

The SHORT WAVE Magazine

VOL. XXXVI

JULY 1978

NUMBER 5

OPEN UP THE EXCITING WORLD OF SHORT WAVE LISTENING



TRIO R300

170 kHz—30 MHz. AM.SSB.CW.
3 Way AC Mains/Battery Power
Completely Self Contained
+TRIO Quality £184.50 carr. £3

FULL CATALOGUE AVAILABLE—SIMPLY SEND 45p IN STAMPS TO MATLOCK

LOWE SRX-30



New Receiver
500 kHz 30 MHz. AM.SSB.CW
Mains/12v Operation
Drift Cancelling System for Spot On Accuracy

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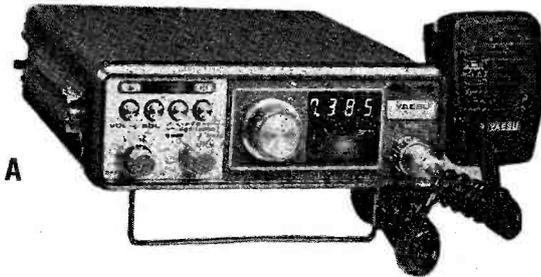
LOWE ELECTRONICS LTD

	Price incl. VAT	Carr. £		Price incl. VAT	Carr. £
RAK ANTENNAS					
A-8XL 80m. 4 element 4kW rating.....	12.15	.86	Hansen SWR3 single meter	9.50	.67
AL-48DXN 80/40m. trap dipole. Length only 28 metres 2 kW. P.E.P.	25.43	1.06	Hansen SWR25 twin meter	10.80	.67
Listener III SWL antenna. Double dipole. 24 metres overall	25.43	.86	Hy-Gain thru line watt meter 3.5 to 30 MHz	32.40	.86
Listener I SWL antenna. Loaded wire ant. Only 5m. long	9.54	.66	Hy-Gain CI centre dipole insulator	3.82	.44
HY-GAIN ANTENNAS—HF Beams					
TH2MK3 2 element yagi for 20, 15 and 10m. 1 kW. rating	117.56	3.00	PUBLICATIONS		
TH3Jnr. 3 element yagi for 20, 15 and 10m. 600W. P.E.P.	121.50	3.00	Log book .....	.75	} inc. P & P
TK3Mk3 3 element yagi for 20, 15 and 10m. 1 kW.	167.62	3.00	Full catalogue .....	.50	
TH6DX 3 element total 20, 15 and 10m.	201.37	3.00	DAIWA MASTHEAD PREAMPS		
Hyquad 2 element quad. 8.5 dB gain on 20, 15 and 10m.	182.25	3.00	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
HY-GAIN ANTENNAS—HF Verticals					
12AVQ trapped vertical self support for 20, 15 and 10m.	39.93	3.00	Rx-430X as above for 70cms.	65.00	1.06
14AVQ/WB trapped vertical self support for 40, 20, 15 and 10m.	56.19	3.00	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
18AVT/WB trapped vertical self support for 80, 40, 20, 15 and 10m.	81.45	3.00	Tx-430XS as Rx-144XS for 70 cms.	90.00	1.06
VHF MOBILE WHIPS					
Revco 2m. 3/8" stainless steel whip and coil	5.06	3.00	DAIWA MASTHEAD PREAMP/LINEAR AMPS		
Revco Lowband stainless steel whip	1.60	3.00	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
Revco Hi-band stainless steel whip	1.18	.67	TRX-430XL as above but for 70 cms.	98.00	1.06
Revco Stand and base mount for above whips	2.95	.30	TRX-144XLS as for 144-XL but with the facility for remotely switching 2 antennas	98.00	1.06
Revco de luxe magnetic mount 3m. coax	14.06	1.06	HILOMASTS—PNEUMATIC TELESCOPIC "PNAM" SERIES		
Bantex B5/GF 2m. 3/8" whip CVW single hole base mount	8.16	3.00	PNAM 9 metres (30ft.) mast	208.44	11.88
Bantex UCL 70 cm. colinear 3/8" over 1/2 wave whip with base	9.62	3.00	PNAM-2 1 1/2 metres (48ft.) mast	254.88	12.96
Bantex UDL 70cm. colinear 3/8" over 3/4" wave whip with base	16.28	.67	ACCESSORIES (Carriage free if supplied with mast)		
Magnetic mount for all Bantex whips	10.40	.66	PNM side mounting brackets (pair)	12.70	.43
"J" Beam TAS 3/8" 2m. whip	13.05	3.00	PN/240 PNAM compressor	99.36	3.02
Daiwa MA41 2m. 1/2 wave gutter mounting with whip, clamp and cable	8.44	.86	PNBP base plate	5.38	.43
Gutter clamp accepts most whips	2.81	.67	GP ground peg	1.25	.21
CABLE (prices per metre)					
5 core rotator cable for AR40 .....	.20	Please add VAT at 8% Up to 20m. £1.00	GS ground stake	3.68	.43
12 core rotator cable—heavy duty .....	.25		PNP/1 50mm. guy plate	1.27	.21
UR43 50 ohm coaxial cable. 4.3dB/100ft. at 100 MHz .....	.17		PNP/2 60mm. guy plate	1.91	.21
UR67/RG8U 50 ohm coaxial cable. 2dB/100ft. at 100 MHz .....	.50		PNP/3 76mm. guy plate	1.91	.21
Twin feeder 300 ohm .....	.08		PNP/4 102mm. support collar	5.21	.43
Twin feeder 75 ohm heavy duty .....	.24		PNC/4 102mm. support collar	6.92	.43
VALVES					
6AHE, 6CB6A, 6CL6, 6UBA, 6BM8, 6BZ6, 6EW6, 12BYA7, 6BA6	each	.90	PNG/70 3 terylene guys (set)	14.90	.43
12GN7	each	2.70	PNG/48 3 terylene guys (set)	12.66	.43
6LQ6 per matched pair	each	7.02	PNG/40 3 terylene guys (set)	11.56	.43
6146B/S2001A	each	6.30	PNG/30 3 galvanised steel guys	12.10	.65
DAIWA ACCESSORIES					
CL-22 aerial tuner unit. 1.8-30 MHz	13.50	.66	*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.		
CL-65 ATU-80—10m. 500V. P.E.P. 200W. CW	54.00	3.00	PLEASE ADDRESS ALL MAIL ORDERS TO MATLOCK		
AT-400X stepped attenuator	41.04	3.00	LOWE ELECTRONICS LTD		
SWX-777 de luxe SWR/power meter with "cross over" metering	75.00	1.06	HEAD OFFICE AND SERVICE DEPARTMENT		
SW-410 SWR/power meter 144 MHz/432 MHz	48.60	.86	119 CAVENDISH ROAD, MATLOCK, DERBYSHIRE		
SW-110 SWR/power meter 1.8-150 MHz. Two power ranges 0-20 and 0-200 Watts	25.92	.86	DE4 3HE		
CS-201 coax switch (SO239 sockets) two way	11.25	.44	Telephone : 9 a.m. to 9 p.m. Matlock (0629) 2817 or 2430		
PLUGS AND SOCKETS					
Microphone plugs 4 pin for Trio, Yaesu .....	.67	.15	Telex : 377482 LOWLEC G		
Microphone sockets 4 pin .....	.67	.15	Southern Sales Peter, G3ZPB, Communications House, 20 Wallington Square, Wallington, Surrey, Tel. 01 669 6700.		
PL259 plugs .....	.51	.15	Midland Sales Peter, G3XWX, Soho House, 362-364 Soho Road, Handsworth, Birmingham. Tel. 021 554 0708.		
Reducers for PL259 plugs .....	.17	.15	Northern Sales Tom, G4DYZ, 27 Cookridge Street, Leeds. Tel. 0532 452657.		
SO239 Sockets .....	.51	.15	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 :		
PL259 in line connectors .....	.82	.15	John, G3JYG 16 Harvard Road, Ringmer, Lewes, Sussex. Tel. Ringmer 812071.		
PL259 angle connectors	1.03	.15	Sim, GM3SAN 19 Ellismuir Road, Baillieston, Nr. Glasgow. Tel. 041 771 0364.		
Standard jack plug 2.5mm. ....	.20	.15	Alan, GW3YSA 35 Pen Y Waun, Efail Isaf, Nr. Pontypridd, Glamorgan. Tel. Newtown Llantwit 3809.		
Standard jack plugs 3.5mm. ....	.20	.15	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.		
Screened phono plugs .....	.25	.15	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.		
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			
Madden 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			

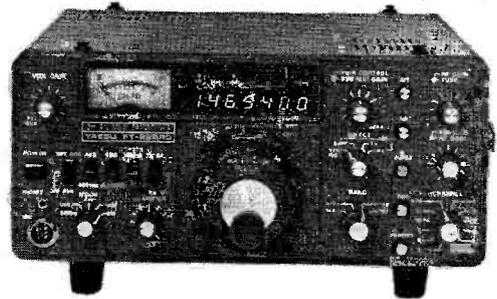
AMATEUR ELECTRONICS UK

AEUK—YOUR NUMBER ONE

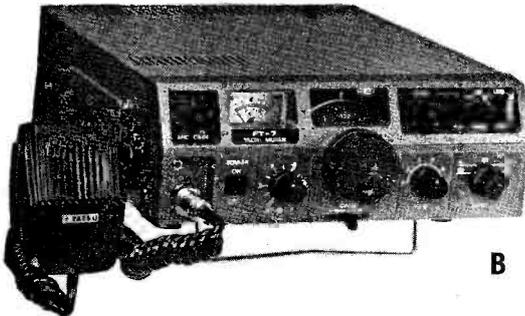
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FAST, SURE SERVICE RIGHT THROUGH.



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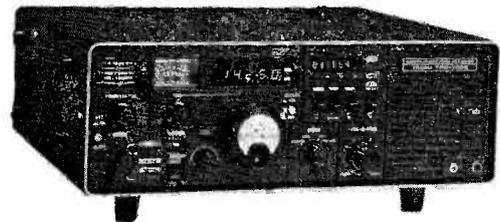
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E



C



F

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SOURCE FOR YAESU MUSEN !



Two New Aces from Yaesu!

Once again the World's most progressive manufacturer of Amateur Radio equipment has come up trumps and now you'll find two new aces in the YAESU winning hand—it's an established fact that more YAESU gear is in use than any other make and this has only been achieved by sheer technical excellence, innovation and style. Even the impressive range shown here is but a part of the full YAESU story and only the catalogue can convey the breadth and depth of the YAESU endeavour—why not take advantage of our offer below and get your own copy?

- A FT-227R** Provides new standards of convenience in 2 metre FM communications. A Phase Lock Loop Synthesiser generates 800 channels in 5 kHz steps between 144 and 148 MHz using an "optical coupling" system for channel selection instead of a rotary switch that could wear out. A memory circuit allows you to memorise any of these 800 channels with return to the memorised frequency at the flip of a switch. The standard repeater shift or any other offset frequency can be utilised. Automatic tone burst and advanced circuitry to protect PA transistors from high SWR or reversed supply polarity. Matching FP-4 AC PSU available. See Catalogue Page 19
- B FT-7** The all-solid state FT-7 mobile transceiver provides high performance on the 80 through 10 metre bands. The operator may select upper or lower sideband or CW operation and the compact package provides many features engineered for convenience while mobile. A single knob provides all transceiver tuning and the state-of-the-art noise blanker minimises impulse-type noise such as that found in mobile applications. The FT-7 is designed for operation directly from your car's 12 volt battery. Can also be used as a base station with the matching FP-4 AC PSU. See Catalogue Page 18
- C FT-901DM** Unparalleled receiver performance plus advanced transmitter features make the FT-901DM the ham's dream come true. The receiver features rejection tuning, dual-filter variable band width tuning and audio peak frequency tuning for maximum rejection of unwanted signals. Transmitter includes built-in Curtis keyer and RF Speech Processor and features a 10 second "TUNE" timer to safeguard your finals. Includes memory for both transmit and receive frequencies, an advanced noise blanker and off-set tuning on both transmit and receive. All modes, USB, LSB, CW, FSK, AM and FM, 160 thru 10. See Catalogue Page 3
- D FT-225RD** This is the very latest of the growing 2 metre range and incorporates digital frequency read-out, optional repeater shift, variable power output, noise blanker, selectable AGC and gives all-mode operation on LSB, USB, CW, FM and AM. The 225RD is, of course fully portable and can be operated off mains supply or 12v. DC and has a host of other fine features including provision for an optional memory unit. Model 225R analog version also available. Full frequency memory option as pioneered in the FT-901DM. Full details with Catalogue
- E FRG-7** The model FRG-7 is a precision built, high performance Communications receiver designed to cover the bands from 0.5 MHz-29.9 MHz without gap. The advanced technology employed in its circuitry includes the famous Wadley Loop System drift cancelling technique. This coupled with a triple conversion super heterodyne system guarantees extremely high sensitivity and exceptional stability. Careful design has minimised unwanted spurious signals so often encountered in cheaper imitations. Features include RF attenuator, selectable audio filter and automatic noise suppression circuit. See Catalogue Page 13
- F FRG-7000** New all solid-state digital read-out general coverage receiver. Covers from 0.25-29.9 MHz AM, SSB, CW. Has unique digital clock feature which incorporates timer which controls rear apron connections to external equipment such as tape recorder, etc., etc. This de-luxe receiver has everything for the dedicated SWL and professional user and supplements the famous FG-7 which continues in production of course. Full details with Catalogue

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Here's a 10-1 winning offer if you'd like the latest Yaesu catalogue. Just send us 4—9p stamps (36p) and we'll send you Yaesu's latest fully illustrated brochure together with our Credit Voucher for £3.60 against your eventual purchase. A couple of stamps will bring you the latest Atlas or Swan leaflets or our current used equipment list.

BRANCH: AMATEUR ELECTRONICS, UK—COASTAL, CLIFTONVILLE, KENT. KEN McINNES, G3FTE, THANET (0843) 291297. 9 a.m. - 10.30 p.m.

BRANCH: AMATEUR ELECTRONICS UK—SCOTLAND 287 MAIN STREET, WISHAW, LANARKSHIRE. GORDON McCALLUM, GM3UCI. TELEPHONE WISHAW 71382. (EVENINGS CARLUKE 70914.)

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In 1963 Drake led the way by producing the first commercially available transceiver that employed the now widely copied 9 MHz i-f frequency. Even today, 15 years later, many major competitive transceivers are still being introduced using i-f's in this range.

In 1978 Drake leads the way again by developing the first commercially available amateur transceiver that uses a 48 MHz i-f, through the technique of "Up-Conversion." This system greatly improves image and general coverage performance, and will be copied in the years to come. With Drake you can join the new state of the art today!

Now **RADIO SHACK LTD.** presents a new addition to the famous C Line from the R. L. Drake Co.



DRAKE TR-7 solid state continuous coverage synthesized hf system

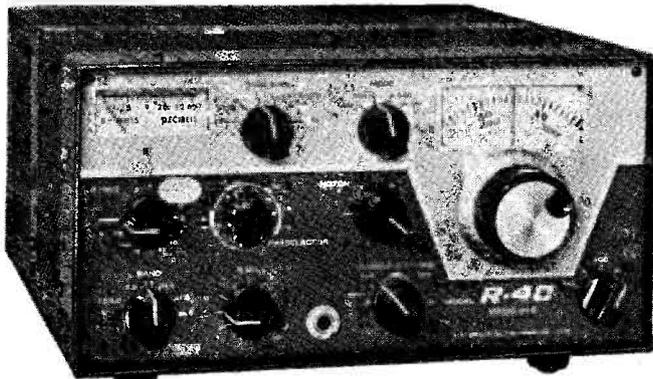
0-30 MHz continuous coverage reception capability.

160-10 metres Amateur Band transmission, including capability for Mars, Embassy, Government and future band expansions.

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To answer your next question, the famous C line continues in production led by the big DXer's ideal radio, the R-4C Receiver.



R-4C amateur band receiver, £427.50 inc. VAT

T-4XC matching transmitter with AC-4 psu package deal, £499.95

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DRAKE RECEIVERS AND ACCESSORIES

R-4C	Receiver—SSB, AM, SW, RTTY	... £380.00	£427.50
FL 250	Filter for R-4C (.250 kHz)	... £36.00	£40.50
FL 500	Filter for R-4C (.500 kHz)	... £36.00	£40.50
FL 1500	Filter for R-4C (1.5 kHz)	... £36.00	£40.50
FL4000	Filter for R-4C (4.0 kHz)	... £36.00	£40.50
FL 6000	Filter for R-4C (6.0 kHz)	... £36.00	£40.50
4-NB	Noise Blanker for R-4C	... £48.00	£54.00
MS-4	Matching spkr. for R-4C/T-4XC/ TR-4CW	... £22.00	£24.75
SPR-4	Receiver—general purpose	... £400.00	£450.00
	DC Power Cord for SPR-4	... £3.60	£4.05
	Accessory Crystals for SPR-4	... £4.00	£4.50
DSR-2	Digital Receiver	... £200.00	£225.00
SSR-1	Receiver—general purpose	... £133.20	£149.85

DRAKE TRANSCEIVERS and ACCESSORIES

TR-7	Transceiver with DR-7 general coverage/Digital Readout Board fitted	... £664.00	£747.00
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AC-4	115/240v. PSU for TR-4CW/T-4XC	£76.00	£85.00
34-PNB	Plug-in Noise Blanker for TR-4CW	£64.00	£72.00
DC-4	12v. PSU for TR-4CW/T-4XC/R-4C	£86.00	£96.75
RV-4C	Remote VFO for TR-4CW	£94.00	£105.75
UV-3E	144-432 MHz FM Transceiver	£440.00	£495.00
PS-3	AC Power Supply for UV-3E	£62.00	£69.7
UMK-3	Remote Trunk Kit for UV-3E	£48.00	£54.00

Ex VAT Inc. VAT

DRAKE TRANSMITTER AND ACCESSORIES

T-4XC	Transmitter—SSB	... £380.00	£427.50
L-4B	Linear Amplifier and Power supply	£620.00	£697.50
MN-4C	Antenna Match Network (new model)	... £110.00	£123.75
MN-2000	Antenna Match Network	... £153.60	£172.80

DRAKE ADDITIONAL ACCESSORIES

W-4	RF Wattmeter 2-30 MHz	... £54.00	£58.32
WV-4	RF Wattmeter 20-200 MHz	... £60.00	£64.80
TV 42 LP	Low Pass Filter 100w.	... £9.00	£10.13
TV 3300 LP	Low Pass Filter 2kw	... £16.00	£18.00

VERY SPECIAL PACKAGE DEAL FOR CASH SALES OR H.P. ONLY

We are offering the TR-7 Transceiver with DR-7 General Coverage/Digital Readout Board plus PS-7 Power supply for the **exceptional price of £783.00 including VAT. (£696 ex. vat)**

Obviously at this price we cannot accept trade-ins

Securicor Delivery £6.00

PS-7	120/240v.	for TR-7	... £114.00	£128.25	RP-500	Receiver protector	... £56.00	£63.00
RV-7	Remote VFO	for TR-7	... £105.78	£119.00	7072	Hand microphone	... £12.60	£14.18
MS-7	Matching speaker	for TR-7	... £22.00	£24.75	7075	Desk microphone	... £25.00	£28.13
NB-7	Noise Blanker	for TR-7	... £49.60	£55.80	RCS-4	Remote control Antenna Switch	... £74.00	£83.25
FA-7	Fan	for TR-7	... £16.00	£18.00		Accessory Crystals	... £4.00	£4.50
AUX-7	Range prog. Board	for TR-7	... £25.60	£28.80		Fixed frequency Crystals	... £7.00	£7.88
SL-300	CW Filter	for TR-7 (.300 kHz)	£35.20	£39.60		Spare operating manuals	... £3.00	£3.00
SL-500	CW Filter	for TR-7 (.500 kHz)	£35.20	£39.60	B-1000	Balun. 4:1 for use with MN-4C only	... £16.00	£18.00
SL-1800	SSB/RTTY Filter	for TR-7 (1.8 kHz)	£35.20	£39.60		The R.L. Drake Company are no longer making the following items: however, we still have a few of each —please check our stock position before ordering:—		
SL-6000	AM Filter	for TR-7 (6.0 kHz)	£35.20	£39.60	TA-4	Transceiver adaptor for SPR-4/T-4XC	£24.00	£27.00
MMK-7	Mobile mounting kit for TR-7	... tba	tba		FF-1	Crystal Control for TR-4CW	... £34.00	£38.25
MN-7	ATU with RF Wattmeter. 160-10m. 250w.	... £110.00	£123.75	A-10	10 watt 2m. Amplifier	... £40.00	£45.00	
WH-7	HF Wattmeter/VSWR Bridge	... £58.20	£62.85					
TR-4CW (RIT)	Transceiver—SSB, CW with R.I.T.	£448.00	£504.00					

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Western



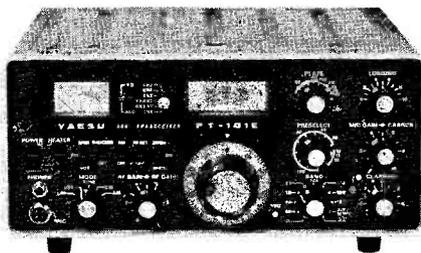
VALUE FOR MONEY
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THE WORLD'S NUMBER ONE TRANSCEIVER
TRIED AND TESTED WORLD-WIDE



Value and performance in one compact thirty pound package. Effective RF speech processor to realise the extra "talk power" to cut through the pile-ups without the need for a linear. All solid-state except for driver and final valves. Plug-in modules for ease of servicing—on the rare occasions it needs it! 12 volt dc or ac mains operation built in. Just add antenna and volts to be on the air—all bands 160 to 10 metres. Accessories available—CW filter; matching speaker; remote VFO.

