 metre converters 2-4, 4-6, 28-30 MHz IF	£18.00
MMC 144/28 LO 2 metre Converter ... ..	£20.00
MMC 70 4 metre Converter any IF ... ..	£18.00
MMC 432 70 cm. Converter any IF ... ..	£22.00
MMC 1296 23 cm. Converter any IF ... ..	£25.00
MMA 144 2 metre Preamp ... ..	£13.00
MMT 432/28 Transverter ... ..	£97.00
MMT 432/144 Transverter ... ..	£133.00
MMT 144/28 Transverter ... ..	£79.00
MMV 1296-70-23 cm. Varactor tripler ... ..	£30.00
NR 56 VFI, 2 metre Monitor Receiver ... ..	£48.00
FDK Multi-11, 2 metre Transceiver 23 channel ... ..	£177.52
50K Push-To-Talk Mics. ... ..	£3.75

ALL ABOVE PLUS 12½% VAT

Microwave Modules Counters 50 MHz ... ..	£62.00
50 MHz Counter with Built-in Pre-Scaler ... ..	£79.00
50 MHz Pre Scaler ... ..	£25.00

ABOVE PLUS 8% VAT

PART EXCHANGE WELCOME ACCESS OR BARCLAY CARD

11 KING STREET, LUTON, BEDS.

Telephone 20907

**G. W. M. RADIO LTD.**

All prices include VAT and post/carriage. Discount for callers

**BC221 FREQUENCY METERS.** Complete with charts, less power supply. These are recently recalibrated. £20.

**ISOLATION TRANSFORMERS.** Double wound 0-250 in, 0-115-250 out or vice versa. 250 watts. 5" x 4½" x 3½", weight 12 lbs. Shrouded type, £4.50.

**INTRUDER ALARMS.** Solid state photoelectric. Three units, transmitter, receiver and control/relay unit. Instruction sheet, £10.

**SAN WEST** edge type meters. Offset zero, FSD 5 volts starts at 1 volt, scaled 0-100. Very suitable for VU meter, £2. **AERIAL INSULATORS,** egg type, white china 1½", 6 for £1. **TRANSMITTING CAPACITORS.** JB 100pf twin stator, £1.50. Reed relays for recent auto keyer designs, 200 ohm coil, 15p plus 10p post any number. **WRIST WATCHES** G5 Smiths. sweep second hand, £9.50. **Lemania** 1/5th second wrist stop, £16.75. Both screw back fully overhauled and genuine ex-Ministry. Sent by Registered post. Quality jewelled action. **ALARM CLOCKS.** Wehrle commander. Steady/repeat alarm. Large, magnificent and brand new, £9.50. **829B** valves with base, ex-equipment, £2. T4188 units with 2 off 4X150 valves, etc., as previously advertised, £11.

**EDDYSTONE CABIN RECEIVERS,** made for Marine use, no BFO. Model 2230 covers 150-350 kc/s, 50-1450 kc/s, 3-7 to 10.5 Mc/s. and 10-5 to 30 Mc/s. Mains and speaker built in, £25.

**OSCILLOSCOPES,** CT436, good working order, £75.

**SONNENSCHHEIN.** 12v. 800ma psu/battery chargers. Stabilised voltage, 220v. AC, suit 12v. recorder, etc., £6.50.

Large solid **CRABTREE** circuit breakers, 1.5 amp 500v. a.c. Last for ever. £1 each or 5 for £3.

**LONDEX** pressure operated switched. Maximum 17 PSI, 5a 230v. a.c. switch, £2.50.

**RADIO TELEPHONES**

**POCKETFONES PFI** for 430 Mc/s. Clean and complete, untested because crystals removed by supplier, less batteries, with circuit and tuning instructions. £20 pair (one Tx one Rx).

**WESTMINSTER WISAM "P"** band ruggedised ex-Police motor cycle. With accessories, £50. Unit only £30.

**VANGUARDS** units only, single channel valve Lo band, no accessories, £11.

**ITT STAR AM7.** Mid-band (buyers report tunable to Hi band). All solid state. 12v. with dropper unit for 24v. in separate mounting rack with speaker. Weighs 11½ lbs. complete, unit only 6½ lbs. Single channel, £32.50.

**CAMBRIDGE** Lo band A.M. or F.M., complete with cable, box, mike and speaker £35. Boot mounting.

Carriage charges included are for England and Wales only.

Terms: Cash with orders. Early closing Wednesday.

40-42 PORTLAND ROAD, WORTHING, SUSSEX

**SMALL ADVERTISEMENTS**

("SITUATIONS" AND "TRADE")

15p per word, minimum charge £1.80. No series discount. All charges payable with order. Insertions of radio interest only accepted. Add 50% for Bold Face (Heavy Type). Box Numbers 35p extra. No responsibility accepted for transcription errors. Replies to Box Numbers should be addressed to the Short Wave Magazine, Ltd., 34 High Street, Welwyn, Herts., AL6 9EQ.

**TRADE**

**Derwent Press for QSL cards.** Send 20p stamp for our sample pack. — 69 Langstone Drive, Exmouth, Devon.

**Lintec Antennas** introduce new colinear base station antenna 'Mercury I', 144-148 MHz, 5dB gain, in smart 2.5m. glass fibre tube. Price, including 10 metres of 50-ohm cable, mounting brackets, V.A.T. and carriage (England), £25.80. — Lintec Antennas Ltd., Guildford Park Road, Guildford, Surrey.

**Cash-and-Carry prices on Yaesu equipment:** FT-221R multi-mode VHF transceiver, £268.00. FT-301D, latest rig with LED readout, £473.00. FT-224 mobile transceiver, 11 channels supplied, £170.00. FT-101E, built-in processor, £378.00. All prices plus V.A.T. — **Dagenham Wholesale Supplies**, Selinas Lane, Dagenham, Essex. (Tel: 01-592 7800).

**July issue: Due to appear June 24th. Single copies at 45p post free will be sent by first-class mail for orders received by Wednesday, June 22nd, as available. — Circulation Dept., Short Wave Magazine Ltd., 34 High Street, Welwyn, Herts. AL6 9EQ.**

**Radio Amateurs Examination City & Guilds.** Pass this important Examination and obtain your G8 Licence with an RRC Home-Study Course. For details of this and other Courses (GCE, professional examinations etc.) write or phone: **The Rapid Results College, Dept. JV1, Tuition House, London SW19 4DS.** Careers Advisory Service, 01-947 7272 or ring 01-946 1102 for prospectus only (24 hr. answering service).

**Japanese Equipment:** Ask us about all Japanese Equipment. Write: **Overseas Section, Yokohama Sogo Ham Centre, 5-42 Minami Yoshida Minami, Yokohama 233, Japan.**

**UHF FM Radiotelephones,** solid-state, mobiles and bases; mobiles from £65. — Ring 0329-832173, or 03294-43894 (Hants.), evenings.

**Wanted for cash:** Receivers, transmitters, complete stations; s.a.c. please. List available. — 5 Columbus Ravine, Scarborough, Yorks. (Tel: Scarborough 65996).

**Racal RA-17 and RA-117** communications receivers, £225 and £300 respectively (carriage £10); air-tested, few only. CV-89A RTTY converters, £25 carriage £3. — John Radio, 424 Bradford Road, Batley, Yorks. (Tel: Batley 478159).

**READERS' ADVERTISEMENTS**

8p per word, minimum charge £1.20, 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 35p extra. Replies to Box Numbers should be addressed to the Short Wave Magazine, Ltd., 34 High Street, Welwyn, Herts., AL6 9EQ.

**Sale:** Hamgear PM-IID preselector, brand new, £12 including postage. — Ring Brown, Maidenhead (0628) 27513.

**For sale:** K.W. Vespa Mk.II Tx, coverage 10-160 metres, 220 watts p.e.p., in superb condition with mic. and spares, £80. Hy-Gain 12-AVQ vertical antenna, unused, £25. — Wynn, G4BNB, QTHR. (Tel: 01-504 3260).

**Selling:** Hudson FM-109 marine radiotelephone base station, £70. Type 51 waveform generator, £8. UHF radio/transmitter performance tester, £10. Hudson VHF amplifier/control-unit, £6. AC-mains stabilised PSU, will drive many ex-govt. equipments, £1.50. Carriage extra, s.a.e with enquiries. — Hayward, Sunnyfields, Lighthouse Road, St. Margarets Bay, Dover, Kent.

