40p

The SHORT WAVE Magazine

VOL. XXXVI AUGUST 1978 NUMBER 6

LOWE ELECTRONICS LTD

PRICE LIST — JULY 1978

	Price incl. VAT £	Carr. £
TRIO EQUIPMENT		
TS820 160–10 transceiver 200W. P.E.P.	693·00	3·00
VFO820 external VFO	120·00	3·00
DGI digital readout to 100Hz	136·00	3·00
DSIA 12v. dc inverter	42·00	·86
YG88C CW filter 8 pole	37·00	·28
SP820 speaker	38·00	1·16
AT200 1–8 to 30 MHz antenna tuner and watt meter	93·00	3·00
TS520S 1·8–28 MHz SSB transceiver 200W. P.E.P.	525·00	3·00
DSIA 12v. dc inverter	42·00	·86
VFO520S remote VFO	101·00	3·00
SP520 matching speaker	18·00	·86
DG5 digital display/40 MHz frequency counter	134·00	3·00
DK520 conversion kit—allows use of DG5 with TS520	12·00	·40
YG339SC CW filter	39·00	·40
TS700G 2m. transceiver. CW/USB/LSB/FM/AM 240v. ac/12v. dc	458·00	3·00
VOX3 matching VOX unit (free with TS700G)	19·00	1·06
TS700S 2m. all mode digital readout transceiver. Simply the best	580·00	3·00
VFO700S external VFO	89·10	3·00
SP70 matching speaker	20·00	·86
TR7010 2m. SSB/CW mobile transceiver 10 watts output	189·00	3·00
PS5 matching ac power unit/digital clock	58·00	3·00
TR7200G 10W. FM mobile fitted 10 channels, auto toneburst, etc.	189·00	3·00
PS5 matching ac power unit/digital clock	58·00	3·00
TR7400A 2m. FM 30W. mobile transceiver 800 channels	334·00	3·00
TR7500 2m. FM mobile 10W. transceiver. PLL. with all 80 FM channels programmed	225·00	3·00
PS6 matching PSU for the TR7500	58·00	3·00
TR2200GX 2m. FM handy transceiver c/w battery charger, microphone, carrying case, fitted 3 channels	142·00	3·00
TR2200GX 2m. FM handy transceiver c/w battery charger, microphone, carrying case, fitted 12 channels	172·00	3·00
RA1 helical rubber antenna	6·90	·15
MB1A matching mobile mount (also fits : TR2200/G)	10·00	·67
Spare power lead	1·25	·15
Pack of 10 ni-cad batteries	9·72	·36
VB2200GX 10W. mobile PA with SWR protection. All leads supplied	45·00	·86
Spare whip for TR2200GX (also available for 2200/2200G	1·90	·15
PS1200 power supply unit (for TR2200G, GX and TR3200)	19·95	·66
TR8300 70cm. FM mobile 10W. transceiver fitted 4 channels	244·00	3·00
TR3200 70cm. FM handy transceiver fitted 3 channels	185·00	3·00
MB1A matching mobile mount	10·00	·67
Spare power lead	1·25	·15
Pack of 10 ni-cad batteries	9·72	·36
VB3200 10W. PA with Rx pre-amp. Same case size as TR3200	95·62	3·00
R300 general coverage receiver. 170 kHz–30 MHz. B/S for broadcast bands	184·50	3·00
HS5 communications headphones, tailored response	23·00	·67
HS4 communications headphones, tailored response	11·00	·15
R599D 160–10m. all mode Rx, CW/USB/LSB/AM/FM	433·00	3·00
TS599S de luxe HF Tx–80–10m. CW/USB/LSB/AM	388·00	3·00
S599 matching speaker 8 ohm	20·00	·86
CC29A 2m.converter for R599 for internal fitting	30·00	·28
TL922 HF linear amplifier : 160–10m/2Kw P.E.P. input 2 x 3–500Z tubes	763·00	3·00
HC2 world time clock. 24 hour time zone clock. Invaluable aid	16·66	·67
MC50 de luxe desk microphone dual impedance. PTT locking bar	27·00	·86
LF30A HF low pass filter 1 Kw. 90dB stop band rejection	19·00	·67
BPF2A 2m. band pass filter 144–146 MHz. 500W. rms. 100W. P.E.P.	28·00	·67
HS5 Communications headphones, tailored response	23·00	·67
PS6 power supply. Matching PSU/speaker for TR7500	58·00	3·00
AT200 1·8 to 30 MHz antenna tuner	93·00	3·00
TRIO OSCILLOSCOPES		
CS1570 dual trace 30 MHz with signal delay	504·36	3·00
CS1560A dual trace 15 MHz. 10mV/cm. on X and Y	345·60	3·00
CS1562 dual trace 10 MHz. Auto run and trigger TB	287·20	
CS1575 dual trace with auto phase display. 1mV sens	282·96	3·00
CS1352 dual trace 15 MHz battery portable	382·32	3·00
B7-7E battery pack	32·40	1·50
All the above oscilloscopes are supplied complete with X10 hi-z probes.		
CO1303D single trace 5 MHz service/student scope	118·80	3·00
CO1303G station monitor scope with 2 tone oscillator	140·40	3·00
DM800 Multi purpose dip meter	51·84	·86
AG202 sine/square audio generator. 20Hz–200 kHz	70·20	3·00
SG402 service shop RF generator. 100 kHz–30 MHz	57·24	3·00
PL830M 50 ohm load. Dc–500 MHz. 40W. cont./120W. int.	28·08	·86
PL831M 50 ohm load. Dc–500 MHz. 200W. cont./500W. int.	54·00	·86
JAPAN RADIO COMPANY		
NRD505 professional communications receiver with matching speaker	1800·00	3·00
LOWE ELECTRONICS LTD.		
Lowe SRX30 synthesised general coverage receiver	158·00	3·00

	Price incl. VAT £	Carr. £
UNIDEN EQUIPMENT		
2030 fm. mobile transceiver 10W. FM fitted 11 channels (Special Offer)	145·00	3·00
KF430 70 cms. 10W. mobile transceiver fitted 9 channels. Auto TB. The ultimate mighty midget	180·00	3·00
NIHON DENGYO		
Liner 430 70cm. SSB transceiver—get ready for OSCAR 8	225·00	3·00
R115E regulated PSU for Linear 420	21·50	3·00
CRYSTALS		
We stock FM channels S0, S10 to S25, S32 (145·80) and all current repeater and reverse repeater channels for the equipment we sell, EXCEPT for the NR56 receiver, for which we stock S0, S16 to S24, S32 and R3 to R8.		
Price per single crystal	2·40	·15
Price per pair	4·80	for any qty.
Special offer on crystals for TR2200GX, TR7200, TR3200 and TR8300 ONLY. 3 pairs	10·00	
VHF AMATEUR RECEIVERS		
NR56 tunable/crystal 2m. FM receiver 144–146 MHz	54·00	·86
ASV1515 VHF FM monitor receiver less crystals. Mains/battery. Self-contained	39·60	·86
AMR217B scanner with 8 crystals. The best and most popular. Mains/battery	112·50	1·06
Crystals for the above Each	2·40	·15
RTTY VIDEO DISPLAY		
TD960 data system with UHF O/P	351·00	3·00
DM170A RTTY terminal unit	129·60	3·00
Murray coded keyboard	t.b.a.	
ASCII coded keyboard	t.b.a.	
MICROWAVE MODULES EQUIPMENT		
MMC70 4m. converter	20·25	All Microwave modules post paid
MMC144/28LO 2m. converter	22·50	
MMC432/28R or S 70 cm. converter	29·90	
MMC432/144R 70cm. converter	27·00	
MMC1296/28 23cm. converter	31·50	
MMC1296/144 23cm. converter	31·50	
MMV1296 23cm. tripler	33·76	
MMD050 50 MHz counter	66·95	
MMD500P 500 MHz prescaler	27·00	
MMD050/500 500 MHz counter	85·32	
MMT432/28 70cm. transverter	133·88	
MMT432/144R 70cm. transverter	169·88	
MMT144/28 2m. transverter	88·87	
MMA144 2m. preamp	14·63	
MML432/100 100W 432 MHz Linear	247·50	
FILTERS		
Trio LF30 Low pass filter 1 kW rating. 32 MHz cut off. 90dB stop band	19·00	·67
Trio BPF2A 2m. band pass filter—144–146 MHz. 50W. rms. 100W. P.E.P.	28·00	·67
Shinwa 1110 2m. band pass filter—144–146 MHz	13·72	·67
Shinwa 1006 2m. low pass filter—146 MHz cut off	11·48	·67
Shinwa 1140 28 MHz transverter filter—28–30 band pass	13·72	·67
Shinwa 1005 HF low pass filter—32 MHz cut off	10·80	·67
HF MOBILE ANTENNAS		
"G" whip tribander helical 20/15/10	19·68	1·06
"G" whip multimobile 20/15/10	23·08	1·06
L.F. coils for the above whips (Specify whether tribander or multimobile	5·90	·66
Telescopic whips for the above	2·25	·66
Base mount for all "G" whips	3·37	·66
Extendarod 40" booster	9·56	1·06
VHF/UHF "J" BEAMS		
5Y/2M 5 element yagi	7·70	3·00
8Y/2M 8 element yagi	10·00	3·00
10Y/2M 10 element yagi	21·31	3·00
P8M14/2M 14 element para beam	31·16	3·00
5XY/2M 5 element crossed yagi	15·97	3·00
8XY/2M 8 element crossed yagi	19·91	3·00
10XY/2M 10 element crossed yagi	26·32	3·00
Q4/2M 4 element quad	16·31	3·00
Q6/2M 6 element quad	21·71	3·00
D5/2M 5 over 5 slot fed yagi	13·61	3·00
D8/2M 8 over 8 slot fee yagi	18·22	3·00
UGP/2M Unipole ground plane	7·03	3·00
MBM48/70 cms. Multi beam	21·65	3·00
MBM88/70cms. Multi beam	28·96	3·00
12XY/70cms. 12 element crossed yagi	29·70	3·00
TAS ⅜" 2m. whip	13·05	3·00
C5/2m. Colinear	30·93	3·00
C8/70 cm. Colinear	39·37	3·00
D15/1296 23 cm. antenna	23·06	3·00
Zycom colinear	35·43	3·00
PHASING HARNESS		
PMH/2C for 2m. circular polarisation	5·06	·28
PMH2/70 for 70 cms.	5·90	·28
PMH4/70 for 70 cms.	12·26	·28
CDE ROTATORS		
AR40 (5 core cable required)	51·75	3·00
CD44 (8 core cable required)	106·87	3·00
Ham–2 (8 core cable required)	145·12	3·00

LOWE ELECTRONICS LTD

	Price incl. VAT £	Carr. £
RAK ANTENNAS		
A–8XL 80m. dipole 4kW rating...	12·15	·86
AL–48DXN 80/40m. trap dipole. Length only 28 metres 2 kW. P.E.P.	25·43	1·06
Listener III SWL antenna. Double dipole. 24 metres overall	25·43	·86
Listener I SWL antenna. Loaded wire ant. Only 5m. long	9·54	·66
HY-GAIN ANTENNAS—HF Beams		
TH2Mk3 2 element yagi for 20, 15 and 10m. 1 kW. rating	117·56	3·00
TH3Jnr. 3 element yagi for 20, 15 and 10m. 600W. P.E.P.	121·50	3·00
TK3Mk3 3 element yagi for 20, 15 and 10m. 1 kW.	167·62	3·00
TH6DXX 6 element total 20, 15 and 10m.	201·37	3·00
Hyquad 2 element quad. 8·5 dB gain on 20, 15 and 10m.	182·25	3·00
HY-GAIN ANTENNAS—HF Verticals		
12AVQ trapped vertical self support for 20, 15 and 10m.	39·93	3·00
14AVQ/WB trapped vertical self support for 40, 20, 15 and 10m.	56·19	3·00
18AVT/WB trapped vertical self support for 80, 40, 20, 15 and 10m.	81·45	3·00
VHF MOBILE WHIPS		
Revco 2m. ¼" stainless steel whip and coil	5·06	3·00
Revco Lowband stainless steel whip	1·60	3·00
Revco Hi-band stainless steel whip	1·18	·67
Revco Stand and base mount for above whips	2·95	·30
Revco de luxe magnetic mount 3m. coax	14·06	1·06
Bantex B5/GF 2m. ¼" whip CW single hole base mount	8·16	3·00
Bantex UCL 70 cm. colinear ¼" over ¼ wave whip with base	9·62	3·00
Bantex UDL 70cm. colinear ⅛" over ⅛" wave whip with base	16·28	·67
Magnetic mount for all Bantex whips	10·40	·66
"J" Beam TAS ¼" 2m. whip	13·05	3·00
Daiwa MA41 2m. ¼ wave gutter mounting with whip, clamp and cable	8·44	·86
Gutter clamp accepts most whips	2·81	·67
CABLE (prices per metre)		
5 core rotator cable for AR40	·20	Up to 20m.
12 core rotator cable—heavy duty	·25	Please add 80p
UR43 50 ohm coaxial cable. 4·3dB/100ft. at 100 MHz	·17	VAT Above
UR67/RG8U 50 ohm coaxial cable. 2dB/100ft. at 100 MHz	·50	at 8% 20m. £1·00
Twin feeder 300 ohm	·08	
Twin feeder 75 ohm heavy duty	·24	
VALVES		
6AH6, 6CB6A, 6CL6, 6U8A, 6BM8, 6BZ6, 6EW6, 12BYA7 6BA6 ... each	·90	·28
12GN7	2·70	·28
6LQ6 per matched pair	7·02	·44
6146B/S2001A each	6·30	·44
DAIWA ACCESSORIES		
CL–22 aerial tuner unit. 1·8–30 MHz	13·50	·66
CL–65 ATU–80—10m. 500W. P.E.P. 200W. CW	54·00	3·00
AT–400X stepped attenuator	41·04	3·00
SWX–777 de luxe SWR/power meter with "cross over" metering	75·00	1·06
SW–410 SWR/power meter 144 MHz/432 MHz	48·60	·86
SW–110 SWR/power meter 1·8–150 MHz. Two power ranges 0–20 and 0–200 Watts	25·92	·86
CS–201 coax switch (SO239 sockets) two way	11·25	·44
PLUGS AND SOCKETS		
Microphone plugs 4 pin for Trio, Yaesu	·67	·15
Microphone sockets 4 pin	·67	·15
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
Standard jack plugs 2·5mm.	·20	·15
Standard jack plugs 3·5mm.	·20	·15
Screened phono plugs	·25	·15
Standard 3 pole jack plugs	·20	·15
Standard 2 pole jack plugs	·20	·15
Cigar lighter plug	·50	·15
BNC plugs 50 ohm	·60	·15
BNC plugs "N" type 50 ohm	1·00	·15
ACCESSORIES		
Trio HS5 communications headphones	23·00	·67
Trio HS4 low impedance padded headsets	11·00	·15
Maeden accessory speakers	2·52	·28
Morse keys HK708	8·60	·67
EK150 Katsumi keyer. 240v. ac/12v. dc operation. Built in monitor	60·75	·67
MK1024 electronic keyer with 1024 bit memory	118·12	·67
MSK3 electronic keyer with 1024 bit memory	95·00	·67
SK3 electronic keyer	43·00	·67
Trio MC50 dual impedance table microphone	27·00	·86
RW151D Kuranishi watt meter/dummy load 0–5–25–150W–DC–500 MHz	75·60	·86
EW1 wave meter	16·20	1·06
DL20 20W. dummy load	4·64	·24
Trio HC2 ham clock	16·66	·67
Hansen SWR3 single meter	9·50	·67
Hansen SWR2S twin meter	10·80	·67
FS301 through line watt meter 3·5 to 30 MHz	32·40	·86
Hy-Gain C1 centre dipole insulator	3·82	·44
PUBLICATIONS		
Log book	·75	inc. P & P
Full catalogue	·50	
DAIWA MASTHEAD PREAMPS		
Rx–144X 2m. low noise masthead preamps. 12 dB gain complete with remote switch (requires 13·8v. dc and 2 core cable)	60·00	1·06
Rx–430X as above for 70cms.	65·00	1·06
Rx–144XS as above but built with additional facility for remote switching of 2 antennas (requires 13·8v. dc and 3 core cable)	75·00	1·06
Tx–430XS as Rx–144XS for 70 cms.	90·00	1·06
DAIWA MASTHEAD PREAMP/LINEAR AMPS		
TRx–144XL combined low noise masthead preamp 12dB gain and masthead linear amp giving 16W. out for 7W. in R.F. or manual switching. Preamp may be switched on or off independently. Requires 13·8v. dc at 3A	80·00	1·06
TRx–430XL as above but for 70 cms.	98·00	1·06
TRx–144XLS as for 144–XL but with the facility for remotely switching 2 antennas	98·00	1·06
HILOMASTS—PNEUMATIC TELESCOPIC "PNAM" SERIES		
PNAM 9 metres (30ft.) mast	208·44	11·88
PNAM–2 14½ metres (48ft.) mast	254·88	12·96
ACCESSORIES (Carriage free if supplied with mast)		
PNSM side mounting brackets (pair)	12·70	·43
PN/240 PNAM compressor	99·36	3·02
PNBP base plate	5·38	·43
GP ground peg	1·25	·21
GS ground stake	3·68	·43
PNP/1 50mm. guy plate	1·27	·21
PNP/2 60mm. guy plate	1·91	·21
PNP/3 76mm. guy plate	1·91	·21
PNP/4 102mm. guy plate	1·91	·21
PNC/1 50mm. support collar	5·21	·43
PNC/4 102mm. support collar	6·92	·43
PNG/70 3 terylene guys (set)	14·90	·43
PNG/48 3 terylene guys (set)	12·66	·43
PNG/40 3 terylene guys (set)	11·56	·43
PNG/30 3 galvanised steel guys	12·10	·65

*Masts packed in custom made wooden cases for safety in transit and storage. This is included in the above carriage cost. Delivered direct from the factory to your address.

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 LOWLEC G

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 and 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.

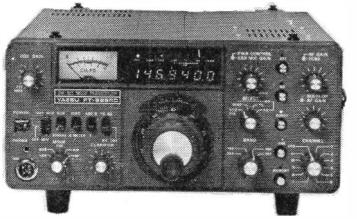
With new products coming along all the time, it is difficult to keep a price list up to date. If you send 50p, you will receive all current brochures, catalogues, prices and the antenna booklet that everyone is talking about.

Gace eolas faoi earrai TRIO in Eirinn fáil ó Donald White, Ballyvourney, Macroom, Co. Cork. Ballymakeera 70.

Communications Ltd

SCOTLAND — NORTHERN IRELAND

S.M.C. FOR VHF; FIXED STATIONS



FT225RD

THE FT225 NEW YAESU MULTIMODE

Based upon the extremely popular FT221, Yaesu proudly present the top line multi mode 2 metre transceiver. Super accurate mode sensitive 100 Hz digital readout, 10W. of AM, 25W. of FM (Continuously variable) and even more power on SSB. Repeater up-down 600 kHz and aux shift. 11 crystals control positions (per 1 MHz Band) and full memory facility.