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FT101E **£517.50**

SPI01B Speaker **£18.00**

FV101B VFO **£82.12**

FL2100B Linear **£313.87**

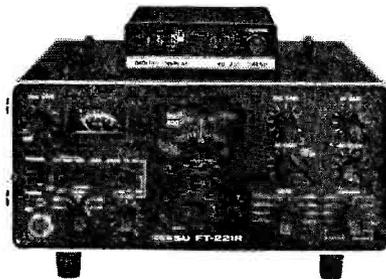
YOUR LAST CHANCE AT THIS PRICE !

FT221R

All-mode operation—SSB (USB, LSB), CW, AM, FM. All solid-state reliability with plug-in modules. Rugged 70-watt dissipation PA transistor for stability and reliability. VHF local oscillator (133–137 MHz VCO) in PLL system minimises spurious responses.

12 volt dc or ac mains operation built in.

Full 4 MHz (144–148) coverage with 600 kHz repeater shift and access tone generator.



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£392.63

OTHER **YAESU** PRICES FROM **Western** SEE HOW WE COMPARE !

FRG-7	0.5–30 MHz GENERAL COVERAGE RECEIVER	The only logical choice hundreds of SWL's can't be wrong !	£178.87 inc. VAT
FT-227R	2M SYNTHESISED FM TRANSCEIVER	Direct frequency readout; auto tone-burst PLUS reverse repeater option—ONLY from WESTERN	£201.37 inc. VAT
FC-301	ALL-BAND ANTENNA MATCHING UNIT	160–10M.; 500W. P.E.P.; 50 ohms ; built-in antenna switch and SWR/PWR. meter	£100.12 inc. VAT

. . . ALSO THE NEW **FT225R** at **£506.25** and **FT225RD** at **£540.00**

SEND 15p IN STAMPS FOR LATEST YAESU MUSEN EQUIPMENT CATALOGUE

Electronics (UK) Ltd

ANTENNAS! SUMMER CLEARANCE OFFERS!

Limited stocks of some items—First come, first served!

★	Asahi	AS-103, 3-element 10m. beam	£37.06	★
	Asahi	AS-21, 3-element 15m. beam	£38.81	
	Hy-Gain	402BA, 2-element 40m. beam	£150.00	
	Hy-Gain	203BA, 3-element 20m. beam	£111.00	
	Hy-Gain	204BA, 4-element 20m. beam	£135.00	
	Hy-Gain	153BA, 3-element 15m. beam	£62.00	
	Hy-Gain	TH3 Jr., 3-element tribander (600W. pep)	£108.00	
	Hy-Gain	TH2 Mk. 3 2-element tribander (2kW. pep)	£105.00	
	Hy-Gain	18v., 80-10m. vertical	£27.00	
★	Hy-Gain	I2RMQ, roof-mounting kit with radials for 10/15/20m.	£14.50	★
	Hy-Gain	I4RMQ, roof-mounting kit with radials for 40/20/15/10m.	£17.50	
	Hy-Gain	Lightning arrestors	£17.50	
		Type LA-1—panel fixing	£3.05	
		Type LA-2—in-line	£88.00	
	Wilson	M615, 6-element, 15m. beam	£212.00	
	Wilson	M620, 6-element, 20m. beam	£74.75	
★	Wilson	DB32, 3-element, 20/2-element 15 duo-band	£345.00	★
	Wilson	DB62, 6-element, 20/2-element 40 duo-band	£340.00	
	Wilson	DB67, 7-element, 20/6-element 15 duo-band	£150.00	
	Wilson	DB76, 7-element, 15/6-element 10 duo-band		
	Newtronics	"Hustler" for HF Mobile		
★		BM-1 Bumper mount with ball	£9.75	★
		MO-2 Mast	£12.95	
		RM-80 80m. resonator	£13.95	
		RM-40 40m. resonator	£13.15	
		RM-20 20m. resonator	£10.50	
		RM-15 15m. resonator	£9.65	
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★		C-32 Ball mount	£4.75	★
		QD-1 Quick-disconnect	£9.65	
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	Newtronics	G6-144A, 2m. base station colinear	£49.00	

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2M FM Synthesised Transceiver



The Multi-800D covers all channels from 144-148 MHz in 5 kHz intervals and there is no guessing what frequency you are transmitting or receiving on. Many views have been voiced as to the good and bad points of digital displays, but let's face it, with digital readout there is only one display that is not ambiguous—readout of the true transmit and receive frequencies. The 800D overcomes all criticisms levelled at other models by giving true readout. Thus on S20 TX/RX indicates 145,500. Flip to the repeater mode and R7 reads receive 145,775 changing to 145-175 on transmit (makes sense doesn't it). For reverse repeater operation simply flip the mode switch to reverse repeater and you are listening on the input channel with the display changing to 145-175. No cranking of dials with the 800D, electronic tuning takes care of that.

£249 including VAT. Remote Display £16.

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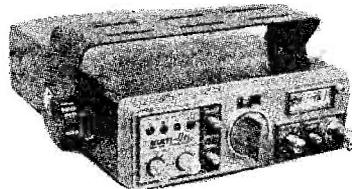
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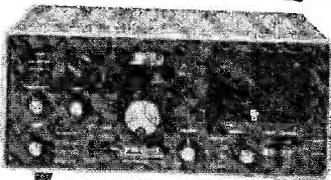
23 Channels
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SIGNALS FROM DARKEST AFRICA TO THE NORTH POLE
OR KEEP IN TOUCH ON THE ROAD OR AT YOUR FIRESIDE WITH YOUR LOCAL AMATEURS
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YAESU FRG7 SHORT WAVE RECEIVER



GREAT VALUE — GREAT PERFORMANCE
£184.50 inc. VAT delivered UK

Whether your interest is in amateur band listening or short wave broadcast monitoring, this receiver must be your first choice. Rarely does one find a low cost receiver that embodies the advantages of general coverage whilst retaining first class band-spread—but the FRG7 is the exception. None of the weaknesses manifest in similar models such as drift, cross modulation, image problems or poor calibration are evident in the FRG7. We have sold many of these receivers to customers throughout the U.K. —and all agree the FRG7 is a winner.

If you're thinking of buying one, why not give us a visit, telephone call or drop us a line. We'll be glad to give you any additional information you may require. And remember, we have our own fully trained service personnel to give you the back-up service that has made us one of the U.K.'s leading communications retail outlets.

TM56B AMATEUR VHF MONITOR RECEIVER

230 volts AC 12v. DC 10 Channels fitted

12 CHANNELS
+
4 AUTOSCAN



NEW STOCKS ARRIVING END OF JULY

Tune into the exciting World of Amateur Radio with this advanced monitor receiver. Listen to your local amateur radio stations both fixed and mobile, direct or through your local repeaters. From the comfort of your fireside chair using the built-in 230 volt AC power supply, this receiver will open up the whole new World of VHF Amateur Radio for you... Alternatively the necessary hardware supplied enables you to power the TM56B from your car radio battery for true mobile operation.

GREAT VALUE
Little wonder that the first shipments of these beautifully engineered receivers were sold out within weeks of the advertisements appearing. We really are amazed at their superb performance at such a low price.

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The design is well and truly tried and tested, and the circuitry is almost identical to the receiver section of the FDK mobile transceivers. Both sensitivity and selectivity leave nothing to be desired and the auto-scan enables the popular calling channels to be continually monitored for activity.

NO HIDDEN EXTRAS

The receiver is supplied complete with all leads, circuit diagram crystals for channels S0, 20, 21, 22, 23, R3, 4, 5, 6, and 7 plus space for a further 6 channels making 16 in all. An additional matching desk top aerial is also available at £2.50 extra.
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5-30 MHz AC/DC ... £184-50
- FRG7D As above but digital
readout ... £227-25
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Rx AC/DC ... £523-00
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AC/DC ... £545-60
- FT101EE As above less processor
£527-60
- FT101E Extra-narrow CW filter
£23-35
- FV101B External vfo for FT101 ... £82-65
- SPI01B External speaker for FT.
FR Series ... £18-56
- FT200 Transceiver 80-10m. 260
watts ... £343-00
- FP200 Matching AC PSU for
above ... £73-70
- YQ101 Monitor scope ... £166-86
- FT227R 400 channel FM trans-
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- FT901DM Digital 160-10m. trans-
ceiver 200W. ... £905-00
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- YD844 Desk microphone ... £20-25
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- FT225R 2m. All mode ... £528-75
- FT225RD 2m. All mode digital... £369-12
- FRG7000 Gen. coverage rx. ... £320-60

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quality amplifier 2KW pep
continuous ... £695-00 (n.c.)
- MT3000A 160-10m. ATU-SWR/
PEP-5-way selector 3KW ... £275-00 (n.c.)
- MT2000A 160-10m. ATU long
wire, coax, balanced feed
3KW ... £175-00 (n.c.)
- 160-10AT 160-10m. ATU long
wire, coax, balanced feed 1KW
MONITOR 160-10m. ATU as
above, Rf indicator, 300 watts
W-2 160-10m. SWR/POWER
METER 0-200/02KW DC/PEP
160-10m. Doublet. Tuned
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model ... t.b.a.
- A separate catalogue on Dentron
is available priced 25p-re-
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3 el. ... £119-25 (£2-50)
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soon.
- Mosely TA33 JR 10-15-20m.
3 el. ... £106-87 (£2-50)
- Mosely TA32 JR 10-15-20m. 2 el.
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- Mosely RDS SWL Amateur band
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10-40m. ... £56-20 (£2-00)
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- 677 5/8th wave deluxe 2m. ... £14-95 (£1-00)
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yagi with 1 1/2" boom ... £12-65 (£2-00)
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yagi with 1 1/2" boom ... £26-32 (£2-00)
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mounting ... £21-66
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RZ100 ... £54-00
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(10w. Drive) ... £399-00 (£4-50)
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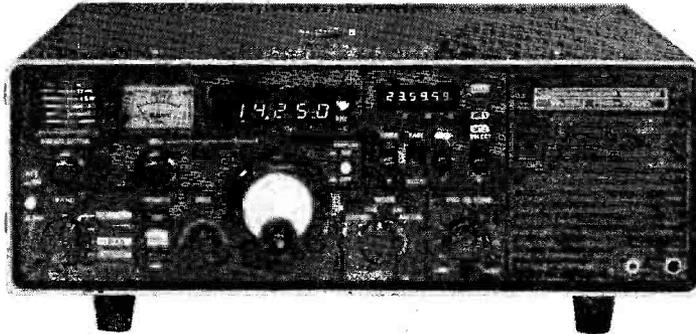
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FRG 7000



THE FRG7000 IS A HIGH PERFORMANCE ALL STATE COMMUNICATIONS RECEIVER DESIGNED TO COVER THE ENTIRE HIGH FREQUENCY SPECTRUM OF 0.25 TO 30MHz. WITH BRIGHT 7" SEVEN SEGMENT LED'S PROVIDING DIGITAL READOUT TO 1 kHz. ALSO INCLUDED IS A 24 HOUR DIGITAL CLOCK FOR BOTH LOCAL AND GMT TIME, WITH A TIMING FEATURE FOR AUTOMATIC RECEIVER (AND/OR TAPE RECORDER THROUGH REAR PANEL RELAY CONTACTS) ON/OFF SWITCHING.

The Barlow Wadley loop (Triple conversion Superhetrodyne) system used, proffers extremely stable (better than 500Hz/hr. A.W.U.) performance. Ceramic IF filters with a 6dB bandwidth of 3 kHz for SSB & CW (8 kHz at 50 dB) and 6 kHz bandwidth for AM (14 kHz at 50dB) provide optimum intelligibility coupled with good rejection of interference.

The Mosfet RF amplifier offers an outstanding sensitivity of 0.7µV for 10dB S/N on SSB and 2µV for 10dB S/N on AM, without sacrificing strong signal performance. Wide provisions are made for antenna connections: for M.W. broadcast (0.25-1.6 MHz) a high impedance binding post, for 1.6-30 MHz a SO239 socket (to take a 50-75 ohm unbalanced coaxial feed) plus binding post (for random low impedance length S.W. antenna). Also on the antenna terminal strip is the earth and a mute (earth for standby) connector.

Audio output of up to 2 Watts drives the internal speaker, but plugging in an external 4 ohm unit or headphones (1/2" Jack) disables this. A socket for tape recording produces about 50mV independent of the volume control setting. A built in mains power supply allows operations from 100/110/117/220/230v. AC (50 or 60Hz). To reduce the power consumption (of 25W) the front panel lamps and displays may be extinguished.

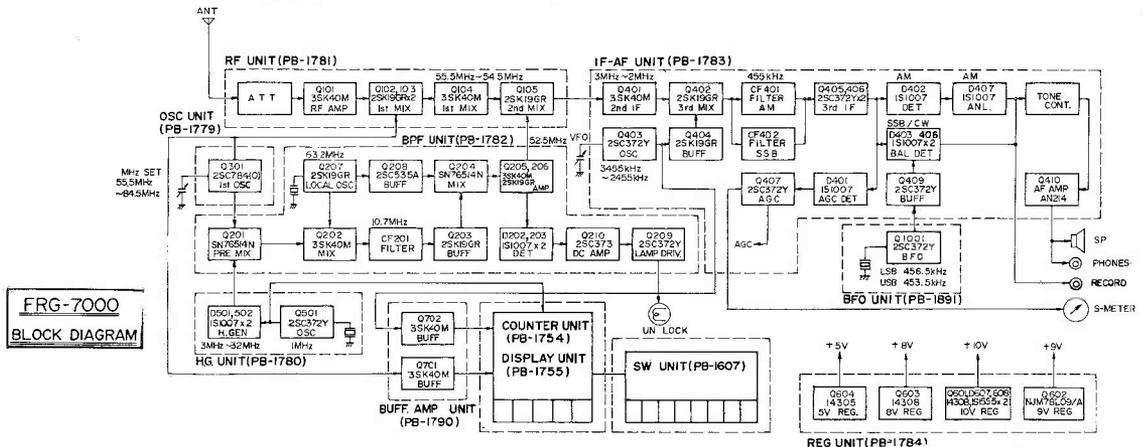
For high reliability FET's and IC's are used extensively throughout the receiver providing maximum performance within a compact cabinet (36(w), 12.5(h), 20.5(d) and 7Kg.). For ease of service plug in boards are employed widely.

A switchable RF attenuator, AM noise limiter and amplified AGC, assist in reception under adverse conditions of a strong adjacent signals, impulse noise and deep signal fading. The continuously variable audio filter minimises the high or low audio responses as required, and a fine Tune (± 2.5 kHz) allows easy zeroing of a desired station.

Free quency readout is taken directly from the digital display. The first two digits are controlled by the "MHz set" oscillator, the remaining three by the VFO (both via a CPU). The receiver front end is a narrow band with preselector and rangeswitch colour coded for ease of use, to provide the maximum in sensitivity and rejection of out of band signals.

Accessories included are the handbook, plugs (for every socket in the receiver) and 3 and 10m. wire antennas.

FRG7000 Ex Stock, £306 + 12½% VAT



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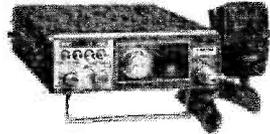
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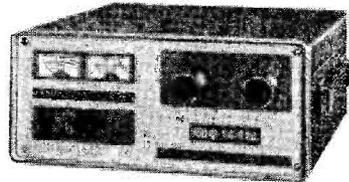


NOW THE YAESU FT227R WITH SMC SCANNER

WE ARE PLEASED TO HAVE MADE THE 227 EVEN BETTER! In addition to full coverage of 2 metres in 5 kHz steps our internally mounted scanner permits automatic tuning of 145-146 MHz in 25 kHz steps in 4 or 10 seconds (switchable). When it finds an occupied channel it stops giving you 7 seconds before it moves on. If you wish you may lock it onto that channel or if you do not want to listen to that frequency (LO for instance!) a momentary squeeze of the P.T.T. will make the scanner skip the channel the next time round.
FT227RX, £191.00 + VAT FT227RXS, £235.00 + VAT Scanner (inc. installations) £45.00 + VAT
 PLEASE NOTE the invaluable lock-out facility and remember that this is the only factory approved scanner module.

THE NAG 144XL LINEAR Ex stock £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 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 excitors. 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 out 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.



KYOKUTO DENSHI SCANNING FM2015R

The 2015 transceivers across 144-146 (RX to 149) MHz in 5 kHz steps tuned by coaxial switch stopped at 0 and 9.

A major feature is the four-channel RAM memory (with an internal Ni Cad back up) which may be programmed direct from the front panel by simply dialling in a frequency, no screwdrivers, no soldering irons, no fuses. Frequencies can be recalled from the memory instantly or they may be scanned in either of two modes—searching for a vacant or an occupied channel, five split (including + and -600 kHz) for repeater or transverter (even tripleverter) use. Multipurpose tone burst, RIT (centre off with "click"), modular constructions, centre zero meter, accessory socket, mounting bracket, microphone etc., are all provided. The sensitive receiver is varicap tuned by the DC level of the PLL IFS of 16.9 MHz and 455 kHz provide high image rejection and good shape factor 2 : 1 at 70dB (12 kHz BW). In the transmitter, modulation is applied directly to the VCO (for the ultimate in fidelity), auto power control and varicap tuning keeps power output constant at band edges and spuri will down.
£45 + VAT (12½%) Ex-STOCK



12 Volt Power Supply



ODR123C

12v. DC from 240v. AC 3 amps. (5A peak) 3½ lbs. 3" x 4½" x 6". Binding post terminals with 4mm. socket, 1 built. Mains neon indicator.
ODR 123C (post free + 8%) £13.42

VHF HANDHELD TRANSCIEVER

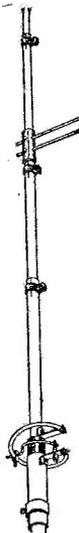


KEN KP202 + VAT Price)

144 MHz, FM, 2W of RF and ½W. of audio. Immunity to breakthrough. Performance to rival all walkie-talkies and many a mobile set.

- C/w F plug, leather handle/whip case and telescopic whip.
- Fitted six channels S20 and S21 plus choice from S (21, 23, 24, 0) and R (3, 4, 5, 6, 7) ... **£114.50**
- R channel only crystal tone burst ... **£10.00**
- Flexible stubby antenna ... **£5.95**
- Case ... **£4.95**
- F to UHF adaptor ... **£1.65**
- Nicads ... **£9.00**
- Base charger KCP2 ... **£12.75**

CUSHCRAFT COLINEAR (illustrated right) EX STOCK
 RINGO RANGER —6dB gain over ± ground plane. Uses 3 x ¼ in phase and 1/8 in stub. Ultra low angle radiation. Extremely low wt.
ARX450 432 MHz RINGO RANGER Post 65p (+ 12½%) £21.50
ARX2 144 MHz RINGO RANGER Post 85p (+ 12½%) £21.50



Boom Microphone Headset

600 ohm magnetic lightweight boom mic. Ideal for mobile or contests, etc. (Post free but VAT + 12½%).
 Microphone only ... **£9.75**
 Footswitch only ... **£5.85**
 MDS3 complete ... **£14.75**

VHF/UHF MONITOR RECEIVERS

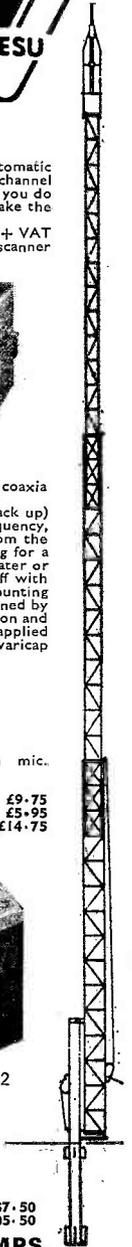
SEIWA MR2, MS2 and MR3 (+ VAT prices)

Ideal for the pocket monitor applications, professional SWL, repeater monitor, raynet, net, YL etc. Tiny (2½" x 1½" x 4½" MR2) (2½" x 4" x 4½" MR3) and light. 8oz. Slips into pocket or onto your belt with optional case. Sensitive double conversion superhet with 12 kHz bandwidth, auto squelch and generous audio output, comes with Nicads, mains charger, ear piece, antenna, etc.
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- 2 A fully automatic tone burst which operates only in repeat mode with NO buttons to press either on the front or on the back of the set.
- 3 Instant reverse repeat at the flick of a switch without any re-tuning or memory programming.
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- 5 A reasonable price—but (more important) a quick, reliable after sales service.

COMPARE THIS LIST WITH PREVIOUS ADS FOR VARIOUS TRANSCEIVERS AND YOU WILL SEE THAT THE 240 WINS EVERY TIME.

IC-240

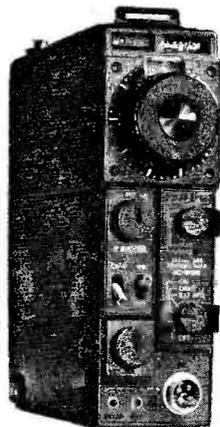
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inc. VAT

SUPERSCAN £77.63 inc. VAT
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IC-202
£169 inc. VAT

◀ **IC-202**

IC202 The 2m. SSB/CW portable which is clean enough to use as a prime mover to drive a linear. The VXO gives continuous coverage over the ranges 144.0-144.2 and 144.4. The coverage can be extended with extra crystals switchable from the front panel. This is the ideal set to buy if you are thinking of sampling the delights and advantages of SSB on 2m. as it gives full coverage of the SSB and CW portions of the band with easy, continuous tuning.
Now available ex stock, delivered free for £162 inc. VAT.