**For sale:** Hallicrafters S.36A, 27.8-143 MHz, AM/FM, with original manual, £30 or near offer. Heavy duty power unit, input 230v. AC, output 450v. DC and 2 x 6.3v. AC, £5. Collector's items: Hallicrafters SX-15 'Sky-Challenger', 550 kHz-38 MHz, with crystal filter and electrical bandspread, £25 or near offer. Type B.2 S.O.E. 'spy' receiver, 3.1-15.5 MHz, with BFO, power unit for 90-250v. AC and 6v. battery, in steel watertight case, £10. All the above in excellent condition and working order. Buyers to inspect and collect. — Smith, 3 Hillbeck Way, Greenford, Middx. UB6 8LT.

**For sale:** Trio JR-599 Rx, 3 years old, excellent condition, hardly used, £110. — Ring Knowles, Longfield 2175.

**Sale:** Eddystone 730/4 general coverage receiver, with crystal calibrator, audio filter, variable selectivity etc., manual, £98. — Clarke, 5 Cherry Tree Road, Kingswinford. (Tel: Kingwinford 6526, evenings).

**Selling:** Hallicrafters SX-28 Rx, working well on AM and SSB, with manual, £30; buyer collect. MFJ frequency standard 100-50-25 kHz, £12 (or exchange for cassette with built-in mic.). Eddystone round speaker, £5. Avoncel Selectorjet filter, £10. — Ring Handy, Coventry 22201.

**Sale:** FT-101B transceiver, excellent condition, £320 or near offer. (Warks.) — Box No. 5577, Short Wave Magazine Ltd., 34 High Street, Welwyn, Herts. AL6 9EQ.

**For sale:** Four R.C.A. 6HF5 valves, new and boxed, £10. 18-AVT/WB vertical, first class condition, £40. Buyer collects. — Button, G3BG, QTHR. (Tel: 033-17 2037, Draycott).

**Selling:** Eddystone 770R, 19-165 MHz in six bands, with manual, good condition, heard working, £125. — Roberts, G3AQZ, Cottage Farm, Wessington, Derbys. (Tel: Alfreton 2943, or Ripley 3189 business hours).

**For sale:** Excellent receiving station: KW-202 receiver, in immaculate 'as new' condition, £185. K.W. E-Zee Match ATU, £20. Codar PR-40 pre-selector, £10. Or £210 the lot. (Matching KW speaker included). Reason for sale: got ticket and gone VHF. — Ring Chaplin, G8MHR, Romford 45014.

**Sale:** 1155, no PSU, £5. Studio tape deck, no pre-amp., £15. 8-watt hi-fi speaker, £1.50. Record turntable, new pick-up, £4.50. Unica 4-valve set, 10-550 kHz, £10. Tape pre-amp. unit, £2.50. — Farrer, 16 Duncan Road, Gillingham, Kent.

**Sale:** Oscilloscope, £50. Signal generator and tracer, £25. Digital frequency meter, £80. Two-metre transmitter and receiver, £50 each (ring for details). Storno two-metre transceiver, £5. Consider exchange any items for HF walkie-talkies. — Ring Poole, 051-498 4186.

## Amcomm Services

194a Northolt Road, South Harrow, Middx.  
Tel.: 01-864 1166

Trio 9R59D Receiver	... ..	£58.00
KW 2000E Transceiver	... ..	£290.00
Marconi Atlanta Receiver	... ..	£145.00
Yaesu FT 501/FP 501	... ..	£345.00
FT DX 40 Transceiver	... ..	£295.00
Yaesu FRG7	... ..	£130.00
KW 201 Receiver	... ..	£100.00
Heathkit HW 202 Transceiver	... ..	£85.00
Yaesu YC 355D Freq. Counter	... ..	£80.00
Racal RA 117	... ..	£285.00
KW 108 Monitorscope	... ..	£80.00
Rogers AF Millivolt Meter	... ..	£80.00
Rogers Low Distortion OSC. 5324	... ..	£80.00

A large selection of other communication equipment available. All types of electronic equipment accepted in part exchange. All equipments guaranteed in working order at time of despatch.

Terms: C.W.O. + 8% VAT

Hours: 9-5 daily. 9-1 Wednesday.



### HAM - SPARES

G3WCS  
G4COO  
262 KENSINGTON, LIVERPOOL L7 2RL  
Tel.: 051-264 9924

QUALITY COMPONENTS AND ACCESSORIES, BY RETURN  
—ALWAYS

#### HIGH QUALITY PLUGS AND CONNECTORS FOR R.F.

See last months add for full details. Best seller so far—PL259 plug for UR43 and UR76 cable. No reducer required. Fitted in one minute. Constant impedance match, 67p. BNC 50 ohm plug, 51p. BNC chassis socket, 44p. BNC single hole socket, 48p. SO239 Chassis socket, 44p. Single hole, 52p.

TBA120/SN76666N FM Discriminator IC, tested	... ..	40p
3N204 gate protected dual gate mosfet, very low noise figure	... ..	£1.25
BC107 plastic type, full spec. Packs of 10	... ..	50p
Deluxe PTT Microphone, similar to Trio 700/7200 type but slightly less bass, dual impedance. 500 ohm or 50K ohm, smooth PTT	... ..	£7.50
Price reduction. PTT microphone, 50k impedance but transformer can be removed to give 300-600 ohm.	... ..	£3.75
2200GX inserts. Still a very popular line. Can be used to replace original insert or to fit any rig, 600 ohm. Good quality output	... ..	£1.50
Small Multimeter, AC/DC volts 4 ranges to 1000 volts. 0-100mA, 0-150K ohm	... ..	£4.95
Miniature Level Meters, 200uA FSD. Ideal as RF indicator, etc.	... ..	45p
Small Mains Transformer. 6-0-6v. at 100mA, ex equip, few only	... ..	50p
Cassette Recorder Mono Heads. Low impedance. Standard size	... ..	£1.00
Digital Watches. LED display, six function with batteries, few only	... ..	£12.25
CA3089E FM discriminator IC. Squelch, S meter outputs, etc.	... ..	£1.95
4 Pin Microphone Plugs and Sockets. Trio style, ICOM, etc., sold as pair	... ..	£1.00
Veroboard, less than ½ price, packs of six pieces, our choice	... ..	£1.00
SECONDHAND. IC22A transceiver. One only, very clean condition with all accessories and full ten channels	... ..	£140.00

Prices include VAT. Cheque/PO with order. Access by telephone.

Our catalogue is available free of charge, please write or phone for copy.

Callers welcome—half day Wednesday—9 a.m. to 5.30 p.m.

Postage on all items 25p except, microphones/test meters 35p.

# C&C electronics

10 WEST PARK, LONDON SE9 4RQ

Telephone : 01-852 9397

• CRYSTALS



THE MADE TO ORDER CRYSTAL SPECIALISTS  
I OFF CRYSTAL PRICES

Fundamentals:	Group	0-030 to	0-009 MHz	100ppm	Price
	1.	0-100 to	0-350	100ppm	£14-25
	2.	0-370 to	0-730	100ppm	£9-75
	3.	0-731 to	1-499	100ppm	£10-00
	4.	1-500 to	1-999	30ppm	£9-75
	5.	2-000 to	3-999	30ppm	£3-45
	6.	4-000 to	20-999	30ppm	£3-00
	7.	21-000 to	24-000	30ppm	£2-85
	8.			30ppm	£3-25
3rd Overtones	9.	23-000 to	54-999	30ppm	£2-85
5th Overtones	10.	55-000 to	104-999	30ppm	£2-95
	11.	105-000 to	119-999	30ppm	£3-85
	12.	120-000 to	130-000	10ppm	£8-50
5th, 7th and 9th Overtones	13.	30-001 to	216-000	10ppm	£10-25

Unless otherwise requested fundamentals will be supplied with 30pf load capacity and overtones for series resonance operation. HOLDERS 0-030 to 0-200 MHz HC13/U, 0-170 to 196-000 MHz HC6/U, 4-000 to 216-000 MHz HC18 or HC25/U. Prices on application for other holders. DELIVERY Groups 1 to 4, 12 & 13—6 to 8 weeks.

Groups 5 to 11—4 to 8 weeks. DISCOUNTS 5% mixed frequency discount for 5 or more crystals within any price group. For orders of same frequency and spec discounts start at 5 off in groups 1, 4, 12 and 13. In all other groups discounts start at 10 off. Special rates for bulk purchase schemes including free supply of crystals for UK repeaters.

CRYSTALS FOR POPULAR VHF TRANSCEIVERS. Crystals supplied in approx. 5 weeks to any stated frequency for the following VHF transceivers: Heathkit, Icom, Ken, Standard, Trio and Yaesu. Price £2-50 per crystal.

IF CRYSTALS 10-245 MHz HC18/U, 20ppm -20 to -4-70°C Price, £2-20. LOW FREQUENCY STANDARDS (8% VAT) 100 kHz in HC13/U Price £2-95. 100kHz in HC6/U. Price £2-80. CRYSTAL SOCKETS HC6/U and HC25/U. Price 16p.