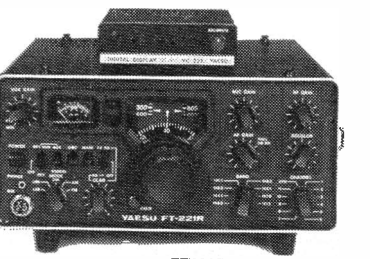
FT225R **£497·50** FT225RD **£535·00**

Counter **£61·00** Memory **£88·00**

All prices are VAT exclusive

THE FT221R MULTIMODE FROM YAESU

The FT221R. The multimode USB, LSB, AM, FM, CW (with semi-break in and side tone), 2m. transceiver offering the choice of phase locked VFO or 44 crystal channels, simplex or repeater (600 Hz up and down shifts), with unique "double push" auto tone burst, mains or 12v. (3A) operation, excellent selectivity SSB 2·4 kHz (1·7 SF) or FM 12 kHz. Front panel adjustable VOX and mic gain, a calibrator (1 MHz + 10), 1 kHz readout and linearity, sensitive squelch, clarifier with IRT and IRT with ITT (makes FSK easy), switchable "S" and centre zero tuning meter, noise blanker, serviceable plug in boards all contained in 11¼" (14") x 5" x 11½", 22lb. rigid package. 600 kHz and 1·6 MHz shifts over 4 MHz. This month FT221+YC221 together **£422.00** + VAT



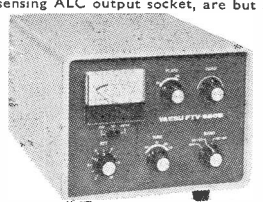
FT221R

FT221R, £357 + VAT **YC221, £72·50** + VAT **MANUAL, £9·50**

THE NAG 144XL LINEAR Ex STOCKS £365 + VAT

The NAG 144XL–2200 is the finest 2m. Linear Amplifier of its type we have yet seen. Identical in size to the FT–221, it produces about 250W. RMS of clean stable output from a grounded grid 4CX 350F for a nominal 10W. drive. The mains PSU using a large cut-core power transformer is built in and provides a 12v. 3 amp fully protected and stabilised output for 12v. only exciters. A switchable 10dB gain, low noise Mosfet receiver amplifier (filtered by a large three section helical filter), a large coax change over relay, RF sensing (with adjustable delay) and manual control, an excellent directional coupler (for the inbuilt SWR bridge), thermal delay on switch on (anode current meter illuminated red for first 60 seconds), a thermal cut but situated in the valve exhaust stream (optional timer available to leave blower on for 90 seconds after switch off), a grid current sensing ALC output socket, are but a few of the star features.

NAG 144XL



FTV650B

FTV VHF Transvertors 250, 650B, 901

FTV250 Ex-Stock

The FTV–250 styled to match the FT–101, etc. sensitive receiver converter with good image rejection and RF gain control on front panel. 10W. P.I.P. (A31 and A1) 4W. (A3 and F3 ; met-red ; power output, and drive level (3V RMS at 29 MHz) 12 lbs., 11¼" x 8¼" x 6". **£167·50** + VAT 12½%.

FTV (6)50B Ex-Stock

The FTV650B now styled to match the FT–101, etc. Modified to 70 MHz. 50W. P.I.P. (A31 and A1) 10W. (A3 and F3) metered :—cathode current power out and drive level (3v. RMS at 29 MHz). 9 lbs. 11¼" x 8½" x 6". **£145·00** or **£150·00** + 12½%.

FTV250

FTV901 Will not be available until October but the interest shown so far, necessitates its inclusion here. The Transvertor is housed in a standard external speaker box designed to match the FT901 (Remember SSB, AM, CW, FM, etc.) and covers 3 VHF bands (70, 144, 432 MHz.) Full coverage (8 MHz on 432) and repeater shift unctions.

MICROWAVE MODELS — WORLD WIDE POST FREE (U.K. + VAT 12½% except * 8%)

NEW 423 LINEAR MML 432/100. TRULY REMARKABLE Ex Stock £220·00

MMT 144/28	...	...	...	£79·00	MMA70	...	...	...	£13·00	MMC 432/28S	...	...	...	£24·00
MMT 144/50	...	...	...	£81·00	MMC 70/4	...	...	...	£18·00	MMC 435/51	...	...	...	£25·00
MMT 432/28	...	...	...	£97·00	MMC 70/28/LO		...	...	£20·00	MMC 432/144	...	...	...	£24·00
MMT 432/28S	...	...	...	£119·00	MMC 113/24	...	...	...	£19·00	MMC1296/28	...	...	...	£28·00
MMT 432/50	...	...	...	£99·00	MMC 136/28	...	...	...	£19·00	MMC1296/144	...	...	...	£28·00
MMT 432/144	...	...	...	£133·00	MMA 144	...	...	...	£13·00	MMD 050	...	...	...	*£62·00
MMT 432/144R		...	...	£151·00	MMC 144/4	...	...	...	£18·00	MMD 050/500	...	...	...	*£79·00
MMV 1155	...	...	...	£31·00	MMC 144/28/LO		...	...	£20·00	MMD 050D	...	...	...	*£25·00
MMV 1296	...	...	...	£30·00	MMC 432/28	...	...	...	£23·00					

COAX RELAYS

12v. DC 50 ohm. Silver plated.
(P. & P. 30p (VAT + 8%))
Power crosstalk (at 500 MHz)

CX120	50W	35dB	Cable entry	£9·30
CX230	300W	40dB	BNC sockets	£19·30
CX600N	600W	40dB	N sockets	£23·25

MORSE KEYS FROM HI MOUND

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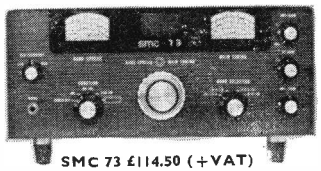
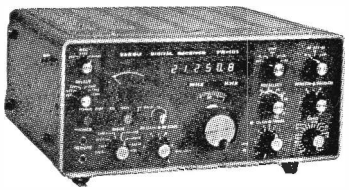


SMC 73 £114.50 (+VAT)



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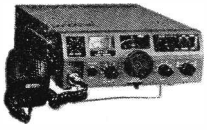

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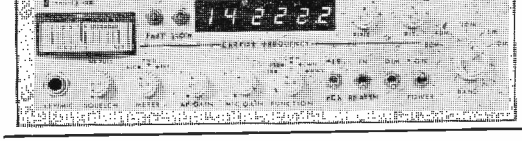

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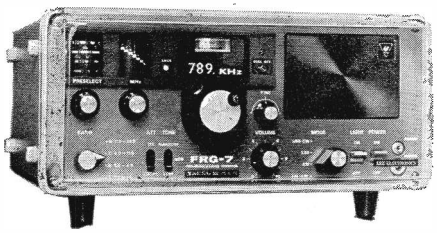

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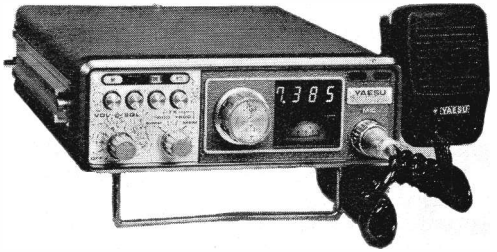

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CONTENTS

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FOR THE RADIO AMATEUR AND AMATEUR RADIO

The SHORT-WAVE Magazine

EDITORIAL

RSGB

Last time round, we had some hard words to say about the RSGB. But however much we may criticise its internal workings, it *is* our national society and as such it will be the U.K. voice at WARC 79—a Conference which will decide the terms on which we are all able to continue the pursuit of Amateur Radio.

This means two things. Firstly, there will be much careful thought among Council members as to how best the Society can select and brief its representatives; but those who are sent will doubtlessly be faced with questions not covered in their briefing and which will have to be answered on the spot—without the opportunity to refer back to Council, or for Council to sound-out members. That is an agonising position to be in.

Secondly—and arising from the situation outlined—it behoves everyone who is in any way interested in, or connected with, Amateur Radio (whether they are members of the RSGB or not), to express their full support for the Society at WARC 79. If our representatives can feel that the British fraternity is behind them, then this will provide them with a source of inspiration when the going gets tough.

That they will do their best is beyond doubt. So when the dust finally settles and perhaps you have lost *your* favourite bit of band, before you start complaining just remember that for those who fought the battle for us—it might just have been *their* favourite bit of band, too. But let us hope there will be no losses.

G3KFE.

COMMUNICATION and DX NEWS

E. P. Essery, G3KFE

ON the few occasions the writer has found time to look round the bands this month, things have been pretty poor and very noisy—static even breaking through on to the car radio to a degree that made the *Radio 3* cricket commentary almost unreadable (how's that for a disaster?) and causing him to harbour unworthy suspicions of the radio itself. There was the matter of a spot of garden work which had to be done; and "mending" the beam driven element almost beyond repair, so that for several days the search was on for aluminium tube of the precise size. In fact, Murphy had a field-day one way and another!

But, in saying "things were poor" we have to remember that all things are relative; a bad day in July 1976 and a bad day in 1978's July are poles apart, simply because in one case the sunspot count was minimal and in t'other the sunspot count is far higher: but the noise generated by man and nature between them can make a very lively band useless—right now the receiver is listening to an SM working a JA, and for both of them a true report would be RST 399! And, of course, from time immemorial Spring and Autumn have been the best, with Winter and Summer useful times for home-brew and aerial-maintenance respectively. Similarly, when we talk of "noisy bands" we must again recall that this is relative, as anyone who has ever had the facility to change at will from vertical to horizontal and back again will agree (the vertical being a prize horror for picking up man-made electrical noise and rain static, both of which are predominantly polarised vertically for some reason).

Ten Metres

Right now, the band is dead to DX, but local G3YPZ/A in Harlow manages to be S9, despite the combined hazards of the G3KFE horizontal facing the wrong way and G3YPZ/A being on a vertical *plus* a bad path. So, when no DX is about, Ten is the best VHF band of 'em all!

G3PKS (Wells) rarely visited this band, and then stuck to CW. Various Europeans were worked, plus EP2FN and YO4ASG/MM who was in the general area of YK; and ZD7WT who was working Europeans and giving them 589 reports was heard weakly at G3PKS and as a result was a Gotaway.

How nice to hear again after a long silence from G3VLX, reporting on his activities as 9H3AM (Sliema) thanks to a 14AVQ and FT-101B lent by 9H1CE. His QTH is at 70 feet above ground, and despite the numerous TV aerials and water-tanks is a superb location with a panorama over sea on three sides. Maltese TV operates from 1800 to 2300, so for such a short stay TVI measures were not bothered with, operating being confined to non-TV hours and about three hours daily maximum. 28 MHz: one 80-minute spell contained 26 *JA's*, and other ten-metre stuff was: RL7AAL, UAØLFK in Vladivostock, ZS5EF, PY2RM, RA9UUH, UL7IBC, UK9WAP, PY6SL, RH8EAA, SV1JY, ZS6WY, LU7NN, LU1NR, LU2NAE, and 9L1JT—not to mention giving lots of non-DX-to-Malta chaps a first Malta contact.

A new reporter, both on the band and to "CDXN," is G4GVN (Sheffield), who for the first three months of his career has had a Ten-Tec Argonaut to 66 feet of wire with which to play, out of which a full month "went west" on the matter of A-levels. This loan rig, coming right at the start of his career has probably, we suspect, turned G4GVN into a CW operator and addict, quite apart from finding him 130 contacts in four continents—28 MHz gave WD9CQD, WB2HWK, and ISØOMH as the best.

As far as G3NOF (Yeovil) was concerned, he heard nothing on the band beyond Europe, albeit some of the short-skip openings were quite interesting.

Right at the last moment we received the reports from G2ADZ (Chessington) and G3CED/G3VFA, and it is the first-named with which we are now concerned. Bill says "Ten metres has been quiet—quieter than last year!" On the other hand he does admit to some Sporadic-E propagation which is not unexpected for the time of year. However, the G2ADZ CW log for Ten shows since his last report QSO's with FY7BC, VK5DB, W QSO's with FY7BC, VK5DB, VK6HQ, VK6AJ, VK2AHM, VK3AKN, ZS6DL, ZS6IW, CX2AQ, CX8DT, JA8PMF/MM off Montevideo, VU2GO, ZD7WT, CE3ZW, OE5CA/YK, assorted *PY* and *LU*, *UL7*, *UA9*—and of course the Gotaways, like VK9YS who went QRT just as G2ADZ appeared on the scene of battle; an odd FF4JX (of whom OT's might note a slight likeness to the original MO1FFI!), 5Z4JE and A4XVK.

Fifteen

Our first reporter this time is G2DHV (Sidcup), George having gone up to 150 watts for the first time, thanks to a pair of TT21's; CW only at the moment, but FM and SSB available, ready and waiting. The receiver is the R316/B34 type, and aerials a 21 MHz dipole, plus a half-sized "G5RV" which in due course will give the 7-30 MHz coverage complete. Conditions, says G2DHV, have been pretty poor, but he worked 9M2FK, ZC4JH, WD9ALL/M, VE4NRC, 9V1LT, 4Z3ØNXI, HV3SJ, A4XHI, VO1LV, JH6ALF, JF3LAP, JA3AMM/MM, and 9M8HG. Heard only was *ZS6*, *HI2*, *JH4*, YB2SV, YB1ADU, *ZS5*, CZ3IVU, YK6ONM, VU2BK, JE1PCX/MM, and 9G1M.

G4BUS (Harwich) last wrote in when he was an SWL coming back to amateur-bands during the aftermath of a coronary. He was able to get back to work as a ship's R/O after it all, and in due course discovered that he wasn't exempt from R.A.E. any more (which was the case back in 1951 or so), sat the exam and the Morse test, and became G4BUS. After five years, a flat 21 MHz band induced the letter-writing bug (of which more anon). SSB contacts in the late-May/early-June period included VP9HX/MM3, one day out of the Panama Canal *JA-*

bound, VP9HZ/MM, abeam West Africa and U.K.-wards, 9V1SW, JA6XMM, and indeed all *JA* call areas, all *W* call areas, PY1DYD but no Southern Africa, VE3UOT, DL3ZM / YV3, G2CWL / W8, G3KQL/W4; and CW ragchew QSO's—none of the rubber-stamp variety for Reg!—with VE7DIH, VU2BK, W6BVM, SM6DJ1/MM in the Indian Ocean and *JA*-bound, lots of *JA's*, and most *W* call areas. The sustained feeling is that the band is buzzing with activity, G4BUS finding more stations entering his log per day than at any time since he started, and with no increase in operating hours.

Short-skip and changeable conditions were noted to be the order of the day at G3NOF, the North Americans having on occasion been missing for days on end. A few *W6* were heard around 0630, and on a few days *KH6* around 0900; short-path *JA's* were also noted between 0900-1130, and a few openings into the Pacific over the Pole. SSB Gotaways were 5W1AX and 5W1BD, but Don made no mistake with CG6TD, CT2BB, EP2PE, JA1YBK, JA2KSI, JA3YKC, JF2ASF, JR1WHW, JR1FBX, HPØAD/MM on an oil platform off the Ivory Coast, HS1WR, K7ZTM (Utah), K8RM/AM off Greece, UI8LAG, W7NLU Arizona), W7LAT likewise, WØTW (Colorado), YS1RVE, 5W1BN, 9G1MB, and 9V1SW.

G4GVN and his QRP system only mentions one QSO on 14 MHz, and clearly he found 21 MHz better for the QRP-er; CW with the Argonaut yielded WB2PWV, K1HO, UA9CAM, and CN8AD.

The 21 MHz log at 9H3AM shows JA6GHS, JJ1CUB, 7X5AB, JR1FZR, JF1EZH, JR1RWW, JF1XID, JH7ROG, VS5XU, JH4EHB, VO1LX/SU, 5H3FW, ZP5WV, JF1EHM, CX8DM, and HI3CNB.

G3PKS likens the band conditions to the Curate's Egg, and notes that he failed to connect with YBØVB, heard giving reports to *JA's* who were themselves readable at G3PKS; likewise 5K1VU/A of whom Jack's comment of "a new one on me!" sounds as though he doubts the call. On the other hand the CW list of stations raised included 9H1FQ, JA1DNZ, EA3EJO, PY4ZI, EA4VA, WD5JAS, SV1JD, JE1VTZ, WB2ULI who was a sixteen-year-old who went QRT to go to school, VE2EPW, VE1BHY; and a QSO with G3YRM in Weston-super-Mare was immediately followed by a call from WA2STD; a quick exchange of reports with a station signing YT3M also had G3PKS wondering just what and where it belonged.

G2HKU (Sheppey) seems to have just had a look at the band before migrating, but his quick look yielded CW contact with HC2SL and KZ5EA.

G3CED/G3VFA (Broadstairs) reappears with his QRP and Joystick at thirty feet—this time minus any ground connection but using a five-band tunable compact radial system he is developing. The two watts into this, with the additional handicap of a "sad" switch on the Tx for a short time, didn't stop five continents going into the log page. 21 MHz offers such as UA1ZX in Zone 19, K9ZO, ZZ6AM, UK9AAN (Willy commented the band was in poor shape and set in to a ragchew contact, while G3CED listened to the pile-up thickening!), a half-QSO with JH1BMV which succumbed to the jungle QRM trying to escape the eternal World Cup on the Box, and the usual crop of short-skip EU such as most people mention.

Odds & Ends

We mentioned Reg earlier on, with a 21 MHz score but G4BUS is not just a mere DX-er—he has a mind that works along some quite off-beat lines! He has been at the dots-and-dashes practically daily since his 18th birthday, first in Burma with Wingate, then post-war Royal Signals and, after demob, at a radio school whence a PMG ticket was obtained, leading to much sea operating, largely from Hong Kong. It was from Hong Kong that Reg met and married his *JA* XYL, and that in its turn was responsible for what he calls his "Rip Van Winkle" phase; but marriage means mortgage, and so instead of "proper sea-faring" G4BUS is now on one of the ferries. It is from here that he comments that the amateur with a true-blue background driving an el-bug at 40 w.p.m. in a ragchew QSO, back and forth for an hour or more, makes him marvel—but some of the sins of the professionals who proclaim their "personalised Morse" make him shudder! Reg quotes one such, 40 years at sea, whose Morse is 75% unreadable; and as it may be heard on any day on any amateur band—"Nag hr is Bill OM"—G4BUS claims the right answer should be "Nag hr is Irish-American donkey wid double hernia es mange OM!" Old G3KFE can't wait to get this piece done so as to find a victim on one of the bands; but it would really need a combination of CW and SS/TV to be able to *see* the face of the chap at the other end, assuming always that he copies 100%! G4BUS says he himself has had a squeeze-keyer for some five years, and it has been the finest entertainment he has ever got from *any* present, even though he admits to not having it quite under control yet! However, having said all this, G4BUS finds it hard to defend either the all-CW or all-SSB type, or even the all-VHF merchant.

G3PKS has been considering ways and means of going QRP with an HW-101; the problem of tuning is somewhat complicated by the standing PA input of 35-40 watts for no output. The way out of it is to make use of a wattmeter (Jack's one has been calibrated against a good commercial one) of ranges 1, 3, 10, and 30 watts full-scale. So—all he does is tune the transmitter into the dummy load *via* the wattmeter for the desired RF output, and then switch to the aerial. As he says, a bit of a sledge-hammer to crack a nut, but a quick way of getting on all bands with QRP. The absence of any reading at all on the reflectometer on Eighty is overcome by the use of a current-indicating device in the aerial feed, comprising some ten turns of fine wire on an old bit of ferrite ring, a diode and load resistor, and an ex-WD instrument; the result is quite sensitive enough to use for nulling out carrier.

Turning to the contest scene, we have first to mention the TOPS CW Club Contest; the 1977 affair was won by YU3TYX, second HA8UB, and third OK2BNR; and to our disgrace there were only 7 *G's* among some 203 stations in the single operator category, of whom the best was G3HZL at sixth. The 1978 Contest runs from 1800 GMT December 2, to the same time on December 3, and all the details can be obtained from Peter Lumb,

G3IRM, 14 Linton Gardens, Bury St. Edmunds, Suffolk IP33 2DZ.

Now we turn to the RTTY side, and here we see an entry of some 110 single-operator stations in the BARTG RTTY Contest for 1978. This one went to W3FV by a pretty narrow margin, and G3RED was the top *G* station at 31st place, the U.K. entry being not much higher in this contest than in the CW one previously mentioned.

Turning to the upcoming battles, W1WY notes that in 1979 there will be a CQ WW WPX CW Contest, thanks to the popular level of demand. Turning to a period somewhat nearer, we have the SEANET Phone Contest on over the weekend of August 19-20, 0001 on the former to 2359 on the latter, a 48-hour stint. While this is going on, there is the SARTG RTTY Contest and the Can-Am for the W/VE chaps. The previous week sees the European DX CW Contest: August 12-13, for the 48 hours, although the single-operator stations must only operate for 36 hours, the twelve hours' rest being taken in up to three periods. This contest includes the QTC feature, and the rules are thus a little complex, so we suggest anyone thinking of taking part in this one gets in touch with DARC Contest Committee D-895 Kaufbeuren, P.O. Box 262, West Germany, which is also the address for logs.