IC-215
£159 inc. VAT
and delivery

▶ **IC-215**

IC-215 By far the best 2m. FM portable on the market—with more power (3W) than most and batteries some 4 times as big thus giving a reasonable period of operating use. Add to this the superb, clear modulation for which ICOM are so famous and a good receiver, plus a solid, reliable construction and you have really good value for money.
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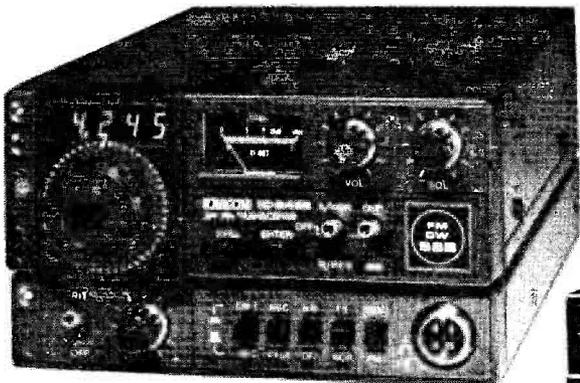
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IC-211E ▼

£549

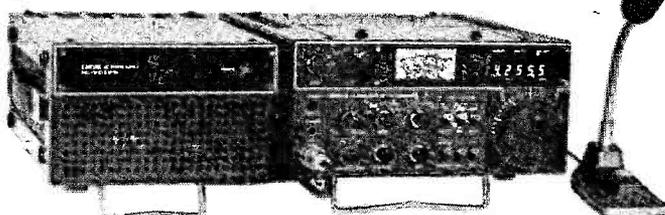
Giving you FM/CW/USB/LSB, all produced from the amazing ICOM synthesizer and patent LSI chip. Frequency read out is to the nearest 100Hz and is amazingly stable and accurate. You can use the two frequency stores as separate VFOs or for any repeater shift required. The tone burst is automatic, of course, and reverse repeat is available at the flick of a switch. Add a keypad (we will give you the circuit to make your own or you will be able to buy one shortly) and find a new facility which is quite impossible with old-fashioned rigs. The original waiting list has now been dealt with and you can now have one from stock.



IC-245E ▲ £396

This truly amazing little box gets you mobile on FM, USB or (if you really think it a good idea) CW! The synthesizer is the same as the IC-211E and can be tuned to the nearest 100Hz, again with amazing accuracy. Of course such a versatile little box will often be used as a base station and facilities such as keypad operation can be added. They are now ex-stock—but only just!

IC-701



◀ Introducing "SLIM JIM" SJ2

144-146 MHz—High efficiency 2 metre omni-directional vertical.
An omni-directional 2 metre aerial developed by T & T from a design by F. C. Judd (G2BCX). Derived from the "J" the SJ2 is a free space aerial with better than 50% greater efficiency than conventional ground plane types due to the very low angle radiation field. The aerial is slim and compact (58 inches long) and as there are no radials it is unobtrusive and has low wind resistance. Supplied complete with mast clamp, £15.50 inc. VAT (carriage £1.00).

The HF rig to beat them all, which is available now! ★All solid state including the finals. ★100W RF output Continuous Duty on All Bands, All Modes. ★All bands 1-8-30 MHz. ★USB, LSB, CW, CW (narrow), RTTY ★Double balanced Schottky Diode mixer used in both Tx and Rx. ★Fully synthesized with Digital readout to 100Hz and two stores to enable split frequency operation. ★ICOM's unique band-pass tune. ★VOX, Semi-break-in CW, RIT, AGC, Noise Blanker. ★Built-in RF speech processor. ★Extremely compact. ★All filters built in. ★12v. or mains operation. ★Electret desk mic. After having used this rig for several weeks on the air we think that it is definitely the nicest HF rig we have ever used. £999.

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TW232	Ceramic Desk mic with PTT, Lock sw and gain cont. Silver grey finish	Compression amp 0-30dB var.	<4.5K	£23-00
DH-218	Moving coil dynamic. Hand held	NONE	500Ω	£4-99
DH-233	Moving coil dynamic. Hand held	Pre-amp 0-15dB var.	<3.5K	£9-00
CH-229	Ceramic noise cancelling. Hand held	Compression amp 0-35dB var	<5K	£15-00

Post and packing 50p in all cases.

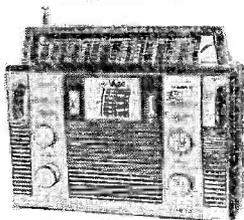
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G3MCN



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£150.00 inc. VAT
 XCR-30 FM Receiver with FM band 87-5 to 101 MHz.
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Mk. 1 MULTI TUNER. Designed and manufactured by us. 50 tunable switched positions for antenna lengths over 5 metres in the 2-30 MHz range. Five different circuits to give an excellent match between your receiver and antenna. Now in use in over 35 countries.
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 See Test Report in February "Short Wave Magazine".



YAESU FRG-7 RECEIVER. Mains and battery operated receiver 0.5 to 10 MHz. Solid state. Advance circuitry offers excellent performance for the DX listener at a moderate price.
Price £177.00

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TR7500 VHF Transceiver	£225.00	...
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VB2200 GX 10 watt n.obile PA	£45.00	...
TR8300 UHF Transceiver	£244.00	...
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AT200 Antenna Tuner	£93.00	...
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Most Drake models available to order.		

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CD44	£106.87	300 ohm Ribbon
AR22	£48.38	10p metre
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PL289	75p	Cable reducers 15p

NEW MODEL		
0-15v. DC stabilised mains power Unit. 3 amps load. Twin meter. Only 6" x 6" x 5 1/2"		£26.00

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Eddystone EC10MK2 Receiver	£95.00	...
Eddystone EC10MK2 Receiver	£100.00	...
Eddystone EC10MK2 Receiver with AC psu	£110.00	...
FDK "Quartz" VHF FM Transceiver	£110.00	...
Heathkit GR78 Receiver	£75.00	...
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Yaesu FT250 Transceiver. No psu	£185.00	...
Yaesu FT200 with AC psu	£275.00	...
Yaesu FT221R VHF Transceiver	£330.00	...
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Your Secondhand Equipment Stock changes daily. Send SAE for latest list.

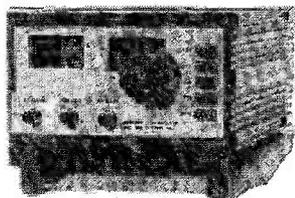
ACCESS and BARCLAYCARD facilities. Instant HP service. Part exchanges always welcome. Spot cash paid for good clean equipment. If you have equipment surplus to your requirement we would be pleased to sell this on commission for you. Shop Hours: 9.30 to 5.30 Monday to Friday 5 p.m. Saturday. No parking problems. Turn at the Greyhound Motel on the A580 (East Lancs.) Road. S.A.E. with all enquiries. 25p will bring you latest information and prices, credited to your first purchase over £5. Postage carriage extra. ALL OUR PRICES INCLUDE VAT. Prices on all imported equipment subject to price increase.

S.T.E. MILAN VHF EQUIPMENT

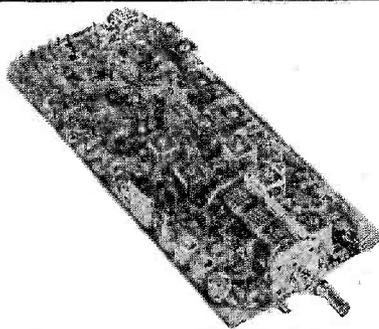
As sole distributors for the STE range of equipment for four years despite rising prices, we have maintained prices stable for over two years. Surely the finest value for money on the market. With the opening of the 28 MHz band the AR10 Receiver module is now one of our fastest selling lines. Demand for these is growing every month.

PRICE LIST including VAT and postage

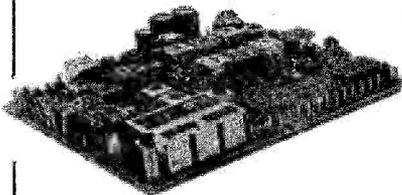
ARAC 102 Receiver	... ..	£100.00
ARAC170 Receiver	... ..	£127.50
ATAL 228 Transmitter	... ..	£127.50
ASAP 154 AC PSU	... ..	£37.50
AR10 Receiver Module	... ..	£39.50
AA1 Audio Amplifier	... ..	£4.10
AD4 FM Discriminator	... ..	£5.00
AT22 Transmitter	... ..	£50.00
AG10 Tone Generator	... ..	£4.50
AR20 C.C. Receiver	... ..	£45.00
AT23 C.C. Transmitter	... ..	£50.00
AS15 Stabilised DC PSU board	... ..	£10.00
AL8 Linear Amplifier	... ..	£27.00
AB40 Mobile 40 Watt FM Amplifier	... ..	£55.00



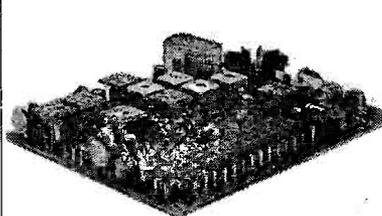
ARAC 102 receiver, 28-30 MHz. 144-146 MHz. AM-SSB-FM-CW Price £100.00



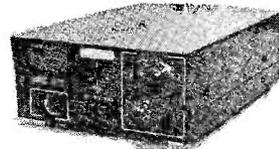
AR10 Mosfet receiver, 28-30 MHz Double conversion superhet. RF and amplifiers stages are gate protected mosfets for good sensitivity and low intermodulation. Noise limiter and squelch circuit. AM, SSB and CW reception. 12v. DC.



AR30. 12 channel FM receiver 144-146 MHz. Input impedance 50-75 ohm. AM-FM modes. Sensitivity 0.2uv AF output 3 watts. 12v. DC operation.



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



AK20, STE. Latest model from the famous STE Milan range of equipment. 12 channel operation in the 144-146 MHz range. 11-15v. DC operation. 3 watts output. Sensitivity 0.2 uv R.I.T. tone burst. Complete with microphone and mobile bracket.

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As from 1st May we shall be sole distributors for the whole range of Technical Associates products. This is to combine with our Multi-Tuner range to give all the accessories needed for the serious Dx listener and licensed amateur.

Rx Band Pass Filter. 9 I.C.'s. 1 watt output* 8 switched positions of filters* High pass 2.5 kHz-2.00 kHz-1.5 kHz-200 Hz-110 Hz-80 Hz* Price £29.75

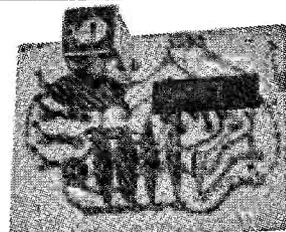
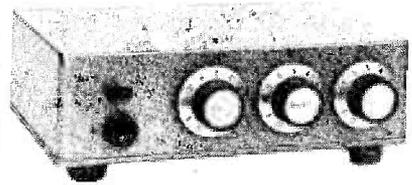
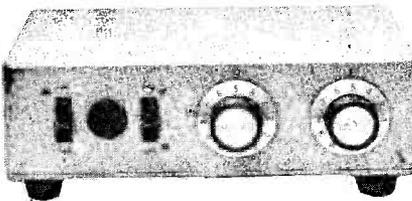
Printed Circuit Module. Including rotary switch Price £17.25

RX Peak and Notch Filter. Goes between RX and speaker* All I.C.'s* By-pass switch* Notch width control for optimum width of notch Price £29.75

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



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Jambic operation—Weighted transmission—Three memory lengths up to 1024 bits. Internal monitor. Transmitter keyed through internal relay. Silver plated contacts. 220v. AC operation. Price £106.00

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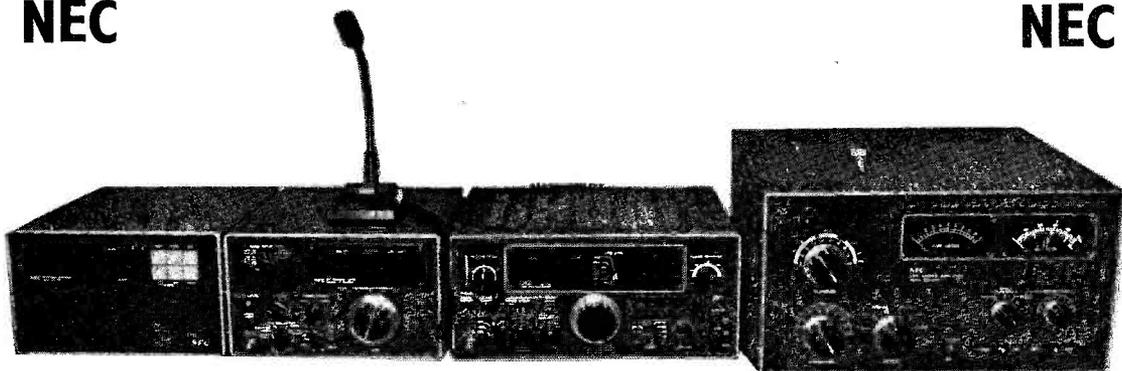
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DISTRIBUTORS FOR NEC AMATEUR RADIO EQUIPMENT

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- CQ110E DIGITAL READOUT TRANSCEIVER**
 Frequency Range : 10M to 160M
 Modes : LSB, USB, CW, AM, FSK, FAX/SSTV
 Power Requirements : 100/234v. AC or 13.5v. DC
 Input Power : 280 Watts PEP (240 watts on 28 MHz)
- CQ 201 EXTERNAL DIGITAL READOUT VFO**
 Three Outputs : 5.0-5.5 MHz, 8.2-8.7 MHz, 8.9-9.4 MHz
 Frequency Counter : 10Hz to 30 MHz
 Output Voltage 2v. (p-p) : Impedance 50-100 ohms
 Counter unit Input Level : 0.1v. (p-p) 100Hz >
 1v. (p-p) 100Hz <
 Power Requirements : 100/234v AC
- CQ 301 LINEAR AMPLIFIER**
 Frequency Range : 10M to 160M
 Mode : LSB, USB, CW, AM
 Power Requirements : 100/234v. AC
 Max. Input : 2kV SSB 1kW AM
 Drive Power : 100-200 Watts
 Circuit : 2 x 3-500Z in Grounded Grid A1
- M 110 DESK MICROPHONE**
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(GB3SWM)

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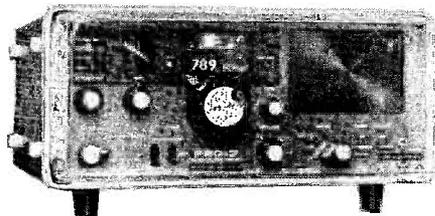
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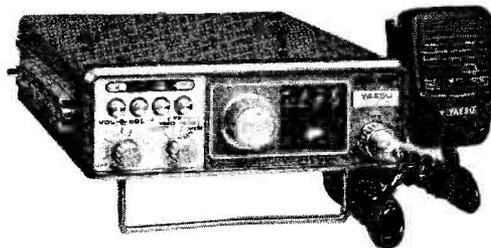
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VHF BANDS

NORMAN FITCH, G3FPK

Morocco on Two Metres

WHAT are believed to be the first 2m. QSO's between the U.K. and Morocco, in North Africa, occurred during the extensive *Sporadic E* openings on June 4. Colin Squires, G3XCS, from Saltash, Cornwall writes:—"At 1944z on 144.270 MHz I heard CN8CC calling CQ on SSB. I called him and we exchanged 59 reports. Serge gave his QTH as 20 kms. north of Casablanca . . . He did not know his QTH locator, but it would be WT. Serge's home callsign is F6CVE. He told me that I was his first contact . . . I have never heard of anyone working CN on 2m. before, so possibly I can claim a new U.K. VHF 'first'?"

Next to work CN8CC was G4GHI and the first Welsh station to contact Serge was Dave Price, GW4CQT, at 1953. This gave Dave his 4th continent on the band leaving Asia and Oceania to go for *via E-M-E* some time. A fuller account of *E's* activity is in the Two Metres section.

VHFCC Awards

Graham Badger, G3OHC (Sutton Coldfield), becomes the 24th recipient of a 70 cm. VHFCC certificate. The gear comprises a Yaesu FT-101B driving a QM70 transverter to 10 watts RMS into a Jaybeam 18-ele. Parabeam at 30ft. On occasions, a Datong speech processor is used after the Shure 444 microphone.

Michael Stringer, G4CLK (South-end-on-Sea) received 2m. award no. 297 for all-German QSO's. He also sent in a list of 100 Dutch QSL's and another non-British Isles one for good measure. Although his principal interests are the HF bands, Michael has collected all the cards over the past couple of years. His station consists of a Drake T4XB/

R4B combination feeding the TC2 VHF Converter Console, which uses a QQV06-40A PA at 50 watts. The aerial is a 7-ele. Quagi, a Quad and Yagi combination, and G4CLK reckons this to give consistently good results when working DX. He is now designing a 20-ele. combination array.

The Satellite Scene

Parameters bandied about concerning *Oscar 8's* orbit are numerous. The latest to hand came from the AMSAT-UK VHF net on June 11. This stated the equatorial crossing time as 10h. 18m. 2.52s. at 193.91°W longitude. The period is now given as 103.23186 mins. *minus* 1.117×10^{-6} N and the longitude increment per orbit is 25.80870162° *minus* 2.325×10^{-7} N where "N" in both equations is the orbit number. A computer programme in *BASIC* is available and any reader wanting a copy should send a *s.a.e.* to Pat Gowen, G3IOR, at 17 Heath Crescent, Hellesdon, Norwich, NR6 6XD. Armed with this and access to a suitable "number cruncher," predictions way ahead can be made.

Oscar 7 is now back on its published operating schedule of A,B, B,A,B,B modes, the A mode being when the *Julian* day number—that is the number of the day starting with Jan. 1 equals 1—is divisible by three; e.g. July 2 is day no. 183, therefore an A day.

New stations on include AP2TC, mode B, SSB/CW; CN8CC, mode A, and HK3AMV on 29.44 MHz. FY7AS is reported active again on mode B. In the March feature, 9LINT was reported as an all-time new one on satellites from Sierra Leone. Norman Price, 9LINP, sets the record straight and advises that it was his station, at present the only active *Oscar* operator in 9L1.

Ben Stevenson, W2BXA, collected satellite DXCC No. 1 in person from ARRL HQ on May 16. G3IOR worked his 100 countries first but is short on confirmations, still.

Beacons

At the recent IARU Region 1 Conference in Hungary, it was agreed to move all beacons out of the lower end of the 2m. band and up to the previously agreed sub-band centered around 144.900 MHz.

Brian Bower, G3COJ, kindly sent

his latest list of U.K. VHF/UHF/SHF beacons. The 70 cm. one, GB3WHA (AL71d) is now operational from Crowborough on 432.81 MHz running 50 watts to an 8-over-8 Yagi beaming 330°. GB3IOW, (ZK34a) on the Isle of Wight, has been repaired and will soon recommence operation on 10.1 GHz and may be QRV by now. The 23 cm. GB3IOW beacon will be on soon, initially on 1296.9, later to QSY to 1296.83 MHz. The Wrekin 23 cm. beacon, GB3WRN, on 1296.91 MHz is now QRT pending a move to a new location.

G3COJ heard the 23 cm. Zandvoort beacon, PA0QHN, (CM53j) on May 26. Its published QRG is 1296.915 MHz but John Tindle, G3JXN, who also heard it, reckons it is nearer 1296.920. Reception reports to:—A. Bol, Koninginneweg 33, Zandvoort, NL-1630, Netherlands. PA0QHN also operates on 2304.92 MHz.

5B4CY is now operating from Cyprus on 50.5 MHz running 35 watts into a 5-ele. Yagi beamed on the U.K. It was copied from 1725 to 1800 GMT up to S9, with QSB, on June 4 by G3COJ. Reception reports to Roland Whiting, 5B4WR, P.O. Box 1267, Limassol, Cyprus.

Letters and comments over the air, continue to be received about FM operators interfering with reception of beacons in the 2m. band round 144.90 MHz. It seems that as soon as one group realises the problem and shifts elsewhere, others then take over.

Raynet

Mike Barker, G8CAC, is Chairman of the National Raynet Committee and wrote concerning the IARU Band Plan for 2m. as published in the *RSGB Call Book* and elsewhere. This clearly recommends no channelised operation below 145 MHz. However, two years ago, the then RSGB VHF Committee agreed that such Raynet operation take place on FM simplex on 144.800, 144.825, 144.850 and 144.875 MHz as well as on 145.20 and 145.80 MHz. He also advised that 144.26 MHz is the Raynet SSB calling channel.

The GB2RS news bulletin broadcast on June 11 carried an item confirming this plan. The 70 cm. frequencies are given as 433.20

and 434.80 MHz, while 70.36 MHz is used on 4m. The choice of 144.26 MHz is not likely to be acclaimed by SSB operators. It is in a part of the band regularly used by DX-peditors and, if an opening should occur during a Raynet exercise, it is hardly feasible that foreign stations would know so QRM would result. On May 21, your scribe came across a Raynet exercise on SSB on 144.425 MHz and that would seem to be a more suitable part of the SSB section for such activity.

Contests

Results:—The 70 MHz Open Contest on March 19 was won by G3UUT/P with G4ARS/P in second place. Winner of the 144 MHz CW Contest on April 22 was G3POI whose 66 QSO's netted Clive 736 points. In second spot was G3SRT/A with 630 points from 78 contacts. This information from GB2RS.

The 2m. Portable Contest on May 27/28 saw a great deal of activity and some participants complained of more lousy signals than lately. On the Sunday morning for a time, there was some incredible ducting in a N/S path and even GB3NEE was S9 in London! One NE England portable worked a South coast station who was using a hand held transceiver and quarter wave whip. Both weather and the conditions were quite good and some very high serial numbers were noted. GW8BHH/P notched up 857 QSO's including 405 continentals and about ten over the 1000 kms. distance. G3PMA/P had 825 contacts, GW4GMO/P 771 and G3PIA/P 735.

Coming event:—The VHF section of the WAB Phone contest is scheduled for July 23 from 0900-2100 GMT, all modes, all bands from above 30 MHz. Full contest rules available from G3TWW, 13 Gannet Close, Haverhill, Suffolk, CB9 0JL, on receipt of an s.a.e.

The 144 MHz QRP contest is on July 30, 0900-1700 GMT, all modes with Tx power limited to one watt CW or p.e.p. output. Fixed and portable sections with usual exchanges and radial ring scoring system.

Anjou 10

The launch of the French balloon borne transponder, *Anjou 10* took place a week later than intended, on May 28. Input was in the 70 cm.

band with the downlink on 145.45 to 145.75 MHz. G3COJ had 11 QSO's through it and remarked, "Surprisingly the output band worked alright in among the FM simplex channels; there is lots of space for SSB and CW in between the FM." At G3FPK, the beacon on 145.901 MHz was quite strong at 0900 GMT and in nine minutes, stations in Departments 37, 85 and 94 were copied.