MINIMUM ORDER CHARGE £2-00 PRICES ARE EX VAT—PLEASE ADD 12½% UNLESS OTHERWISE STATED

All prices include postage to UK and Irish addresses. Crystals supplied to any specification for industrial, mobile radio or marine use etc. State equipment/specification when enquiring. Please send s.a.e. with all enquiries.

## "Mosley"-the tested and probed Antennae

TOWERS  
ROTATORS  
COAX  
ROPES

Send for HANDBOOK containing full details of Antennas and other technical information. 33 pages 50p. Refundable upon purchase of Antennas.

### SOME ANTENNAS

Mustang	3 Elements, 10, 15 and 20 metres	£90-00
TA-33 Jr.	High Power Model incl. Balun 3 Elements, 10, 15 and 20 metres	£82-00
TA33 Jr.	3 Elements, 10, 15 and 20 metres	£70-00
TA32 Jr.	2 Elements, 10, 15 and 20 metres	£49-00
TA31 Jr.	Rotary dipole, 10, 15 and 20 metres	£30-00
ELAN	3 Elements, 10 and 15 metres	£58-00
TD-2	Trap Dipole 40 and 80 metres	£27-00
TCD-2	Trap Dipole 40 and 80 metres compressed	£33-00
V-3 Jr.	Trap Vertical 10, 15 and 20 metres	£22-00
Atlas	Trap Vertical 10, 15, 20 and 40 metres	£40-00
SWL ANTENNAS		
SWL-7	Dipole 11, 13, 16, 19, 25, 31 and 49 metres	£21-00
RD-5	Dipole 10, 15, 20, 40 and 80 metres	£21-00
Orbit	Vertical 11, 13, 16, 19, 25, 31 and 49 metres	£36-00

Prices correct at time of going to press

**MOSLEY ELECTRONICS LIMITED**  
196 Norwich Road,  
New Costessey,  
Norwich, NR5 0EX  
ENGLAND  
Administrative Address only

(All antennas available ex works carriage and VAT extra)

**Sell or exchange:** Versatower 4-section 80-ft. telescopic antenna mast. Would exchange for good HF/SSB transceiver, multi-mode 2-metre rig, or W-H-Y? — Ring Laurence, G3GGI, 01-366 7030 (daytime).

**Selling:** Barlow Wadley portable receiver, HF/VHF/FM, mint, with manuals, £145 or near offer. — Ring Butler, Leatherhead 73906.

**Sale:** RSL 2m. FM Tx, module TX-25B, with 7 channels, £35. — Heath, G8JWO, QTHR.

**Wanted:** Panoramic adaptor (1031A, Eddystone EP series, or similar), W-H-Y? Must be first class; no junk. — Holden, G2HIX, 2 Westbrook Drive, Chesterfield. (Tel: 0246-6215, evenings).

**Selling:** FRG-7 Rx, mint condition, boxed, £95. Microwave Modules 2-metre converter, £10. AR-40 rotator, as new, boxed, £30. Joymatch aerial with tuning unit, as new, £18. 10XY 2-metre aerial, £7. — Ring Needham, Byfield 60916 (Northants).

**For sale:** Heathkit DX-100 transmitter, little used, full working order but modified to xtal-controlled single frequency, £100 or near offer. — Fryer, Rank Hi-Fi, Idle, Bradford, Yorks.

**Sale:** FT-75 with matching external VFO, mains and 12v. PSU's, £160 or very near offer. **Wanted:** Trio VFO-5S, Datong Clipper. — Whatton, G4DCV, 21 High Street, Dover, Kent. (Tel: 0304-206230).

**For sale:** Eddystone 680X, very good condition, with speaker. — Ring Ford, Dartford 22250 (Kent).

**Selling:** R.C.A. AR88LF, recently overhauled, £60. HRO complete with 9 coils and power pack. £30. Possible delivery in UK. — Ring 0225-837227, weekends only.

**Wanted:** Hallicrafters SX-110 Rx with manual, any condition. Details and price please. — Homewood, 73 Huchenden Road, Hastings, Sussex TN34 3TF.

**Sale:** Trio 9R-59DS receiver, good condition, £35. Beulah CCTV camera kit, includes Vidicon p/c boards, scan coils, case and some components, to be sold with Philips Type EL8114 video monitor (not working but with complete workshop manual), £35. — Evans, 90 Clare Road, Stanwell, Staines, Middx. TW19 7EH. (Tel: 01-759 5511 ext. 5197, office hours).

**For sale:** IC-210 FM 2-metre transceiver, fully VFO, in good order, £210. FT-101E transceiver, 6 weeks old, hardly used, condition 'as new', £410. Both 'or near offer'. — Ring Crouch, G8KEN, Folkestone 55241.

**Selling:** Lafayette HA-800 amateur bands receiver, all transistor, with xtal calibrator, very good condition, £60. — Ring Hartley, 061-487 2294.

**Selling:** Drake T-4XC and R-4C, 160-10m. WWV, with AC-4, 4NB, MS-4, Magnum Six and Shure 444 mic., £850. — Baker, G4DJC, QTHR. (Tel: 0245-69034).

**For sale:** UHF FM base station: Pye U450L transistor Rx (ideal for 70cm.), valve Tx, with four spare QV03/20 PA valves, £35. Modern rack cabinet, 4-ft. high (std. 19-in.), plus 19-in. panels with chrome handles, £8. Ditto, with blower unit, £12. — Ring Dunn, G8KOV, Falfield 8213 (Avon).

**Wanted:** Icom IC-210 or similar VHF transceiver. — Box No. 5579, Short Wave Magazine Ltd., 34 High Street, Welwyn, Herts. AL6 9EQ.

**Sale:** Ampere APB-82A 2-metre mobile, full legal linear, £90. Hustler colinear, £6. Bantex 3/4-whip with magnetic base, £10. — Walker, G3AZT, Woodcote, Abingdon Road, Tubney, Abingdon, Oxon.

**Sale:** FT-101, unmarked condition, with fan, never used mobile, £285. — Herbert, G2KU, QTHR. (Tel: 01-657 1126).

**Sale:** Heathkit OS-2 'scope, RF-1U signal generator (as new), the pair, £60. Solid State Modules Europa transverter ('B' spec.), with relay etc., brand new valves, like new, £60. — Druce, G3ZGT, 6 Kennedy Drive, Goole, Humberside.

**Selling:** AT-5 transmitter with PSU and spare set of valves, and companion T.28 receiver. EC-10 Mk.II, in mint condition. (London). — Box No. 5580, Short Wave Magazine Ltd., 34 High Street, Welwyn, Herts. AL6 9EQ.

**Offering:** Eddystone 940 receiver in immaculate condition. Offers? — Ring McCulloch, Johnstone 24666 evenings.

**For sale:** Heath SB-400 transmitter with manual and all crystals, £125 or near offer. AR88D, AR88LF and AR8516L manuals, new, £2 each. Hustler mobile antenna with five resonators, £30 or near offer.

**Wanted:** CW filter for FT-DX400. — Ring Limehouse, G2FDF, Weybridge 45214.

**For sale:** Yaesu FRG-7 receiver, mint condition, virtually unused, £140 or near offer. Joystick, as new, £10. (London). — Box No. 5581, Short Wave Magazine Ltd., 34 High Street, Welwyn, Herts. AL6 9EQ.

**Offering:** Latest series KWM-2 with separate VFO, fitted Walters rejection tuning, noise blanker and antenna, portable power supply, carrying case, mobile power supply and mobile mount. Collins' finest receiver Type 51S-1 with tuner, rare opportunity to purchase this model. All manuals. Both in mint condition. Reluctantly selling owing to lack of use through my business commitments. Offers? — Box No. 5582, Short Wave Magazine Ltd., 34 High Street, Welwyn, Herts. AL6 9EQ.

**Sale:** K.W. Atlanta, with AC/PSU, handbook, new PA valves, Shure mic., excellent condition, £170. Lionel J36 bug key, £5. Ribbon mic., hi/lo-Z, £6. Minimitter low pass filter, 75-ohm, £6. FT-241 crystals, ch. 44, 45, 46, 47, £1 each. Buyers collect, or carriage extra. — Crisp, Rame Barton, Rame, Penryn, Cornwall TR10 9DY. (Tel: Stithians 516).

**For sale:** Tubes: Two Eimac 100TH, unused, brand new, £8 each; Two Mullard QY3/125A, as new, £6 each. R.C.A. Type TE-149 frequency meter, crystal calibrated, with manual, £8 plus carriage. — Bottomley, G6TZ, QTHR. (Tel: Coventry 468388).