Looking at the forward calendar in the way of contests we see October as the heavy month, October 7-8 having both the VK/ZL/Oceania Phone and RTTY, the CW leg on October 14-15 along with the RSGB 21/28 MHz Phone, and on October 21-22 we see the RSGB 7 MHz SSB—all good training for the CQ WW DX Phone Contest on over October 28-29. OK, so some people don't like contests, but these are all of major significance and they all contribute to the use of the band. We might also comment that if the RSGB 7 MHz SSB one were to be repeated with interest every week of the year, but with the frequency limits so set as to be on the edges of the biggest BC stations on the band, then it would probably (*a*) improve the receiver breed, and (*b*), more importantly, shift some of the interlopers!

Twenty

This might be the right place for an initial try for the Award proposed by G4BUS called "Cursed on all Continents" to be offered to all the Cloth-eared and Nitwitted Brigade. Incidentally, Reg made an interesting point when he suggested the award, in that the worst of the liddery comes south of a line about 47° latitude. North of that all is (relatively) sane and gentlemanly, but south of it the mayhem gets really going.

However to return to our business. Like the other two bands so far dealt with, the 14 MHz allocation has had both up and down periods. Most evenings at around 2000z there have been signals workable—so at least those of us who have to work can switch the rig on and have a contact of *some* sort—but the quality is the variable bit.

G3CED makes up a lot of his low-power and Joystick handicap by his own undoubtedly far-above-average ability to read Morse through QRM and QRN at high speed; and we suspect that many of his contacts are with chaps of the same ilk, to judge from the number of long ragchew contacts noted in the log. Twenty in fact is not a good band for QRP, and G3CED only managed a few QSO's around Europe, which included ragchew QSO's with several Iron Curtain types; on the other hand, while we note various familiar QRP types by callsign in the list, we don't see G4EVO mentioned.

G3NOF says he found the early-morning *VK/ZL* openings as good as in previous months, as for that matter were the West Coast *W's*, but a new phenomenon not observed in previous years has been East Coast *W's* surfacing at 0700z. However, all that being said, "short-skip and changeable conditions" sum Twenty up as much as it did 21 and 28 MHz. Don mentions QSO's with IN3NHZ, K5MVP, K6AXC, KV4AA, VE3KDK/SU, VK2FD, VS5DX, W6SJC, W7GLU (Oregon), W7OK likewise, WB5BXP, WB7CHS, WD5DLZ, and 9Y4FS.

G4GVN found the QRP a big handicap to a newcomer on 14 MHz, not unexpectedly, but he still rang the bell with CT1OI; and when he says this is the way to get a start with HF CW operation he is very close to the mark.

Most of the 7 MHz regulars have migrated to 14 MHz, says G6TC (Wednesfield); the *VK's* in the morning were very good, and in both letters Ted singles out VK3VJ as the best and most consistent of the many loud *VK's*. CW QSO's were made with many *VK's* (probably more than 30 when one takes both lots—there were 26 in the first letter!), HC2SL, OD5FZ, FY7AN, VE6AWS, *VE7* and *W7*, plus the prize of the month in ZL4LR/A (who came back to a CQ call) from Campbell Is.

9H3AM spent much time on 21 and 28 MHz as already indicated, but that didn't stop Deryck from talking to LU9EGL, VK4ALA, OD5AT, FP8DX, UO5OWB, TF3SG, YV5EK, HI8SSB, UD6DFD, UH8HAI, 9K2GAH, and 5B4HF.

G3PKS is yet another one to note the variability of conditions, often noting them as downright rough. Listening before breakfast indicated the *VK's* being worked; but Jack confined himself to WA2WKC, ZE1FW, Wd8MJE, W6PW/6, and 6W8FA, the last-mentioned being a very weak signal, so that with all gains turned right up the antenna noise was rising and falling like waves on a shingle beach. On a completely different tack, G3PKS raised HB9CR with one watt output, and then both stations went down to one tenth of a watt of RF output at which point they exchanged 429 reports with some 500 miles separating the two stations.

It's a longer than usual list for G2HKU, particularly at this peak gardening time; SSB managed VK5QG, and CW accounted for ZL4CO, 4X4WN/W6, VE7MW, VK3MR, K5HDN, WA6CTW, WA6OEC, WA6GSR, UA1GZ/UAØ, JJ1FSK/MM off Townsville, Australia, VK2AFG, W6PYV, VK3VJ, UKØBAA, VK3BZ, UD6DKU, VK3MJ, K6DDO, ZL2GG, UD6HX, VK3LV, K7QA (Montana), UF6CX, W6KQK, and W7OMN for Oregon.

The LF Bands

Noise above all—either rain static or the static from thunderstorms. As far as *Top Band* goes, for the writer the search continues for something to replace the departed long-wire. Perhaps that old wire and its supporting tree had a special blend of magic about them, for it has to be said that so far nothing remotely good enough has been put up in

their place. Your scribe has still got *lots* of ideas left, *and* the formulae to back 'em up, but somehow the results always seem to be not as good as expected—at least a five-and-nine bit of fishfone is wanted before it'll be even worth a try! Mind, it did cross the 'KFE mind that some kind soul was nobbling the said fishfone station's PA stages, but that seems a long shot just to keep the dreaded G3KFE off the band!

G2HKU remarks that having an argument with Authority seems to have paid off, as he now gets his mail copy on time. However, to the matter of the stations worked, and with SSB it was PAØINA and PAØPN, plus CW to F8DB, OL8CGS, OK1DIP, OK1DOT, OL5AWC, OK2BAS, and OK2PGU.

'CDXN' deadlines for the next three months—

September issue—August 3rd
October issue—September 1st
November issue—October 5th
Please be sure to note these dates.

On a different tack, Ted is pleased to note our comments on use-or-lose as far as Top Band goes, but he adds to it a plea for the CW chaps to spread out a bit, rather than all sitting between 1820-1840 kHz. If a QSO is established there, then perhaps a move to a channel in another bit of the band—*spread* the activity and let's have more of it, both CW and SSB.

As for Eighty, we have already mentioned the way in which G3PKS runs his main rig at one watt output; during daylight the ploy brought comfortable QSO's with Derby, Bradford and Reading, through G3IVF, G4GU, and G3LWI.

QRP on Eighty was also used by G4GVN who worked ON5JH, and SM6EPS.

Quite a bit in the way of news from G2NJ (Peterborough) who thoughtfully pops them in the post as they are noted, in the hopes that by so doing he may be helping to get the piece on its way—Nick's nose twitches at the smell of ink! That DK4BP/5N/MM which boggled the mind a while back came up with a handsome QSL card and picture of the ship to add to Nick's collection. An interesting contact with an octogenarian came G2NJ's way at the start of July, the station in question sending and copying in fine style despite it being his first QSO of the year. In the afternoons things have continued poor, and some of the *G's* have migrated to 7 MHz; but in the evenings there have been some nice inter-*G* QSO's, such as with G8DV in Cheltenham, who has been modifying his HW-8, G8CK/P in Watford, with a W3DZZ aerial at the enormous height of nine feet but 599 all the same, G4GTU (Worthing) with an HW-8. Also G4BKG of Nottingham with two watts, G4GWV of Manchester at three watts, G3XUL at Weston-super-Mare who was holding his own at 2010z with half a watt, G3TWF (Epsom Downs) who had five watts, and a nice QSO with DK4YW near Munich when it was G2NJ using the HW-8 and the DK some 240 watts. Nick reckons 1900z is a good time for inter-*G* QSO's on Eighty in June, and cites his series of contacts from G3EEL/A (spending a week with G3KPO in the Isle of Wight), and every evening the QSO sked was 599 both ways.

Eighty is in the summer doldrums and no mistake, says G4BUS, being the band to which he resorts when Twenty is played out and the desire for a contact with another human arises—but of late there have been times when G4BUS might have been on the far side of the moon for all the good his CQ calls have done! And, at the end, it has to be admitted that the band is short on conversational spell-binders of the Rene Cutforth or Alistair Cooke calibre, albeit one can get useful hints on rose-growing or the tuning of church organs. However, there are some prizes in the opposite direction, like the clown who said "I am orientated in the proximity of Porchester"—a lousy way of saying "I live near the damn place!"

Now to G3CED/G3VFA who doesn't seem to have done much on the band, a couple of *ON's*, a few *G's* and a 45-minute ragchew with G4AYG of Harwich.

As we have already indicated, the 7 MHz band is the place where much of the inter-*G* traffic of recent months has migrated; and correspondingly the 7 MHz DX-ers have of late gone up to 14 MHz—not that they are getting in each other's hair we think, but more that the interest of each group is probably served by such a move.

G6TC is one of several who remark on the way 14 MHz is "quite like old times" but he stuck to Forty to work ZL2UV, CM2ER and LU5DXA; and in his second letter he adds CM2VG and VE3EWY.

At G2HKU there were only two CW QSO's noted, Ted obviously having moved to 14 MHz as we have already seen. The two in question were UA9LBP and UF6FDS.

The G3VFA/G3CED log shows immediately the advantage of having the rig at work(!) with his 7 MHz contacts spread in time from as early as 0742z (for a fairly solid ragchew with G3XID despite G3CED receiving a report of RST 529), right through lunch-time, tea-break, and even while waiting for the evening meal to be dished up; the coverage was all over Europe as well as up and down U.K., and the log page shows vividly how the inter-*G* and EU daytime working on CW has shifted from Eighty to Forty with the rise in the sunspot count.

Another one to give Forty a whirl with QRP was G4GVN, who found his signals were consistently pouring into German receivers for lots of interesting QSO's, while the other way led to GD3TNS—all CW of course.

Our final reporter is G3PKS, and he also comments on the inter-*G* traffic on 40 metres, noting that it seems to trend a little later in the day as compared with the previous month; but Jack doesn't make any comment about DX QSO's.

Wind-Up

We seem to have come to the bottom of the pile again, and we hope the story of the month has been as interesting to read as it has been to put together. For next time the dates are, as always, indicated in the 'box' in the body of the piece. In the meantime, may the WX and the DX both hold 'set fair,' with lots of interesting reports to come in. Address them to "CDXN," SHORT WAVE MAGAZINE, 34 High Street, Welwyn, Herts. AL6 9EQ.

6000 KILOMETRES-PLUS ON TWO METRES

THE MEDITERRANEAN/ SOUTHERN-AFRICA T.E.P. TESTS

N. A. S. FITCH, G3FPK

Introduction

THIS article has been prepared following the successful transequatorial contacts on the two-metre band concluded earlier this year between stations in the Mediterranean area and southern Africa. It is presented as a record of events to assist others researching into this fascinating VHF propagation mode.

Pocket Guide to T.E.P.

Before chronicling the events culminating in the first two-way contacts on two metres between Cyprus, Greece and Rhodesia, a few paragraphs of explanation about T.E.P. As the name suggests, Transequatorial Propagation is a north/south phenomenon across the geomagnetic equator. Depending upon the longitude, the geomagnetic equator varies up to about 12° north or south of the geographic equator.

There are two types of T.E.P. Class 1 mode peaks between 1200 and 1900 local mean time (LMT) referred to the point where the path crosses the geomagnetic equator. Referring to Figure 1, the signal is propagated from point "A" to a region in the F-layer shown as "C." The ray then does a "chordal hop" to a similar crest on the opposite side of the equator and is then refracted down to point "B." This mode is known as "Supermode" or "2-F" mode as double reflexion in the ionosphere is involved.

The crests, "C," represent an increase in the electron density in the F-layer and occur between 10° and 20° north and south of the geomagnetic equator. They are a regular feature of the ionosphere and their development depends upon magnetic activity to a considerable degree. They vary diurnally and sunspot activity and time of year affect their magnitude and position.

Class 2 mode peaks between 2000 and 2300 LMT and is a simpler, single refraction mode. A typical path is shown by "D" to "E" in Figure 1 and it can be seen that shorter ranges will occur, *e.g.* between 3000 and 6000 kms. T.E.P. has been observed outside these peak times and there have been instances when the two modes appear to have overlapped.

The African-Europe Path

Roger Harrison, VK2ZTB, [1] suggests that the geomagnetic equator in Africa coincides with the geographic one in Zaire and that it is tilted anti-clockwise at about 13°. However Ray Cracknell, ZE2JV, [2] suggests that the geomagnetic equator is roughly parallel to the geographic one but about 10° north of it on average, across the continent. The author thinks that ZE2JV is right as borne out by the observations and results so far.

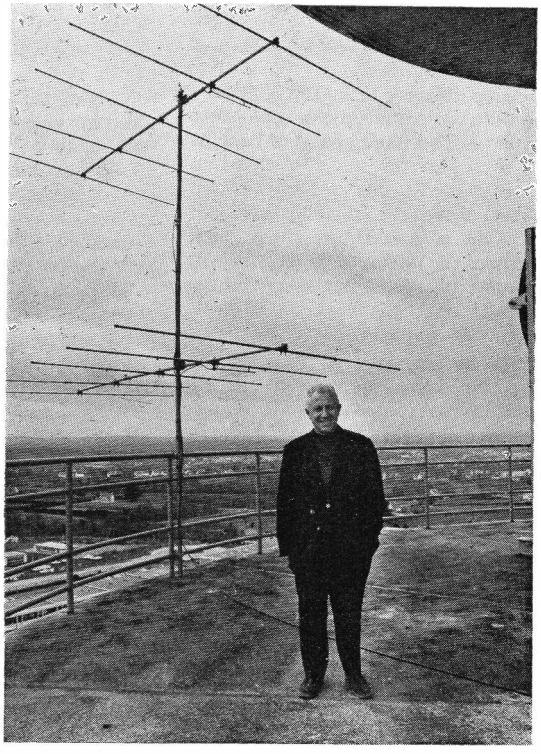
The Spring 1978 Tests: Preparation

It has been generally accepted that the best T.E.P. occurs around the equinox periods. Accordingly the target date for the commencement of these tests was fixed for March 1. At the southern end, Ray Cracknell, ZE2JV, in Salisbury, Rhodesia, started up a beacon on 144·1185 MHz beaming to the north. Simultaneously at the Mediterranean end, the Cyprus beacon 5B4CY, located at Paphos on the south-west coast of the island, was beamed south. The Salisbury beacon runs 50 watts output to an 11-ele. Yagi and sends its callsign in F1 mode. The Cyprus beacon runs 25 watts output to a 6-over-6 slot fed Yagi on 144·139 MHz and identifies in F1 mode.

The following radio amateurs are known to have participated in the tests:—

Rhodesia:	ZE2JV, Ray Cracknell, Salisbury;
South Africa:	ZS6LN, Jack de Villiers, Pietersburg;
Cyprus:	5B4WR, Roland Whiting, Limassol, 5B4AZ, Nic Kyriazis, Nicosia;
Greece:	SV1AB, George Vernardakis, near Athens; SV1CS, Spyros Chimarios, Athens; SV1DH, Costas Fimerellis, Athens;
Malta:	9H1BT, Paul Galea, Rabat; 9H1CD, Henry Souchet, San Gwann.

LZ1AB has been mentioned also but no reports have been received from him.



Serge Canivenc, F8SH, on the platform of the water-tower at Lannion. The 5-over-5 Yagi array for 50 MHz is used for Projects "Tessa" and "Vesna." F8SH is IARU Region 1 Sporadic-E co-ordinator, and the author of many reports on VHF propagation.

Results

5B4AZ in Nicosia was the first to hear ZE2JV's beacon on April 8 at 1725z. He alerted 5B4WR who confirmed reception in Limassol. The first Rhodesia to Cyprus two-way contact was completed on April 10 at 1800-1810 GMT between ZE2JV and 5B4WR over a distance of 5970 kms. The following day, ZS6LN heard 5B4CY for 40 seconds at 1759 GMT.

The second transequatorial QSO took place on April 12 between ZE2JV and SV1AB at 1756-1806 GMT over a distance of 6258 kms. It was the culmination of 42 days of continuous tests by the two stations between 1700 and 1800 GMT, daily. The ZE2JV beacon was heard daily in Cyprus and/or Athens between April 13 and 20. Sometimes, as on the 14th and 18th, signals were up to 20 kHz wide.

On April 28, ZE2JV worked SV1DH at 1737 GMT and SV1CS at 1748, signals being quite clear with no *Doppler* spread. 9H1BT in Malta heard ZE2JV during these two QSO's. Reception of ZE2JV in Cyprus continued more or less on a daily basis till well into May. Another QSO between ZE2JV and SV1DH took place between 1806 and 1809 GMT on May 9 with 9H1BT again hearing the Rhodesian station. On May 23, 5B4WR copied ZE2JV for twenty minutes from 1825 GMT, the last report to hand at the time of preparing this article.

Up to May 19, ZS6LN's signals had been heard in the Mediterranean area on four occasions:—
April 15, by SV1AB for 1½ minutes,
April 18, 5B4WR at 1805 GMT,
April 21, by 5B4WR at 1835 for one minute,
April 26, by SV1AB at 1820.

ZS6LN suggests that high local noise at his QTH prevented reception of signals from Cyprus and Greece. In a letter dated May 22, 9H1CD reports that on May 11, ZE2JV received signals of unintelligible quality on a frequency, and at a time, when he was transmitting, and *vice versa*.

Observations

The various participants in these tests have made the following observations:—
5B4WR: "Throughout the period signals have displayed the rapid and irregular flutter fading characteristic of this TE circuit. Sometimes the signals were accompanied by short duration echoes of a fraction of a second. The signals were also characterised by an increase in bandwidth, on occasions up to 10 kHz. ZE2JV has also reported signals as sounding like a raw AC note," Roland also reports a few early morning and midday openings of short duration with weak signals, noted by 5B4AZ, ZE2JV and himself.
ZS6LN: "I have had numerous fleeting openings ex-Europe and hold the opinion that regular long distance communication on two metres is a possibility provided power, say in excess of 500 watts, coupled to a high gain antenna system is used. Moreover, since the first contacts were made, a far too regular pattern seems to be emerging and by the time these tests end, I feel sure some of the earlier theories regarding V.H.F. propagation will fall by the wayside."
SV1AB: " . . . from the first days of April, I started to copy bursts and pings from ZE2JV, something like meteor scatter signals, but the Q5 signals started from April 9 with the characteristics of the TE path, flutter and frequency spread, making signals difficult to copy. Finally on April 12, the signal was really at its best; absolutely Q5 copy as was mine with ZE2JV."
9H1BT: "It seems that our respective positions are not very good since the paths Rhodesia to Cyrpus or Greece are often open when we—9H1CD and 9H1BT—hear nothing of ZE2JV's transmissions. It could be that our path angle in relation to the geomagnetic equator not being near 90° makes it unlikely we will have any good openings."

The author is particularly intrigued by two observations, first the MS type bursts and pings mentioned by SV1AB and second, the amazing frequency spread and *Doppler* shift frequently observed, far more pronounced than any reported by T.E.P. experimenters in the Australian and South American regions.

Summary of equipment used

ZE2JV: Tx 200 watts to an 11-ele. beam. Rx is a 1961 vintage nuvistor converter with a 3·5 dB noise figure.
ZS6LN: Tx 250 watts to four 6-over-6 slot fed Yagis at 60 feet. Rx is an *Icom*.

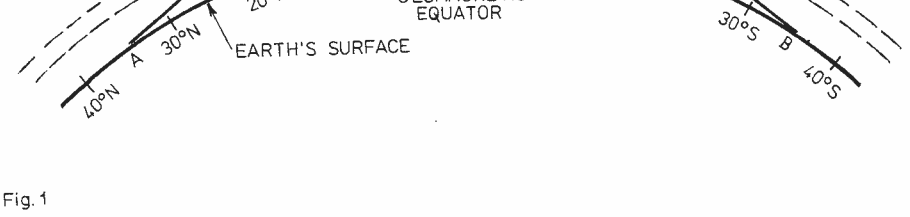


Fig. 1

D 203

Transequatorial Propagation paths. Class 1 TEP depends upon the presence of two crests C (shown shaded), between which the wave performs a "chordal hop." Class 2 TEP is propagated *via* a bulge in the equatorial ionosphere over the geomagnetic equator.