DX Notes

During VHF NFD weekend, July 1/2, Malcolm Andrew, G8NRP, plans to operate from CE square in the south of France using the call F0EFE/P. He then plans to travel to Andorra from where he will use the call C31QC in locator AC39a from July 6-11. As the portable site is 2600m. *a.s.l.*, no operation after 8 p.m. is envisaged, as it can get bitterly cold later on. Malcolm will be QRV on 144-370 MHz running 90 watts output to a 10-ele. beam.

Until July 18, F6CTW and F1DRR will be operating from Corsica (EC36g) on 144.420 MHz. They should be a big signal with a QRO final and a 36-ele. array. This year's CUWS expedition is to EI. A recent letter from G4CIK to G3POI mentioned the dates from July 23 to Aug. 5 but no callsigns were quoted. It is hoped that the group will activate some of the rarer squares. Operation on 4m., 2m. and 70 cm. is planned. Also in EI from July 23 till Aug. 7 will be Ron Howe, G3PLB and Tony Howe, G3PLF, whose respective reciprocal calls are EI2VCI and EI2VCN. They will be operating mobile and portable in counties Cork and Kerry, VL and VM squares, using an FT-221R on SSB/FM and an FT-227R on FM.

The Faeroe Islands will be activated by the OZ3TZ/OZ7IS group on 2m. and 70 cm. till July 26 and the Glenrothes and DARC trips to OY and Iceland are from July 18 to Aug. 5; see page 241, June. Ray Elliott, G4ERX, will be holidaying in Scotland from July 29 to Aug. 12 and hopes to get in some portable operating from Dumfries and Galloway, and Strathclyde regions from XO and XP squares. 10 watts of 2m. SSB is envisaged and anyone wishing to arrange a sked should contact Ray. (QTHR).

Twenty-three Centimetres

Harry Bellfield, G3SBV, and son Alan, G4GLN, went out portable on the evenings of May 27, 28 and 29 near Tatsfield in Surrey. (AL51g). Using a home-brew transverter,—2C39 high level mixer, 10 watts, and 2C39 50 watts amplifier—driven by a *Trio* TS-700, into a *Jaybeam* 15-over-15 slot fed Yagi, they both worked G3XGS, G4BYV, G8EVU, G3LQR, DK1ZD, DK3UC, DJ8XO and nine Dutch stations. Most of the reports were RS59 in very good conditions. Their home QTH in Streattham is badly screened to the continent by the Crystal Palace ridge.

Mike Dormer, G3DAH (Kent), has increased his counties total to 34. It is hoped to find room for the 23 cm. All Time Table next month so please send in your updated scores. Arthur Breese, GD2HDZ, writes, "No progress with 23 cm. SSB yet, but I am still hoping!" Ron Oakley, G8GRT (Cams.), has a *Microwave Modules* converter feeding an *Icom* IC-201 receiving set-up with a 15-over-15 Yagi and hopes to have a few watts of AM or FM soon from an *MM* tripler.

Seventy Centimetres

In a letter to G8BKR, Des Walsh, EI5CD (Co. Tipperary), says he has a few watts of FM on 433.55 MHz. Des logs cross-channel UHF TV as an indicator of conditions. G4ERX (Essex) got four new counties for this year's table in the contest on May 7. During the tropo. lift on May 9 he worked a string of PA and DL stations the best DX on 10 watts being DB2BZ in EM04a. G8GRT (ZM59e) uses his *IC-201* into a *MM* transverter to produce 10 watts of SSB on the band. The aerial is an 8-over-8 slot fed Yagi, indoors.

Steven Ruff, G18EWM (Co. Antrim) tells of very low activity on the band and that must make it difficult for the GI's to accrue reasonable totals in the annual table. Phil Johnson, GJ8KNV, runs a *Belcom* Liner 430 and 50 watts amplifier to a 48-ele. *Multibeam*. He made a four-days trip to Guernsey at the end of May and worked 30 stations including 20 *via* the *Anjou 10* transponder.

During an opening on June 1, George Szymanski, GM4COK,

worked LA6HL (CS08e), LA8UU (CT80j), OZ9NI (GP22c), SM6ESG (GR72h), SM6HBH (FS80g) and SM6HYG (FS58f).

Two Metres

Auroras have occurred on May 1-4, 9, 11, 13, 21-24 and 30th and on June 2 and 4/5. Using SSB, G3XCS (XK49c), worked G8LIC (ZO34d) and GM4DTH (YP25g) in the early hours of May 2. On the 3rd, GM8LHE (Elgin) was heard. All QTF's were 30°. These are interesting contacts in view of Colin's southerly latitude.

Clive Morton, G4CMV (Leeds), has increased his squares tally partly due to recent auroras. The May 3/4 affair produced UP2BBC (LP07c), SM1BSA (JR22e), LA7KK (FU73j), SM5EKQ (HS48d) and LA3VU (FV64d). In the June 4/5 event, he worked GM5CJF/P in the Shetlands in ZT04a, QTF 20° and noticed the same odd azimuth for a while for best reception from SM4EBI (GT) as mentioned last month; 350°. Bob Mackean is now G4HAO (ex-G8LYH) from Liverpool. He caught the events on April 30, May 3 and on May 9 worked GM8NEY (YP02h).

GM4COK (Edinburgh) has 148 QSO's in the May 3/4 aurora. His list includes F8OQ (BI56a) plus OH, UR2, UP2 and UQ2. George expects to be QRT for about five months now so will likely miss any Sporadic E. In a weak *Ar* on June 2, discovered at 1747 GMT, only GM4DSZ (YR70e) and GMCOK (XP04b) were worked from G3FPK and SMØDJW (IS10d) was just about copied. The event of June 4/5 produced a contact with the Shetlands rather surprisingly, as GM5CJF/P was working Scandinavians at great strengths, many of whom were "tail-ending" making it difficult to get in.

Sporadic E really makes this month's headlines. During the 2m. portable contest on May 28, Graham Preece, G3RSX (Wolverhampton) worked a station signing CT1AG at 0936 GMT on 144.508 MHz SSB. CT1AG's QTH is Lisbon but there were no other *E*'s reports that day. Too much contest QRM? Around lunch time on May 30, GW4CQT heard a brief snatch from an Italian station.

The first major *E*'s of this season

THREE BAND ANNUAL VHF TABLE
January to December 1978

Station	FOUR METRES		TWO METRES		70 CENTIMETRES		TOTAL Points
	Counties	Countries	Counties	Countries	Counties	Countries	
G3SPJ	50	6	56	12	32	5	161
G3CO	30	4	49	11	19	6	119
G4BWG	23	4	54	14	14	5	114
G8GXP	—	—	55	12	40	7	114
G2AXI	22	5	46	12	20	6	111
G4ERX	15	1	49	11	20	5	101
G4AEZ	23	4	36	10	19	5	97
GD2HDZ	17	2	38	7	23	3	90
G4DEZ	—	—	70	20	—	—	90
G3FPK	—	—	72	16	—	—	88
G8BKR	—	—	58	10	16	3	87
G3FIJ	23	2	35	5	13	2	80
G8MEJ	—	—	52	12	10	2	76
G18EWM	—	—	50	9	9	6	74
G8APZ	—	—	56	13	3	1	73
G8KGF	—	—	59	13	—	—	72
G8HHI	—	—	31	9	23	6	69
G8KSS	—	—	55	10	—	—	65
G8ITS	—	—	43	6	12	3	64
G4HAO	—	—	50	10	—	—	60
G8BLJ	—	—	50	9	—	—	59
G8GRT	—	—	35	4	15	3	57
G4GXT	—	—	48	7	—	—	55
G8NYS	—	—	44	8	—	—	52
G4GET	—	—	42	9	—	—	51
G4FKI	4	1	29	6	9	1	50
GM4CXP	—	—	36	11	1	1	49
G8OGD	—	—	38	5	4	1	48
G8LHT	—	—	36	10	—	—	46
GJ8KNV	—	—	18	7	9	6	40
G8MKW	—	—	34	4	—	—	38
GJ8AAZ	—	—	20	6	6	5	37
GJ8ORH	—	—	20	6	3	5	34

started around 0945 GMT on June 4 till about 1115. G3XCS heard many brief snatches from I and YU but worked nothing. It was G3COJ's birthday and Brian celebrated by working his first Italian station on 2m. in the shape of IT9TAI (GY66c) at 1001. Roger Thorn, G3CHN (Devon), worked YU2CKL (HD30a) and YU2CBM (ID33f) around 1100 and John Hunter, G3IMV (Bucks.), worked I7LVI (IA30e) and I7WAF

(JA62d but missed out on I7KBI (IB75). The YU's worked by G3CHN were only RS31 at Paul Locks, G8HTE, Truro QTH.

Ken Osborne, G8KSS (Avon), managed a contact with YU2CBM at 1125, as did George Gullis, G8MFI (Wilts.). At 1003, Glen Ross, G8MWR (Coventry), worked IT9VMN (GY76b) and 40 mins. later, I2CVC/7 in HB square. The IT9 and also IT9TAI were heard by

Martyn Baker, G8KGF (Oxon.). In Jersey, Geoff Brown, GJ8ORH, worked YU2CKL (HD30a) at 1046. Probably one of the best performances was that of G8MZI (Somerset) who worked LZ1AB on SSB at 1341 using 3 watts to a 6-ele. Quad, the QRB being 2167 kms.

The next major *E*'s opening seems to have started around 1730 GMT. G3COJ copied the Gibraltar beacon, ZB2VHF, on 144-145 MHz around 1808. G3XCS heard it at S8 at 1830 for a couple of minutes, and again from 1917-1939, it fading out just before he worked CN8CC. At 1900, G8HTE worked YU1ONH (KE31e) and YU1OHK (KE25e) at S9 in 15-20 seconds! At 1742, G8KSS worked YU2RR (HF20c) and heard others. GJ8KNV heard SM5AGM at incredible strength but could not make a QSO of it. G3CHN copied ZB2VHF at S9-plus from 1818-1841 and it was still S3 at 1851 at Bolberry Down. At 1915, Roger heard a group of EA's chattering away on FM up the band but could not break in.

Your detailed reports of stations heard and/or worked with dates, times and QTH locators would be welcomed so that the information can be correlated and passed on to F8SH. There were many "circuits" worked on June 4, e.g. squares HX to CH and HH to ZT. Only by mapping them all out can an idea of the position and movement of the reflecting clouds be ascertained.

On June 8, there was more extensive *E*'s activity which started when Clive Penna, G3POI (Kent) worked LZ2NA in ND40g at 0753 GMT. Throughout the morning at G3FPK, very strong Italian and Spanish Band 2 FM signals were rolling in with Spain's "Radio Nacional" even blotting out local police relays.

ZB2VHF was copied at times by G3POI and G3CHN copied it very strongly in Devon. Roger heard Paul Galea, 9H1BT, calling CQ at 1036 for five minutes but by the time he finished, his signal had faded away. IT9ZHA was heard at 1210 when the session was on the way out. GJ8ORH managed to have QSO's with 9H1BT, 9H1ED and with Henry Souchet, 9H1CD twice around lunch time. *Via* G3POI, there is a report that F6FHP in AE square, worked no less than 31 YU's and 7 SV1's, mostly in LX square.

Ar and *E*'s events have somewhat overshadowed some occasional good tropo. lifts. Your scribe's log for May 9 reveals a good opening to a restricted area of Germany around EN square while on the 26th, there were very many German and Danish stations coming in from all along the North Sea coast, many from small islands. John Heys, G3BDQ (E. Sussex), kept to SSB and found many OZ's in Jutland and also worked 5 SM6's in FR, GR and GS, plus SM4CSK (HT55) a QRB exceeding 1300 kms. All contacts were in a line from Hastings to Orebro in Sweden and no DL's at all were heard.

Good tropo. conditions occurred in the contest on May 27/28 and G4ERX reports the Vange Contest group, G3YCW/P in AL33g, working over 300 PA and DL stations in their 718 QSO's with 11 countries. Best DX was SK7CE (GP27g) at 930 kms.

G4HAO in Liverpool winkled out E17CS/P near Sligo in VO square on the 17th of May for a new one. After many years off the air, Jim Batten, G8BIJ (Shepparton) is steadily adding to his table score with DL, GM and OZ added this time. G8BKR has regular attempts with EI5CD (Tipperary) at 0830 and 0900 GMT on Saturdays and at 1145 on Sundays around 144-275 MHz. Des, EI5CD, spends ages calling on '300 with his *Liner 2* and 40 watts amplifier and would welcome some DX calls. G18EWM's Saturday morning skeds with your conductor usually result in some "meaningful dialogue" although there is usually deep fading under flat conditions.

G18OJG (Co. Down) assures us that the GI's *do* beam towards the U.K. This in response to Bob Mackean's comments in last month's piece. He suggests that lack of GI QSO's could be because many G's beam towards the east! GM4COK was out with the group using GM4EZJ/P on Lowther Hill (YP42f) for the contest on May 27/28 but reports conditions, "... not too hot." Only ON5UI on the continent was worked—on CW. George mentions a few shocking signals and cites one group using an 800 watts generator to run a *TS-700* and a pair of 4CX250B's!

Hal Graeper, EIIDA (Co. Cork) reckons to be Ireland's most southerly VHF station in Kinsale, VL28j. He offers to be QRV every Sunday morning on 144-075 MHz from 0900 GMT.

Meteor Scatter

Interest and activity is steadily increasing in MS. G4CMV (Leeds) reports that the *Aquarids* shower in early May as, "... a bit of a wash-out..." Clive concluded a QSO with I3LGP in GF24g the best reflexion lasting some 30 secs. Skeds with UP2BCK and 11DMP produced pings only. Clive Penna, G3POI, has made it at last with CT1WW on SSB. His recent week's holiday was taken with some daytime MS in mind and happily coincided with some *E*'s. Murphy dumbfounded! Henry Souchet, 9H1CD (HV03e), is now QRV on MS with a memory keyer and has added JF square to his 2m. total.

Vale

David Niven, GM2CHN, has reported the death on February 23 of Jimmy Hunter, GM6ZV, one of the best known amateurs on the Scottish VHF scene. A great devotee of the old 5m. band, he was the moving spirit in the very active West of Scotland VHF Group. During Hitler's war, he played a key role in what has become known as, "The Secret War." A keen Tx designer and constructor, he was equally noted for his cheerful help and encouragement to the newcomer.

Deadlines

Nobody can say the VHF/UHF scene is dull and it is difficult to do justice to everything each month within the space available (sorry, not even room for the 'Squares' table this time!). All your contributions for the August issue by July 6 please and for the September edition, by August 3. Everything to:—"VHF Bands," SHORT WAVE MAGAZINE, 34 High Street, WELWYN, Herts., AL6 9EQ. 73 de G3FPK.

ANTENNAS—THE WEAK LINK, PART IV: DIRECTIVITY AND GAIN

A. P. ASHTON, G3XAP

DIRECTIVITY and *Gain* are closely related properties and in few cases is it possible to have one without the other. (Note however that 'gain' used in this context refers to free-space gain). It is difficult, therefore, to discuss one without reference to the other, so although the two properties are considered here under separate headings there is inevitably some overlap.

Directivity

Practically all antennas are directive to some extent—especially at frequencies of 30 MHz and below. It is well-known however that vertical antennas are far less directive than horizontals, but even practical vertical installations are directive to some degree due to the effects of reflection from nearby objects, non-symmetrical earth or radial systems, the feeder, etc. Let us consider the ways in which directivity is achieved, and what to take into account when designing either a "directive" or "non-directive" array.

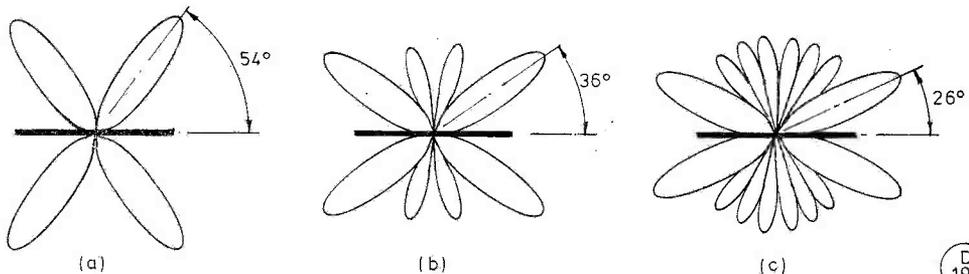


Fig. 1.

Radiation Patterns for single long-wire antennas: (a) 1λ ;
(b) 2λ ; (c) 4λ .

Broadly speaking, there are two methods of obtaining directivity: firstly by altering the length of the antenna, and secondly by the use of additional elements. The classic "figure of eight" radiation pattern of the half-wave horizontal antenna is well-known, but the patterns of antennas of lengths up to about 4λ are less frequently encountered, see Fig. 1. A big disadvantage of long wires is the fact that on the communication frequencies they require rather more space than most of us have access to, and they are of necessity of fixed direction of radiation; for example, a 4λ long wire on 14 MHz is about 250ft. long. Note that antennas of this type are only broadly directive, *i.e.* they have a series of lobes, although these lobes do become quite sharp as the antenna length is increased.

For the reasons just given single long wires are rarely used by amateurs as directive antennas, but combinations of more than one such wire are more frequent (especially in commercial installations). Consider Figs. 2 and 3

which show the V-Beam and the Rhombic antennas—these are simply combinations of two or four long wires so arranged that their lobes either cancel or reinforce to form patterns that are considerably more directive than those from single long wires. It is important to note that as the frequency of operation is altered, so the length of the antenna in wavelengths also alters, and the directive pattern of the array changes. For this reason, if it is desired to obtain the maximum possible directivity, (*i.e.* sharpest lobe) from such an array, it is important to use the most suitable angle between the wires, and to specify the design frequency of the array. In practice, however, it is found that with long arrays of this type, a good directive pattern will exist even if the operating frequency is altered over a fairly wide range. The V-Beam and the Rhombic are therefore considered to be "wide-band" antennas, although operation on other than the design frequency can cause difficulties in feeding. Fig. 4 gives a table of leg-lengths and angles for antennas of this type.

It will have been noticed that the antennas described so far have been bi-directional rather than unidirectional, but a slight modification to these arrays will render them unidirectional—another commercial practice which is not often seen in amateur installations. The 'modification' consists of a 'termination' at the far end of the antenna—*i.e.* the end remote from the feed point. This

termination consists of a non inductive resistance, connected between the wire(s) and ground in the case of single long wires or V-Beams, or between the two halves of the antenna in the case of the Rhombic, see Fig. 5. The effect of this termination is not only to render the antenna substantially unidirectional, but also to make it non-resonant or wideband—the feed impedance of the array remaining fairly constant over a wide frequency range. It is suggested that as the theory behind antennas of this type is beyond the scope of this series, interested readers should refer to the ARRL *Antenna Book* where the subject is presented in an "easy to read" manner, along with much useful information on sizes and angles, etc.

The second method of achieving directivity—by the use of additional elements—is a somewhat lengthier subject, and before discussing the techniques employed, it is worth defining some of the terms used:

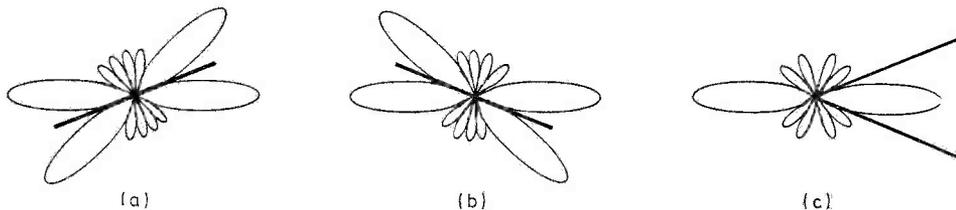


Fig. 2

The V-Beam antenna. The two single wires (a) and (b) are combined to form the 'V' at (c); by using the correct angle between the wires, a bi-directional pattern results due to cancellation and re-inforcement of the lobes of the single wires.

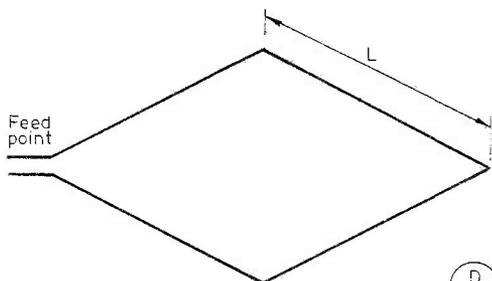


Fig. 3

D 193

The Rhombic antenna. All four legs (1) are identical and this antenna can be considered to be two V-Beams placed together; note that the wires are not joined at the point opposite to the feed point.

LEG LENGTH	ANGLE BETWEEN WIRES
2	72°
4	50°
6	40°
8	35°
10	32°

Fig. 4

D 194

Relationship between leg length of V-Beam and Rhombic antennas and the angle between the wires to give optimum bi-directional radiation pattern.

- Parallel Elements** — elements arranged parallel to one another, Fig. 6a.
- Collinear Elements** — elements arranged "end to end", Fig. 6b.
- Driven Element** — one which is supplied with power direct from the transmitter.
- Parasitic Element** — one which derives its power from other elements by coupling to them by reason of their proximity.
- Driven Array** — one in which all the elements are driven.
- Parasitic Array** — in which one or more elements are parasitic.
- Broadside Array** — in which the major lobe(s) is at right angles to the array axis and the plane containing the array, Figs. 6c and d.
- Endfire Array** — one in which the major lobe(s) coincides with the array axis, Fig. 6e.

It is important to note that an antenna can fall into more than one category, e.g. one antenna can have both parallel and collinear elements and display both endfire and broadside directivity.

Driven Arrays

Driven arrays are considerably less common in amateur radio circles than parasitic arrays, the reason probably being that in general they are somewhat more difficult to construct, tune and feed than parasitics.