**Selling:** Eddystone 750 Rx, £40. Eddystone modulation meter, £3. Heathkit DX-40U Tx with VF-1U VFO, £35. Heathkit RF-1U signal generator, £15. Heathkit V-7A/UK valve voltmeter, £15. (Herts). — Box No. 5584, Short Wave Magazine Ltd., 34 High Street, Welwyn, Herts. AL6 9EQ.

**Wanted:** HA-350 or -500. Details and price please. Peckham, 10 Station Road, Wootton, Isle of Wight. (Tel: 0983-882479).

**Wanted:** Heathkit Mohican with manual, or R.1155N. Details and price please. — Wilson, 15 Temperance Place, Brixham, Devon.

**Wanted:** Mint condition Collins 30L-1 'Regent' 'round emblem' series (not 'winged' emblem). Collins 312B-4 control unit. Details and price please.

**For sale:** Katsumi MC-701 compressor, £7. Collins F455-FO5 mechanical filter, new, 50-ft. Telomast, tilt base, rigging kit, unused. — Box No. 5583, Short Wave Magazine Ltd., 34 High Street, Welwyn, Herts. AL6 9EQ.

**July issue:** Due to appear June 24th. Single copies at 45p post free will be sent by first-class mail for orders received by Wednesday, June 22nd, as available. — Circulation Dept., Short Wave Magazine Ltd., 34 High Street, Welwyn, Herts. AL6 9EQ.

## REG. WARD & CO. LTD. (G2BSW) (G8CA)

KW 103/VSWR Meter and Combined Power Meter	£16.00
KW 107 Combined E-Z Match, VSWR and RF Power Indicator, Dummy Load and Antenna Switch for 3 Outlets	£78.00
KW Trip Dipole Coaxial Feeder	£26.00
KW Trap Dipole with Balun	£29.00
KW 3-way Antenna Switches (for coax)	£7.50

<b>YAESU</b>	
Yaesu FT 301D All solid state TCVR	£599.00
Yaesu 101 E	£429.00
FT200B Transceiver and FP200 A/C PSU	£289.00
Yaesu FR101S RX	£299.00
Yaesu FR101D	£390.00
Yaesu 401B TCVR	£365.00
Yaesu YO100 Mon. scope	£118.00
FT21-2M TCVR / CW/AM/FM	£339.00
Yaesu FRG7 New General Coverage Receiver	£144.00
Yaesu 401B	£365.00
Yaesu FT 224 VHF/FM 2m. Mobile TCVR	
Sentinel 2m. Preamps and 2m. Converters/Europa Transverters.	

**SHURE MICROPHONES**  
Model 444, £19.20; Model 201, £9.50.

**TECHNICAL ASSOCIATES**  
Audio Compressor ... £21.00

**USED**  
Satellit 2000 ... £115.00

**WANTED**  
Yaesu FR50B's in good condition.  
VALVES for YAESU, etc. GBM8, 6BZ6, GU8, CEJ7, 6AV6, 6KD6, 12AX7A, 12BY7A, 12AU7, R.C.A. VALVES for KW and Heathkit equipment, 6146, 6146B, 6HF5, 6LQ6, 6GES, 6EA8, 6GW6, 6GK6, 6CM6, 6CL6, 6CB6, 6BN8, 6HS6, 6EY6, 12BA6, 12BE6, 12B26, 6JS6C, etc., and many other types.

J Beams and Stolle Rotators: 140ft. 14g. copper ant. wire; Ribbed and T-insulators: 52 and 75 Ω co-ax. and U.H.F. plugs and sockets. Mast Couplers for 2in. Masts. Wightraps. G-Wings mob antennae, 12AVQ and 18AVT, etc., SWVR 10 (Twin Meters), SWR/PWR Meters.

**AMTRON KITS**  
TRADE INS WITH PLEASURE. OUR STOCK OF GOOD SECOND HAND EQUIPMENT CHANGES DAILY—LET US KNOW YOUR REQUIREMENTS

Due to currency fluctuations prices of imported equipment are liable to alteration. Add 12½% VAT to all prices except used equipment.

HP TERMS AVAILABLE CARRIAGE EXTRA ON ALL ITEMS

ACCESS/BARCLAY CARD

AXMINSTER - DEVON Telephone: 33163

## NEW SAMSON ETM-3C C-MOS KEYS

- Self-completing dots/dashes/spaces. ● Can be used either as normal electronic keyer or as an iambic mode squeeze keyer.
- 8-50 wpm. ● Constant 3:1 dash-dot ratio. ● 6 C-MOS ICs and 4 transistors. ● Plug-in PCB. ● Long battery life—typically 1 μA drain when idling—Built-in battery holder for 4 x 1.5v. batteries (but will work over 3-10v. range). ● PCB has both a reed relay (250v., 0.5 amp., 25w. max.) and a switching transistor (300v., 30 mA max.)—either keying method can be used. ● Has the well-known fully-adjustable Samson precision twin keying lever assembly. ● Operate/Tune button. ● Sidetone oscillator.
- Grey case 4" x 2" x 6". ETM-3C, £63.88.

ETM-4C: As ETM-3C but with 2 combinable memories.  
BUILT FOR DEPENDABLE MARINE AND COMMERCIAL SERVICE

**JUNKER PRECISION HAND KEY**  
A superbly engineered straight key used for many years by professionals afloat and ashore. With this key you can't help but send good morse. Free-standing—no screwing down. Front and back contacts—fully-adjustable gaps/tension. Key-click filter. Hinged grey cover, £28.64.

**BAUER KEYING PADDLE**  
Single-paddle unit on 1½" x 2" base for home-built EI-bugs. Adjustable gaps/tensions, £9.97.

**88 mH TOROIDS**  
For CW, RTTY, SSTV and other filters, 90p each.

All prices post paid UK and include 12½% VAT.  
Please send stamp with enquiries.  
**SPACEMARK LTD.**  
THORNFIELD HOUSE, DELAMAR ROAD  
ALTRINCHAM, CHESHIRE  
(Tel: 061-928 8458)

## A FREE introduction to MORSEMASTER 77

Our new MORSEMASTER series is so good we'd like you to listen to a trial lesson and judge for yourself.

WRITE NOW FOR YOUR FREE CASSETTE  
(or phone us during the cheap rate—  
it's quicker and cheaper than a letter)

Send Name, Address, and approx. speed required  
for by-return despatch.  
(Offer applies to UK only)

**TAPETALK PO BOX 99**  
**MILTON KEYNES, MK3 5BR**  
**Tel.: Milton Keynes (0908) 77710**

### RADIO AMATEUR PREFIX-COUNTRY-ZONE LIST

published by GEOFF WATTS

Editor of "DX News-Sheet" 1962-1976

The List you have always needed, the list that gives you everything, and all on one line! For each country:—

- its DXCC "status"
- the normal prefix
- the special prefixes
- the ITU call sign block allocation
- the continent
- the "CQ" Zone No.
- the ITU Zone No.

Full information on Antarctic stations, USSR Klub-stations, obsolete prefixes used during the past 5 years, and much more, and the List can be kept always up-to-date because ample space has been provided for adding every new prefix, each new ITU allocation, etc. Everything arranged alphabetically and numerically in order of prefix. Ideal for Contest operators and SWL's.

Tell your Club-members about it. Order a gift copy for that overseas friend 15 pages. Price 35p (UK) or sent overseas (air-mail) for \$1 or 5 IRCs (55p)

GEOFF WATTS

62 BELMORE ROAD, NORWICH, NR7 0PU, ENGLAND

### JUNE OFFERS FROM G8MWW . . .

**UR76.** 50 ohm stranded Coax at 10p per metre (P/P 2½p per m.)

**500 Resistors.** Mixed wattages and values. Carbon Film £2 (P/P 50p)

**555 TIMER IC's.** 45p each (P/P 15p any number)

**20 Core.** Screened Cable at 18p per metre (P/P 4p per m.).  
Up to 10m. coils.

**8 core.** Screened Cable at 12p per metre (P/P 2½p per m.).  
Up to 20m. coils.

**MAINS ISOLATION TRANSFORMERS.** 240v. about 250-300  
watts, £2.95 (P/P £1).

**SRB MINIATURE SOLDERING IRONS.** 240v. 18w., £3.50  
(P/P 30p).

**HC25U XTAL SOCKETS** (the miniature plug in type Xtals) at 16p  
(P/P 8p any number).

**UR95.** 50 ohm Miniature Nylon Coax at 4p per metre (P/P ½p per m.).

**XTALS.** 10 mixed Miniature HC25U/HC18U, my choice for £1 (P/P 10p).

**Mixed Pack Copper PCB Board,** approx. 14 mixed sized pieces, £1  
(P/P 50p).

**New 815 Valves,** 50p each (P/P 30p any number).

Now available up-dated full Xtal and Cable lists, etc. SAE for your copy.  
**W. H. WESTLAKE, CLAWTON, HOLSWORTHY, DEVON**

### WANTED

TEST COMMUNICATION & EQUIPMENT,  
single items or quantities, also RF plugs,  
sockets and connectors.