SV1AB: Tx 200 watts CW to a 9-ele. Yagi. Rx has a 1·5 dB noise figure.
SV1DH: Rx 1·0 dB noise figure. 8-over-8 Yagi.
5B4AZ: Rx 1·8 dB noise figure. 10-ele. Yagi.
5B4WR: Tx *FT-200* plus transverter, 100 watts RF output to 10-ele. Yagi. Rx has 1·8 dB noise figure.
9H1BT: Braun SE-401 transceiver plus amplifier, 150 watts DC input on CW. Two 11-ele. Yagis.
9H1CD: Braun SE-400 transceiver plus amplifier, 150 watts DC input. Four 11-ele. Yagis.

Past and Future Research

These experiments in 2m. T.E.P. are the logical extension of the pioneering studies commenced in September 1957 by Ray Cracknell, ZE2JV, in collaboration with Roland Whiting, then ZC4WR; Jean Garat, F9BG, in Toulon; George Barrett, ZC4IP and Gordon Spencer, G4LX, from Newcastle-upon-Tyne, using the 50 MHz band.

The 50 MHz research programme is again underway with *Project TESSA* — TransEquatorial Scatter to Southern Africa. This is being coordinated by Serge Canivenc, F8SH, on behalf of IARU Region 1, who kindly sent the author a report prepared for and presented to Committee B at the Miskolc-Tapolka conference in Hungary in April. Although U.K. amateurs do not yet have an allocation in the 50 MHz region, they can participate in both *Project TESSA* and *Project VESNA* by monitoring signals from the south in the equinox periods and from across the Atlantic in summer.

It is planned to recommence the 2m. tests in mid-September now it is proven that a T.E.P. path between the Mediterranean and southern Africa exists. It would seem to the author that tests between Malta and Sicily and South West Africa would be well worth trying and possibly from southern Spain and Gibraltar, to South West Africa. There seems no reason why Israeli amateurs should not be able to work into Rhodesia and South Africa.

Acknowledgments

The author is indebted to the following radio amateurs who supplied information direct for this report:—5B4WR, SV1AB, ZS6LN, 9H1BT and 9H1CD. A special word of thanks to Professor Martin Harrison, G3USF, who passed along much detailed additional information from ZE2JV obtained from correspondence and by monitoring the 10m. "T.E.P. Net" during the period.

This research is in the best tradition of our hobby in that radio amateurs in several countries are cooperating enthusiastically to attempt and then achieve the impossible. Their findings are of great interest to the scientific community and it is worth repeating that such programmes of research are undertaken voluntarily, for the love of them, at no cost to any tax payer.

Bibliography

(1) "VHF Transequatorial Propagation" by R. L. Harrison, VK2ZTB. *VHF Communications* for November 1972 and February 1973.

(2) "Transequatorial Propagation of V.H.F. Signals" by Ray Cracknell, ZE2JV. *QST* for December 1959.

HAMSTRUNG

ANGELA COOMBES

Editor's note: the following must surely be pure imagination, and as such really ought not to be published. It wouldn't have been, had not the highly informative article intended for this space been somehow dropped down a manhole in Potters Bar . . .

I HAVE survived seven years of marriage. "So what!" you may say, "several dozen others have done so too." But if I give you *the* pertinent piece of information, *i.e.* that my husband is a Radio Amateur, you'll see that far from being commonplace, it verges on the miraculous.

Take aerials. They are poles and things that suspend wires and bits of metal so that the crackly noises that come out of 'the rig' are of the optimum quality.

The Irish aerial was fairly typical. We had a detached garage—a house too—behind which was a clump of athletic, tall and bushy rhododendrons. Stand in front of the garage doors and you face West, down the length of Lough Erne. The weather in County Fermanagh comes in from the West, unhindered across 3,000 miles to break, with a fury that would corrugate iron, upon our garage doors. Beside this, naturally, was the site picked for the aerial.

Only we had not got one.

So out ambled our Amateur and bought three 10ft. plastic drainpipes in a pretty shade of grey. Then we waited for the next really big storm. It came scudding in, lancing needles shot by a Force 6 breeze. As soon as the wind howled with the correct number of decibels the aerial became an immediate necessity. Of course, it was daylight. He's not silly.

He tied ropes to the end of one drainpipe to make four guy ropes, stuck the aerial in the top, stood it upright and pushed the second drainpipe underneath. Simple? It wasn't; twenty feet of flexible drainpipe was flexing.

"Hold this!" I'm told, while the demon fanatic rushed about banging in stakes and attaching guy lines. This took half an hour, by which time the rain was using me as a drainpipe.

Did I mention the aerial was to be beside the garage? Yes. Well, two guy lines had to go over the top. He really is quite good at hurling Army boots plus line over high objects. He'd heave off an old size niner and if it was gusting right it would boomerang back. It only hit me twice. However, determination won the day and off he cantered. Every ten minutes or so, broken by swearings and bangings, a demented figure flashed past followed by more oaths and twangings. When I thought I was being ignored I would drop the pipes. Eventually it was held sufficiently so that we could both do circuits and play at adjusting the guys. Well, as much as one can with raging frostbite. Then, at last, it was up and secure.

Then the evil gremlin that lurks in every Ham took over. "It's not high enough," he uttered. I politely declined to hold the pole and so was instructed to slacken off the ghastly guys. I did. Next I had to place the third drainpipe under the other two as he lifted them. I tried, but the wind was against us. The pole developed

kinks at both joints and we tried in vain and rain to straighten it out; slackening off some ropes, tightening others. The aerial behaved like a drunken giraffe with a desperate desire to drink at a moving waterhole. It dipped, lurched, straightened, bent, bowed, and finally, thankfully, it broke. I wasn't a bit sorry. However, communications were not improved on any level.

The German aerial was rather special. The first intimation of joys to come was when a happy ham showed me an advertisement in one of his radio magazines. "I've always wanted one of these!" It was a telescopic aerial. Many weeks passed in feverish anticipation before it eventually arrived in a regimental horsebox. Its entrance on to our stage coincided with a visit by my brother and it was unpacked before he was.

Immediately the two men fell on the bits and pieces with whoops of recognition and cries of wonder. It is considered cheating in Hammy circles to read the instructions before assembly. So they didn't. My brother came on Saturday, and the following Sunday, after a happy if chaotic week, it was presumed ready to be put up. There was naturally a strong wind blowing. The four guys were of wire this time and the entire height to be reached was 40 feet. As my babe was having her afternoon sleep I went out to watch.

They stood the telescoped aerial upright and there was the customary, indeed obligatory, canter round hitching guys on to stakes. The actual aerial was already on top of the pole. It was like a box-kite in shape, about eight feet long and placed on its side. Now all that had to happen was the telescope had to be elongated. Easy? No. It went well for a couple of sections but then the aerial started swaying about with increasingly erratic gyrations.

We each took a guy and tried to play the aerial as the deepsea angler will play the shark. Ours was just as cunning and evil. A killer. As it dipped, the lethal prongs malevolently sought to pinion us to the earth. The wires were hard on the hands and when the aerial dipped away the technique was to arch backwards like a retarded porpoise, hauling on the wire. The gusting wind was not helpful.

By now our neighbours, used to our strange ways and ready for fun, came out to watch. They, too, were dragged into the vortex. After a long play we had it almost vertical. Up went another section. It will be noted that amateurs are not prone to that dreaded disease of learning by experience. It went beserk. The aerial began attacking the upstairs window. I threw up my wire and rushed off to rescue my babe from her cot. The whip action was now absolute. It was flexing through 180° from dust to dust. Neighbours fled, wires snapped, metal twisted and down it came.

It was broken. It was then they found the instructions and discovered they should have started unscoping the tele from the bottom sections, which being thicker were more capable of supporting the weight on top.

The wreckage lay in the garden for days. It was unusable—or was it? The barmy boffin's brain was off again.

We had a large, cement floored attic in the roof with a window in it. He threw a rope from the window, attached it to the box-kite and hauled. My uninteresting part in this was to guide it up the wall and over the gutters.

" . . . don't know if you heard it OM, but I've just had the call for lunch . . . "

It got stuck. So all I had to do was stand on the bedroom windowsill—outside—and jump up and down to help it over. When it was finally tethered to the window he decided it was too big to attach safely to the chimney. So we took it back to earth again.

We still had no aerial. In desperation he bought himhimself a commonplace and inferior model that could in safety stand upon the roof. Then on a windless, sunny day he stood on a chair in the attic, pushed the aerial before him and climbed forth out on to the roof. Spurred by the thought of perfect reception he attained the summit and fixed the aerial securely to the chimney. Having done so he looked about. He then remembered that he had to get down.

By now he had all the neighbourhood children watching fascinated. A six-year-old jungle drum came to inform me that my husband was cuddling the chimney. I declined to go and look.

Not being prone to public exhibitions of panic the Himalayan Amateur lit a cigar and had a quiet smoke. When our long suffering neighbour arrived to see what the children were gaping at he perceived the whole.

The descent was accomplished with relative ease if not consummate grace. Cigar finished, the climber lay down on the tiles, hands gripping the ridge. The catcher stood on the chair leaning out of the attic window. At the shouted word of command, 'A' let go of the ridge and 'B' caught him by the trousers as he slid past!

This aerial was not a success, though it fulfilled its purpose adequately: it had none of the required elan of a vintage model.

Thus, when one Saturday morning—it always seems to be a Saturday—it was raining the grandmother of a cloudburst, I returned from the *Naafi* to find in the bottom of the garden five German amateurs in black oilskins and dripping hair, plus one sheepish Englishman digging for victory, it was no surprise. The reason was lying on the grass. It was a fully fledged telegraph pole.

With the teutonic flair for obstinate objectivity despite the searing glances that flashed from me to them, they

dug a six-foot hole in our best clay. They had to dig fast to beat the water sluicing down. Having achieved the desired depth they picked up the telegraph pole. That is somewhat a euphemism. The clay from the hole had turned to mud about its edge. I really rather began to enjoy it. Telegraph poles are fairly hefty and the five Germans and one cigar-smouldering helper danced a comical caber caper. Finally they had it upright and began compacting the sludge back around its base.

Having succeeded in their endeavours they all squelched into the sitting room and spread all the left-over mud onto the carpet and chairs and drank beer until they were all fraternally fuddled.

Well now we had the pole—the aerial itself went up with a young signalman wearing belt and spikes, in a quiet and professional demonstration of what could be done and how to do it.

Incidentally, when we did leave Germany we had to remove the pole. The mud had dried to cement and in the end we had to pull it over with a Land-Rover and burn it 'in situ.'

I've only bothered with aerials; the other facets of living with an amateur are many and varied and equally horrific and just as difficult to survive. But we have. Listen on the next seven.

AMATEUR RADIO— COMMUNICATION OR TECHNOLOGY, OR BOTH? Part V

N. H. SEDGWICK, G8WV

FOLLOWING the discussions in *Part IV* we can now say that the modulation options likely to be encountered by amateurs in the HF bands are A1, F1 and A3J, used for transmitting Morse code, RTTY and SSB speech respectively. We can also say:

(*a*) A transmitter amplifier designed for maximum efficiency when using A1 or F1 modulation will be unsuitable for A3J service because it will have non-linear performance.

(*b*) A transmitter amplifier designed for maximum efficiency when using A3J modulation will be suitable for use with A1 or F1 modulation but will run less efficiently (power-in for power-out) than if specifically designed for those modes.

A1

The RF Exciter which generates the initial RF signal voltage for an HF A1 transmitter generally has a limited tuning range, set at the lower end of the frequency range to be covered by the transmitter. The amateur frequency bands are approximately harmonically related, and it was at one time universal practice to start the drive sequence on the lowest frequency band to be used and to follow it with non-linear amplifiers, which could also be used as frequency multipliers by tuning the outputs to multiples of the inputs. It was quite a happy practice as multipliers are much less prone to retroactive instability than fundamental frequency amplifiers, which require careful screening and neutralising.

The power-in/power-out efficiency of multipliers varies between about 10 per cent for quadruplers to 40 per cent for doublers, and one needed to keep a close eye on the anode and screen dissipation power to which the valves were being subjected; overall power efficiencies tended to be low in such circumstances, but since our licences did, and still do, rate power by DC input to the stage feeding the aerial, only the final PA efficiency was treated with tender care.

Power-in/power-out efficiencies of transmitter output amplifiers in practice can be expected to run at about 55 per cent for Class AB1, 65 per cent for Class B, and 75 per cent for Class C: for 150 watts input this means outputs of 82·5, 97·5 and 112·5 watts respectively. Use of a Class AB1 amplifier for CW A1 working can therefore result in an RF power reduction of around 1·35 dB from the practical maximum for 150 watts DC input, and at 6 dB per S-point at the receiving end it is not much to worry about signal strength-wise (but it does mean 112·5—82·5 = 30 extra watts to be dissipated in heat by the output valve, and 30 extra watts to be supplied by the power unit, and increased rating for any blower that may be required to cool the valve). In any case, knocking dB's off one's power is related to how much one has in hand in the first place: on a professional radio telegraphy circuit where the signal always shows 30 dB above the threshold of the telegraph receiver it is quite permissible to quarter the power, for the financial saving will be high and the signal will still be 24 dB above threshold. For the amateur who does not know who will be his next QSO, and what his report will be, the idea that odd dB's of power will make no difference must be taken with a pinch of salt, for he may unknowingly already be at the threshold of readability for some rare DX station and require only three minutes above parity with noise to earn his QSL, in which case dB's are indeed golden!

F1

Exciters for F1 can be reactance modulated VFO's, but this has the disadvantage that shift must be checked and re-adjusted following every frequency change. It is better to have a fixed-frequency reactance modulated oscillator and beat its output with the VFO to produce the frequency modulated drive source, as then the shift will be independent of the VFO setting. However, if the drive source is followed by frequency multiplying stages they will multiply the shift as well as the basic frequency.

One way of meeting this problem is to have a switched voltage divider network in the input to the reactance modulator; this will control the DC-coupled telegraph voltage, mark or space, from the keying contact into the modulator, and since this will be linear in operation, reducing the telegraph voltage will reduce the modulation index and hence the shift in direct proportion. The

switch would therefore be labelled 'Shift' and its positions '1,' '÷2,' '÷3,' '÷4,' etc. Thus when a frequency multiplier stage is brought into use, the switch is set to divide the shift by the same ratio as the multiplier stage multiplies it; a preset potentiometer in the same DC coupled input to the modulator is also needed to allow setting the basic shift of the oscillator with the divider switch at '1.' In this way shift remains constant on all bands.

A3J

When we come to A3J modulation the use of frequency multipliers is out of the question, for the effect would be to multiply all the audio modulating frequencies, and there is no easy DC fiddle we can use to put that right, as in the case of F1. Translation of the basic fixed frequency SSB signal to the frequency which is to be radiated is done at low level by mixing with a heterodyne oscillator and selecting the required sum or difference frequency by tuned circuits, which must then be followed by linear amplification at the radiated frequency.

Thus if we have an SSB exciter producing a 9 MHz signal, and we use a VFO having a tuning range from 5 to 5·5 MHz, we can mix this with the SSB signal and obtain 'sum' and 'difference' combinations which can be selected by tuning like the following examples:

f_{vfo}	f_{ssb}	$f_{ssb}-f_{vfo}$	$f_{ssb}+f_{vfo}$
5000	9000	4000	14,000
5500	9000	3500	14,500

It will be seen that the 'sum' mixes give more than complete coverage of the 14 MHz band and the 'difference' mixes do the same for the 3·5 MHz band. Note, however, that the sum mixes cause the selected output frequency to move in the same direction as the VFO tunes, but the difference mixes reverse this, so that the highest VFO frequency produces the lowest output frequency; this means that one has to increase VFO frequency on some bands to increase radiated frequency, but reduce VFO frequency on other bands to do the same thing.

Frequency Translation

When carrying out frequency translation by mixing it is possible to reverse side-bands, and this applies to F1 telegraphy too, where the effect manifests itself as reversal of mark and space frequencies.

Suppose the SSB generator has a carrier frequency of 9000 kHz and is modulated by a 1 kHz tone with the output set for upper side-band: this produces a signal on 9001 kHz which, mixed with 550 kHz, would give a 'difference' output of 3501 kHz and retain its upper side-band feature. On the other hand, if the roles of VFO and SSB generator were reversed so that the USB signal was on 5501 kHz and the VFO on 9000 kHz, the difference would be 3499 kHz and the modulation would be lower side-band!

Attention must also be given to the possibility of a choice of mixing frequencies which produces the wanted final frequency but also one in the opposite sense which, moving in the opposite direction, falls across the tuning range of the wanted frequency—thus producing two emissions close together, one of which may be out of band. Illustrating this, although in a different context, the writer once used a superhet receiver with a crystal controlled converter in front, to turn it into a double-superhet covering the DX bands by tuning the main receiver in the 3 to 5 MHz band. For 14 MHz, a 9·4 MHz crystal was used and the receiver was tuned from 4·6 to 5·0 MHz on the basis:—

9·4 + 4·6 = 14·0 MHz and 9·4 + 5·0 = 14·4 MHz,

but completely missed the point that:—

9·4 — 4·6 = 4·8 MHz, 9·4 — 5·0 = 4·4 MHz,
and 9·4 — 4·7 = 4·7 MHz!

So that, in effect, tuning the main receiver from 4·6 to 5·0 MHz was simultaneously sweeping it from 4·8 to 4·4 MHz and reaching a point of crossover coincidence at 4·7 MHz.

The technique of frequency translation by mixing can get very complicated and obscure and the origin of spurious signals can be quite baffling. But properly done, the method allows us to change frequency band without affecting the modulation and without any requirement for harmonic relationship of the bands, and although it considerably increases the complexity of the transmitter circuit, it is still less of a problem for the home-brewer than making a simple superheterodyne receiver (which involves such nasty things as tracking the HF oscillator to the signal circuits!). With the typical SSB exciter based on a 9 MHz filter and the typical VFO designed to serve the 3·5 and 14 MHz bands, it will be necessary to use a second mixing process to produce 21 and 28 MHz band outputs; the mixing of this with the exciter output is best done prior to the mixing with the VFO, for since the VFO frequency is varied, all following tuned circuits must be capable of being tuned over the same number of kHz as the VFO. Prior to the VFO mix all tuned circuits can be preset.

We have seen that the easy method of frequency band translation by the use of multipliers (the most efficient method of power amplification, so adaptable to A1 and F1 requirements), is quite unsuited to A3J mode. On the other hand, the transmitter suited to A3J is also suited to both A1 and F1 modes with simple accessory equipment.

A3J Transmitter in A1 Mode

To use an A3J transmitter in A1 mode all that is necessary is to key an audio tone at suitable level into the normal microphone input; another method is to switch out the SSB modulator and substitute its output by a keyed crystal oscillator operating on the nominal carrier frequency of the modulator. In either case, the drive level must be set to give the rated continuous wave power and not peak envelope power of the amplifiers (and either way not exceeding the allowed 150 watts input to the amplifier feeding the aerial).

If the valve used in the output amplifier has the capability it can be switched to non-linear Class C operation when used for CW by suitably increasing its grid bias, but there will need to be plenty of RF drive in hand to enable the output valve to be driven into grid current in spite of the increased bias. If the linear amplifier is designed only for use on SSB speech its design probably takes into account the fact that average power in speech is a long way behind peak power, but when one switches to CW the average power and peak power are one and the same, so p.e.p. rating of an SSB transmitter is no

reliable indication of CW rating.

Incidentally, the use of the abbreviation 'CW' to describe A1 telegraphy in Morse code, which is common in amateur radio parlance, is misleading: continuous wave means what it says and has nothing to do with Morse code as such. It means that the transmitter is running at its full output all the time, so strictly speaking F1 is CW but Morse keyed A1 is not. The term is used commercially mainly in relation to safe transmitter power ratings and distinguishes a steady power radiating condition from one in which there are high level peaks of power for very short periods; but average power is no greater than the CW rating, and safe power under such conditions is rated in Peak Envelope Power (p.e.p.). It is all a bit nebulous, for clearly p.e.p. will depend on the cycle of incidence of the peaks of power, and this will differ between speech with pauses in it, and music, for example. Piccolo *is a telegraph modulation system where each alphabetic character is denoted by a single tone transmitted for 100 milli-seconds; there are no gaps between characters and the tones are fed into SSB modulators. The system uses suppressed carrier so the output is indistinguishable between a 33-step frequency shift system and an A3J system which limits its modulation content to 33 single tone pulses. Although the system employs SSB methods to generate the radiated signal, the power in the amplifiers is always the same and it is a truly CW system.*

A3J Transmitter in F1 Mode

To use an A3J transmitter in F1 mode two audio tones whose difference equals the required shift frequency are needed, one allocated to 'space' and the other to 'mark' in such a way that the mark frequency appears as the upper frequency radiated. The mark and space tones are keyed into the audio input of the SSB modulator by the telegraph contact, or by the contact of a a telegraph relay operated by the telegraph voltage, or by an electronic switch which is keyed by the telegraph voltage. The levels of both tones are set to give rated CW power input to the amplifiers within the terms of the licence.