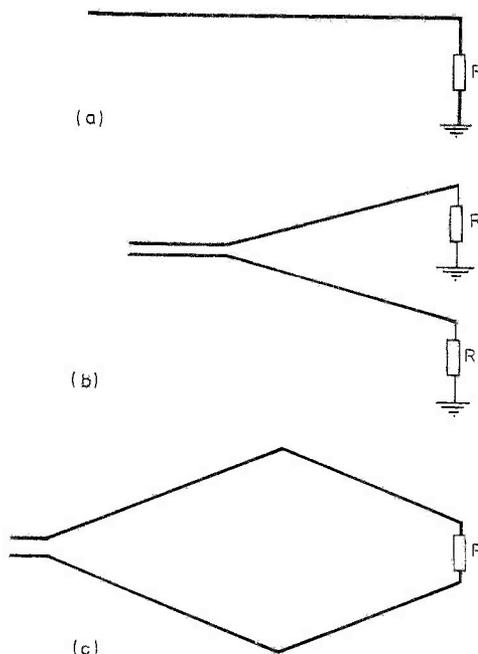


Fig. 5

D 195

Termination of single and multiple long-wire antennas (a) Single long wire; (b) V-Beam; (c) Rhombic

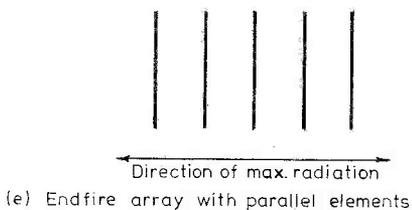
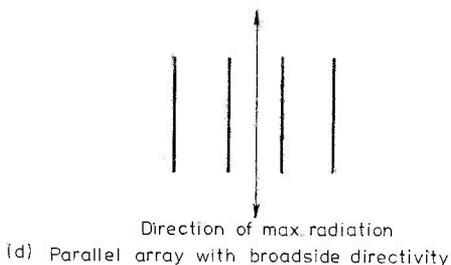
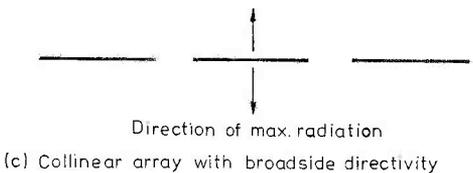
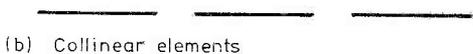


Fig 6

D 196

Definition of terms used in antenna theory.

Fig. 7 shows a four-element collinear array—note that the elements are lengths A-B, E-F, G-H and K-L, and the lengths B-C-D-E and H-I-J-K are phasing stubs. These phasing stubs simply ensure that the four elements are fed in such a way that their centres are points of maximum current (current antinodes). This four element array is bi-directional.

Let us now look at a four-element array with parallel elements, see Fig. 8, this being a broadside array. It can be seen that with this antenna, the current in the outer elements is kept in phase with the inner two by means of a "twisted" phasing line. (This practice will be familiar to readers who have met the W8JK and "ZL Special" beams).

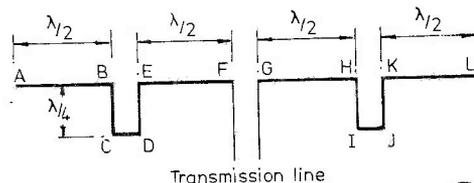


Fig. 7

D 197

Four-element collinear array.

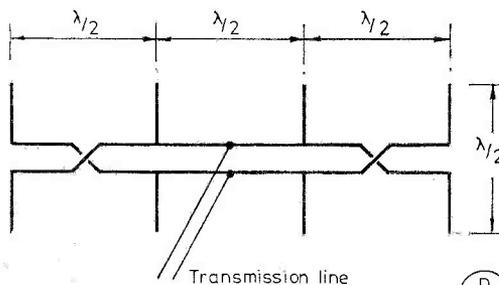


Fig. 8

D 198

Four-element parallel array.

Finally, Fig. 9 shows a four-element array having parallel elements and combining both endfire and broadside directivity, the twisted phasing line again being employed to maintain the correct phase relationship.

The driven arrays described have all been bi-directional, the phasing required to render them unidirectional being rather difficult to adjust; however, it is a useful fact that bi-directional arrays require rotation through only 90° to provide coverage in any direction. There are, of course, many more driven arrays than those described, and again the ARRL *Antenna Book* is recommended for those readers who wish to go deeper into the subject.

Possibly the most common driven arrays in amateur radio are "phased verticals", although these devices have certainly not received anything like the attention they deserve. In a later article we will discuss phased verticals in some detail, but basically they consist of a pair of

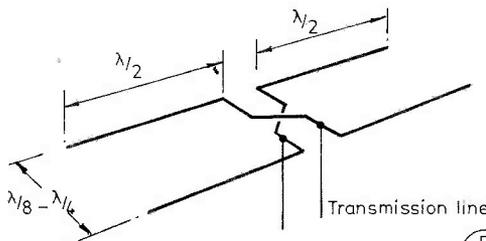


Fig. 9

D 199

Four-element array having both collinear and parallel elements and combining both broadside and endfire directivity.

No. of Elements	Gain dB
2	4.7
3	7.2
4	8.6
5	9.8
6	10.5
8	11.9
10	13.2

Fig. 10

Gain figures for Yagi antennas.

resonant quarter-wave verticals, the feeders to which are of different lengths. For example, if we site our two verticals a quarter-wavelength apart and have the feeder to one of them a quarter-wavelength longer than the other, we will achieve a "cardioid" shaped radiation pattern, which is substantially unidirectional, and the array will have a gain of a few dBs over a single vertical. By interchanging the two feeders, we can make the array directional in the opposite direction; and by making the feeders the same length as one another, we arrive at a "figure of eight" pattern, the lobes being at right angles to those obtained in the "unidirectional" mode. A large number of different patterns can be obtained by altering the spacing of the two verticals and "phasing" of them and in practice the phasing can be altered by simply switching lengths of feeder in and out of the main feeders. We can thus use the verticals as an array which to all intents and purposes can be considered to be "electronically" rotated as opposed to the usual mechanical rotation.

No. of Elements	Array Length
2	0.20
3	0.35
4	0.60
5	0.85
6	1.15
8	1.80
10	2.45

Fig. 11

Optimum length of Yagi antennas.

Parasitic Arrays

These are extremely common in amateur radio, and the Yagi is probably the best known example. This antenna has a half-wave driven element, directivity being achieved by placing reflectors behind it, and directors in front of it. Reflectors are longer than the driven element, whilst the directors are shorter—radiation taking place in a direction leading from the reflector, through the driven elements towards the directors, thus forming a unidirectional radiation pattern. The major lobe becomes sharper as more elements are added; in practice as many directors as desired may be used, but only one reflector is used—the extra directivity resulting from additional reflectors being rather marginal. The actual radiation pattern achieved depends very much on the lengths of the parasitic element and their spacing from the driven element and from one another.

Yagis fall into two broad groups—close-spaced Yagis and long Yagis. Close-spaced arrays tend to give a sharper forward lobe than a long array, but they also display lower front-to-back ratios, *i.e.* there is quite a large lobe off the back of the array. Yagi arrays require

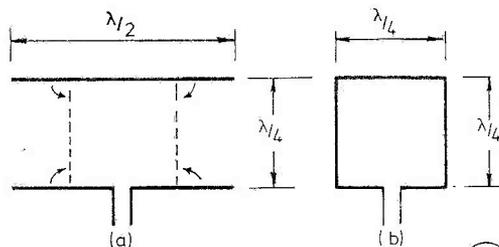


Fig. 12

Derivation of the Quad Loop: The elements of the two stacked half-waves in (a) are folded as shown, and their ends joined together; this results in the full-wave quad loop shown at (b).

careful design and tuning if they are to act effectively, but much work has been carried out into determining parameters such as the optimum lengths of the parasitic elements, their spacing, etc., and practically any book that deals with Yagis for amateur use gives full details of the dimensions required.

It is interesting to note that the overall length of the Yagi array (the distance from the reflector to the director farthest from the driven element) is almost as important to gain as the number of elements used; the difference in gain of 10 elements in an array length of 2.5 wavelengths, and 12 elements in the same length would be insignificant. Fig. 10 gives the gain for Yagi arrays against the number of elements used, but is based on the assumption that the optimum array length is used. This optimum length can be found from Figure 11.

The Cubical Quad is another well-known parasitic array; however, the quad loop itself may be considered to be two half-wave elements fed in phase and stacked at a distance of one quarter-wavelength. (Fig. 12 has been included to make this argument clearer). It is not surprising, therefore that the gain of a 2-element Quad is slightly higher than that of a 2-element Yagi.

Gain

Inevitably, some mention has already been made of gain whilst dealing with directivity, as gain is the result of introducing directivity into the radiation pattern. However, it must be realised that when thinking of gain we must include directivity not only in the accepted sense of the word, but also directivity in the vertical plane (the angle of radiation and the shape of the lobe from the vertical viewpoint). As stated in an earlier article, it is possible to achieve again at long distances from an omnidirectional antenna; it follows, therefore, that if the vertical plane radiation pattern of a directional antenna varies with the height of the array, then the "DX Gain" of the array also varies with antenna height.

The gain of an antenna is usually expressed in terms of decibels, and the dB figure quoted is a comparison of the field strength produced by the antenna, compared to another antenna fed with same power—both measurements being made at the same distance, and in the antenna's favoured direction; the comparison is usually made with a half-wave antenna. Every increase of 3 dB means that the received power has been doubled. Hence if a directional antenna has a power gain of 6 dB, the power received in the receiving antenna in the comparison described above will be four times as great from the directional antenna than that received from the standard half-wave antenna.

To put antenna gain into some perspective, let us assume that we have erected a 3-element Yagi, and that its free space gain is around 7 dB—a typical figure. (6 dB is considered by common practice to be one 'S' point on reception, hence the free space gain of the array is a little over one 'S' point). Over a long path, such as from Europe into South America, a 3-element Yagi would be expected to display a gain of somewhat more than this—3 to 4 'S' points being a far more realistic figure; this leads the author to repeat his view that too much emphasis should not be placed on directivity and, hence, free-space gain. True, directivity does much to reduce QRM from unwanted directions, but this advantage should not be overstated: the most common complaint on the HF bands is that the DX stations do not hear us and a low angle of radiation—with or without directivity—is the most effective cure.

Summary

From the above, we should now understand how gain and directivity are achieved, and how the two properties are inter-related. It should also be clear that directivity is the major influence on gain when direct wave comparisons are made, but that wave angle has a greater influence where long distances are concerned. It is important to realise, therefore, that directivity and DX gain are not necessarily related, and we must decide right from the start which of these properties is the most important for the job in hand and how best we can achieve the desired effect.

to be continued

IMPROVING THE LINER-2 RECEIVE SECTION

P. L. NEWMAN, G8HUU

WHILST fully accepting that the Liner-2 is by today's standards rather limited in its usefulness, the author felt that its receiver could be much improved by little effort and cost. Recent QSO's on the subject have yielded many helpful hints and this is an amalgamation of those ideas with the author's own findings. It was thought that the bandpass-filter, L19-L20, adversely affected sensitivity and the installation of a more conventional input circuit would be beneficial.

The improvements are presented in five easy steps, although they represent a month of experimentation.

- (1) Remove Liner from its case and locate the receiver board underneath at the back; make a diagram of all connections to the board *prior* to removal.
- (2) Using a desoldering tool if possible, carefully remove the following components:—L19, L20, C81, C82, C83, R70, Tr12 and Tr13. Make direct replacement of Tr12 and Tr13 with Tr12_x and Tr13_x.
- (3) Solder L_x between the topside earth-land and the antenna input pin, connecting C_x in similar fashion. Take the tap on L_x to the point where C84 joins Gate 1 of Tr12_x. The receiver input circuit now looks like Fig. 1.
- (4) Re-install the board checking at all stages, switch on, and trim C_x (and if needed the tap on L_x), for best results.
- (5) Refer to *SWM* Sept. '76 and modify the noise-blanker as suggested in 'VHF Bands.' Some adjustment of the 15 μ F capacitor may be needed for best results.

Results

The result of this effort was spectacular! The Wrotham beacon was 3 S-points stronger, noise was not audibly worsened, and the receiver had a flatter response over the SSB segment. As to cross modulation, this did not seem to be affected and there are two other stations on SSB within a ½-mile of this QTH! Further work along these lines is in hand, and transmitter performance will, hopefully, also be examined for possible improvements.

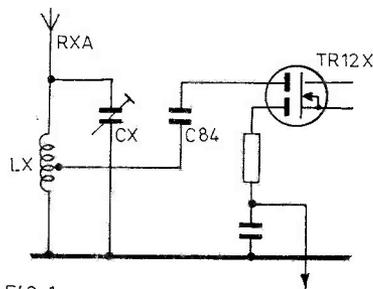


FIG. 1

C_x = 4.5-20 pF ceramic trimmer

L_x = 5 turns of 20 s.w.g. silver-plated wire, ¼ in. dia., spaced at wire diameter

Tr12_x,
Tr13_x = 40673

• • • SWL • • •

SHORT WAVE LISTENER FEATURE

By Justin Cooper

IN the years since your scribe came to the task of writing the "SWL" piece, one rarely recalls anyone indicating that they had built all their gear; on the other hand, it is rare for an advanced SWL station to have nothing home-brewed in the shack. There are those who say that no amateur station worth the name should contain anything "commercial"—but this writer has yet to hear one of these chaps define just what he *means* by 'homebrew'. If we take it to its logical conclusion, we should make all our capacitors, all our resistors, all our metalwork and slow-motion drives; indeed we need not buy anything—after all diodes are only clever versions of the old cat's-whisker, and as long ago as 1953 G3HMO described the manufacture of a transistor, and used these home-brew devices in a low-power rig. So—if you have your *Short Wave Magazine* back numbers to hand, and a lathe, a chemical workshop, a photographic darkroom, an infinity of time, and the financial resources to be able to acquire or make any tool required in order to make the components, then one could be said to be home-brewing. Anything less is clearly only a partly home-constructed job; and this is most definitely true of any station using valves if only because valve manufacture requires a hard vacuum to be generated.

One goes on to the chap who buys a box of bits—a kit—and assembles it to printed instructions, coming finally to the man who buys all his gear and moves it about on the operating table until he has come to what he feels to be the most efficient layout of the station. If home-brew is a magical thing which distinguishes the true amateur from the merely-an-operator imitation, would any one of our readers care to define where a line can be drawn so that we have to one side the true-blue, and to the other the completely non-U variety? He would be a fool who tries.

Similarly to try and equate good operating to CW, or to SSB, or to FM operators leads to a non-answer. A bad operator is so either because he doesn't know any better (which says his locals haven't taught him how), or he is a bad operator because of his nature, which is the result of heredity and/or upbringing.

However, since it is said that the onlooker sees most of the game, let us turn to the onlooker letters.

New Chums

A Bumper Bundle this time round. Top of the pile we have *J. Roberts (Birmingham)* who would like to see a tabulation of all the readers and their equipment against their HPX or countries score, which he feels would be of help to newcomers when it comes to choosing equipment. We doubt it, if only because an experienced SWL will get more out of, say, a simple direct-conversion receiver than a novice with a Sooper-Blooper 99. It's the bit between the headphones that matters!

J. Doughty (Birmingham) has an FRG-7 which since December 1977 has collected some 253 prefixes for a first entry—a score which would have been higher had there not been so many other calls on his time.

On to *K. E. Steele (Derby)* who is interested mainly in QSL's from DX he has heard and reported with his FR-50B.

Last time out R. Bithell was doubting his ability to get a "ticket" because of his age. Right back comes *G4AXQ* who was 74 when he decided to start RAE, back in 1971; he took the RAE and passed in December 1971, in time to be first licensed in February 1972. He first applied for a licence back in 1921 but was turned down under the rules of a half-century ago, and his first start as an SWL was back in 1912. So, let's hope R. Bithell gets his ticket, says *G4AXQ*—and we agree 100 per cent.

Next we have *C. I. Mobbs (Leeds)* who started with a home-brew single-conversion job, but then obtained an FRG-7 which he reckons to have improved the scoring rate. The aerial at the time of writing was 110 feet end-fed but a trapped dipole was actively being considered.

A nice conundrum is presented to us by *D. J. Langridge (Weymouth)* with his first list. It comes in the shape of a station signing CT3/P/OH2BC. Strictly speaking, *Rule 3* should be applied here, in which case it would count arbitrarily as CT2. Another puzzler was IN3LQB, not found in either Geoff Watts' *DX Prefix List*—but only because reader Langridge hasn't kept tabs on the updating of his list! IN3 is shown in an update as being Trentino, which lies almost due North of Verona, and on the border line.

P. Leather (Camberley) writes with a first entry, having been smitten with the SWL bug for a second time. Back in February he bought an FRG-7, and since then has put up a twenty-metre folded dipole in the loft, bent as necessary to get the ends in, which seems to work quite well on all the bands of interest.

Is there a club for SWL's, asks *D. Lightfoot (Cyprus)*. We believe there is a Cyprus Radio Club, and of course ISWL and RSGB both have thriving SWL sections. SWL Lightfoot is using a Joystick in conjunction with the FRG-7.

We have just a list from *S. Farkas (Birmingham)*, to bring him to the bottom of the 1978 Table.

J. Nicol (South Croxton) recently retired through ill-health; but a son-in-law with a "ticket" (and an understanding wife) resulted in a shack in the "utility room" of his house, a trapped dipole about 110 feet long running N-S at about 35 feet, plus some 200 feet of end-fed long-wire running E-W and rather lower. The receiver is an FRG7. Looking ahead a bit, RAE is envisaged in the shape of the December examination.

After a break of well over 25 years, *B. L. Henderson (Chetnole, Sherborne)* has returned to the game with a Drake SSR-1, and wound up some 75 prefixes in ten days. Brian asks for a clarification of *Rule 1*, covering the frequent case where one can hear only one end of the contact. As far as HPX is concerned, you must hear the station for which the prefix is claimed, being implicit that you can't claim the prefix just because you hear the station being called. We could add that many entrants add a bit of spice by not claiming anything until they can

identify both ends and log them, so that their entry lists contain all the details of the QSO's; but we don't insist on that degree of thoroughness, only that the station holding a prefix must have been heard before that prefix could be claimed. Otherwise, particularly with DX-peditions such as the recent Clipperton effort, you could be claiming it without ever hearing it; J.C. himself sat down to log Clipperton, well knowing that it was there somewhere, and heard the Clipperton *callsign* a few hundred times before he actually located it under the pile-up.

J. Timms (London N.4) uses a Joystick system with a Kyo Interceptor Type KTR1662 which has eight bands down to 21 MHz; so some Top Band nets are listened to, and CW on the other bands covered. John wants to know where he can obtain a circuit diagram of his receiver; we would suggest for a start the reference section of the local public library, where they usually either hold, or have access to, a set of service sheets or the bound equivalents. It won't be possible to take them away, but the library will be able to provide copies for a few pence. If that line fails, the next one is to advertise for a copy of one, or even to write to the makers.

Now to D. G. Sim (Southampton) who has been on with an HRO-5 fed through a preselector from a multi-band dipole. Reader Sim mentions the problem of not being able to separate stations with the HRO; bandspread is plenty good enough on an HRO with the bandspread coils, so the problem is one of *selectivity*, which can be defined as the ability to separate signals which are using frequencies very close together (whereas bandspread is best regarded as a means to slow the tuning rate down to a more suitable degree for the task in hand). Improving bandspread won't improve selectivity one iota, but on the other hand if you make a considerable improvement in selectivity you may well find so much more in the way of signals that you want to add more bandspread. Selectivity in the HRO-5 was by way of a single crystal with phasing, which is at best a design which is more useful on CW than on SSB—don't forget the HRO was designed back in the mid-thirties! The writer would be rather inclined to try the effect of either adding a 455 kHz mechanical filter, or of changing the existing single-crystal set-up to a half-lattice. If you can lay hands on one, a good read of the chapter on Crystal Filters in the wartime or pre-war RSGB *Radio Communication Handbook* would put you in line with the thought being pursued in those days, and you can then step forward to a modern book with much more of an idea of how to make things better than they were. History is always valuable if we ever want to learn wisdom; all the same mistakes have been made before!

G. Moody (Stockton-on-Tees) started with an air-band receiver, and progressed from there; he now has a DX-160 into which he can put a *Microwave Modules* two-metre converter. Aerials include a four-element quad, four-element Yagi, a "slim-jim" all for two metres, along with 14/21/28 MHz dipoles in the loft and a 132-foot wire bent into a 30-by-15 foot garden—oh, yes, and a car-radio aerial which uses the VHF Yagi as a sort of ground-plane (which, being in essence a vertical, has the low-angle properties which help to get rid of the continental interference).

ANNUAL HPX LADDER

Starting date, January 1, 1978

WL	PREFIXES	SWL	PREFIXES
G. W. Waddell (Herne Bay)	499	C. I. Mobbs (Leeds)	334
G. Brazil (Dublin)	499	P. Sharpe (London W.2)	316
R. E. Thomas (Corwen)	495	D. G. Sim (Southampton)	311
P. Leather (Camberley)	457	Mrs. J. Brooks	
K. Piper (Bognor Regis)	449	(Loughborough)	304
J. Nicol (South Croxton)	431	K. M. Rogers (Lutterworth)	282
D. J. Byers (London N.7)	429	J. Doughty (Birmingham 44)	253
R. Jacobs (Margate)	423	S. Farkas (Birmingham)	204
D. Lightfoot (BFPO 58)	355	G. Moody	
N. Rimmer (Port Erin)	342	(Stockton-on-Tees)	204

200 Prefixes must have been heard for an entry to be made, all heard since January 1, 1978. See also HPX Rules.

We have two letters from R. Jacobs (Margate); Bob has an HAC T-Twin transistor receiver which came as a kit for a tenner, plus a twenty-metre dipole surrounded by buildings. Chasing the short-wave BC stations was an interest prior to the amateur-bands listening, so experience has been gained to help the score along. Bob got in a tangle over the AA prefixes being used by the Americans, his copy of Geoff Watts' *Prefix List* not taking into account the uses of these prefixes after the Bi-Centennial Year. It seems that the running out of W/K calls with two-letter suffixes has been the problem, plus the explosion and subsequent fall-off of CB which brought in an increased number of amateur licences as a spin-off; so a complete new block of calls now come into play, and several changes are also made, or in the pipeline, to the U.S. possessions.