Call, write or phone. 01-743 0899

**COLOMOR ELECTRONICS LTD.** 170 GOLDHAWK ROAD  
LONDON W12

### G2DYM AERIALS AND PROJECTS

In addition to our normal aerial service for S.W.L's and Tx-ing Amateurs,  
we now offer a new service: "THE BRITISH RADIO TECHNICAL  
ADVISORY SERVICE". Full details large S.A.E. + 3 8½p stamps.  
Briefly, you send us details of your technical problem, we will quote you  
first the cost of our written advice on any matter in the field of Radio  
Communication.

**LAMBDA ANTENNA STUD FARM**  
**WHITEBALL, WELLINGTON, SOMERSET**

**Sale:** Yaesu FR-50B, coverage 10-160 metres, with speaker, 100 kHz calibrator and handbook, in excellent condition, £50. Joystick VFA and Joymatch III ATU, £15. — Ring Pearce, Keevil 453 (Wilts).

**Selling:** Avo electronic 97-range multimeter, with manual, £20. Avo electronic testmeter, £10. U.S. Navy BC-221 with mains PSU, £20. Type CT-53 signal generator, 6.9-300 MHz in six ranges, manual, £12. T/R power-pack, 480v. at 175 mA. twice, 350v. at 225 mA., 6.5v. at 5A. twice, £10. CV power pack, 25v. at 8A., £12. TF-144G signal generator, £12. s.a.e. for list of other items. — Barnes, 14 Laurel Drive, Eccleston, St. Helens WA10 5JD. (Tel: St. Helens 53018, evenings).

**Sale:** Pye PF3FMH Pocketfone, 2-metres, 2+ watts, handheld, working on S20, S0 and R6, with battery and manual, £72. Pye R17FM modern base receiver, 12.5 kHz high-band FM, £36. U450L transmitter on 70cm., £12. Microwave Modules 2-metre converter, £11. Cambridge boards, ring for wants. — Ring Jolly, GW4BTW/A, Mold (0352) 57239.

**For sale:** TS-700, mint condition, perfect performance, with manual, £250. No telephone, so first telegram secures. — Davies, GW8EHR, Brynsworth, Dandorlan, Buryport, Dyfed.

**For sale:** Air Ministry Morse keys, enclosed type, adjustable, £1 each. Pye 116/7X Reporter manual, £1. Cradle for dashboard Ranger, £1. 4X150D, £1. Six 6BH6's, £1. Three EF95's, £1. — Edwards, G3MBL, 244 Ballards Lane, London N.12. (Tel: 01-445 4321).

**Selling:** IC-22A (December '76), as new, £145 or near offer. IC-3PA PSU, ditto, £40. (Essex). — Box No. 5578, Short Wave Magazine Ltd., 34 High Street, Welwyn, Herts. AL6 9EQ.

**For sale:** Trio 9R-59DS with SP-5D speaker, with handbook, original packing, little used, good condition, £50. — Ring Cooper, Chapel End 393035 after 7 p.m. (Warks.).

**Sale:** Trio JR-310, good condition, with manual, good reason for selling (student short of cash!), £55. — Mann, G8MPV, 14 Torridge Close, Plympton, Plymouth. (Tel: Plymouth 338933).

**For sale:** AR88D, S-meter, speaker, manual, £40. Two-metre Cambridge, FM mod. 5-channel, fitted comp., £45. 4m. AM-10D, single channel, fitted comp., £25. Vanguard, partly stripped, £2. Signal generator, £2. Marconi VHF Rx, not working, £5. One-inch home-built oscilloscope, £5. Type 3 PSU, plus EHT, £5. — Bean, G3TJQ, QTHR. (Tel: 01-679 1089, evenings).

**Sale:** Multi-2000, very good condition, fitted pre-amp. and tone access, offers around £150. — Smith, GM4DNM, QTHR. (Tel: 0592-720224).

**Wanted:** Marine receiver, must be in top class, no mods. please. — Anderson, 6 Charsley Place. Blurton, Stoke-on-Trent ST3 3EB.

## MORSE MADE EASY BY THE RHYTHM METHOD!

**FACT NOT FICTION.** If you start RIGHT you will be reading amateur and commercial Morse within a month. (Normal progress to be expected.)

Using scientifically prepared 3-speed records you automatically learn to recognise the code RHYTHM without translating. You can't help it. It's as easy as learning a tune. 18-W.P.M. in 4 weeks guaranteed. For Complete Course 3 Records & Books send £5.00 including P.P.I. etc. (overseas surface mail £1 extra).

For further details of course Ring 01-660 2896 or send 7p stamp for explanatory booklet to: S. BENNETT, G3HSC. (Box 14) 45 GREEN LANE, PURLEY, SURREY

**CRYSTAL TYPE HC6U and 4039 £2 each. 25% discount 10 or more.** 2179 2189 2222 2753 2750 2764 2802 2805 2840 2854 2858 2875 2889 2938 2948  
 2951 2952 2954 2957 2965 2985 3023 3232 3319 3333 3354 3375 3389 3396 3403 3404 3410 3411 3417 3419 3431 3432 3438 3445 3473 3481 3488 3854 3868 3869  
 3876 3883 3889 3897 3904 3911 3918 3924 3925 3932 3938 3939 3946 3966 3973 4002 4318 4320 4365 4432 4467 4481 4654 4668 4674 4688 4709 4730 4744 4751  
 4758 4765 4786 4800 4807 4814 4821 4828 4843 4952 5000 5010 5025 5092 5119 5133 5140 5147 5154 5161 5224 5231 5238 5252 5259 5266 5273 5280 5287 5294  
 5301 5320 5324 5328 5332 5337 5341 5345 5349 5354 5362 5366 5375 5379 5383 5388 5465 5505 5521 5524 5551 5589 5611 5619 5649 5658 5910 5920 5934 5952  
 5956 5964 5971 5984 5985 5986 6084 6089 6091 6093 6106 6110 6121 6125 6132 6136 6143 6145 6165 6171 6182 6187 6198 6210 6221 6332 6337 6376 6387 6410  
 6415 6432 6480 6488 6495 6498 6502 6506 6509 6516 6521 6532 6552 6554 6559 6567 6589 6598 6604 6607 6611 6619 6627 6632 6649 6657 6662 6677 6686 6721  
 7500 7533 7542 7552 7557 7562 7566 7567 7572 7577 7582 7583 7587 7600 7616 7633 7664 7683 7685 7700 7716 7733 7766 7850 7866 7883 7950 8116 8333 8183  
 8150 8266 8333 8350 8349 8357 8360 8366 8387 8402 8409 8410 8417 8432 8447 8454 8434 8516 8845 8854 8862 8871 8930 8953 9096 9285 9293 9302 9310 9319  
 9327 9336 9344 9353 9361 9370 9378 9395 9404 9412 9413 9421 9432 9461 9487 9519 9781 9815 9837 9845 9863 9868 9871 9873 9883 9893 9907 9962 kHz.  
 10021 10037 10062 10087 10112 10137 10158 10162 10187 10212 10237 10262 10287 10437 10465 10486 10513 10549 10909 11250 11500 11550 11859 12287 13112  
 12337 12362 12387 12412 12437 12412 12487 12512 12537 12562 12587 12612 12637 12687 12712 12737 12750 12762 12787 12837 12900 13032 13075 13087 13212  
 13137 13162 13187 13212 13222 13227 13229 13237 13250 13262 13272 13275 13304 13312 13337 13350 13387 13412 13425 13427 13462 13487 13500 13540 13590  
 13640 13690 13729 13739 13740 13747 13749 13750 13769 13779 13789 13790 13799 13809 13840 13890 13940 13972 13990 14112 14250 14408 14416 14500 14750  
 14762 14787 14812 14848 14887 14898 14912 14937 14948 14962 14987 14998 15000 15012 15037 15048 15062 15087 15098 15112 15137 15148 15162 15187 15198  
 15212 15237 15248 15250 15262 15287 15294 15298 15311 15337 15344 15377 15511 15512 15537 15544 15561 15562 15577 15584 15611 15612 12637 15662  
 15686 15712 15725 15737 15762 15767 15857 15887 15912 15937 15962 16837 18247 18250 18372 18431 18497 18662 18677 18887 18997 19122 19247 19372 19497  
 19622 19747 19872 23620 23720 23820 24620 34720 24820 25020 28000 31200 31225 31250 31275 31300 31325 31350 31375 31400 31425 31450 31475 31500 31525  
 31550 31575 31600 31625 31600 31675 kHz.