RTTY

Piccolo and F1 RTTY are both single-tone systems in the sense that there is never more than one modulating tone applied, and that is a sine-wave and so is free from significant harmonics; the p.e.p. is therefore equal to the average power. However if two audio tones of equal level are applied to the modulator input, the RF output waveform will appear as a 100 per cent amplitude-modulated waveform at the difference frequency of the two audio frequencies, and the peak voltage of the envelope will be the sum of the voltages arising from both tones as their peak voltages coincide in time. Since both tones are set at the same level, this means the peak envelope voltage will be twice that arising from either one of the tones, and since power relates to the square of the voltage, the peak power will be four times that arising from either one of the tones used singly. The difference lies in the fact that the peak power arising from a single tone is sustained continuously so that CW rating applies, but peak power arising from two tones is an instantaneous power rating which occurs only when the peak voltages of both tones coincide in time as the two frequencies beat together. Therefore, the high power the transmitting amplifier is called upon to handle is not likely to damage the valve by excessive anode dissipation, but the high voltage could cause flashover in the stage.

The real trouble of course is linearity, for unless the amplifier maintains its linear response when it sees this high peak voltage applied to its input, it will distort the peak or even square it off, and this will show up by the presence of inter-modulation products in the output at an unacceptable level.

The 'Two Tone Test' is therefore an important one which tells the technician much more about his linear amplifier's behaviour than a single-tone test can. It leads to the rule that if one intends running two frequency division telegraph channels into one SSB transmitter, each channel must be reduced in level not by 3 dB (as one would expect to share the transmitter power capability between the two tones), but by 6 dB, so that the total average power handled by the transmitter is half of what it can handle with a single-tone modulation. If a third tone is added there will be instantaneous coincidence of peak voltage of all three channels, adding together to produce three times the voltage contributed by any one of the tones, and so on. The fact that the linear amplifier is looking at voltage at its input though we are considering power at its output, means that any reduction of voltage made in the interests of linearity is squared in terms of power output, because power varies as the square of the voltage across the load.

The author encountered this problem professionally when faced with the requirement to run four *Piccolo* telegraphy channels simultaneously over one modern SSB transmitter rated at 10 kW p.e.p. The departmental scientists introduced a 'diversity factor,' pointing out that the more channels used, the less the chance of peak voltage coincidence between all of them (noting they were *Piccolo* channels and the audio frequency of each channel varied all the time with the telegraph signals; mathematically the problem of how much power could be used per channel was insoluble because the variables were unrelated). The idea was tried and it was found that 1 kW per channel adding up to 4 kW total produced no IP's that we could find, although it seemed much better than expected. Clearly the transmitter was conservatively rated and still linear in response even when the drive voltage was considerably exceeding that which gave rated p.e.p. output.

This reminiscence has been included to illustrate just how difficult it is to interpret p.e.p. ratings in practice, relative to how one wishes to use the transmitter. In our licences the Home Office allows that " . . . power shall be determined by the p.e.p. under linear operation," and fixes the limitation at a p.e.p. of 2·667 times the DC input power allowed on the band concerned. But the DC input power is hypothetical in the case in point, for the amateur who compresses or clips his speech may produce and use much more average power than the chap who does not, without exceeding the p.e.p.; and although the licence does qualify the rating as " . . . under linear operation" (which compressing and clipping are not), how should the amateur re-adjust to take such practice into account when he switches his clipper back into circuit after setting up power according to the licence? In fact, the p.e.p. output rating given by a

manufacturer for a transmitter has little useful meaning unless the allowable distortion and the test method are stated.

Although it has been stated that for a single-tone modulation the p.e.p. is the average output power, the p.e.p. ratings given for many commercially produced transmitters take advantage of the 'diversity factor' of speech modulation and its average low power (as compared with its peak power) and cannot therefore tolerate a sustained single-tone modulation at anything like the rated p.e.p. Clearly, if the design of one's transmitter is an exercise in such brinkmanship, an add-on device which increases the average speech power by compression of its amplitude dynamic range must take it nearer to, and perhaps over the brink! Over-running the rated electrode dissipation of valves shortens their life quite drastically; a runaway condition can arise due to grid emission which will completely destroy a valve in a few seconds. Some valves are more prone to grid emission than others but it originates by over-heating of the grid, causing it to emit electrons; this results in a current flow up through the bias supply circuit which develops a voltage across the resistance of that circuit, which is in opposition to the grid bias voltage, so reducing the bias and causing still more current to flow, more heat to develop and more grid emission to take place. The effect is cumulative and the valve destroys itself. The reverse voltage that appears at the grid is equal to the product of the reverse current and the bias circuit resistance, so that if the latter is kept low the danger will be minimised.

Suppose the precise grid bias voltage for a Class AB1 amplifier were set by a 15K potentiometer (apparently a reasonable practice as no grid current flows as a result of the RF drive in Class AB1) and the actual total circuit resistance works out to 10K, then 1 mA of reverse grid current will reduce the bias voltage by 10 volts; if the bias circuit resistance is reduced to 500 ohms the same 1 mA will only reduce the bias by 0·5 volts. The author has the circuit of a well-known Japanese transceiver for amateur use, and it is noted that the grid bias supply to the PA valves routes through a 22K resistor, a 20K potentiometer, another 22K resistor to earth, and the slider of the potentiometer routes through a 1K and then a 10K resistor before it eventually reaches the grids: G8WV would hate to increase the duty cycle of those valves!

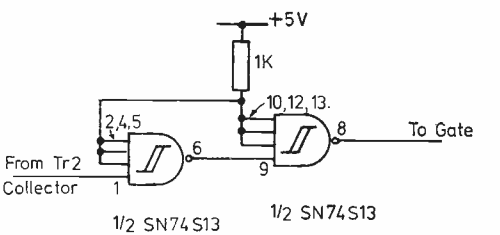
to be continued

CORRECTIONS AND AMENDMENTS

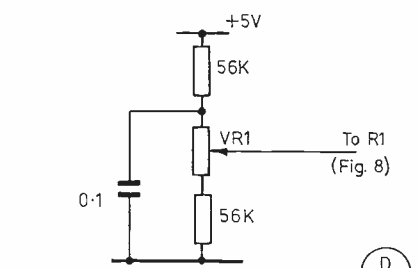
Referring to the article "IRT for the Heathkit 'SB' Range of Transceivers" on p.159 of the May 1978 issue, the following two points should be noted. Firstly, the values of R5 and R6 in Fig. 1 were omitted, but both may be of a value anywhere between 100 and 1,000 ohms. Secondly, it has since come to the attention of the author that there are apparently a very few SB-102's which have a different type of varactor in the FSK control line—quite arbitrarily fitted and with no relationship to the VFO serial number—which makes the IRT range extremely limited and substantially non-linear. It would therefore be advisable to carry out a check before making the modification, and an easy test is to apply a few DC volts to the FSK terminal at the rear of the VFO and check the frequency swing. If the swing is not satisfactory, then more drastic 'surgery' is required (*i.e.* the complete modification shown in Fig. 1).

In the two-part article "A Digital Frequency Meter" in the May and June 1978 issues, the following corrections should be made. *May*, p.168, Fig. 3: (i) join L9 to M9; (ii) extend the link from K24 to M24. p.170, Fig. 5: (i) R1 should be from J9 to P9; (ii) the output (clock signal) should be taken from S10; (iii) no break at either T27 or T28. *June*, p.230, Fig. 6: pin 1 of IC1a goes to reset output of IC3b. p.231, Fig. 7: (i) IC2 and IC3 labels have been interchanged; (ii) delete link shown on board as K19 to 020, instead use J17 to 020 as shown in Table of Values; (iii) should be breaks at R13 and S14; (iv) delete capacitor shown between T15 and U15; (v) insert reset line to IC1a, and link R15 to C21; (vi) line N should be 5 volts *not* 15v. Fig. 8, p. 232: *see* Diagram 1A. In line 4 of the paragraph headed "Input Amplifier," p.232, delete " . . . a BSX20 in common emitter and . . . "; the text there states 2N3702 and the Table of Values 2N3905—either will do.

The level control has been found to be far too 'sharp,' so its effect was band-spread, *see* Diagram 1B. The upper resistor should be adjusted so that the first figure on the display changes to '1' at 9 o'clock and back to '0' at about 3 o'clock; operation will then be found to be far less critical.



1A



1B

MORE BITS AND PIECES, JUST FOR STARTERS

CONTINUING THE THEME OF THE ARTICLE WHICH APPEARED IN THE FEBRUARY 1978 ISSUE, DESCRIBING SOME ITEMS OF EASILY-BUILT APPARATUS

A COMPARATIVE newcomer to the radio amateur transmitting sphere can easily be intimidated by the high cost of commercially produced equipment and as the ink dries on a newly acquired ticket so may hopes sink as prices are studied—the VAT extra is no help either!

Getting 'airborne,' though, need not be an expensive business for it is a fairly easy job to put together a 3-band CW rig for a modest sum that will not only provide hours of enjoyment but also afford a high degree of personal satisfaction at having actually made it! And, if the receiver previously used for SWL-ing isn't too hot selectivity-wise for CW copying, then the addition of a fairly simple external audio filter using a couple of IC's can do wonders in sharpening up the appropriate band patches.

A 3-Band CW Rig

A practical 3-band CW rig is shown in Fig. 1 using just two valves and if a type 6CH6 is not to hand for use

Table of Values

Fig. 1 — Transmitter

R1 = 100,000 ohms
R2 = 1,900 ohms
R3 = 22,000 ohms
R4 = 22,000 ohms
R5 = 220 ohms
R6 = 10,000 ohms, 10W.
R7 = 15,000 ohms, 1W.
R8 = 100,000 ohms
R = *see text*

V1 = 6CH6/6BW6
V2 = 6146

S1 = DPDT slide switch
S2 = 2-pole, 3-way rotary switch
S3 = DPDT slide switch
S4 = 3-pole, 3-way rotary switch

C1 = 22 $\mu\mu$F s.m.
C2 = 220 $\mu\mu$F s.m.
C3 = 2,000 $\mu\mu$F cer.
C4 = 0·01 μF
C5 = 150 $\mu\mu$F
C6 = 50 $\mu\mu$F
C7 = 2,000 $\mu\mu$F cer.
C8 = 1,000 $\mu\mu$F 1000v.
C9 = 2,000 $\mu\mu$F cer.
C10 = 2,000 $\mu\mu$F cer.
C11 = 2,000 $\mu\mu$F cer.
C12 = 1,000 $\mu\mu$F 1,000v.

VC1 = 100 $\mu\mu$F variable
VC2 = 150 $\mu\mu$F variable
VC3 = 2 x 470 $\mu\mu$F variable

RFC1 = 2·5mH choke
RFC2 = 2·5mH transmitter choke

AP1/2 = 5 turns 30 s.w.g. enam. on 100-ohms 1W resistors

COIL DATA

L1 = 11 turns 26 s.w g. enam. closewound on 0·25in. dia. dust-cored former.
L2 = 21 turns 26 s.w.g. enam. closewound on 0·25in. dia. dust-cored former.
L3 = 45 turns 26 s.w.g. enam. closewound on 0·25in. dia. dust-cored former.
L4 = 22 turns 18 s.w.g. tinned copper wire, spaced wire thickness, tapped at 5 and 12 turns from VC2 end, and on 1·25in. dia. air-cored former.

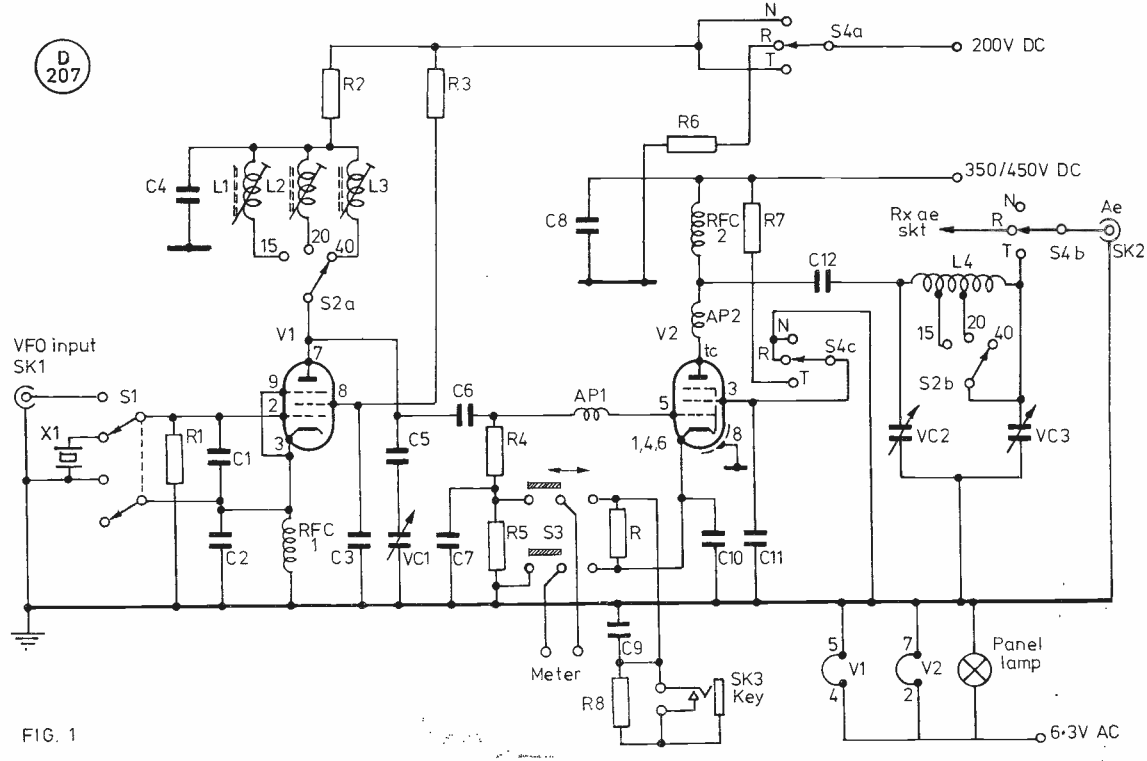


FIG. 1

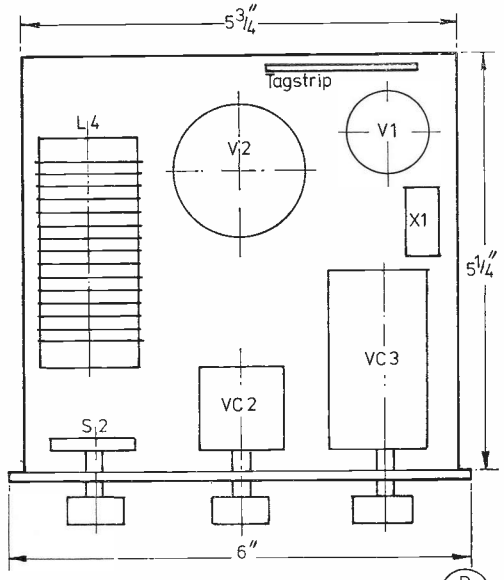


FIG. 2

at V1, use instead a 6BW6—the basing is identical (they cost less too!).

Just a few crystals in the 7 MHz region are sufficient to produce RF output in the CW segments of the 7, 14 and 21 MHz bands and suitable specimens are usually readily acquired quite cheaply at amateur radio mobile rallies, junk sales, etc. Circuitry for a simple portable pocket crystal tester is to be given later.

In Fig. 1, V1 functions as a simple crystal-controlled oscillator and the fundamental frequency plus the various harmonics desired are available at the anode circuit to drive V2. The PA stage is conventional with cathode keying and there is no need even to buy a panel meter for the station testmeter can be made use of. All coils are hand wound—L1, L2 and L3 being made 'peakable' be means of VC1 which is protected against DC by C5. Switch S3 will enable 'Drive,' and PA current monitoring R (the meter shunt) being adjusted experimentally to permit, say, a 0-10mA meter to read 0-100mA f.s.d. in the anode position.

The bandswitch is S2, and S4 provides Net/Receive/Transmit facilities, the central position being used for Receive. To avoid overstraining S4c only the screen supply to V2 is broken on Net and Receive. Switch S1 enables the output of an external VFO to be injected, and in this connection V1 would act simply as a straightforward amplifier.

Clearly the RF output depends on the HT potentials applied; for the oscillator HT rail 200v. DC is adequate but up to 450v. DC can be applied to the PA. The two rails could be coupled into a single rail voltage of say 350v. DC provided a 3W resistor of around 5,000 ohms is fitted immediately after S4a to drop the oscillator supply potential.

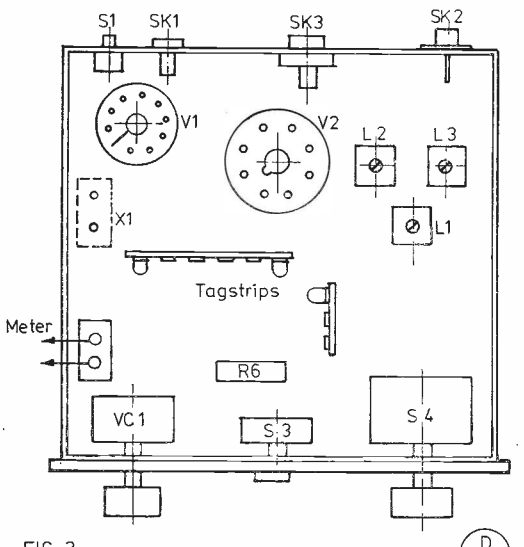


FIG. 3

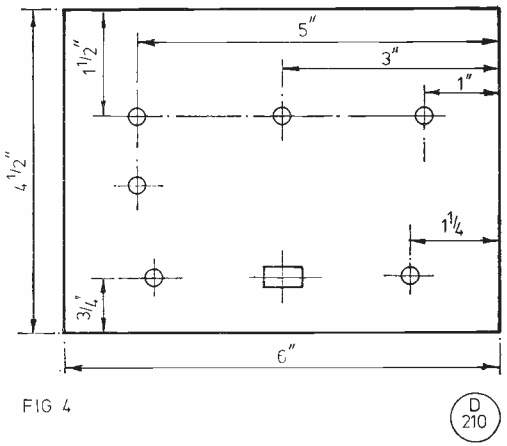


FIG 4

Construction and Testing

Suitable above-and-below chassis layouts are shown in Figs. 2 and 3 respectively and this, it is thought, can hardly be improved upon—the taut layout affording short interconnecting leads and the chassis acting as a screen between the anode coils of V1 and the PA. Fig. 4 gives panel dimensions.

Initially the oscillator is checked by putting S4 in the Net position and listening for the note produced on the station receiver; thereafter the rig is more rigorously tested, first into a lamp or dummy load and subsequently into the aerial if all is well. It is of course essential to check that output is in the band selected and for this purpose a simple wavemeter is desirable.

A Crystal Tester

Unfortunately not all crystals obtained cheaply are perfect. It is therefore very useful to have in the pocket when visiting mobile rallies, etc., a simple crystal tester,

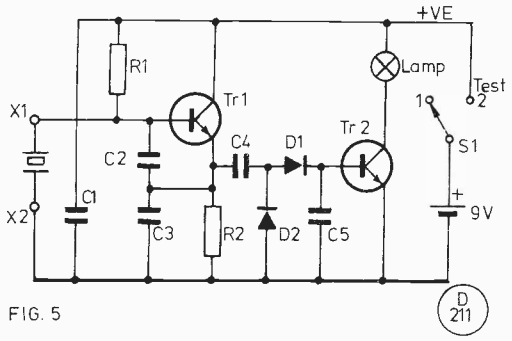


FIG. 5

Table of Values

Fig. 5 — Crystal Tester

R1 = 82,000 ohms	TR1 = BC109
R2 = 1,000 ohms	TR2 = BFY51
C1 = 0·01 μF	D1 = OA91
C2 = 470 μμF	D2 = OA91
C3 = 1,000 μμF	X1/2 = *see text*
C4 = 470 μμF	Lamp = 0·06A, 6v.
C5 = 5,000 μμF	S1 = Min. slide switch

and a suitable circuit for one is shown in Fig. 5. Although the test crystal frequency when plugged in at socket X1/2 remains unknown if it is otherwise in order the lamp will light when S1 is briefly closed; if the lamp remains dark the crystal is suspect and should be discarded. Various sockets other than HC6-U can be wired in parallel with X1/2 if required, or short flying leads with 'croc' clips can be used.