D. J. Byers (London N.7) bought an FRG-7 on April 1, which is used with an end-fed wire, although at the time of his letter he had just obtained a *G-Whip* tri-bander. He lives in the third floor of a block of flats. Other interests include the study of Ancient Egypt, stamp collecting, Kendo, and Origami, not to mention taking a course at the Open University. Dennis doesn't just dabble at any of them—he has appeared in the 'Mastermind' series answering questions on Egyptology, and teaches Origami. He, like so many of us, is most put out by the amateur transmitter habit of gabbling callsigns regardless of the poor SWL trying to get copy through heavy European QRM!

Others

R. Barker (Workshop) duly finished his modifications to the FRG-7, and his article on them appears in this issue. On a different tack entirely, Ron has taken the trouble to resonate his indoor aerials properly, and he has been surprised at the amount of pruning the old GDO has indicated to be needful. At a tangent again, Ron noticed the modification by D. A. Robinson which we ran in the column last time, and thinks the scheme could well be applied to the FRG-7, which goes about 100 kHz per dial revolution in the standard form. No doubt this is made more noticeable on Ron's FRG-7 just because improvement in selectivity results in the need to tune more slowly and carefully lest one of the Wanted Ones be missed altogether.

In *Crawley*, D. L. Hill has been neglecting his CW in favour of SSB—he miscopied "VR6PC" under a pile-up one morning, without realising he had in fact managed to hear VR6TC, Tom Christian, direct descendant of the

Otherwise, one will never get the best out of the expensive receiver, simply because one will not know the "tricks of the trade" which one is forced to resort to with a simpler receiver—even using design defects to advantage. For example, it is a fair certainty in this day and age that none of the top-price receivers have oscillators that shift with changes to the RF Gain, but on a simple receiver it isn't unknown for it to be used as a last little tweak to extract the wanted signal.

A line from *S. Foster (Metheringham)* indicates that he has been more active of late, and he has ZS3WBC for Walvis Bay QSL'd, as is VK9NI on Norfolk Is. YIIBGD is not yet in the log, but the Clipperton expedition is, and Stew is patiently awaiting the verification. In all, some 30 prefixes are noted, which is quite a lot to find at the top of the tree.

Luckily for *P. L. Shakespeare (Foulness)* the ground has been pretty muddy, so gardening is out and listening is in—the more so since an FRG-7 has been bought from *Amateur Radio Exchange* in Ealing, all nice with digital readout—goes OK on the old long-wire, and only needs one hand to drive it rather than the two-handed work with the old one—so the next move will be some dipoles to feed it into.

D. W. Waddell (Herne Bay) noticed lots of CW stations calling "CQ M Test" and wonders whether it was some sort of mobile contest—no, just a common-or-garden variety of CW contest involving the Common Market countries. A beef concerns those operators who send interminable CQ's but don't seem to consider sending their own callsign to be important! These have always been with us, sad to say, and nothing seems to make them realise how just plain daft such a call is; the writer makes it a rule never to work such stations, because it is a dead certainty that they won't be at all DX'y—if they were, a short CQ would set up a string of contacts or even a pile-up.

K. Piper (Bognor Regis) found his AR88D too far gone to restore, so he still uses the home-brew direct-conversion receiver which gives coverage of 14 and 21 MHz only; however, *Ambit International* have indicated that an AM/FM/SSB module will be available in the summer so some construction work may be in order then to make the basic receiver double-conversion and varicap-diode tuned.

A most interesting long letter from *P. Rooney (Liverpool 4)* covers all sorts of topics. From it we must take one small extract, which is that Philip has an FR-50B, which he was told at the time of purchasing was a bit deaf on Ten. J.C. doesn't personally have any knowledge of this, but a look at the book of words should yield some figures for comparison between, say, 14 and 28 MHz bands. This will establish whether there is a basic weakness; if there is, then a pre-selector and an attenuator are in order, if not then a thorough re-alignment looks to be the answer. It is true, though, that a lot of the older receivers were a little sad on 28 MHz as compared with 14 MHz, due to the valve types used. However, that being said, the modern all-transistor box is much more prone to overload on any band, which is just as bad a fault but a bit more widespread in its effects! Of course, a good start would be to remove the valves ahead of the mixer and the mixer, and fit new, known-make good ones. Beware of the "cheap" valves

as they may not be new, and there is no doubt that the noise from any valve rises quite rapidly in early life, which can be a nuisance on a quiet band such as Ten. Transistors do not normally become noisier with age unless they are clobbered by oversize signals or by big "spikes" on the HT rail, neither of which should happen in an SWL set-up.

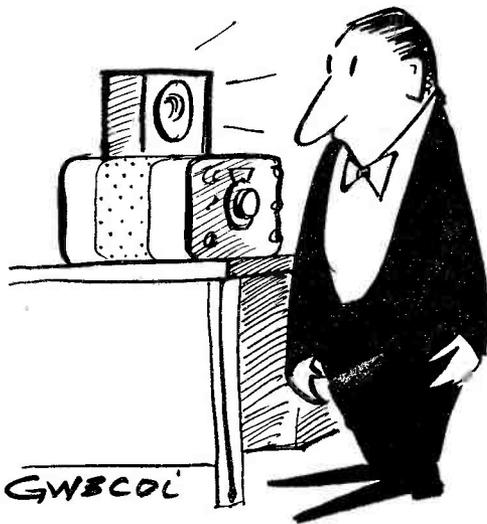
Thanks to the "spring" weather, *E. W. Robinson (Bury St. Edmunds)* has been able to spare time from gardening while the rain has been falling and so he had quite a bit of time to play wireless. The prize of the month was most definitely YIIBGD, who was finally identified for sure after an hour of steady listening through the pile-up.

Other Letters

These have been from: *R. Towlson, Nottingham; A. Rimmer (I.o.M.); S. Bowen, Kippax; K. Kniveton, Kingswinford; D. A. Robinson, Felixstowe; L. Stockwell, Grays; M. Rodgers, Harwood; M. C. P. Bennett, Datchet; K. A. Burch, Plymouth; J. H. Sparkes, Trowbridge; B. F. Hughes, Worcester; R. Shilcock, Kingswinford; M. Law, Chesterfield; G. Brazil, Dublin and Mr. and Mrs. Jane of East Looe.* To all these, thanks for your entries, and be assured they are read with as much interest as those which appear in the body of the piece—if only the Editor would give us a bit more space!

Finale

That's the lot for this time; for next, the deadline is July 13, to arrive, addressed as ever to "SWL", SHORT WAVE MAGAZINE, 34 High Street, Welwyn, Herts., AL6 9EQ.



"... interested to hear you operated in Antarctica for a long time, OM ..."

SWITCHED SELECTIVITY FOR THE YAESU-MUSEN FRG-7 RECEIVER

IMPROVING THE PERFORMANCE
OF AN ALREADY-GOOD
GENERAL-COVERAGE RECEIVER

R. BARKER

AFTER years of short wave listening on the amateur bands using a home-built six band (160 to 10 metres) crystal controlled converter into what must be one of the most modified of R.1155's (details of which would fill a whole issue of *Short Wave Magazine*), the decision was made in the summer of 1977 to get up to date with an all-transistor communications receiver. The R.1155 rig had performed remarkably well and although it had a built-in output stage, the power supply, converter and speaker were all separate units, all showing their age and making up a major eyesore in the corner of the dining-room—which resulted in regular outbursts of audio frequency QRM from the XYL.

Of the available new equipment the Yaesu Musen FRG-7 appeared to offer the best specification within the price range which could be considered, although there were reservations about the suitability of a single-selectivity receiver for all modes of operation under the prevailing crowded band conditions. Despite these reservations an FRG-7 was purchased in June 1977.

It very soon became apparent that the circuit of the FRG-7 was something of a contradiction, although it must be said at the start that within its price range the FRG-7 is a superb general coverage receiver with some very sophisticated circuitry: the Wadley triple-mix drift cancelling loop front-end gives a standard of frequency stability and calibration accuracy which up to a few years ago would have been available only on exotic professional general coverage receivers such as the Racal RA-17, or on equipment of restricted frequency coverage, for example amateur bands only, using crystal controlled converters into a tunable IF operating on a frequency in the 2 to 4 MHz range. The dual gate Mosfet RF stage gives excellent signal-to-noise characteristics and the input incorporates two levels of attenuation. There are no image problems and after an initial short warm up period the receiver is extremely stable, SSB signals held exactly in tune apparently indefinitely.

There is, however, one major deficiency in the FRG-7 for amateur band use and this is where the contradiction arises; the IF bandwidth is much too wide for satisfactory reception of SSB signals on the crowded amateur bands. The specified bandwidth is ± 3 kHz which is obtained by a ceramic filter operating at 455 kHz immediately after the final mixer. In the writer's receiver the bandwidth is more like ± 4.5 kHz but with an excellent shape factor which makes the receiver very good for medium and short wave AM Broadcast reception but is just not acceptable for serious amateur band listening.

One effect of this excess of bandwidth, apart from the obvious one of the inability to reject adjacent channel

QRM, was that SSB signals could be tuned with the 'Mode Switch' in either USB or LSB positions on all of the amateur bands from 160 to 10 metres. Another effect was that when the receiver was tuned to a weak signal, a strong signal separated from the wanted signal by a frequency greater than that of the audio frequency response of the AF stages (and therefore inaudible), could activate the AGC and 'S' meter and reduce the gain of the receiver to the point where the weak signal would become unreadable; in fact, one could never be sure that the 'S' meter reading related to the signal being received. Adjustment of the BFO to frequencies corresponding to 20dB down the skirt of the selectivity response, and with the tone switch in the 'Low' position, gave some improvement in signal readability under crowded band conditions, particularly on 80 metres, but it was evident that only by very substantially reducing the bandwidth could good SSB performance be realised. It seems strange that *Yaesu Musen* should have chosen not to include separate IF filters for SSB and AM even as an optional extra in a receiver which is otherwise so suitable for amateur band work and has been extensively advertised for this purpose. (It is interesting to note that two other receivers in a similar price range, the Drake SSR-1 and the Trio R-300 both incorporate separate selectivity elements for SSB and AM, although the writer has no operating experience with either receiver).

This situation obviously posed a major problem with three possible options:—

- (a) To continue to use the FRG-7 as it was.
- (b) To trade-in or sell and obtain a more selective receiver.
- (c) To modify the FRG-7 to give the correct bandwidth for the mode of operation in use.

Option (a) was dismissed. Consideration was given to option (b), but taking account of all the excellent features of the FRG-7 other than inadequate selectivity for good SSB reception, and the possibility of having to spend a substantial amount of money to obtain something which taken overall might not be much better, resulted in a lengthy study being given to option (c).

It is an unfortunate fact that modification of equipment has a deleterious effect on resale or trade-in value even when the modification results in improvement: this must be taken into account when dealing with equipment worth well in excess of £100. It was decided, therefore, that any modifications would have to be readily reversible, that the work must involve no drilling of any part of the receiver and an absolute minimum of alteration to the existing wiring so that the receiver could be completely restored to mint condition should the need arise. A method of achieving the required performance with inthese constraints was worked out and is described below.

The Circuit

The first consideration was the choice of SSB bandwidth and the method of obtaining it. It was decided that the SSB filter should have a bandwidth in the range 2.0 to 2.5 kHz with a shape factor (6dB to 60dB) of 2 or better if possible. A study of the advertisements of UK suppliers at that time revealed nothing suitable for use at 455 kHz; the obvious choice was a Collins mechanical filter but these are not readily available in the UK

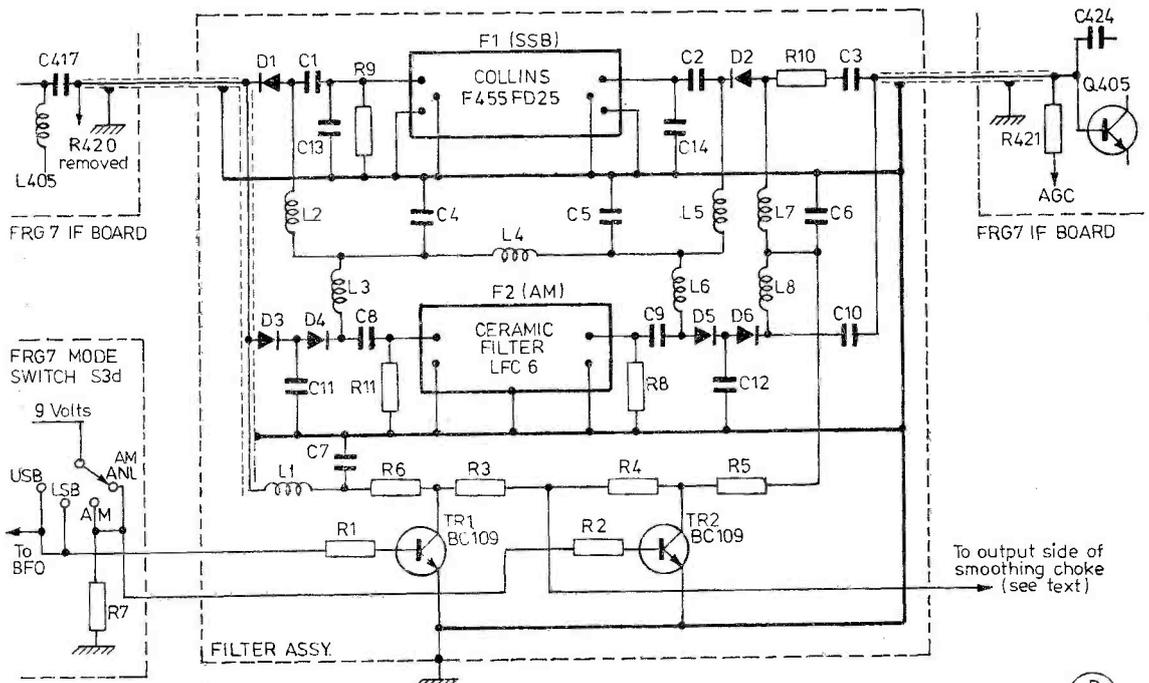


FIG. 1 CIRCUIT OF FILTER SUB-ASSEMBLY AND CONNECTIONS TO FRG7

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and a study of the 'small ads.' over two or three months produced nothing. Undaunted, the London Office of the Collins Radio Company was contacted which resulted in directions to their UK agents for Mechanical Filters—*G. A. Stanley Palmer Limited*, Elmbridge Works, Island Farm Avenue, West Molesey Trading Estate, Surrey, KT8 0UR. This company was contacted and they were very helpful, providing a copy of the Collins Mechanical Filter Catalogue and prices for the particular filters which were appropriate to this application. After considerable soul searching the decision was taken to purchase a Type F455 FD25 at a cost of £50 plus VAT. Collins' specification for this filter quotes a minimum 3dB bandwidth of 2.5 kHz with a maximum 60dB bandwidth of 6.5 kHz, but typically the shape factor is claimed to be better than that indicated by the above limiting values at 2-to-1; better filters are available from Collins but at even higher prices. (It is ironic that since purchasing this Collins filter, a 2.1 kHz Toko mechanical filter is being offered in the UK by *Ambit International*, 2 Gresham Road, Brentwood, Essex for about £10!).

The next consideration was whether to retain the existing ± 4.5 kHz ceramic filter for AM or to incorporate a filter having the specified ± 3 kHz bandwidth. In view of the fact that the receiver is used almost entirely for SSB work and that the existing filter gave good Broadcast reception there seemed little point in changing it, and so it was retained.

Switching of the two filters is accomplished electronically by means of IN4148 silicon switching diodes, and

the circuit is shown in Fig. 1. These diodes have a resistance of about 20 ohms when forward biased and conducting a few milliamps, but when reverse biased they have a resistance of hundreds of megohms. A study of Fig. 1 shows that the diodes are in series with the filters but are polarised in one direction for the SSB filter and in the other direction for the AM filter; the remainder of the circuit is merely to bias the diodes to channel the signal through the required filter. Consideration was given to biasing the diodes directly from the 9 volt BFO supply on the FRG-7 mode switch (S3d) but this could not have been achieved without substantial modification to the switch wiring. It was decided, therefore, to make use of a pair of switching transistors operating directly from the BFO on/off switch wafer of the mode switch (S3d). A pair of BC109 or equivalent transistors are used, and this is advantageous in that the additional current requirement from the 9 volt double-stabilised supply is only 0.2mA—thus eliminating any possibility of overloading the 9 volt supply which also powers both VFO's and the 1 MHz crystal oscillator (which if it did occur would almost certainly lead to stability and calibration problems). The main current source for the circuit is taken directly from the 13.5 volt output of the power supply which can readily cope with the extra 20mA required.

For those readers who are unfamiliar with transistor and diode switching, the following explains the exact operation of the circuit: when the mode switch is set in either of the SSB positions the base of TR1 draws about 0.2mA from the 9 volt supply through the 47K

resistor, R1; the collector to emitter resistance of TR1 drops to a very low level and draws about 20mA through R3 and the voltage on the collector is very low; the base of TR2 is earthed through the 3.3K resistor, R7, in the FRG-7 and in this condition is non-conducting between collector and emitter. Thus a current of about 2mA flows through R4, R5, L7, D2, L5, L4, L2, D1, L1, R6 and then to earth through TR1; D1 and D2 are therefore forward biased and offer a low resistance to the signal which passes through D1, C1, F1, C2, D2, R10 and C3. With this arrangement the diode pairs D3, D4 and D5, D6 are each reverse biased by about 0.75 volts and the high resistance cuts off the signal path through F2. With the mode switch in either of the AM positions the situation is reversed, TR1 is cut off, TR2 is conducting and a current of about 2mA flows through R3, R6, L1, D3, D4, L3, L4, L6, D5, D6, L8, R5 and to earth through TR2. Thus D3, D4, D5 and D6 are forward biased and provide a signal path through D3, D4, C8, F2, C9, D5, D6 and C10; D1 and D2 are reverse biased and block the signal path through F1. The 10mH RF chokes provide a low resistance DC path, having a very high impedance at the signal frequency, and stray coupling is eliminated by the 0.1 μ F, decoupling capacitors C7, C4, C5 and C6.

Collins mechanical filters require to be terminated by specific values of resonating capacitance and load resistance which for the F455 FD25 are 510pF \pm 5 per cent and 2K \pm 5 per cent on both input and output; on the input side these requirements are met by C13 and R9. The output of the 2SK19GR JFET final mixer stage in the FRG-7, Q402, is designed to match the 1.5K resistor R420 on the input side of the ceramic filter. No matching problems were envisaged from increasing the value to 2K for the mechanical filter and none were met in practice. At the output end of the mechanical filter the capacitor C14 presented no problems but the input resistance of Q405, the 2SC372Y silicon bipolar transistor first 455 kHz IF amplifier, was estimated to be very much less than 2K, though the writer was not in a position to make an exact evaluation. Taking account of the 100 ohms of un-decoupled resistance in the emitter earth return, it was estimated that the input resistance would be in the region of 300 ohms. This meant including a series resistance, R10, in the output which should have a value of 1.7K if the above assumptions are correct, but the nearest value to hand was 1.5K which has proved satisfactory as will be explained later.

The terminations for the ceramic filter presented no problems as they could be exactly the same as in the unmodified receiver; that is 1.5K, R11 on the input side and straight into the base of Q405 on the output side. Because the coupling from the output of the ceramic filter to Q405 is through capacitors in the modification and DC coupled in the FRG-7, a 20K resistor R8 is used as a precaution against any possible problems were this termination to be left floating; double diodes with 5pF earthing capacitors are used for switching the ceramic filter to eliminate any possible capacitive coupling effects when the diodes are reverse biased—which could conceivably spoil the SSB performance by strong signals within the passband of the ceramic filter bypassing the mechanical filter. This could be an

unnecessary refinement, single diodes not having been tried, but the cost is negligible and it was considered prudent to design them in from the start. The 10mH RF chokes are Toko type 8RB miniature inductors available from *Ambit International*. The 0.1 μ F capacitors are disc ceramic, or "humbug" types, and with the exception of R3 and R4 (which are $\frac{1}{2}$ W rating) all the remaining resistors are $\frac{1}{4}$ W. The total cost of the parts, not including the Collins filter, was about £3.

Construction

The circuit was built on a piece of 0.1in. pitch *Veroboard*, 5.2in. x 2.6in., and the layout is shown in Fig. 2; all the unused conductors on the *Veroboard* are earthed. If for some reason a reader should wish to modify the layout, for example to use components already to hand which differ in size from those shown there should be no problems. The important point is that there should be an absolute minimum of coupling between input and output; Collins quote a stopband rejection of better than 90dB for their filters and stray coupling could lead to deterioration of this characteristic.

It is suggested that the circuit board be completed except for the insertion of the ceramic filter, F2, so that the FRG-7 remains operational whilst construction is in progress. The pin spacing on the Collins mechanical filter and on the Toko RF chokes match exactly the 0.1in. pitch of the *Veroboard* and construction should present no problems. Having completed the board apart from F2, attach both screened leads and the three other leads allowing a generous length in each case.

There is plenty of space within the FRG-7 to locate the board and the positioning will depend to some extent on personal preference. In the writer's receiver the facility for operation from internal dry batteries is not needed since in the event of power cuts or requirement for portable operation, the 12 volt supply would be provided externally from the car battery; the plastic battery holders were removed from their sub-chassis which then provided an ideal position for the *Veroboard* sub-assembly. For anyone wishing to retain the internal battery facility the most obvious alternative is to mount the sub-assembly on the back panel behind the RF unit (PB1526); longer leads would be required, but it must be stressed that the system has not been tried in this position.