S.A.E. ALL ENQUIRIES

# BAGINTON ELECTRONICS

COVENTRY AIRPORT  
 (G3TFC) Tel. (0203) 302449

## MISSING DX?

Here's how to SOUP UP your RECEIVER—the EASY way

**TUNABLE AUDIO NOTCH FILTER** gets rid of tiring whistles and CW interference, fits between receiver and speaker ... .. **£5-30**

**CRYSTAL CALIBRATOR** gets you SPOT ON. 1 MHz, 100 kHz and 25 kHz with equal level harmonics up to VHF ... .. **£11-30**

**LOW FREQUENCY CONVERTER** adds 100-600 kHz, 20dB antenna tuner, feeds 3-5-4 MHz ... .. **£8-80**

Each kit includes ALL parts, 1½ x 3" x 5" case etc., instructions, postage, money back assurance. Get all the EXOTIC, send TODAY.

### CAMBRIDGE KITS

45(ST) OLD SCHOOL LANE, MILTON, CAMBRIDGE

## MORSE CODE RECEIVING AND SENDING

### Receiving :

**CASSETTE A** For Amateur Radio examination preparation. Speed slowing increasing from 1-12 w.p.m.

**CASSETTE B** For Professional examination preparation. Computer produced morse from 12-24 w.p.m. Including international procedure signs and symbols and their incorporation into messages.

### Sending :

Morse Key and Buzzer Unit for sending practice and own Tape preparation. Phone output. Headphones available.

Prices : each cassette, including booklets, **£4**  
 Morse key and buzzer unit, **£4**. Headphones, **£3.50**

Prices include VAT, postage, etc.

**M H ELECTRONICS**  
 12 LONGSHORE WAY, MILTON,  
 PORTSMOUTH, PO4 8L5

## G3ACQ OFFERS:—

**YAESU** by Western Electronics ;

FL 101 — FR 101 — FT 101E — FT 221R

Western Power Meters

J. Beams Rotors

**EUROPA'S—PA 3's** by S.S. Modules

## S. MAY (Leicester) LTD.

12-14 and 27 CHURCHGATE

City Centre, LEICESTER

Telephone : Leicester 58662

## G3EKX S.S.B. PRODUCTS G3EKX

**QUARTZ XTALS.** Many thousands of new ones in stock. Price **£1.65** inclusive. Specials **£2.15** inc. Miniature, HC6U, etc. **MUST SEND S.A.E.** and state alternatives.

Few **6146A**. New R.C.A. Matched pairs ... (40p) **£9-00**

**NEW SUPERB PADDED HEADPHONES.**

8 ohm only ... (30p) **£6-50**

New Low/High Z dynamic **MICROPHONES.**

(Press SW). On flexible stand. Only ... (40p) **£12-00**

★ **PRICES INCLUSIVE.** Please ADD Carriage ★ and safe packing

## TOWN QUAY . TRURO

CORNWALL Telephone 0872-862575

**PLANET COMMUNICATIONS LIMITED.** (Reg. in England No. 1285841 in 1976). We wish to announce that the above Company will in future trade as **COM-TEK (Mids.) Ltd.** This will avoid any confusion which may have occurred with products bearing the same name but not manufactured or sold by us.

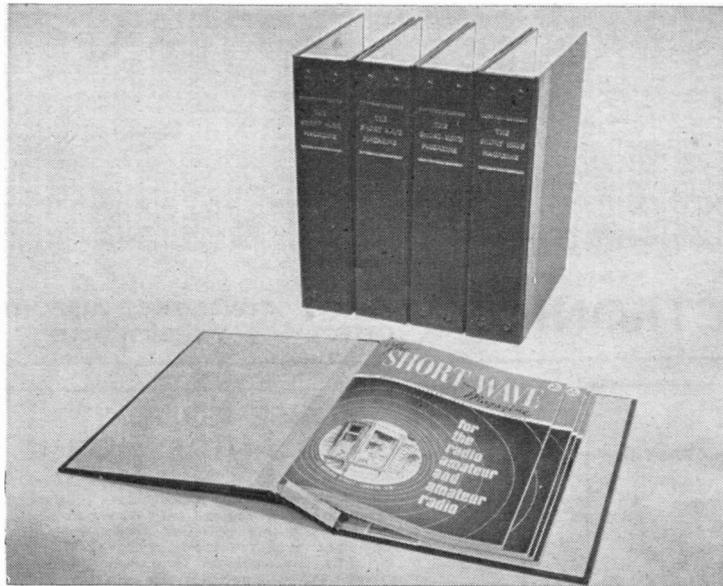
Reg. Office : 506 Alum Rock Road,  
 Birmingham, B8 3HX  
 Tel.: 021-326 6343  
 Telex : 339938 (RSSBMG)



**2 M L — 144 MHz Linear Amplifier** | **T V 2 A — 28/144 MHz Transverter**  
 FM-SSB 100w. PEP Output | 100w. PEP output

EXPORT ENQUIRIES WELCOME

UK Agent : Stephen-James Ltd., 47 Warrington Road, Leigh, Lancs, WN7 3EA Tel.: 0942-676790



## CREATE YOUR OWN REFERENCE LIBRARY

The "EASIBINDER" is designed to bind 12 copies of the Magazine as you receive them month by month, eventually providing a handsomely bound volume for the bookshelf.

No need to wait until twelve copies are assembled. As each copy is received, it is quickly and simply inserted into the binder. Whether partially or completely filled, the binder is equally effective, giving the appearance of a book, with each page opening flat.

Strongly made with stiff covers and attractively bound in maroon Rexalon and Milskin, the binders have only the title gold-blocked on the spine and the date frame.

Price £1.75 (incl. P & P)

PUBLICATIONS DEPARTMENT  
SHORT WAVE MAGAZINE  
34 HIGH STREET,  
WELWYN,  
HERTS. AL6 9EQ

*Subscription rate to Short Wave Magazine is £4.80  
for a year of twelve issues, post free.*

## a selection of specially recommended titles . . . . .

* SIMPLE, LOW-COST WIRE ANTENNAS, by W. Orr W6SAI	... ..	£3.30
* A GUIDE TO AMATEUR RADIO, 16th Edition (RSGB)	... ..	£1.30
* HAM RADIO, A BEGINNERS' GUIDE	... ..	£2.50
* SUN, EARTH and RADIO	... ..	£1.60
* WORLD RADIO TV HANDBOOK 1977	... ..	£5.60
* RADIO AMATEUR OPERATORS HANDBOOK (Data)	... ..	85p
* WORKING WITH THE OSCILLOSCOPE	... ..	£1.85
* AMATEUR RADIO TECHNIQUES, 5th Edition (RSGB)	... ..	£3.40
* TRANSISTOR AUDIO & RADIO CIRCUITS, 2nd Edition (Mullard)	... ..	£3.00
* TOWERS' INTERNATIONAL TRANSISTOR SELECTOR	... ..	£3.45
* VHF/UHF Manual, 3rd Edition (RSGB)	... ..	£6.60
* VHF HANDBOOK, by W. I. Orr W6SAI (New Edition)	... ..	£3.90
* RADIO VALVE AND SEMICONDUCTOR DATA, 10th Edition	... ..	£2.35
* RADIO COMMUNICATION HANDBOOK, VOL. I (New 5th Ed.) RSGB	... ..	£9.15
* RADIO COMMUNICATION HANDBOOK, VOL. II (New 5th Ed.) RSGB	... ..	£7.95
* TEST EQUIPMENT FOR THE RADIO AMATEUR (RSGB)	... ..	£2.35

(all prices include post/packing)

Available from **SHORT WAVE MAGAZINE**

Publications Dept.,

34 HIGH STREET, WELWYN, HERTS., AL6 9EQ Telephone: Welwyn 5206/7

# Technical Books and Manuals

(ENGLISH AND AMERICAN)

**Radio Communication Handbook, Vol. 1.**  
(NEW 5th Edition) **RSGB** . . . . . £9.15

**Radio Communication Handbook, Vol. II.**  
(NEW 5th Edition) **RSGB** . . . . . £7.95

## AERIAL INFORMATION

Practical Aerial Handbook, 2nd Edition (King) . . . £6.10  
Aerial Handbook (Briggs) . . . . . £1.05  
Beam Antenna Handbook . . . . . £3.20  
Cubical Quad Antennae, 2nd Edition . . . . . £3.05  
Simple Low Cost Wire Antennas, by Orr . . . . . £3.30  
73 Vertical Beam and Triangle Antennas  
(E. M. Noll) . . . . . £3.70  
73 Dipole and Long-Wire Antennas (E. M. Noll) . £3.70  
S.W.L. Antenna Construction Projects (E.M. Noll) O/S  
Antenna Handbook (ARRL) 13th Edition . . . £3.38