Constructionally the whole assembly, together with a PP3 battery, can be housed in a small hard plastic box (suitable ones can be obtained from *Boots* stores for approximately 25p each; they measure 4 x 2½ x 1½in. deep and are obtainable at the toiletries counter. They can be lined with metal foil to make them 'earthy' if required). A small oddment of copper-clad board etched to agree with Fig. 6, where the conductors are shown shaded, is ideal—all components being pushed through from the plain side for soldering. Capacitor C1 should not be omitted since it forms part of the oscilla-

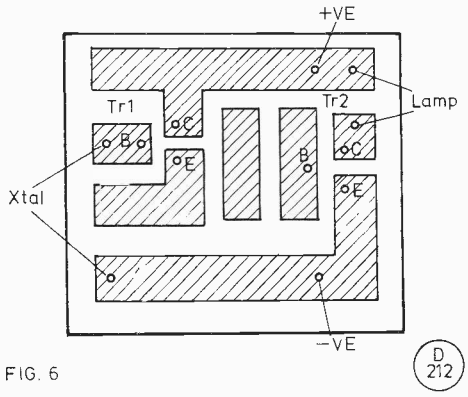


FIG. 6

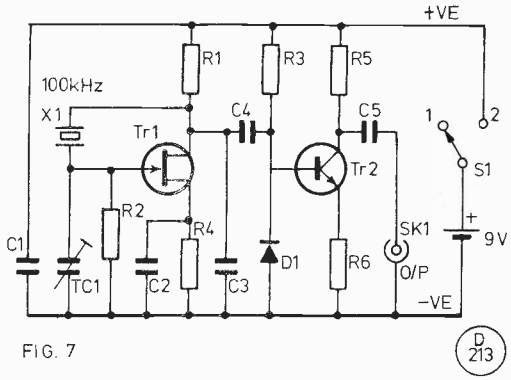


FIG. 7

Table of Values

Fig. 7 — Frequency Marker

R1 = 3,300 ohms	C4 = 0·04 μF
R2 = 82,000 ohms	C5 = 0·01 μF
R3 = 3·3M	TC1 = 20 μμF trimmer
R4 = 2,200 ohms	X1 = 100 kHz frequency standard crystal
R5 = 6,800 ohms	
R6 = 1,000 ohms	D1 = OA91
C1 = 1 μF	TR1 = 2N3819
C2 = 0·2 μF	TR2 = BC109
C3 = 1,000 μμF	S1 = Min. slide switch

tory circuit. In use, incidentally, some 50-80mA may flow on closing S1, but as only a brief closure is necessary this is of small consequence.

In making the etched board, the diagram shown is first painted on to the copper using enamel point and a small artists' brush. When the paint is dry the board is placed copper side down to float on a saucerful of dilute ferric-chloride solution, using tweezers to avoid getting the chemical on the skin. A few hours later the board is lifted with the tweezers and rinsed well under the tap

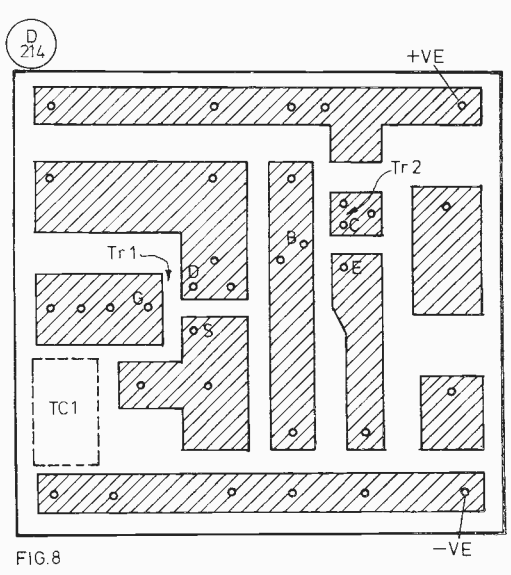


FIG.8

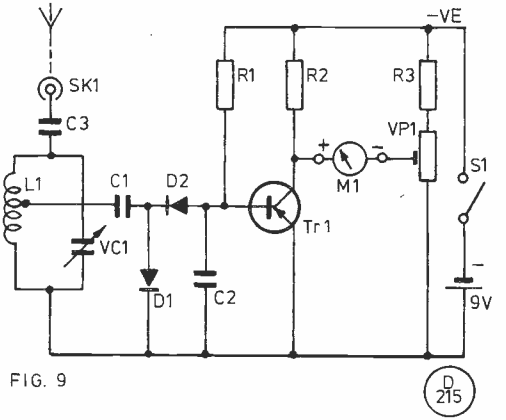


FIG. 9

Table of Values

Fig. 9 — Wavemeter

R1 = 3·3M	D1 = OA91
R2 = 1,000 ohms	D2 = OA91
R3 = 5,600 ohms	TR1 = ACY21
VP1 = 10,000 ohms min. potentiometer	S1 = min. slide switch
C1 = 2,000 $\mu\mu$F	M1 = 0-1 mA
C2 = 1,000 $\mu\mu$F	
C3 = 47 $\mu\mu$F	

COIL DATA

Using 26 s.w.g. enamelled copper wire:
'160' to '80' = 52 turns closewound, tapped 5 turns.
'80' to '40' = 22 turns closewound, tapped 3 turns.
'20' to '15' = 8 turns spaced wire thickness, tapped 2 turns.
'15' to '10' = 5 turns spaced wire thickness, tapped 1½ turns

and the chemical poured away to safety; paint stripper then clears the paint leaving the desired copper intact when a further rinse and scour with *Vim* leaves a good solderable surface ready for drilling and general completion.

When assembling the complete tester it is convenient to let the lamp project very slightly so that it is clearly visible.

100 kHz Frequency Marker

This easily duplicated device is very useful for locating amateur-band edges and intermediate points, and can be

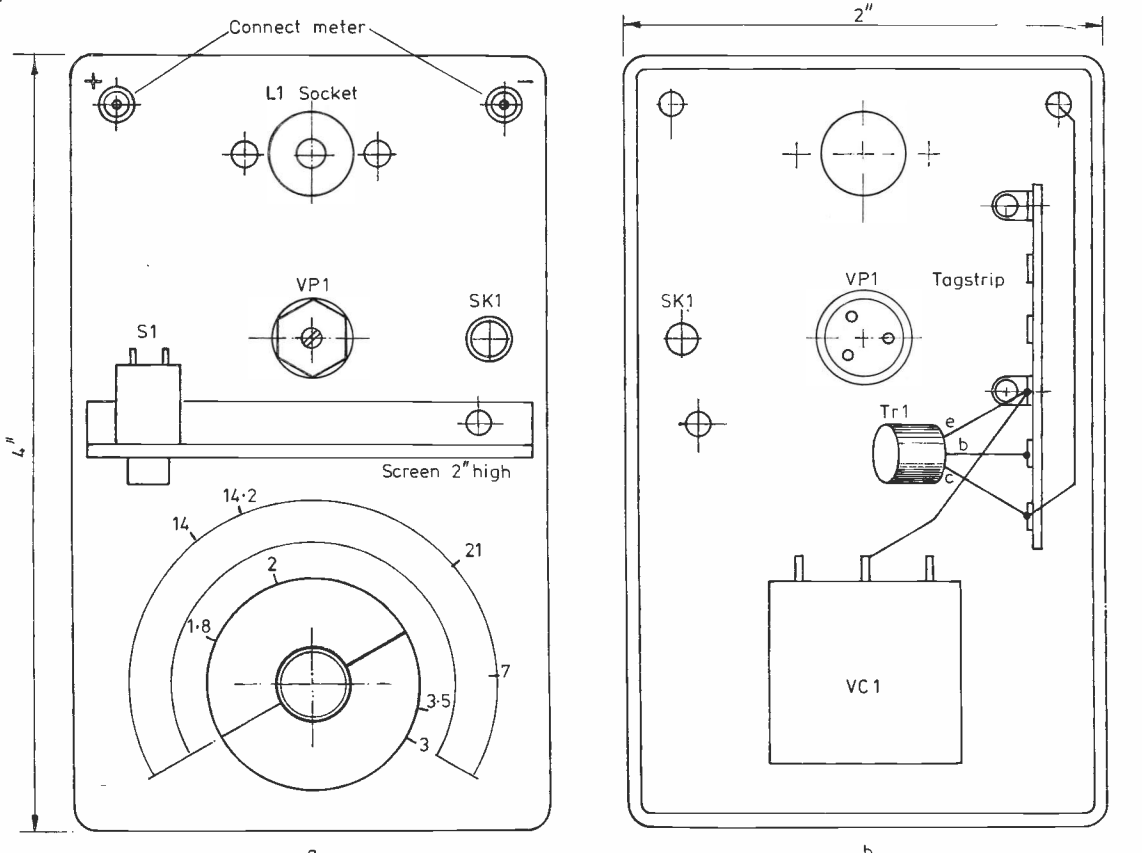


FIG. 10

built quite easily into a small plastic box of the sort used for the Crystal Tester. The circuitry is shown in Fig. 7 and can be accommodated on a home-etched oddment of copper clad board as depicted in Fig. 8. To avoid a height problem the 100 kHz crystal—in HC13-U in the test model—is laid out horizontally on the conductor side of the board and spaced from it by about ¼in. after all joints have been made. Trimmer TC1 enables the final generated frequency of the marker to be brought into sympathy with one of the broadcast frequency standards tuneable on the receiver. Although the device cannot identify both band edges of all HF amateur bands, all LF edges are identifiable and these are of especial interest to CW operators. The total current drain of the marker is 2·5mA from 9v. DC.

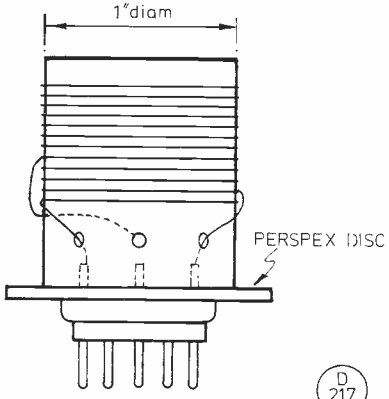


FIG 11

Wavemeter

It is not impossible when tuning up a transmitter to accidentally develop the output at the wrong frequency; therefore some form of signal monitoring is desirable, and may well take the form of a simple wavemeter. A suitable item is shown in Fig. 9 and this in common with the devices previously described can be accommodated in a small plastic box. The layout can take the form shown in Fig. 10, virtually all the components being attached *via* a 6-way tag strip. Home-made coils plugged into a Noval valveholder are ideal with the 'formers' made from 1in. diameter plastic tube—as found in office gummed paper rolls—and stuck with *Araldite* to a perspex disc to which a Noval plug is bolted—*see* Fig. 11.

To prevent the coils from being unduly 'damped,' the diodes feeding the meter amplifier are well tapped down the windings; the ACY21 transistor affords a high degree of sensitivity. A short wire pick-up aerial can be plugged in at socket SK1.

Because the wavemeter is likely to be used merely to confirm that signals are being radiated in a particular band, it will not normally be left switched 'On' for lengthy periods—therefore it is hardly worth while providing a permanent meter (particularly nowadays when they are so costly and hooking-up the station testmeter is adequate). A simple card scale and a pointer knob associated with VC1 (a miniature solid-dielectric type) can be calibrated for the bands required, using either a GDO, a signal generator or a transmitter of known accuracy in conjunction with a crystal marker to fix points. In use VP1 sets the meter pointer to zero initially, subsequent drive from the tuned circuit giving deflection appropriately.

THE MONTH WITH THE CLUBS

BY *'Club Secretary'*

New Club

East Anglia has always been one of the less active parts of the country, radio-wise, with little known to us there save for the enormously successful Spalding group, and Norwich which used to be the same but from which we've not heard in years. Now we have another one to help along; this one will be in the Cromer district and called the **North Norfolk.** Details from the address given in the Panel or by turning up at their stand at the Model Club Exhibition, which will be on during August at St. John's Hall in Cromer.

Mystery!

We have a letter from John O'Riordan, 59 Bandon Road, Cork, who sent a letter to the Hon. Sec. of IRTS, which although correctly addressed was returned as "not known at this address." Odd indeed, the more so as your scribe has had correspondence through that same address within the last few weeks, and has in front of him the very latest **IRTS Region 1** *Newsletter*, in which it gives the same EI6DG as the address for all correspondence. Perhaps one of the IRTS gang will latch on to Mr. O'Riordan, who basically just wants to join the club!

On now to the rest of the mail, and our first stop is at **Crystal Palace,** who have a session at Emmanuel Church Hall, Barry Road, SE22 on the third Saturday evening of each month; they also have an informal at a member's home on the first Tuesday each month, but it would be simple courtesy to contact the Hon. Sec. first before attending the latter. On a different note, one observes that the talk for June 17 is at least partly concerned with the use of ropes and guys, both at home and out /P. At NFD a sudden squall and thunderstorm brought down their mast and beam—cause and effect? The subject is certainly one that should be in the RSGB tape library.

Now to **Cheltenham,** who seem to be going great guns since they did their amalgamation thing; they are at the Old Bakery, Chester Walk, Cheltenham, normally—but on August 11 they have a Barbecue at Kilkenny. For more details, the Hon. Sec. is your man, and his

name and address will be found in the Panel.

We are completely in the dark about the doings at **Sutton & Cheam,** the more so since we can't extrapolate from the listed dates—they have an "odd" one listed! However, a call to the Hon. Sec. will doubtless yield the desired information. As for Hq., they sometimes use the Sutton College of Liberal Arts, Cheam Road, and as an alternative, Ray's Social Club, London Road, North Cheam.

Acton, Brentford & Chiswick will be available to visitors on August 15, at Chiswick Trades and Social Club, the activity being to keep a schedule with member G3CCD who is operating from France as FØUT.

In all the years the writer has been connected with the hobby, he only recalls hearing of one AC4 station, namely AC4RF, Bob Ford, who gave a talk shortly after his release by the Chinese. So far as the writer is aware there only ever was one other AC4, and that was AC4YN, Sir Evan Nepean, who is to talk to **Bournemouth (Wessex)** on Friday, August 18, about the Tibet activity and some other odd places. A *real* radio amateur is this G5YN; when your scribe worked him back in 1969 on Top Band, he was using a home-brew phasing SSB rig with a quite remarkably good signal, both as to quantity and quality. To revert to the matter in hand, there will be *no* meeting on August 4, as members will be fully occupied with the setting-up of the station GB3WHF at Wimborne Hobbies Fair. Hq. address, by the way is the Dolphin Hotel, Holdenhurst Road, Bournemouth.

Sad to say, the **Surrey** *Newsletter* doesn't seem to go as far forward as is needed for our deadline; however we know their Hq. address is *T.S. Terra Nova,* 34 The Waldrons, South Croydon, and they appear to have the first and third Wednesdays. But, since we're talking about the peak of the holiday season, a contact with the Hon. Sec.—see Panel—may save a journey; lots of clubs have their August off in favour of holidays and gardening!

Northwards now, to **Wirral,** who still have their place at the Sportscentre, Grange Road West, Birkenhead, on the first and third Wednesdays in every month. We liked the tailpiece to their *Newsletter* "and so another edition sinks slowly in the West!"

At **Crawley** the Hq. address is at Trinity United Reformed Church Hall, Ifield, where they appear to take up residence on the second and fourth Wednesdays of each month. For more details we have to refer you to the Hon. Sec.—*see* Panel. We were amused to note that a certain member who holds a reciprocal G call received the Home Office questionnaire postmarked April 22, and on the next day the licence, postmarked April 20. G5. . . . reckons they have a crystal ball at the Home Office!

Solihull write to note that they have been re-formed now for some ten years—it seems only yesterday that we ran the initial letter on the subject in this piece. They still have Hq. at the Manor House, High Street, Solihull, and the actual tenth anniversary falls exactly on the meeting date of August 15—visitors welcomed, of course.

To **Cheshunt,** the club now have Hq. at Church Room, Church Lane, Wormley, Herts., where they are to be found on every Wednesday evening. In essence, the way of things is a couple of natter evenings (August 9 and 23) interspersed with talks. August being an "outdoor month" weather-wise, they have devoted August 16 to an evening investigating the propagation in the Lea Valley (for more distant readers, it does some distinctly odd things!), while August 2 is an evening spent with the club HF station. Finally, after all this operating in the heat of summer, on August 30 they have a Rig Clinic.

It's too late now for us to give notice of the **RAIBC** Picnic and Rally, at the Fairground, Romsey Estate (with permission of Lord Mountbatten). However, we can say that RAIBC is the club for all those who are invalid, bedfast, blind, or otherwise disadvantaged in health; and of course it follows that for every such member there will be a supporter and representative, fully fit, who contrive to get the things done that need doing. Finally, G2CLP says in his note that it is urgent that some sort of constitutional change and worksharing between the officers of the club has become necessary as membership has grown. So—*volunteers please* contact the Hon. Sec. at the address in the Panel.

Deadlines for "Clubs" for the next three months—
(*For September issue—July 28th*)
For October issue—August 25th
For November issue—September 29th
For December issue—October 27th
Please be sure to note these dates!

Midland now have their base at Room 110, University of Aston, Gosta Green; August 22 is down for a tape and slide evening.

Right down south now, to **Southdown,** who cover the Eastbourne area. On August 7, at Chaseley Home, South Cliff, they propose an evening of brief lecturettes by members: G8KQN on Fire Precautions, G4BCO dealing with computer operating systems, and G8CVV on 600-ohm line systems. Their general routine is to foregather at Hq. on the first Monday of each month, or if that falls on a Bank Holiday, the second.

Although membership overall is rising, **Torbay** have to report with sorrow the death of yet another of their number, G3WWK. They are *moving their August date* from August 26 to *August 19* so as to give themselves a clear week before their rally, which is now to be held at the STC Social Centre in Paignton; look for Brixham Road.

One of those rare **White Rose** letters advises that they are still at 83 Armley Town Street, Armley, Leeds 12. Although they have every Wednesday there, it is normal for them to have a speaker once every second or third week. They are also doing their best to encourage the SWL element, reckoning that some 80 per cent of the membership licensed is a bit too high!

It looks as though the problem of the lost club shack of **South Manchester** has been resolved by way of another room at Hq., opened formally by G3SMM on June 23. Looking towards the August programme we see August 4 for a talk on Teletext by Mike Counsell, and on 11th a session by G3WFT on the design and construction of high powered linear amplifiers. August 18 is down for a discussion evening with some operating

thrown in, and on 25th there will be a QRP review.

Nottingham usually take the line of least resistance in August, and fit the programme around whoever turns up—but by popular demand this year they have a Fox-hunt on August 17. The Hq. at Sherwood Community Centre, Woodthorpe House, Mansfield Road, Nottingham is in radio-amateur business every Thursday evening, and visitors are welcome.

We have heard of some oddball things but the **Stowmarket** one of having the August meeting on *July 31* is a novelty! This one will be an alignment evening, showing everyone how, and getting everything into apple-pie order.

Next we have the neatest excuse for asking for visits: to calm the nerves of those awaiting the results of the R.A.E.! Try any Friday except the third one in each month, at the United Services Club, 61 Micklegate, **York.**

Verulam have a good speaker, on August 24, in Dr. Dain Evans, G3RPE—but rather than his speciality of Microwaves he will be talking about RSGB matters. The venue is the Market Hall, St. Albans. The informals in summer are all held at Salisbury Hall on the second Thursday of the month.