Assuming the internal battery facility is not required, remove the battery sub-chassis and unplug the lead; remove the plastic battery holders and the socket from the sub-chassis. Cut and drill a piece of 20 s.w.g., or similar aluminium to the dimensions shown in Fig. 3; fix $\frac{5}{16}$ in. 6BA countersunk screws to each of the four corner holes, and then attach the aluminium plate to the side of the battery sub-chassis nearest the outside of the receiver using the same screws and screwing into the same holes as those used to secure the plastic battery holder. This completes the work which can be done with the receiver operational.

Remove the FRG-7 from its case and un-solder the battery plug leads from their connections on the external battery socket, J5, on the rear panel (take note of how these wires were connected in case reconnection is required at some future date). With the aid of the FRG-7 Manual locate the ceramic filter and the 1.5K resistor,

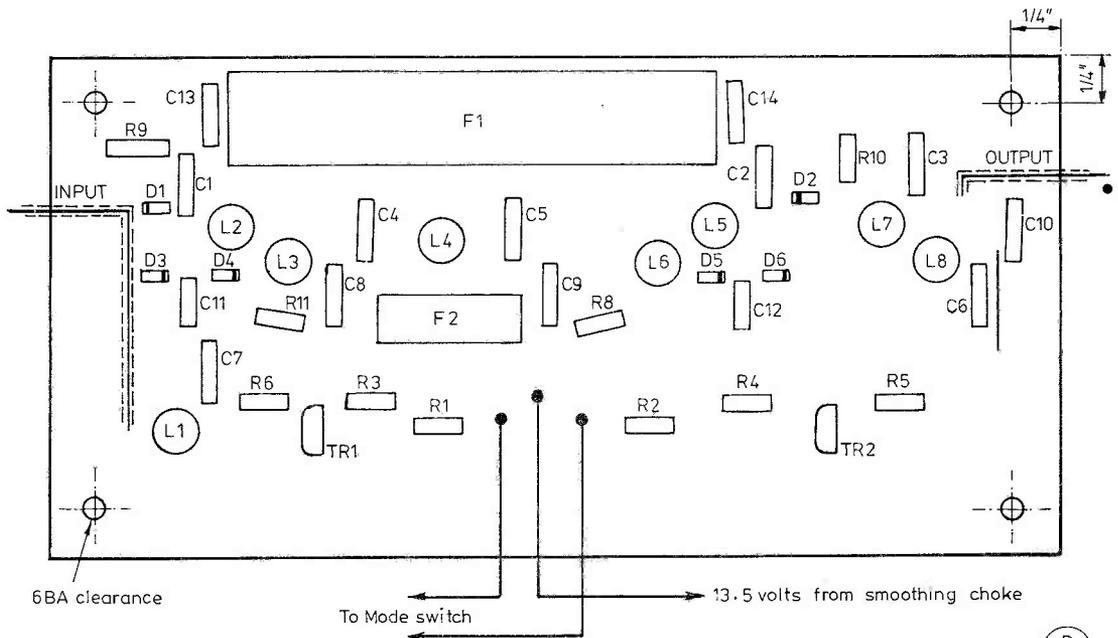


FIG. 2 COMPONENT LAYOUT ON VEROBOARD

R420, on the IF board (PB1528) and identify their connections on the underside; the filter has five connections to the board (only three are shown on the FRG-7 circuit diagram) and its removal requires some care. In the writer's case, this was accomplished by using the outer wires taken from very fine screened lead liberally coated with a non-corrosive flux, to blot up the solder from each connection using a soldering iron with a very fine bit. The filter could then be just lifted out. Alternatively, a proprietary de-soldering product or a solder sucker could be used, but on no account try to tackle the job with a soldering iron too large for fine printed circuit work. Removal of R420 should present no problems.

Insert the ceramic filter into its position on the Veroboard panel maintaining the same input/output configuration as in the FRG-7. This will require a bit of coaxing since the pin spacing on the filter does not exactly match the 0.1in. pitch of the Veroboard, and an enlarged hole is required for the filter case earthing tag which must be connected. Secure the panel to the four 6BA screws on the aluminium plate using nuts on both sides, making sure that the Collins filter is at the top as shown in the photograph and that there is adequate clearance between the conductor side of the Veroboard and the aluminium plate.

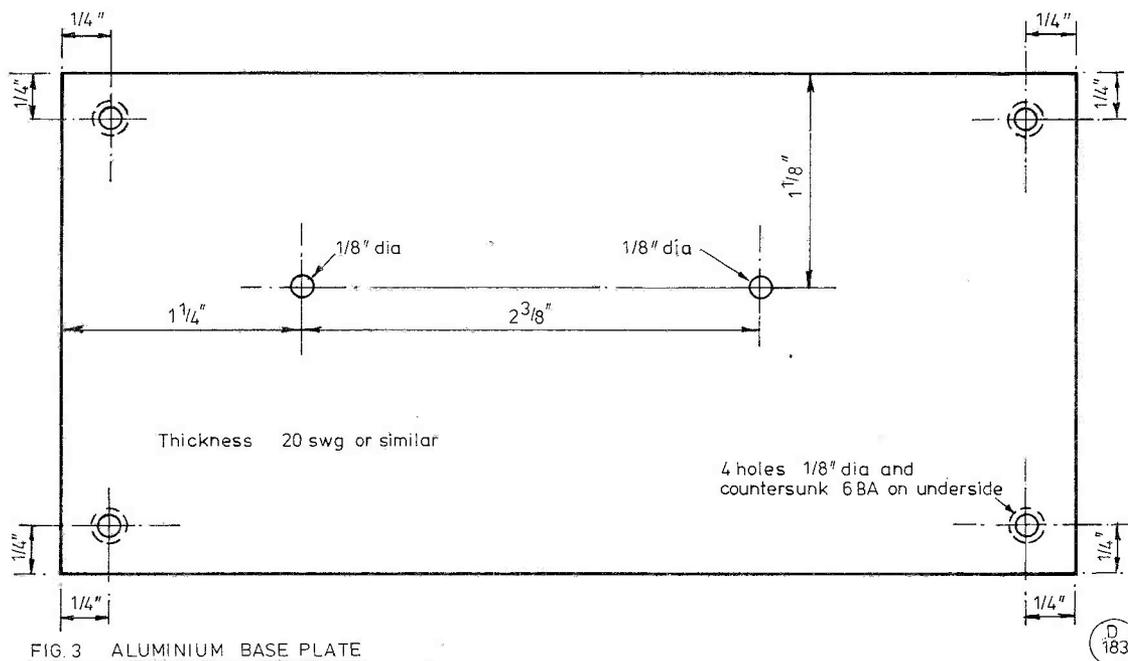
All that now remains to be done is to make the five connections to the wiring of the FRG-7. Trim the input screened lead to length and prepare the ends for connecting to the IF board; the lead goes in on the top side of the board into the holes which were originally the input side of the ceramic filter (that is, the left side looking at the top of the board from the front of the receiver).

The inner of the screened lead goes to the front hole and the screen to the rear hole, and it is vital that only the absolute minimum of inner lead be exposed. Similarly, connect the output screened lead which also goes in on the top side of the board into the holes which were originally the output side of the ceramic filter; these are at the right hand side, with procedure as before. It is desirable that both leads be no longer than is necessary, and that they do not come into close contact). Take the three remaining leads to the underside of the chassis through the grommetted hole originally occupied by the internal battery wires; now make the connections to the BFO wafer of the mode switch (S3d) taking care to ensure that they are the correct way round. The connection for the lead from TR2 is readily identified by the 3.3K resistor, R7, which goes from the switch to an earth point on the IF board. The lead from TR1 goes to the switch terminals carrying an orange lead (in the writer's receiver) to the IF board and the connection is most readily made at the IF board end. The main power lead from the junction of R3 and R4 goes to the output

Table of Values

Fig. 1

R1, R2 = 47K	C1 to C10 = 0.1 μF
R3, R4 = 680R	C11, C12 = 5 pF
R5, R6 = 2K2	C13, C14 = 510 pF
R7 = 3K3	C417 = 0.01 μF
R8 = 20K	C424 = 1 pF
R9 = 2K	L1 to L8 = 10 mH
R10, R11 = 1K5	L405 = 1 mH
R420 = 1K5	D1 to D6 = 1N4148
R421 = 220K	



side of the smoothing choke which is mounted under the chassis. The output terminal is the one on the right looking from the front, which has a grey lead (in the writer's receiver) going to the underside of TP407 on the IF board; the connection could be made to TP407 if preferred. Position these wires tidily and secure to the existing harnesses at appropriate points.

Setting-up and Operation

Make a final check on the connections, and with the receiver still out of its case plug in and switch on. Check with a voltmeter that the switching transistors are operating correctly. The following readings should be obtained on the collectors:—

Mode Switch Setting	TR1	TR2
USB/LSB	0.2	12 volts
AM/AM ANL	12	0.2 volts

Assuming these are correct set the 'Mode Switch' to the AM position and plug in the aerial; the receiver should perform exactly as before the modification. Disconnect the aerial. (For SSB reception it will be necessary to retune the BFO). A signal generator is not required, though one could be used if preferred. For setting up without a signal generator set the preselector bandwidth

to either of positions B, C and D (the position of the preselector tuning control is irrelevant). Tuning the receiver to 1000 kHz should give a signal of S9—plus from the receiver's 1 MHz crystal oscillator; with the Mode Switch in the LSB position, tune the main dial down in frequency until the signal drops by about 20dB below the maximum reading obtained and adjust the core of T406 to give zero beat. Turn the Mode Switch to USB and retune the main dial up in frequency through the peak response until the signal drops to about 20dB below maximum, and adjust TC404 to zero beat. The adjustment of TC404 for USB will be found to affect the LSB tuning so it is necessary to repeat these adjustments until zero beat is obtained at the required positions in both cases.

The insertion loss of the Collins filter was found to be 2 or 3dB greater than that of the ceramic filter in the FRG-7 as measured by the 'S' meter on the signal from the 1 MHz crystal oscillator; in practice the loss of 2 or 3dB of gain is not of significance. To obtain precise bandwidth response curves would require equipment not available to the writer, but with care a useful assessment can be made using the dial calibration of the FRG-7, the signal from the internal 1 MHz crystal oscillator and

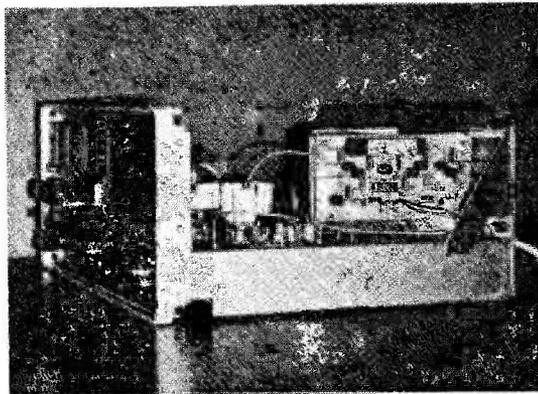


Fig. 4. The filter sub-assembly installed in the receiver, mounted on the battery sub-chassis after removal of the battery holders. With the exception of C14, all the components are visible and can be identified by referring to Fig. 2.

the 'S' meter. By this method the mechanical filter appeared to have an almost ripple-free response of about 2.5 kHz, thus confirming that both input and output terminations for resistance and capacitance are correct. It is a feature of Collins mechanical filters that if they are incorrectly terminated in either resonating capacitance or load resistance, they exhibit substantial passband ripple as well as deterioration of selectivity characteristics. In the writer's receiver when set up as previously described for tuning the BFO, the 'S' meter peaks at 15dB over S9 with the Mode Switch in the SSB position; the frequency difference between the dial settings at which the signal drops to strength 'O' on the 'S' meter on both sides of the passband is 4 kHz (as near as can be read on the FRG-7 dial), and this is indicative of a standard of performance for the mechanical filter well in excess of the minimum specified by the manufacturer. The equivalent figures for the ceramic filter obtained in the same way are 9 kHz between the 6dB points and 12 kHz between the points taking the 'S' meter to zero.

On the air, the improvement in SSB reception under crowded band conditions can only be described as staggering. This was the writer's first experience of using a receiver with a really excellent selectivity characteristic, and the overall cost of the modification (almost £58) is considered to be worth every penny. For an FRG-7 owner wanting to improve his receiver, the improvement of selectivity would seem to be of much higher priority than that of digital frequency readout which, whilst admittedly improving the accuracy of frequency measurement very substantially, does nothing to improve the readability of a DX signal struggling against European QRM. With the availability now of the Toko mechanical filter at about £10 including its matching transformers, it should be possible to make the FRG-7 very much more suitable for SSB reception using essentially the same circuit as that described here for a total cost of under £15. Having no experience of the Toko filter the author is reluctant to suggest circuitry for its use; however, mere substitution in the circuit described, but without

C13, R9, C14 and R10, should provide satisfactory operation. On the other hand, having now put in a good many hours of listening using the Collins filter, there is no hesitation in recommending it despite the availability of the very much cheaper product.

Apart from the improvement in the readability of signals under crowded band conditions, the reduced bandwidth appears to have reduced background noise under quiet band conditions. This is not to say that there has been any improvement in the inherent noise figure of the receiver (which the writer has always found more than adequate since plugging in the aerial always leads to an increase in noise level even under dead band conditions on 10, 15 or 20 metres) but there has been a definite improvement in signal-to-noise ratio under operating conditions. One feature of the FRG-7 is that on a quiet band signals can be of "armchair" copy whilst being too weak to override the AGC delay and give no 'S' meter reading. The view is held that any signal which is 100 per cent readable should give a reading on the 'S' meter, but with the FRG-7 signals can be readability '5' and strength '0'—and this has been more so with the improved noise characteristics, resulting from the narrower bandwidth and increased insertion loss of the Collins filter. For this reason it would appear that the FRG-7 would benefit from another AGC controlled IF stage immediately following the filter, and it is the intention to experiment on this eventually. For the time being, however, the novelty of having a highly selective receiver has still to wear off and time spent with the soldering iron is listening time wasted!

In conclusion, although this article has been written specifically around the FRG-7, there must be many other 455 kHz IF receivers in the hands of SWL's, valve or transistor, which are lacking in selectivity and which could make use of this circuit or something very similar. Anyone with such a receiver would be well rewarded for the trouble and expense of the modification though, as already stated, if the equipment is of substantial value be careful to make any modifications in such a way as they can be taken out and the equipment restored to mint condition should resale or trade-in be required.

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A SIMPLE SOLAR RADIO-TELESCOPE

AN AID TO PROPAGATION STUDIES

C. J. REED, G8MFP

If you have a quiet and sensitive receiver which is either out of use or only used for a small proportion of the time, a simple set-up will enable the sun's noise output to be monitored. For this purpose quite a simple aerial can be used, either commercial or home brewed, *see* Fig. 1. A two-metre ground-plane aerial is fed into a VHF converter, the output of which is attached to the receiver proper. From the receiver output is taken either to a tape-recorder (an old reel-to-reel machine with long-play take run at its slowest speed will give a few hours of recording time) or to a pen-recorder. Normally a pen recorder will require that a DC amplifier be used to feed the AGC output from the receiver.

Clearly with the tape-recorder system there will be loss of much of the information as the method does not have a wide enough bandwidth to cope with the "white noise" of the sun. However, it can still be of considerable interest.

Choice of the frequency to monitor depends on many variables, such as what's available in the shack, what the local QRM situation is like both as to local stations and electrical noises; but in general one could use 28-30 MHz or, best of all, a signal around 150 MHz where the solar noise is at its maximum. Other choices are 144 MHz (especially if a good two-metre converter is lying spare), 135-137 MHz, 408-410 MHz (the international radio astronomy band), or 430-431 MHz. If you stick to the bottom 100 kHz of two-metres, all of these frequencies should be pretty clear of radio traffic and other man-made noises.

The receiver should always use the wide-bandwidth position of the selectivity switch, if there is one. So far all is plain sailing, but now we come to the interesting bit.

Aerials can be either fixed or tracking. Let us consider a fixed aerial first; this can consist of a dipole, colinear, Yagi, or even a ground-plane, tuned "on the nose" for your selected frequency. The prime require-

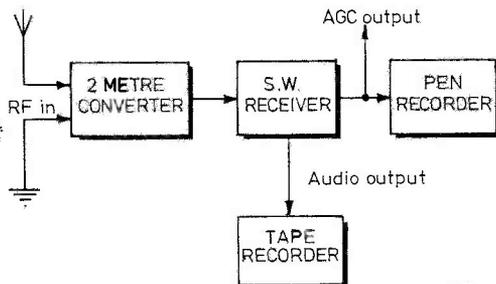


Fig.1 FULL POWER RADIO TELESCOPE

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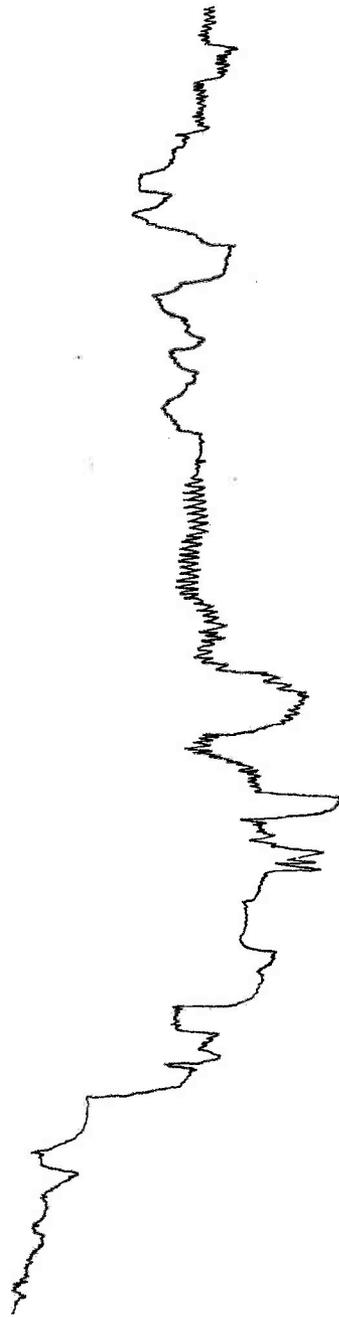


Fig.2 A SOLAR RECORDING AT 408 MHz.

ment is for the front lobe to be ± 20 degrees or better, and for it to be so arranged that at noon the sun is in the centre of the front lobe; this arrangement gives two or three hours of solar track time. A tracking aerial requires rotation such that the sun remains in the "eye"

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of the beam for the whole period from dawn to dusk.

The pen recorder and/or tape recorder may be built, or obtained from the local scrap equipment dealer and refurbished to a satisfactory standard.

A previous article ('Watching Sunspots,' by G2QY, *Short Wave Magazine*, April 1978, p.113) shows an optical method of observing sunspots; using both optical and RF systems as described here, it is possible to relate the visible effects to their results in the radio spectrum. On the other hand, the RF method described above is usable even when visual observation is not

possible and—all-important!—the operator remains in the warm dry shack.

Another interesting activity is to relate solar phenomena to beacons on the Ten, Four, and Two-metre bands. One can also spot the difference between a "quiet" sun and an active or very active one, and almost see sunspots coming, radio-wise.

The time taken to attend to the equipment is minimal, and the information obtained is both useful and interesting. Of course one can go further, and slowly build up to a much more complex system.

THE MONTH WITH THE CLUBS

BY 'Club Secretary'

BLAZING sun outside (first warm spell of the year!) and we're into the Spring Bank Holiday, so no more preamble this time!

Our first stop is with the **G-QRP Club**, which is the 'Mecca' for those interested in QRP—and, we could add, anyone interested in home-brewed equipment, or even *ideas*; they are all there, in every issue of the Club Newsletter *Sprat*. For more details, contact the Hon. Sec.—see Panel.

The **UK FM Group (London)** have a modified constitution as the main item of their current *Newsletter*, plus several articles of some interest; in addition they have a key to that somewhat mindbending collection of colour-coded information which manufacturers persist in putting on ceramic capacitors, and even professionals find hard to read "off the cuff". They foregather at the Grove Park Hotel, Chiswick, W.3 on the second Tuesday of each month. For more details, contact the Hon. Sec.

The object of the old **Cheltenham** club and RSGB group amalgamation was, among others, to be able to put on the sort of programme that will attract yet more to their ranks; and it seems rather as though this particular goal is being achieved, with new attenders at most meetings. Look for them at the Old Bakery, on July 6 or July 21—note these are different days of the week—which lies in Chester Walk, at the rear of the Library.

We had a telephoned last-minute change from the **South Manchester** scribe. The July programme is now to be: July 7, a night for the SWL's in the club, and a D/F practice on July 14. On July 21 Mike Woolley talks about Radio Astronomy, and on 28th, G3VYB of *Microwave Modules* will be discussing the implications of noise in VHF receiving equipment.

Down south now, to **Bournemouth (Wessex)** where they have a room at the Dolphin Hotel, Holdenhurst Road, Bournemouth, on Fridays, July 7 and 21. The first date is set aside for a visit from *SMC's* G8CKZ, while the 21st sees them hearing about the setting-up of UHF TV repeaters by G3PVX who is on the staff of the BBC. Just for once we look a week further forward, to *August 4*, when, instead of a meeting as such, all hands will turn-to and prepare for their station at

Wimborne Hobbies Fair the next day.

Verulam have the fourth Thursday in each month at the Market Hall in St. Albans; on July 27 G8AMG talks on the building of Amateur Repeaters. There is also an informal on the second Thursday in the month, which in summertime takes place at Salisbury Hall, London Colney; they will have GB3MAM operational there from July 1-9, the week prior to an Open Day at the Mosquito Aircraft Museum there on 9th. Not only was the "Mossie" designed at Salisbury Hall, but before that it was the home of Sir Nigel Gresley of steam locomotive fame.

It's July 18 for **Acton, Brentford & Chiswick**, at 66 High Road, Chiswick, London W.4. There will be no lecture as such, but rather a discussion on the Amateur's Test Equipment.