## BOOKS FOR THE BEGINNER

"Short Wave Magazine" R.A.E. Questions and  
Answers, 1971-1975 . . . . . £2.10  
Solid State Short Wave Receivers for Beginners  
(R. A. Penfold), . . . . . £1.05  
Electronics Self-Taught . . . . . £2.15  
Beginners Guide to Radio . . . . . £2.60  
Beginners Guide to Electronics . . . . . £2.25  
Course in Radio Fundamentals, ARRL . . . . . £2.13  
Guide to Amateur Radio (16th Edition) (RSGB) . £1.30  
Ham Radio (A Beginners Guide) by R. H. Warring £2.50  
Learning the RT code (ARRL) . . . . . 70p  
Morse Code for the Radio Amateur (RSGB) . . . 45p  
Radio Amateur Examination Manual (RSGB) . . . £1.30  
Simple Short Wave Receivers (Data) . . . . . £1.00  
Understanding Amateur Radio (ARRL) . . . . . £3.23

## GENERAL

50 CMOS IC Projects (R.A. Penfold) . . . . . £1.10  
50 Projects Using IC CA3130 (R.A. Penfold) . . . £1.10  
Better Short Wave Reception, New 4th Edition . £3.30  
FM & Repeaters for the Radio Amateur (ARRL) £3.00  
Easibinder (to hold 12 copies of "Short Wave  
Magazine" together) . . . . . £1.75  
Guide to Broadcasting Stations (17th Edition) . . 95p  
Practical Wireless Circuits . . . . . £2.45  
Prefix List of Countries . . . . . 28p  
Radio Engineers Pocket Book (Newnes) . . . . . £2.05  
Test Equipment for the Radio Amateur (RSGB) . £2.35  
World Radio & T.V. Handbook 1977 Edition . . . £5.60  
World's SW, MW, LW, FM and TV Broadcasting  
Stations Listing . . . . . 70p  
Walkie-Talkie Radio Operators Guide . . . . . £1.95

O/P (Out of print)

O/S (Out of stock)

THE ABOVE PRICES INCLUDE POSTAGE AND PACKING

Many of these titles are American in origin

(terms C.W.O.)

Available from

**SHORT WAVE MAGAZINE**

Publications Dept.

34 High Street, Welwyn, Herts. AL6 9EQ - Welwyn (043871) 5206/7

(Counter Service. 9.30-5.00. Mon. to Fri.)

(GIRO A/C. No. 547 6151)

## HANDBOOK AND MANUALS

Radio and Electronic Laboratory Handbook,  
8th Edition (Scroggie) . . . . . £8.65  
Amateur Radio DX Handbook . . . . . O/S  
Electronic Circuit Handbook Vol. 1 . . . . . £1.73  
Electronic Circuit Handbook Vol. 2 . . . . . £1.73  
New RTTY Handbook . . . . . £2.75  
Radio Amateur Handbook 1977 (ARRL) . . . . . £6.60  
Radio Amateur Handbook 1977 (ARRL) Hard  
Cover . . . . . £9.85  
Radio Amateur Operators Handbook . . . . . 85p  
Slow Scan Television Handbook . . . . . £3.10  
Television Interference Manual (G3JGO) . . . . . £1.00  
Specialized Communications Techniques for the  
Amateur (ARRL) . . . . . £2.55  
Practical Wireless Service Manual . . . . . £2.45  
Advanced Communications Systems  
Working with the Oscilloscope . . . . . £1.85  
Know your Oscilloscope . . . . . O/S  
Know your Signal Generators . . . . . O/P

## USEFUL REFERENCE BOOKS

Foundations of Wireless and Electronics,  
9th Edition (Scroggie) . . . . . £4.40  
Amateur Radio Techniques, 5th Edition (RSGB) £3.40  
Engineers Pocket Book, 6th Edition . . . . . £1.98  
U.K. Call Book 1977 (RSGB) . . . . . £2.10  
Hints and Kinks (ARRL) . . . . . £1.83  
Radio Data Reference Book (3rd Edition) RSGB . O/P  
Single Sideband for the Radio Amateur (ARRL) . £3.25  
Sun, Earth and Radio . . . . . £1.60  
NBFM Manual (RSGB) . . . . . £1.30  
Q and A on Short Wave Listening . . . . . O/P  
Electronics Data Book (ARRL) . . . . . £3.20

## VALVE AND TRANSISTOR MANUALS

Field-effect Transistors (Mullard) . . . . . £2.15  
MOS Integrated Circuits & their Applications  
(Mullard) . . . . . O/P  
Transistor Audio & Radio Circuits—2nd Ed.  
(Mullard) . . . . . £3.00  
Towers' International Transistor Selector . . . . . £3.45  
Principles of Transistor Circuits (5th Ed.) . . . £3.43  
Service Valve and Semiconductor Equivalents . . 50p  
Radio Valve and Semiconductor Data (10th Ed.) . £2.35  
Transistor Pocket Book . . . . . £1.70  
Popular Valve/Transistor Substitution Guide . . £2.10

## VHF PUBLICATIONS

VHF Handbook, Wm. 1 Orr (New Ed.) . . . . . £3.90  
VHF Manual (ARRL) . . . . . £3.15  
VHF/UHF Manual (RSGB), New 3rd Ed. . . . . £6.60

Amateur Radio Awards (RSGB) . . . . . £2.05  
Teletypewriter Handbook (RSGB) . . . . . £6.75

# B. BAMBER ELECTRONICS

DEPT 5, 5 STATION ROAD, LITTLEPORT, CAMBS., CB6 1QE

Tel.: Ely (0353) 860185 (Tuesday - Saturday)

CALLERS WELCOME BY APPOINTMENT ONLY

TERMS OF BUSINESS: CASH WITH ORDER. MINIMUM ORDER OF £2.00. ALL PRICES NOW INCLUDE POST & PACKING (UK ONLY)

EXPORT ENQUIRIES WELCOME  
PLEASE ENCLOSE STAMPED ADDRESSED ENVELOPE WITH ALL ENQUIRIES.

PLEASE ADD VAT AS SHOWN

## ALL BELOW — ADD 8% VAT

RED LEDs (Min. type), 5 for 70p.  
VIDICON SCAN COILS (Transistor type, but no data) complete with vidicon base, £6.50 each. Brand New.

FULL RANGE OF BERNARDS/BABANI ELECTRONICS BOOKS IN STOCK. S.A.E. FOR LIST.

NEW FOR THE VHF CONSTRUCTOR. A range of tuned circuits on formers with slugs and screening cans. Frequencies quoted are approximate, and range can be greatly extended by using varying capacitors in parallel.

Type S  $1\frac{1}{2}$ " square, dummy type).  
Type SA 20 to 30 MHz (when 33pf fitted in parallel).

Type SB 35 to 50 MHz (with link winding).  
Type SC 70 to 100 MHz (with link winding).  
Type SD 135 to 175 MHz (with link winding).

Type M (Min.  $1\frac{1}{2}$ " square types).  
Type MA 19 to 28 MHz (when 33pf fitted in parallel).

Type MB 22 to 32 MHz (when 33pf fitted in parallel).  
Type MC 25 to 35 MHz (when 33pf fitted in parallel).

Type MD 38 to 50 MHz (when 33pf fitted in parallel).  
Type ME 45 to 60 MHz (when 33pf fitted in parallel).

Type MF 100 to 200 MHz (without slug) when 0 to 30pf variable fitted in parallel. All the above coils available in packs of five only (same type) at 50p per pack of 5.

NUT SPINNER SETS—SPIRALUX.  
Model 2210 BA sizes, 0, 1, 2, 3, 4, 5, 6, 8, £4.20.  
Model 2230 Metric sizes, 4, 4.5, 5, 5.5, 6, 7, 8, 9, 10mm., £4.50.

MAGNETIC DEVICES PROGRAMMERS. Contain 9 fully adjustable cams and change over microswitches (rated approx. 1A 240V. AC). Needs slow-motion motor to drive (not supplied). Ideal for disco lights, sequence switching, etc. ex-equipment, £1.50 each.

PLASTIC PROJECT BOXES with screw on lids (in Black ABS) with brass inserts.  
TYPE NB1 approx.  $3\frac{1}{2}$ " x  $2\frac{1}{2}$ " x  $1\frac{1}{2}$ ", 40p each.  
TYPE NB2 approx.  $3\frac{1}{2}$ " x  $2\frac{1}{2}$ " x  $1\frac{1}{2}$ ", 50p each.  
TYPE NB3 approx.  $4\frac{1}{2}$ " x  $3\frac{1}{2}$ " x  $1\frac{1}{2}$ ", 60p each.