On to **Cray Valley,** and they *are* taking the line of least resistance for August 17, by making it a Natter evening; the venue is the Christchurch Centre, High Street, Eltham, London S.E.9. Since they have a booking also on the first Thursday of the month it rather seems as though they have a complete month of nattering—but September sees a reversion to form with a Surplus Sale on 7th. On a different tack, we notice in the *Newsletter* G6HD reporting on SSB transmission by the Post Office as early as 1930—though it had been done long before that, and across the Atlantic to boot. The frequencies, as was normal in those distant days, were very low, and the method used was to prune the aerial to favour one sideband at the expense of the other one and to some extent the carrier.

At **South Birmingham** they have a pretty complex sort of routine; the main meeting is on the first Wednesday in every month, notices being read at 7.55 for a start at 8. In addition, the club shack is open every Thursday evening, and every Friday evening also, for operating activities. The venue for all these is at Hampstead House, Fairfax Road, West Heath.

Now we come to the **North Kent Repeater Group,** who are the small group concerned with GB3NK; they are putting out a very good *Newsletter* to all who do or will support their aims and objectives. They are a totally local group, independent of U.K. FM Group, RSGB, Kent Repeater group or anyone else, and they mean to stay that way!

Hereford have an interesting little note, about K4OCE. It took him just 95 days to work 100 countries with a kilowatt; later on he dropped to 7 watts and started from scratch again—this time the 100 took 83 days! There has to be a moral there somewhere! To get back to the gang, they have Hq. at County Control, Civil Defence Hq., Gaol Street, Hereford on the first and third Fridays in each month.

The **Royal Navy** *Newsletter* gives advance warning that resulting from the new rule at the last AGM that no-one could hold office for more than three years without

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HEREFORD: S. Jesson, G4CNY, 181 Kings Acre Road, Hereford. (*3237.*)
I.R.T.S. (Region 1: J. Ryan, EI6DG, 23 Dollymount Grove, Clontarf, Dublin 3.
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NORTH NORFOLK: C. Thackeray, 23 Cross Street, Cromer, Norfolk NR27 9DE.
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WOLVERHAMPTON: J. Cook, G8EDG, 75 Windmill Lane, Castlecroft, Wolverhampton WV3 8HN.
YEOVIL: D. L. McLean, G3NOF, 9 Cedar Grove, Yeovil, Somerset.

a break, there will be four committee vacancies, not to mention G3JFF resigning as Hon. Sec. for domestic reasons, and (possibly) the disappearance of the *Newsletter* editor; which seems a pretty massive shake-up. On a differing tack, we were very much amused by the *true* story of the chap who actually contrived to send Morse with an ordinary key, a lanyard and *his foot*! Details on membership from the Hon. Sec.—*see* Panel.

Pressing on with our tour we come next to **Wolverhampton,** where they continue as usual through August on each Monday evening. August 7 is down for a Used Equipment (and perhaps some junk?) Sale, 14th and 28th are both natter-nights, and the 21st is given over to a discussion of D/F hunts. Hq. is at Neachells Cottage, Stockwell End, Tettenhall, Wolverhampton, and they make a point of welcoming new members and visitors.

Turning to **West Kent** we notice that while they are in recess as far as the Monson Road Hq. goes, they will still be findable, on August 8 and 22, at the Drill Hall in Victoria Road, Tunbridge Wells. The new session starts at the Adult Education Centre, Monson Road, on Friday September 1, with a talk by G8CDD entitled "Current IC's, and their Application in Communication."

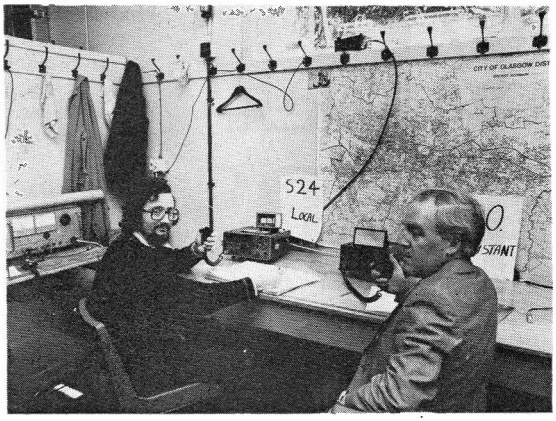
AMSAT next: the group who are responsible for the OSCAR satellites. There is, as many will be aware, a group called AMSAT-UK—and if you have any interest at all in OSCAR activities, you should become a member. It is perhaps of interest to note that the Phase III satellite(s) will cost something like 250,000 dollars—but, while you get your breath back, just think that a commercially built version would come out to *ten million* dollars; in both cases we assume monetary targets being met. Contact the Hon. Sec.—*see* Panel—for more details.

Nice to hear again from **Dartford Heath D/F** who still have Hq. at the Scout House, Broomfield Road, Dartford, Kent. This is probably the only group in the country who make their main *raison d'etre* the arts and crafts of D/F—it is a family game more than most other varieties of amateur radio, as the membership lists and the results show. The current copy of *Compass Points* is almost all given over to the latest version of a Top Band D/F set, the parts for the previous "standard" one having become somewhat unobtainable. Details, from the Hon. Sec.—*see* Panel.

A nice big *Newsletter* from **Chiltern** this time says the appeal for material yielded some result. It also tells us that their next date is August 30, in the Conference Room, 42 Castle Street, High Wycombe.

We now come to **Cornish,** and here we have to admit to a slight amount of doubt as to their August plans. The normal routine is to foregather at the *SWEB* Clubroom, Pool, Camborne on the first Thursday in the month, but we suggest you contact the Hon. Sec. just to make sure before you set out; his address is in the Panel.

On to **BARTG** who will have their annual Convention at Harpenden over by the time this comes to be read; if you didn't go and if you don't know what BARTG is about, it is the group concerned with those amateurs round the world who use radio-teletype, usually with surplus teleprinters of one make or another. They have



Talking-in visitors to the recent Bellahouston Sports Centre (Glasgow) open-day were, left, V. Budas, GM3VTB, and J. Reilly, GM3HOM.

quite the most elegant *Newsletter* to come our way for a long time, and anyone interested in RTTY should consider membership. Details, of course, from the Hon. Sec.—*see* Panel.

Another really first-class *Newsletter* is the one put out by **Mid-Sussex,** from their Hq. at Marle Place, Burgess Hill, Sussex. The only snag is that it says "the details of the August informals to be announced later." So—to the Panel, for the name and address of the Hon. Sec., and the details you want!

A.R.M.S. looks after the interests of the /M amateur or SWL, in the world-wide sense; the Hon. Sec. of course is our own *VHF Bands* scribe G3FPK, who would, we are sure, be only too pleased to pass on the details; his address is in the Panel.

With their Mobile Rally set for September 17, it's hardly surprising that the meeting of the **Peterborough** types on August 18 will be largely devoted to the briefing and other such preparations as may be needed. For the forward programme we must point you at the Hon. Sec.—*see* Panel.

At **Stourbridge** we read it that their formal and activity nights come on the first and third Mondays, at Longlands School, Stourbridge. In addition they have informal get-togethers at "The Bird in Hand," Hagley Road, Oldswinford, dates not quoted.

If you are looking for the **Yeovil** lads, on any Thursday evening firstly locate Houndstone Camp, and then Building 101—and you've arrived! Like most weekly groups, they have a talk some weeks and natter others; for August 3 we see G4GNV talking about Interference Analysis, and on 10th the famous G6CJ tape-and-slide talk, on Aerials. They have a couple of weeks to get to grips with that bit and then they have another tape-talk, this time G3IOR on Propagation.

Wind-Up

Which is where we usually tell you that if your copy isn't in yet, you've missed the deadline! Seriously, keep an eye on the 'box' in the piece containing the forward dates. Send the material to "Club Secretary," SHORT WAVE MAGAZINE, 34 High Street, Welwyn, Herts., AL6 9EQ.

VHF BANDS

NORMAN FITCH, G3FPK

VHFCC Awards

THREE more readers this month have joined the ranks of 2m. VHF Century Club Certificate winners. No. 298 goes to Paul Broadhurst, G8LGL, from the county of Avon. The radio bug bit when he was twelve years old when a one-valve Rx was built. A Trio 9R-59DS and converter enabled the 2m. band to be monitored. Paul took the R.A.E. in December, 1975 when he was fifteen, and was licensed in the following February. The first rig was a *Heath* "Two-er" with 2 watts of AM to a home-made 3-ele. quad, followed by a *Pye* "Ranger" converted to FM with a 5-ele. quad. In September, 1976, a *Belcom* Liner-2 was bought and the aerial changed for a 10-ele. Yagi. The present station has a '6-40A amplifier and the aerial has been pushed up to 35 ft. Paul hopes to get on 70 cm. SSB soon.

Barry Thompson, G8JJE, from Corby, Northants., receives Certificate No. 299 and tells that he has been interested in amateur radio since 1938, but has only recently found the time to take the R.A.E. Only limited time is available for the hobby and all Barry's operation to date has been on FM on 2m. and 70 cm. His main Tx is a modified *Pye* F-27, the Rx for 2m. being a *Trio* JR-101 and *Microwave Modules* converter. Barry is a Ex-RAF type—regular 10 years—and is a RAFARS member. He records a 92 per cent QSL return rate, which is excellent, and puts in a plea for more use to be made of the "all modes" section of the 2m. band.

Dr. Bob Nash, G4GEE, from Coventry, is the recipient of No. 300. He was first licensed as G8MDI in September, 1976 and got his G4 call in June, 1977. Initial operation was with an *Icom* IC-202 and 5-ele. indoor Yagi. The current set-up incorporates a 25 watts amplifier to an outdoor 4-ele. quad. The most recent purchase is an *EDL-144* amplifier. Operation is on 70 cm. as well as on 2m.

Beacon Notes

In the 23 cm. band, GB3EDN, is now operating from Edinburgh on 1296·99 MHz with 25 watts e.r.p. beaming NE/NW. The QTH locator is YP04g and reception reports should go to GM8BJF (*QTHR*).

The 6m. Gibraltar beacon, ZB2VHF, on 50·003 MHz, has been copied in the U.S.A. on June 10 and was received by G4BPY in Walsall on June 16. In the Republic of Cyprus, 5B4WR has applied for permission to install a 70 MHz beacon but is not optimistic. However the 6m. beacon, 5B4CY, is QRV on 50·498 MHz A1, running 30 watts RF to a 5-ele. Yagi. It is beamed towards Europe and transmits a carrier for ten seconds, followed by a similar period of silence.

Satellite News

AMSAT-UK secretary Ron Broadbent, G3AAJ, passes along an explanation for the 3½ minute discrepancy between recent predicted and actually observed AOS/LOS times for *Oscar 8*. It seems that the predictions were based on radar checks, not of the satellite, but of a rocket nose cone some 1,000 miles ahead! The AMSAT-UK boys have now worked out their own predictions for the rest of this year and their publication is imminent. Inquiries for these should be sent to G3AAJ at 94 Herongate Road, London E12 5EQ, *with an s.a.s.e.* please, otherwise no answer! Please mention your membership number too.

The reference orbit mentioned in last month's column was no. 1363 on June 11. For the latest predictions, please check into the numerous AMSAT nets, details of the VHF ones being given on page 106, April.

On the operational side, DB4EX is looking for SS/TV contacts *via* satellite on 145·950 MHz on *0-7*, mode B.

Dr. Athur Gee, G2UK, the editor of *Oscar News*, has had to go into hospital so the next issue will be prepared by G3AAJ in A5 format.

The Repeater Scene

The Home Office has now approved the RSGB's Phase Three repeater proposals in principle, including the experimental RTTY one, GB3PT (AM71f) on RB12 in the 70 cm. band. It is understood that recent rests with this repeater were quite successful.

Technical Corner

Your scribe has noticed that the popular Yaesu FT-221 2m. transceiver is decidedly clicky when in CW mode. Careful monitoring has revealed that the trouble is confined to "break" rather than "make." Fortunately, it is a relatively easy matter to effect a vast improvement by adding two capacitors to the "Mic Amp" board, which is PB-1460. First, a 4·7 μF tantalum capacitor should be soldered from pin 8 to earth, and second, a 47 μF electrolytic connected in parallel with C42 in the emitter circuit of transistor Q07. This connexion is from pin 26 to earth. Thanks to Dick Plumb, G3IRP, for passing along these gems.

The Six Metre Band

At the recent IARU Conference in Miskolc-Tapolka in Hungary, Serge Canivenc, F8SH, the IARU Region 1 *Sporadic-E* Coordinator, sounded out the attitudes of some of the representatives of Western European countries on the possibility of a future amateur band allocation in the 50 MHz region of the spectrum. A summary of the current thinking shows that in Belgium, Holland and Italy there is no hope at all. In Denmark and Finland nothing definite has been decided but there seem few hopes to get even a small allocation. Switzerland is against the idea but the national society, USKA, plans to make proposals to the P.T.T. The French, German and Norwegian adminstrations are not against the idea provided there is no opposition from any other C.E.P.T. members. Sweden and the Irish Republic are very much in favour of granting an allocation in the 50 MHz band. As for the U.K., Serge understands that we are not against granting part of the band but that nothing will be decided till after the WARC Conference in Geneva next year.

Contests

Results:—Section 1, for amateurs residing in the old county of Essex, in the Barking Radio and Electronics Society's 2m. contest of March 26 was won by G8APZ with 1932 pts. Runner up was G8ILO with 1596. Section 2, for those outside Essex, was won by G8EFS/P in Surrey, with 2860 pts. and G8KSP, London, came second with 2403.

Coming Events:—The 70 MHz Open and SWL affair is scheduled for Aug. 12 from 1900-2300, and Aug. 13 from 0700-1500. The 144 MHz Open and SWL event is on Sept. 2/3 weekend from 1600-1600. The 10th B.A.R.T.G. VHF/UHF Contest is a two part affair from 1800-2300 on Sept. 9 and from 0700-1200 on Sept. 17. This one is for the 2m. and 70 cm. bands with the usual radial ring points system for scoring but with a multiplier of 2 for 70 cm. QSO's. For a copy of the rules, send an *s.a.s.e.* to G8CDW (*QTHR*)

National Field Day

Both the weather and radio conditions for VHF NFD on July 1/2 were rotten, apart from a wee bit of *E's* in the closing stages for the lucky few. As observed from G3FPK, there were periods when it was possible to tune the normally busy parts of the 2m. band but hear few signals. Signal strengths from the loud "regulars" were well down and DX was hard to come by.

Arthur Breese, GD2HDZ, missed out on ON4ERX on 4m., who were not heard in the Island, but did manage to boost his 4m. score substantially to help achieve 2nd place in the annual table this month. Ray Elliott, G4ERX, reports on the activity of the Vange ARS who ran stations on 4m., 2m. and 70 cm. The 23 cm. transverter played up before the weekend so no operation was possible on 1296 MHz. They operated from Langdon Hill, Basildon in AL33g and made 112 QSO's on 4m., about 250 on 2m., and 144 on 70 cm. Their main problem was two hired generators allegedly 240 volts AC but producing 110 and 200 respectively. The local police helped them locate replacements. (Aren't our policemen wonderful!). Ray reckons conditions appeared normal on 4m., but were not really up to "flat" on 2m. and 70 cm.

John Woodham, G8BKR (Bristol), reports 70 cm. as "poorly supported," best DX being G8FIS/P in Z055. John Pilags, G8HHI (Hants.), thought that 2m. activity was good, " . . . all signals heard, clean. . . " Julian Moss, G8ILO (Essex), has now concluded his studies at Lancaster University attaining an Upper Second, and is now back in Thorpe Bay basically. He thought conditions to have been completely flat and no DX at all was heard. He remarks that a couple of contest stations seemed to have very deaf receivers!

The rather tight deadline has resulted in few written reports from contestants. As regards real DX, the ON's were working LZ2NA (ND40g) and LZ1BW (LC27e) from about 1500 and it will be interesting to learn if anyone in the U.K. worked any *E's* contacts. Other tropo. DX reported included PE1ALA/LX/P (DK71g) and HB9MMM, both on 2m. One weird one on 2m. mentioned by Dave Wood, G4CQR, who operated from N. Staffs, making 413 QSO's was HP1LA/MM in Clacton! He worked down into BH square but the group's 70 cm. aerial, "filled up with water three times!"

Auroral Happenings

Auroral propagation is not generally reckoned to be a mid-summer phonomenon to any great extent. However looking back over the years in this column, there do seem to have been some quite good *Ar* events in June. In the July 4 *Ar*, John Hunter, G3IMV (Bucks.), worked UR2HD (LS53e) at 1626 for his 31st country on 2m. But he missed OHØAA, with perhaps some consolation from working IS square, for a new one, thanks to SMØDJW. Clive Morton, G4CMV (Leeds), says it was all happening when he got home from work. He heard the UR2, plus SM1BSA (JR) and SM3FGL (IV) which latter pair had been worked previously. This first phase ended at about 1800. During a second weak phase at 2300, he worked LA3UU, (FT) LA6HL (CS) and GM4CXP (YP) on CW and GM8FFX (YR) on SSB.

Doug Parker, G4DZU (Leeds), managed SP2GGG in the first phase. Ray Elliott, G4ERX, caught the last half hour of phase 1 and contacted GI8EWM, (XO) and GM8FFX using 5 watts output from a very sick '6-40A, but that was too little "puff" for a complete contact with SMØDJW.

Jon Dougherty, G4FUT (Sunderland) sent in a most comprehensive report on the July 4 event. In the first phase, every beacon he knew was *Ar*. Jon worked G5RP (ZL34h) who was using an *indoor halo*! His beam headings suggest that the reflecting curtain must have been very far south in the later stages as he had to swing his beam to 100° to complete the QSO with PA2VST in CM44h. From his long list of QSO's, DM2ARE (HM52j) is a good one. His last contact was the PA2 at 1708, but more good stuff was worked in the second leg between 2306 and 0200, including a couple of SM3's in IV square, QTF's for this were all 45°-40° but another interesting thing is that at 2218, GB3LER

TWENTY-THREE CENTIMETRE ALL-TIME TABLE

Station	Counties	Countries	Total
G3JXN	35	9	44
G3DAH	36	8	44
G3NHE	24	5	29
G6NB	22	6	28
G3COJ	19	8	27
G4ALN	20	5	25
G3JVL	21	4	25
G3OBD	20	3	23
G8ARM	20	2	22
GD2HDZ	13	6	19
G8GML	14	3	17
G8EOP	11	5	16
G5DF	13	1	14
G8AOD	11	2	13
G8FMK	12	1	13
G8IFT	8	4	12
G8AII	7	2	9
G4DKX	7	2	9
G3OHC	8	1	9
G8ABH	7	1	8
G8FJG	7	1	8
G3BW	3	3	6
G8GNZ	4	2	6
G2AXI	4	1	5

(ZU) could only be copied (*Ar* at 120° so Heaven knows what G2FKZ will make of it all. Jon feels that monitoring *Ar* events is something which *swl's* should be encouraged to do, sending in their reports to G2FKZ noting beam headings particularly.

Bob Mackean, G4HAO (Liverpool), mentions the *Ar* of June 26 when he heard GM8NCM at about 1700. Pete Connors, G8LEF (Huddersfield), was in on the July 4 affair and worked CN square at last, after a two year hunt, thanks to PAØGJS. Others worked—with just 10 watts—included DC2BE and DJ2HQ. Steven Ruff, GI8EWM (Co. Antrim), worked PAØJMV at 1650 in this *Ar*. At G3FPK, nothing was heard in the June 26 event. The July 4 one was listened to from about 1650 and OZ7UHF/A was loudest of the non-U.K. stations from EP14c. QTF's for all stations was 15° from ZL60j and fadeout was around 1720.

Sporadic E

During the June 4 *E's*, mentioned in last month's piece, Paul Broadhurst, G8LGL (Avon), worked YU2CCY (IF37g), YU2RRC (HF20c) and LZ1AB (LC27d) but just missed out on CN8CC. GI8EWM lists I4VOS/4 at 1745 in FE67j on June 3?—surely the 4th? G8BKR heard the same three stations worked by G8LGL, while George Gullis, G8MFJ (Wilts.), worked YU2CBM (ID33f) at 1130, with YU2RRC and LZ1AB heard.