QUARTZ-XTAL CONTROLLED CLOCKS, 9 to 12V. DC at approx. 3mA required. Dial size approx. 2", depth of unit approx. 2". Not in cases, unit only, smart modern appearance, black face with white setting, 12hr., with second hand, and 1 hour and minute hands. (Cost over £40 to produce) £10.00 each, while stocks last, tested before despatch.

PYE SSB125T P.C. BOARDS (All brand new with circuit diagrams), 12V. DC.

SSB RF FRONT END PCB, 4 channel, 3-15 MHz, RF and Mixer stages, ant in, 1-4 MHz out, £2.00.

SSB CHANNEL OSCILLATOR PCB, 4 channel, with trimmers, for 4 fundamental xtals (2 stage), £1.00.

SSB AUDIO AMP PCB (3 stage), £1.50.

SSB 1-4 MHz OSCILLATOR & AGC AMP PCB (less xtal), £1.50.

LIMITED SUPPLY ONLY. ORDER NOW!  
PYE PFI UHF POCKETPHONES, can be converted to 70 cms. Complete, but untested, with circuits, less batteries, £25.00 pair (ITX + IRX).

THIS MONTH'S SCOOP PURCHASE, PYE CAMBRIDGE AM AUDIO PCB. Brand new, 60p each, or 4 for £2.00.

CHARGER PCBs for ITT Starphone batteries (12v.), with battery compartment. Requires 28V. DC at 50mA. Contains transistorised circuit for constant current limiting. £2.75.

TELEPHONE HANDSETS with "PRESS-TO-TALK" buttons, on curly lead, brand new, £3.50 (few only).

AND SPIRALUX. Tools for the Electronics enthusiast. S.A.E. for list.

AEI CS108/R MICROWAVE MIXER DIODES, up to X-Band, max. noise figure 8.5dB at 9.375 GHz, 80p each.

14 DIL REED RELAYS, 5 to 12v. DC, 450 ohm coil, designed to work directly from TTL logic, single pole change over. Contact ratings, 28v., 3A, 3W, £1.75 each.

## ALL BELOW — ADD 8% VAT

### PLUGS & SOCKETS

BNC PLUGS (ex-equip.), 5 for £1.50.

PL259 PLUGS (PTFE). Brand new, Packed with reducers, 65p each or 5 for £3.00.

SO239 SOCKETS (PTFE). Brand new (4 hole fixing type), 50p each or 5 for £2.25.

N-TYPE PLUGS, 50 ohm, 60p each.

GREENPAR (GE30015). Chassis Lead Terminations. (These are the units which bolt on to the chassis, the lead is secured by screw cap, and the inner of the coax passes through the chassis), 30p each, 4 for £1.00.

WELLER TCP2 and PUZD PSU. Temperature controlled soldering iron with matching Power Supply Unit, containing sponge and spring stand, £27.00.

SPARE TIPS (for TCF1/2) Three types available: TYPE CC7 (Standard), TYPE K7 (Long fine tip), TYPE P7 (Very fine tip) £1 each.

WELLER W60D mains operated temperature control soldering iron, £13.80.

SPARE TIPS (for W60D) Two types available. TYPE CC7 (W60D) Standard, TYPE AA7 (W60D) Finer tip, £1.15 each.

110v. NEONS, screw-in type 4 for 50p.

SUPER FREEZIT (FREEZER), 65p can.

MULTICORE SOLDER. Size 5 Savbit, 18 SWG in alloy dispenser, 32p; Size CISA V18 Savbit, 18 SWG, 50p; 1 kg. (11 lb.) 60/40, 20 SWG on plastic reel, £3.00.

ALU-SOL ALUMINIUM SOLDER (Made by Multicore) Solders Aluminium to itself or Copper, Brass, Steel, Nickel or Tinplate, 16SWG with multicore flux with instructions, approx. 1 Metre coil 40p pack. Red £3.75.

SOLDER SUCKERS (Plunger type). Standard model, £4.50. Skirted model, £4.95. Spare nozzles, 60p each.

4 MHz XTAL PACKS (10 assorted xtals between 4 MHz and 5 MHz) our selection only, £1.00 pack.

MAINS ISOLATION TRANSFORMERS. Tapped mains input, 240v. at 6A Made by Gardners, £18.00.

PERSPEX TUNER PANELS (for FM Band 2 tuners) marked 88-108 MHz and Channels 0-70, clear numbers, rest blacked out, smart modern appearance, size approx.  $8\frac{1}{2}$ " x  $1\frac{1}{2}$ ", 2 for 35p.

DIECAST BOXES. We still stock these but, owing to frequent price rises from our suppliers, and costly postal charges, it has become found impossible to publish up to date prices on these items. Please ring, or write (with SAE), for latest mail-order prices.

HEAVY DUTY RELAYS, 24v. DC operated (will work on 18v.) 3 heavy duty make contacts (around 10A rating) + 4 change contacts + 1 break contact. New, complete with mounting bracket (ideal for switching HT on Linears). Many uses for this high quality unit, £1.50 each.

CERAMIC TAG STRIPS (4 on 1 mount), 10 mounts for 50p.

TUNED COILS, 2 section coils, around 1 MHz, with a black smart tuning knob, which moves an internal core to vary the inductance, many uses, easily rewound, 3 for 50p.

2-6pf, 10mm. circular, ceramic trimmers (for VHF/UHF work), 3 pin mounting, 5 for 50p.

ON/OFF/RX STANDBY SWITCHES for AM10B Cambridge and Vanguard control boxes, 40p each, 3 for £1.

OSMOR REED RELAY COILS (for reed relays up to  $4\frac{1}{2}$ " dia., not supplied), 12v., 500 ohm coil, 2 for 50p.

## ALL BELOW — ADD 8% VAT

### TRANSISTORS

TO3 TRANSISTOR INSULATOR SETS, 10 sets for 50p.

BSX20 transistors (VHF OSC/MULT), 3 for 50p.

BC108 metal can), 4 for 50p.

PBC108 (plastic BC108), 5 for 50p.

PNP AUDIO TYPE TOS TRANSISTORS, 12 for 25p.

BFY51 TRANSISTORS, 4 for 60p.

BF152 (UHF AMP/MIXER), 3 for 50p.

2N3819 Fet. 3 for 60p.

BC148 NPN SILICON, 4 for 50p.

BC158 PNP SILICON, 4 for 50p.

BAY31 Signal Diodes, 10 for 35p.

BOX380 Stud Rectifiers, 300v. at 2.5A, 4 for 60p.

BA121 Varicap Diodes, 4 for 50p.

IN914 DIODES, 10 for 25p.

RALLY SEASON HERE AGAIN! If you require items in our ads for collection at rallies or exhibitions, please give us a ring to reserve, and we will bring them along for you.

### VALVES

QQV03/20A (ex equipment), £3.00.

QQV03/10 (ex equipment), 75p or 2 for £1.20.

2C39A Ceramic (ex equipment), £2.00 each.

DET-22 (ex equipment), 2 for £1.00.

6BH6 (ex equipment), 2 for 50p.

All the above valves are untested, except for heaters, and no guarantee of percentage of emission is given. Sorry, no returns.

MULLARD 85A2 85v. STABILISER VALVES (Brand New), 70p each or 2 for £1.20.

## ALL BELOW — ADD 12½% VAT

BARGAIN PACK OF LOW VOLTAGE ELECTROLYTIC CAPACITORS. Up to 50v. working. Seatronic manufacture. Approx. 100. £1.50 per pack.

VARICAP TUNERS, Mullard type ELC1043/05. Brand New, £4.40.

A large range of capacitors available at bargain prices, S.A.E. for list.

TV PLUGS (metal type), 5 for 50p.

TV SOCKETS (metal type), 4 for 50p.

TV LINE CONNECTORS (back-to-back skt.), 4 for 50p.

DIN 3-pin LINE SOCKETS, 15p each.

3 PIN DIN PLUGS, 15p each.

### ELECTROLYTICS

ELECTROLYTICS, 50µF, 450v., 2 for 50p.

ELECTROLYTICS, 100µF, 275v., 2 for 50p.

ELECTROLYTICS, 470µF 63v., 3 for 50p.

ELECTROLYTICS, 1,000µF 30v., 3 for 60p.

ELECTROLYTICS 5,000 mfd. at 35v., 50p each.

ELECTROLYTICS 5,000µF 50v., 60p each.

ITT ELECTROLYTICS, 6,800 mfd at 25v., high grade, screw terminals, with mounting clip, 50p each.

ELECTROLYTICS 10,000 mfd. at 63v., 75p each. 50k ohm lin. POTS  $\frac{1}{2}$ " plastic spindle 40p each.

TWIN IF CANS, approx.  $1\frac{1}{2}$ " x  $1\frac{1}{2}$ " x  $1\frac{1}{2}$ " high around 3.5 to 5 MHz, 2 separate transformers in one can, internally screened, 5 for 50p.