The opening on June 8 produced only weak signals for G4GEE in Coventry and G8MFJ reports hearing 9H1BT (HV03f) at 1024, also copying ZB2VHF at 1053. On June 19, your scribe was lucky enough to hear OK3CDI (KI27h) on CW at great strength, calling "CQ" with no takers at 0912 so had a QSO, and on the following morning, 9H1BT was worked on SSB at 0957. IWØAQD in GC square was heard in this opening.

The next major event was on July 8 and it started soon after 1800. As far as southern G's were concerned, the propagation was into central and southern Italy, Sicily and Sardinia. IT9TDN (HY68b) and IT9VMN (GY76b) were extensively worked, the latter by Sheila Williams, G8KPL (Cumbria). Others doing a brisk trade included I7ECT (HB), I7WAF (JA), IØJFE (GC) and IØMNI (GC). At G3FPK, the U.S. Forces station in Naples on 106 MHz was belting in on its 250 watts.

Michael Stringer, G4CLK (Essex), worked ISØPUD (EX66a) at 1935. At 1800, there was an *E's* path between SMØFFS (JT) and C31PS (AC). HD5KDQ told G3POI on the *DUBUS* VHF net that the *only* G station heard in Hungary was G8OQA. It seems that all *E's* stopped across Europe at 1943, give or take a minute. The last one logged at G3FPK was IØMNI at 1941.

Just as this was being edited, there occurred another fine opening on July 10 starting soon after 1700, notable for at least four Greek stations being heard/worked, SV1's AB, CS, DH and KD. This event

QTH LOCATOR SQUARES TABLE

Station	23 cm.	70 cm.	2 m.	Total
G3JXN	26	66	88	180
G3COJ	17	61	75	153
G8LEF	10	51	94	155
GD2HDZ	10	32	59	101
G8GML	8	50	89	147
G8EOP	8	36	38	82
G8IFT	7	18	49	74
G4DKX	5	30	68	103
G3OHC	4	31	98	133
G8FUF	2	84	207	293
G4AEZ	2	22	57	81
G2AXI	1	48	82	131
G8BKR	1	19	94	114
GJ8AAZ	1	24	67	92
G4ERX	1	24	63	88
G3BW	1	21	47	69
G3POI	—	—	239	239
I4EAT	—	25	196	221
GM4CXP	—	25	127	152
G3SEK	—	—	152	152
G3CHN	—	—	148	148
G3FPK	—	—	148	148
G8HVY	—	48	96	144
G4BWG	—	27	116	143
9H1CD	—	13	127	140
G3XCS	—	21	111	132
G4CMV	—	3	127	130
G4BAH	—	32	92	124
G4DEZ	—	—	119	119
GMCOK	—	9	106	115
G8HHI	—	29	84	113
G4FCD	—	22	89	111
G8IWA	—	29	77	106
9H1BT	—	—	105	105
G3FIJ	—	27	62	89
G8GII	—	22	63	85
G4AWU	—	—	85	85
G6UW	—	—	85	85
G8HUY	—	28	56	84
9H1C	—	—	83	83
G8JJR	—	—	79	79
G4FBK	—	5	73	78
G8KGF	—	—	76	76
G4GEE	—	24	50	74
G8JHX	—	—	74	74
G8LHT	—	1	71	72
G4GET	—	—	70	70
GM8NCM	—	4	65	69
GD3YEO	—	8	59	67
G8KUC	—	7	60	67
G8ITS	—	12	53	65
G8KPL	—	—	65	65
G8KSS	—	—	64	64
G8KLN	—	1	62	63
G8JAG	—	—	63	63
G4CIK	—	—	62	62
G4GCQ	—	—	61	61
GJ8KNV	—	11	49	60
G8KSP	—	—	60	60
G3KPU	—	—	60	60
G8JEF	—	—	58	58
GW4FJK	—	—	57	57
GJ8ORH	—	8	47	55
OZ9IY	—	—	53	53
G8GSA	—	1	48	49
G4EYL	—	—	41	41
G8MFJ	—	6	31	37
G8JGK	—	—	37	37
G8JAH	—	1	35	36
G8JAJ	—	—	24	24
G8JKA	—	—	21	21

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

finished around 1940. GW4CQT was heard working SV1CS and G3BDQ working SV1KD. John also worked LZ1CD (MC) on CW at 1839. From about 1900, some *YU's* were about including YU2CKL (HD30a) and YUØOM. YU6ZAC, in a town called Bar—he did not know his locator—was a dreadful signal, both on SSB and CW.

Now most everyone imagined that would have been the end of the day's *E's*—but no. When your conductor switched on again at 2130 for a sked, there were the fans, all working I's and YU's, with some SV's around for good measure. Bryn Llewellyn, G4DEZ (Oxon.), worked a string of very weak YU's in this second phase which finally petered out at 2200, probably one of the latest E's events? One interesting observation was made by Prof. Martin Harrison, G3USF, to your scribe which was that he was receiving in Keele, Staffs., GB3SX on 10m. from Crowborough at enormous strength *via E's*, suggesting a very high MUF right over England.

Two Metres

The best tropo. conditions were on June 18/19 and many readers have sent in reports of Scandanavian DX worked. John Heys, G3BDQ (Hastings), found signs of the opening on the 17th when strong PA's and DL's were about. On the 18th, John really went to town with the OZ's, LA's and SM's in EP, EQ, CU, FP, FT, GR, GS and GT squares. Frank Howe, G3FIJ (Essex), was one of many who worked CW square provided by SM7GWU/LA/P. G4CMV did and Clive also worked LA6HL in Stavanger while driving home from work. He worked 60 continentals from CW square in the north, to BK in the south.

G8ILO (Essex) worked dozens of ON's and PA's on the 18th, all at way over S9. However, Julian reports that the Scandanavians being worked, one after another, by G3BDQ and G4CUS on the south coast were virtually inaudible in Southend. G8LEF (W. Yorks.) was on from 1300 on the 18th to 0230 the next morning on 2m., 70 cm., and 23 cm. Pete got the CW square plus another rarity, DK5HP, who is on the island of Helgoland in DO square. At

THREE BAND ANNUAL VHF TABLE
January to December 1978

Station	FOUR METRES Counties	FOUR METRES Countries	TWO METRES Counties	TWO METRES Countries	70 CENTIMETRES Counties	70 CENTIMETRES Countries	TOTAL Points
G3SPJ	50	6	56	12	32	5	161
GD2HDZ	37	5	44	7	30	7	130
G2AXI	36	5	46	12	24	6	129
G3CO	30	4	49	11	19	6	119
G4BWG	23	4	54	14	14	5	114
G8GXP	—	—	55	12	40	7	114
G8LEF	—	—	50	13	36	12	111
G4ERX	15	1	50	13	20	7	106
G8BKR	—	—	65	12	23	3	103
G8HHI	—	—	50	14	29	6	99
G4AEZ	23	4	36	10	19	5	97
G4GEE	—	—	54	8	29	3	94
G4DEZ	—	—	70	23	—	—	93
G3FPK	—	—	73	20	—	—	93
G3FIJ	29	3	38	6	14	2	92
GI8EWM	—	—	57	11	11	6	85
G4BYP	9	3	38	6	21	6	83
G8MFJ	—	—	53	12	12	2	79
G8KGF	—	—	60	16	—	—	76
G8KSS	—	—	61	15	—	—	76
G8APZ	—	—	56	13	3	1	73
G8ITS	—	—	43	6	12	3	64
G4HAO	—	—	51	10	—	—	61
G8BIJ	—	—	50	9	—	—	59
G4GXT	—	—	51	8	—	—	59
G8GRT	—	—	35	4	15	3	57
G8MKW	—	—	47	9	—	—	56
G4FKI	6	1	29	6	9	1	52
G8NYS	—	—	44	8	—	—	52
G4GET	—	—	42	9	—	—	51
GM4CXP	—	—	36	11	1	1	49
GJ8AAZ	—	—	31	6	7	5	49
G8OGD	—	—	38	5	4	1	48
G8LHT	—	—	36	10	—	—	46
GJ8ORH	—	—	25	11	3	5	44
GJ8KNV	—	—	18	7	9	6	40
G8JGK	—	—	29	9	—	—	38

G3FPK, the Lerwick beacon was very loud for well over 24 hours from the 18th but "CQ GM" calls produced no Scotsmen. Are they all playing with repeaters? Many people worked the Western Isles DX-peditionaries Paul Widger, GM8AGU and Iain McHardy, GM3JFG, from both WR and WQ squares in the period June 6-9, although signals were often marginal in the south of England due to the flat conditions.

OY5NS in Torshavn was on during

the June 18/19 lift but only stations in East Anglia were able to work him. It seems he likes to rag-chew rather than work scores of eager DX-ers.

Seventy Centimetres

Alan Scott, G4BYP (Liverpool), added Co. Wicklow, EI9D and Dumfries & Galloway, GM4DGM/P, on June 18 for a couple of new countries for this year's table. G4ERX's 10 watts was enough to attract OZ9DT and OZ9FW's attention, the same day, but G8BKR heard no DX. G8LEF " . . . worked everything from LA to ON," in the June 18/19 period plus EI9D after it had all subsided. GD2HDZ reckons the lift hardly reached the I.O.M. but did hear PAØDBQ at S9. GI8EWM's list includes GM4DGM/P in Central Region and GM8NXW in Strathclyde on the 11th. Lawrence Woolf, GJ8AAZ, now has 50 watts output on the band from a 2C39A.

Twenty-three Centimetres

Mike Dormer, G3DAH (Kent), is now up to 36 counties on this band, level pegging with G3JXN. Roger Taylor, G4BEL, asked to be deleted as he was fed up with being at the top: reckoned it was time others took up the challenge! G8LEF is fairly satisfied with QSL return rates on the UHF's but still awaits SM6ESG's card for a QSO last year when he was using 2-3 watts of FM. Present urge is 10 watts of SSB. GD2HDZ heard PAØDBQ on 23 cm. too on June 18 at RST 579 but, as he could not raise him on 70 cm. he was unable to get a QSO on this band.

Finale

It has not been possible to cover MS this time, nor to mention all the interesting topics you have raised. Perhaps we may have a normal, flat month some time so that we can catch up. Now the postal service is somewhat less reliable please bear in mind that the absolute deadline for September is August 3 and for October it is Sept. 7. Everything to:—"VHF Bands," SHORT WAVE MAGAZINE, 34 High Street, WELWYN, Herts., AL6 9EQ. *73 de G3FPK.*

NEW QTH's

This space is for the publication of the addresses of holders of new callsigns, 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.*

EI3CZ, R. Power, 6 Rockville Park, Blackrock, Co. Dublin.
EI9DB, P. F. McGovern, Barran, Blacklion, Co. Cavan.
G2CJC, F. M. M. Beerling (*ex-G8OEI*), "Highland," Staines Hill, Sturry, Canterbury, Kent CT2 0ER (*re-issue.*) (*Tel. Canterbury 710763.*)
GM3CVJ, J. W. Sime, 2 Craigswood, Livingston EH54 5EP (*re-issue*). (*Tel: Livingston 33518.*)
G4GJN, M. J. Shannon, "Rowany," Lakeside, Windermere, Ulverston, Cumbria.
G4GKA, R. Mahmud, 34 Queens Avenue, Muswell Hill, London N.10.
G4GON, Dr. J. M. Guest, 14 Ashleigh Road, Barnstaple, N. Devon.
GI4GOW, R. L. Armstrong, 24 Suffolk Square, Antrim BT41 2SZ.
G4GPG, J. M. Devereux-Colebourne, Riverside Cottages, East Garston, Newbury, Berks. RG16 7EU. (*Tel. Great Shefford 286.*)
G4GPW, B. D. Ainsworth (*ex-G8HYN*), 36 The Lawns, Sompting, Lancing, Sussex BN15 0DT. (*Tel: Lancing 63226.*)
G4GQT, J. W. Clement, 57 Canterbury Avenue, Bowerham, Lancaster, Lancs. LA1 4AU. (*Tel: Lancaster 2389.*)
G4GRJ, D. O. Gower (*ex-G8OEV*), 2 Norview Road, Whitstable, Kent CT5 4DM.
G4GSA, P. J. Milsom (*ex-G8LLG*), 477 Chickerell Road, Weymouth, Dorset DT3 4DQ.
GW4GSL, R. Prince (*ex-GW8NFI*), "Ty-Capel" Bungalow, Penmynydd Road, Llangefni, Anglesey, Gwynedd. (*Tel: Llangefni 722957.*)
G4GSV, I. C. Williams (*ex-G8LNZ*), 3 Ford Way, Downley, High Wycombe, Bucks. (*Tel: High Wycombe 446228.*)
G4GTS, D. F. Fairhurst, 202 Chambersbury Lane, Hemel Hempstead, Herts. HP3 8BH.
G4GTU, S. Pocock, "Lanfine," 57 Golden Avenue, Angmering-on-Sea, Sussex BN16 1QX.
G4GUX, G. W. Grieveson, 6 Spinney Bank, Kings Sutton, Banbury, Oxon OX17 3RL.
G4GVB, A. Floyd (*ex-G8KLN*), 95 Old Worthing Road, East Preston, Littlehampton, W. Sussex.
G4GVM, D. R. R. Alexander, The Manor House, Quayfield Road, Ilfracombe, N. Devon EX34 9EN. (*Tel: Ilfracombe (0271) 62319.*)
G4GVN, D. J. Barrott (*ex-G8NUV*), 95 Towngate Road, Worrall, Sheffield, S. Yorkshire S30 3AR.
G8JML, B. H. Body, "Penolver," Scarcewater Vean, St. Clement, Truro, Cornwall TR1 1TA. (*Tel: Truro (0872) 78020.*)
G8NCC, J. R. Morgan, R.N.R., 13 Manor Green, Stratford-upon-Avon, Warks.
G8NYX, S. H. Bergman, 76 Knights Road, Hoo St. Werburgh, Rochester, Kent ME3 9DX.
G8NZB, B. C. Durrant, 137 Churchway, Weston Mill, Plymouth, Devon.
G8OFY, S. J. Bishop, 29A Montague Street, Mansfield, Notts. NG18 2PL.
G8OGH, J. W. R. Cook, 120 Woodham Lane, New Haw, Weybridge, Surrey KT15 3NQ.
G8OLJ, A. J. Picard, 3 Meadow Way, The Willows, Hitchin, Herts. SG5 2BN.
G8OMB, D. G. Parker, 41 Brookdale Road, Nuneaton, Warks. CV10 0BL.
G8OOF, G. T. H. Ellison, Arden Cottage' Rowington, Warwick CV35 7AD.
GJ8ORH, G. Brown, Lemnos, Longueville Road, St. Saviour, Jersey. (*Tel: 0534-26788.*)
G8OVQ, J. Mansfield, 33 Morley Road, Tiptree, Colchester, Essex C05 0AA. (*Tel: Tiptree 816677.*)
G8OVS, P. B. Jordan, 5 Appleton Drive, Ormesby St. Margaret, Norfolk NR29 3RL. (*Tel: 0493-731838.*)
GM8OWW, A. L. Douglas, 48 Marmion Drive, Glenrothes, Fife KY6 2PF. (*Tel: Glenrothes 753149.*)
G8OXB, M. J. E. Gater, 268 Main Road, New Duston, Northampton NN5 6PP.
G8OXL, Amateur Radio Club, Oxley Developments Co. Ltd., Priory Park, Ulverston, Cumbria.
GM8OXQ, J. Branegan, 8 Whitehills, Saline, Fife KY12 9UJ.
G8OYQ, M. F. Everitt, 48 Rant Meadow, Hemel Hempstead, Herts. HP3 8EQ.
G8OYZ, A. J. Adamson, 29 Dearnsdale Close, Stafford, Staffs. ST15 1SD.
G8PDR, T. Hart, 23 Gregory Crescent, Great Horton, Bradford, W. Yorkshire BD7 4PG. (*Tel: Bradford 72406.*)

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EI4CI, P. O'Brien, Clavinstown, Drumree, Co. Meath. (*Tel: Drumree 259279.*)
G2HJV, F. C. Soans, 73 Beverley Road, Leamington Spa, Warks. (*Tel: Leamington Spa 25395.*)
GM2MG, Lt. Col. C. C. Millar, 2 Lynton Avenue, Giffnock, Glasgow G46 7TP.
GW3CBA, J. Kellaway, 50 Winston Road, Barry, S. Glamorgan CF6 7SW.
GM4DTH, P. J. Dick, 9 Greenhill Park, Edinburgh EH10 4DW.
G3HAA, J. R. Morgan, 2-C Waterloo Road, Birkdale, Southport, Merseyside PR8 2HW.
G3IJU, E. Briggs, M.I.E. T.Eng. M.I.S.M., 149 Avondale Drive, Coldharbour Lane, Hayes, Middlesex.
GM3JNW, H. L. Fleming, B.Sc., 30 The Green, Swinton, Duns, Berwickshire TD11 3JQ.
G3NUY, S. Almond, 11 Basset Street, Falmouth, Cornwall TR11 2LW.
G3RSJ, R. H. Williams (ex-9V1NY/9M2NY/9M6MW/ZB2BV), 3 Ford Way, Downley, High Wycombe, Bucks. (*Tel: High Wycombe 446228.*)

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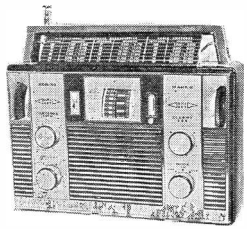

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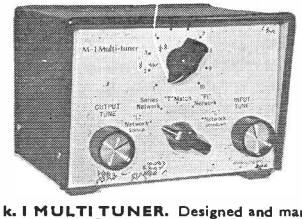

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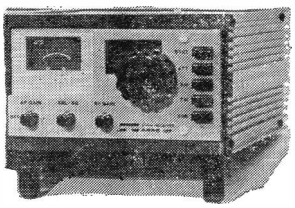

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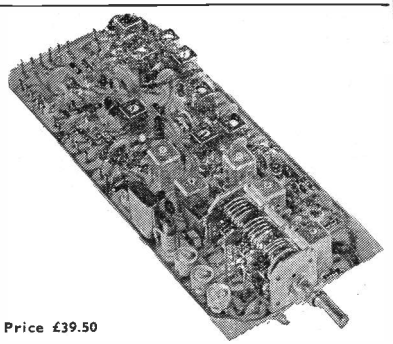

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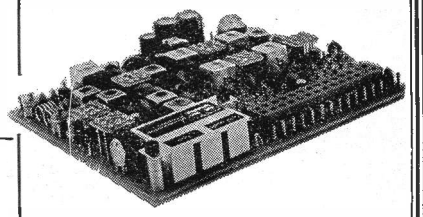

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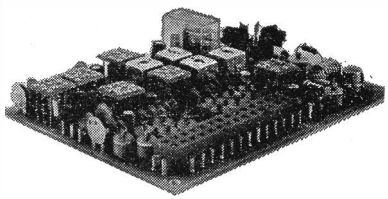

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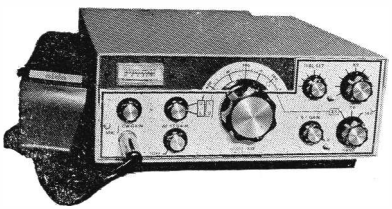
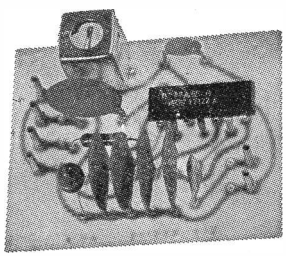
★  ★



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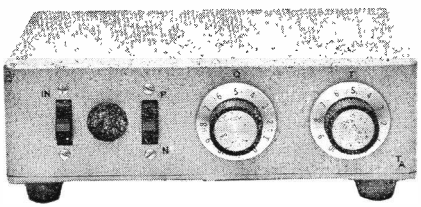

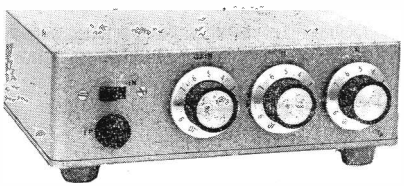

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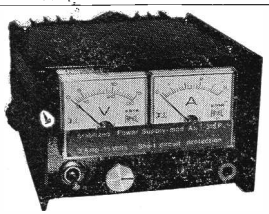

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