Deadlines for "Clubs" for the next three months—

(For August issue—June 30th)

For September issue—July 28th

For October issue—August 25th

For November issue—September 29th

Please be sure to note these dates!

Change of Hq.

This can happen for any one of a multitude of reasons, and can be the making or breaking of a club. No reason is given by **Bolton** for their move to Committee Room 'B' at Horwich Leisure Centre, Victoria Road; Horwich, Bolton BL6 6JR. (This of course alters the G8WY details in the Call Book). The dates continue to be set at the first and third Wednesdays in each month, and for more information we have to refer you to the Hon. Sec.—see Panel for his address.

Back to our main theme, and next on the pile is **Rugby**, where the members must feel envious every time they head for a meeting in the Cricket Pavilion; it is located adjacent to 'B' Building entrance, Rugby Radio Station, which is on the A5 at Hillmorton, where all those nice high masts are to be seen—just imagine four of those in use for, say, a rhombic! They foregather on each Wednesday, and in addition July sees them setting out a show station at Dunsmore Schools Fete, Ashlawn Road, Rugby, on Saturday 8th—the call will be G4APD/P.

Now we head for **Reigate** and the Constitutional Centre, Warwick Road, Redhill which is their Hq., the

date being July 18. Earlier in the month they have an informal at the Marquis of Granby in Redhill; this one is dated for July 4.

A "Loudest Crystal Set" competition recently occupied an evening at West Kent, the judging being done by Ron Ham. Turning to the July affairs we see they are gathered together on 7th and 21st; the former is a natter evening for those who are not on the trip to Commander Hatfield's solar observatory, while an activity for the latter date is not settled at the time of writing.

Kidderminster are going to the IBA transmitter at Lichfield on July 5, and on 23rd they are off for a picnic trip to Jodrell Bank in Cheshire. The Hon. Sec. also says there won't be any formal activities in August, the restart being Wednesday, September 6, at the Youth Centre, Bromsgrove Street, Kidderminster. For more data, get in touch with the Hon. Sec.—see Panel.

Leicester Polytechnic are taking the chance to get a word in now, to attract anyone interested who may be starting a course there in the coming autumn; they generally get together three times weekly at lunchtime, and have a station available with beams for HF and VHF up to 80 feet, and D/F hunts, lectures, discussions, Morse practice and contests are all part of the scene. Details from the Hon. Sec. at the address in the Panel.

The Community Centre, John Cleveland College, Butt Lane, is Hq. for the **Hinckley** crowd every Wednesday evening. The arrangements are that every other week in what they call a 'normal evening'—with a talk, film show or some such activity all arranged; this is alternated with evenings when G3VLG is put on the air (on Eighty at the time of writing).

On to **Southdown** and the Chaseley Home, South Cliff, Eastbourne; on June 3 they have an open-air meeting at Butts Brow, Willington, Eastbourne, where they will have hot dogs and refreshments, not to mention a talk-in on 145 MHz; and the same frequency will be in use at the Polegate Steam Engine Rally over July 29/30 for the same purpose; GB3SS will be operational, not forgetting some representation from RAEN and the local repeater group. This is one event your scribe has never managed to get to, though he has made a resolution to do so for several years running!

The **Stevenage** group have July 6 set aside for G3AGP, talking about the use of electronics in medicine, and July 20 for a talk on Radio Model Control. Both these are to be held at the senior staff mess at the Hawker Siddeley works in Gunnels Wood Road, Stevenage.

The North-West group of the **Amateur Computer Club** doesn't sound much like our sort of scene, but it seems that their stand at Belle Vue during the Convention attracted quite a few licensed amateurs, doubtless with advanced ideas on keying or Morse-reading, or maybe some smart machinery around the station. The booked dates are Thursdays July 6 and August 3, both at the National Computing Centre, Oxford Road, Manchester. Arrive by 6.50 for a prompt start at 7, the doors being closed to all comers ten minutes later.

There are three dates on the July calendar for **Walsall**, all at Forest Comprehensive School Community Centre, Hawbush Road, Leamore, Walsall; the 5th, when G8III will be talking about Modern Power Stations, 12th for a Natter and Morse Practice evening, and 19th

when they will be putting their HF and VHF stations on the air.

Formal meetings and Activity Nights for **Stourbridge** are held at Longlands school, Brook Street, Stourbridge, while the informals are at Shrubbery Cottage, Heath Lane, Oldswinford. For dates and details we have to refer you to Hon. Sec. G4IP, at the address in the Panel.

We have a bumper issue of the **Mid-Sussex Newsletter**, for various reasons; from it we find that the Hq. address is Marle Place, Burgess Hill, and from the picture on the front cover it looks as though once in the general area, the beams for VHF and HF will lead you to the gang. On July 1-2 they have a Radio Weekend at Hq., and a Constructional Contest on 13th. This leaves July 27, on which date it is hoped they will have G5RV back from Uruguay, to give them a talk and slides of his trip.

A.R.M.S. is the one for the keen mobile operator, be he HF or VHF oriented. Eight times a year they put out *Mobile News*, and indeed for all the news on the /M scene that is the place to look—not just for advance information on events, but also for reports on the ones you missed! All this, plus the various awards for operating activities and technical articles adds up to a good reason for membership, for details of which contact the Hon. Sec. at the address in the Panel.

It is always the second Thursday of each month for the **Southgate** group, at the Scout Hut, Wilson Street, Winchmore Hill Green, London N.21. For July they have G8ODR on Basic Logic, while August is still to be finalised.

Reformation

No, not a date in history, but the second time since writing this column that your scribe has been told of the formation of a club in **Lincoln**. Let us hope that this time things will prosper; to find out, try the second or fourth Wednesdays of each month in the City Engineers Social Club, Waterside, South Lincoln; and keep open the date of July 23, when they will have a sort of combination of Mobile Rally and 'At Home' with an HF station and talk-in on S22, so that everyone can come and see them and know who is around in Lincoln. This little party will be at R.A.F. *Swinderby*, on the A46 Lincoln-Newark Road, and all will be welcome.

Slight changes in the **Wolverhampton** programme for July make it: the 3rd, a UHF Night in the clubroom and on the air, 10th a natter-night also in the clubroom. On July 17 G8BHH will talk about SSB above 432 MHz, while the remaining two dates (July 24 and 31) will both be natter evenings, tacitly accepting that this is the time when most people are on holiday. In addition, on one Sunday afternoon each month while the weather remains fair, there is a D/F Hunt. Visitors and guests always welcomed, at Neachells Cottage, Stockwell End, Tettenhall, Wolverhampton.

There is a special event in the **Crystal Palace** book on July 15, when they have persuaded Ron Broadbent, G3AAJ, over to their place to talk about the arts and crafts in the proper use of *Oscar*—so others are invited to join the lads at Emmanuel Church Hall, Barry Road, East Dulwich, London S.E.22. G3AAJ knows both ends of the problem, having been involved with both the

professional side of communications and also as an amateur operating with *Oscar*; so this sounds like a worthwhile invitation to accept.

The last time we heard from **Sutton & Cheam** there was an AGM due; now it is over the *Newsletter* is fully taken up by NFD. However, we find that they have not forgotten to note their forward details: on July 19, Ray's Social Club will be the venue for the last meeting before the summerbreak, details to be announced—doubtless the Hon. Sec. will be pleased to give the latest details, and he can be found at the address in the Panel.

Sad to say, we can't tell you what is down for July at **Crawley**; we know they have an informal on July 12 at G3TR, but for the main meeting at the United Reformed Church Hall, Ifield, we must refer you to the Hon. Sec. to get the details, his address as always appearing in the Panel.

Up north we go again, to Halifax and the **Northern Heights** crowd at the Peat Pitts Inn, Ogden, where they meet on alternate Wednesdays. Following their recent AGM, they have come to the end of an era, as G3MDW has given up as Secretary/Treasurer after some 17 years of service to the club; G3UI takes over the task, and his details are in the Panel.

At **Yeovil**, they are looking forward to the special-event station they are putting on at RNAS *Yeovilton* on August 5, using GB3FAA. The normal weekly dates for July at Building 101, Houndstone Camp on Thursdays

are noted as follows: July 6 for G3XFW "To Set a Trap," (doubtless a mouse-trap?), July 13 for a talk by G3MYM entitled "Lambda Diode Experiments," July 20 has G2FKZ's tape-and-slide talk on Radio Aurora, and on 27th G8NBM will be enlightening the troops on the subject of Phasor Diagrams, applications, and the significance of 'J'.

At **Macclesfield** they have a new arrangement as to dates in each month—the main affair takes place on the 2nd Tuesday in each month, and the informal project nights are on the last Friday in each month—the only snag is that the Hon. Sec. doesn't tell us where the Hq. is, but you can chase him up at the address in the Panel.

I.R.T.S. Newsletter has a point which is as valid in every other Country as it is in *Eire*: with WARC 79 getting ever nearer, every holder of an amateur licence of *any* grade, or any SWL, should be a member of their national society; forget about the internal politics for a moment and just think that whether or not you like the particular society or its policies, whether you are a club man or a loner, for this year at least the support of every amateur or SWL is *vital*. All the delegations from all the nations need to know that the amateur movement is 100 per cent united: if only half-hearted support is given, the pressure from the professional users to take over our bands will be all-but impossible to fight off. If the challenge is not accepted, then we might as well chuck away our rigs and receivers for there won't be

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 STOURBRIDGE: S. Shacklock, G4IP, 12 St. Peter's Road, Stourbridge, West Midlands DY9 0TY.
 SURREY: R. Howells, G4FFY, 7 Betchworth Close, Sutton, Surrey SM1 4NR.
 SUTTON & CHEAM: J. Korndorffer, G2DMR, 19 Park Road, Banstead Surrey. (01-255 8729.)
 UK FM GROUP (London): R. G. Street, G3TJA, 3 White Ledges, St. Stephens Road, London W.13.
 VERULAM: B. Pickford, G4DUS, "Netherwood," 130 The Drive, Rickmansworth (77616), Herts.
 WALSALL: K. Boucher, G8KML, 22 Emery Close, Walsall (39457), West Midlands.
 WEST KENT: B. P. Castle, G4DYF, 6 Pinewood Avenue, Sevenoaks, Kent TN14 5AF. (0732 56708.)
 WOLVERHAMPTON: J. Cook, G8EDG, 75 Windmill Lane, Castlecroft, Wolverhampton, WV3 8HN.
 YEOVIL: D. L. McLean, G3NOF, 9 Cedar Grove, Yeovil, Somerset.
 YORK: K. B. Cass, G3WVO, 4 Heworth Village, York.

bands to use them on. Whether or not you agree with the nitty-gritty of this-or-that proposal about our bands is neither here nor there—you all need a band if you are going to continue the hobby, so just give 100 per cent support to the national societies and let them fight off the usurpers: they'll be getting together almost hour by hour and the tactics will and must change as the threat varies.

To return to the matter in hand, for anyone going to EI or wanting to get in touch with a club in EI, a contact with EI6DG at the address in the Panel should set them on the right path.

Cray Valley have bookings at Christchurch Centre, High Street, Eltham, London S.E.9; the first Thursday is the main one with a lecture, films or whatever, and a fortnight later (*i.e.* the third Thursday) they have a less formal sort of affair at the same venue.

It seems to have been a general change-around at **Surrey's** AGM, the object of the exercise being to stop at an early stage a slight falling-off in numbers which had been noted on the first and third Wednesday each month. The new Hon. Sec's. name appears in the Panel, and it would seem that G3FWR relinquished the reins after 24 years of sterling service to the club; the new man will have to be very efficient if everything is going to be "just so", as it was with G3FWR as far as this piece was concerned.

Silverthorn are to be found on Friday evenings at the Hq. at Friday Hill House, Simmons Lane, Chingford, London E.4. Just trot along, and you'll surely be able to find them—or you could contact the Hon. Sec., see Panel.

Earlier on we mentioned a club being reformed; now we have another one, this time at **Gravesend**, where the re-formed club is to be found at the Windmill Tavern, in Shrubbery Road, Gravesend, every Monday evening. It is understood that they have obtained the old club call G3GRS and intend to put it to good use.

Milton Keynes seems to have settled back into their Hq. at Lovat Hall, Newport Pagnell, Milton Keynes. July 10 sees a talk by G4DAW on Computer Games, and on 24th there is a Chat Night. A bit further on we note that the August 14 meeting is cancelled.

An interesting variant on the "what do do" theme is mentioned by **Nottingham**, where the idea is to put all the possible contenders on the club station, each for a given number of minutes, and to award a small prize to the chap who makes the most contact in the time. They seem to be booked in for each Thursday at Hq., Sherwood Community Centre, Woodthorpe House, Mansfield Road, save that June 13 is down for a Foxhunt.

Blackwood live at Oakdale Community Centre, near Blackwood, and there on July 7 they will present a couple of *ARRL* films, one about MARS, and the other one showing something of the activity at Talcott Mountain Science Centre in Connecticut. On July 14 they have a tune-up session, when an SWL member (shame on you licensed types!) will bring along a selection of power, frequency and deviation-measuring devices on which all present can get their black boxes "on the nose" for the summer recess. There will be no more Blackwood

activity at Hq. until September when the new session starts.

Crowded meetings are the order at **York**, where they have a room at the United Services Club, 61 Micklegate, York, every Friday *except the third one in each month*. All welcome, bring your own lever to get in if you are late!

It's a long time indeed since we last heard from the club at **AERE Harwell**, though our spies have told us the odd thing or two to indicate they are still going; now the Hon. Sec. confirms this. It seems they have Friday lunchtimes in the G3PIA shack, and they also have the third Tuesday in each month at the Social Club, Currie Avenue, Harwell.

Cornish have a new Hon. Sec.—see Panel—after the AGM. Thus, there isn't room in *The Link* for much about the coming month, but we can say that it is the first Thursday in every month, at the *SWEB* Clubroom, Pool, Camborne. The start is at 7.30, and as the normal turnout is between 40 and 50 members you have every encouragement to turn up early in order to be sure of a seat! We might add, for the benefit of the occasional club secretary who writes to bleat that his club is too far into the sticks for any lecturer to make the journey, that Cornish have been living from their own resources in terms of talks at meetings for years, and the success of their club proves what can be done when there are a few members who are enthusiasts on the one hand, and self-reliant on the other.

At **Bishops Stortford** things still bumble along in the same old way, and any third Monday will find the lads at the British Legion Club, Windhill, Bishops Stortford.

Last month we slipped up by not mentioning the Hon. Sec. of **Peterborough**—sorry, fellers! They are based on the Scout Hut, Occupation Road, and will be there on July 21, for a topic still to be finalised at the time of writing.

Finis

This month it so fell out that we were able to take in the odd late arrival—but that's not to say we can make a habit of it! Your August material should be with us now, and your September material on July 28 (as set out in the 'box' showing the deadlines). Send it all to "Club Secretary," *SHORT WAVE MAGAZINE*, 34 High Street, Welwyn, Herts. AL6 9EQ.

RALLIES AND 'SPECIALS'

To be added to the list published in the May issue are: **July 23**, Cornish Mobile Rally at Penweathers School, Truro, talk-in on 2m. FM; details from H. Adcock, 1 Bowglas Close, Castle Road, Ludgvan, Penzance (Tel: Cockwells 562). **August 20**, Preston ARS rally, at Walton le Dale High School, Bamber Bridge, Preston (one mile from M6, Junction 29), talk-in on S22, usual attractions; details from E. Howarth, G8KTM, QTHR. *Special events: July 8 and 9*, Barking RES will be operating GB3DTS at Dagenham Town Show in the civic centre, on 20/15/10m. SSB, 2m. FM and SSB, and 'Oscar'. **July 23**, Lincoln Short Wave Club, G3IXH, will be at R.A.F. 'Swinderby' (A46 Newark/Lincoln road) Open Day, with an HF station and talk-in on S22.



This is just what we like to see! The Amateur Radio movement, like any other, must have its young enthusiasts: three of the younger members (R.A.E. candidates in 1988?) of the Shelburne Youth Centre Radio Club, G4BXW, with Tom Clarke, G5BWZ, on the KW-2000E. We wish the Club the very best of luck.

COMMUNICATION and DX NEWS

E. P. Essery, G3KFE

THE high sunspot count of recent months has one—only one—drawback, and that is the annoying tendency of the sun to produce flares. Those with a long memory will doubtless recall the one back in August 1972 which has since then been taken as something of a yardstick; at 3 GHz the background level is about 70 flux units during the minimum solar activity, rising to 170 during an active period. The 1972 event took the flux up to the 22,000 mark, and the recent (April 28) effort got it up to 24,000—a super-flare indeed, and causing distortion of the earth's magnetic field for four days. And that's not an isolated case: over a two-week period in April, if one takes into account the tiddlers, some 200 flares may have been on the go—ten biggish ones on April 7 alone!

On an entirely different tack, that very last sentence last time—about the matter of a mast and a triband beam—rebounded well and truly. At this moment the tribander adorns the lawn (can't be bad: removes the need for mowing temporarily!) while the mast lies along the path. Moral: don't try and raise a mast with too few troops and not enough guys!

Here & There

First off we have a letter from Stephen Lowe, who is awaiting his Iranian licence; he has been advised it will be EP2SL, and should be on the air mid-late June and looking for G contacts. The EP QSL Bureau is closed, and so the EP2SL QSL's will be managed by G3XCS who is QTHR in any callbook. The aerial is a Hustler 4BTV vertical at fifty

feet, on a roof which is 3500 square feet of copper; there will be dipoles for 160 and 80 at the same height. The prime mover down below is a KW-2000B. SWL reports will also be QSL'ed *providing* the report is correct.

Looking at the YI situation, various people have made QSO's, the matter of gear is being handled—*Yaesu-Musen* having donated an FT-101E and associated outboard VFO, and the North California DX Foundation have shipped a FT-560 with VFO to Europe where it has been tested and proven to give out some 350 watts. There now remains the negotiating to get this gear into the country. If it does nothing else, it will give the opportunity for some split-frequency operation; and we hear that if that isn't enough to help out, then something in the

directional aerial line will be organised.

A DX-pedition is set up for July 7-9, aiming at St. Peter & St. Paul Rocks, by PY1RO (Rolf Rasp of Top Band fame). It is interesting to note that July 9 ten years ago was the very date on which the ARRL released their decision on W9WNV's operation from there; but with PY1RO at the sharp-end there shouldn't be any problems.

The coming autumn will see, if all goes well, some operation from Bouvet (September) plus a showing from San Felix around October/November with a team who have been on the trail before and will be looking to knock up a fat total of QSO's.

The current ZS2MI situation is that Gordon left the island a couple of weeks early, but we understand that the replacement does intend to keep the station going, although the emphasis is going to turn from SSB to more CW.

By the time you get this, the dust will have set on the Cocos-Keeling operation. QSL's for this one go from Europe to F6CYL, Ann Koboloff, and for the rest of the world the routing is to K4UTE. Incidentally, Ann was the VK9YL of the expedition.

Back to the future, and we see some planning going on to activate Sable Is. during the month of July. We also have some similar noises indicating a Sao Thome trip signing D4CBS, and staying for several weeks. The Mellish effort for late August is also beginning to firm up.

All of which makes a large improvement on the scene of a couple of years ago!

Twenty Metres

Still sounding good, but with its off-days is the summary from G6TC (Wednesfield); and most of the 7 MHz fraternity of the last few years have migrated to 14 MHz, at least for the breakfast time activity. Ted found CW did the trick with VK3ADX, VK3FC, VK3ZM, VK1VK, VK6ZE, 8P6GG and UK8AAC.

Not a lot of activity on the band from G3PKS (Wells) thanks to the attractions elsewhere. However, CW made it to UL7FP, VE3BIU and

VE3COP/W9, plus ZL3BH, who was hooked OK but the tide went out completely before the end of the QSO.

G4BHE (Basingstoke) played in the Ten Ten QSO party, but there was a little time for 14 MHz on which N6BP/7, VK3LC, VK3XB, and ZL4LR/A were worked (the first-mentioned, incidentally, being the last state required for WAS).

The absence of the Thing from Poltava of late is noted by G2HKU (Sheppey), who occasionally hears it but only weakly, for which Ted's solution is the suggestion that they may have ice in the coax! He used SSB to work VK3TE, ZL1AAE, ZL1VN, ZL3FV and ZL3SE, while CW accounted for LU9CV and VK3BBT.

One of many who approved of the Editorial last month was G4DMN (Wirral) who comments that the nice computer which was going to solve all the RSGB's problems can't do sums anything like as well as his pocket calculator, having twice been accused of underpaying on an order. Were that not enough he ordered three log books and ended up with only one arriving, and when the rude letter went in, indicating the error the other two arrived—*six weeks* later! The whole business, as Richard says, has become more than a joke. To do justice, perhaps, to G3OUF he hasn't had very long to cleanse the stables, and he was very quick to write and defend Hq. after he read our Editorial. However, we digress; back to DX, and G4DMN who found the band rather noisy, but still made QSO's with KH6HBT, HKØCLS, VYØCA, VR3AK and 5T5CJ.

If you listen around for the special-event GB3TCF on August 26-28, you will be listening to a station from the National Agricultural Centre, Stoneleigh, Kenilworth. They seem to have reserved the period 1100 to 1500 for working on Eighty, but for the rest of the operational time they will be on 21 or 14 MHz. If you want to go and cheer them on, the Centre lies on the A444 near Kenilworth.

Now to G3NOF (Yeovil) who seems to have bust the elastic in the transmitter which has made him QRT for most of the period. However, on 14 MHz the early-morning

conditions have been very good indeed to W6/7, VE7, for about an hour before the arrival of VK's and ZL's around 0700; in their turn the Pacific stations started to surface around 0800. SSB QSO's were made with FB8YF, K6AXC, VE7BXG, VK2EQ and W6AOC. Changing tack a little, Don mentions that his YI1BGD QSL came back by air mail, return post.

A new reporter is G4EZF who announces himself as a QRP man by comparison with the four-element beam and KW merchants, having about twenty watts input of CW to a CO/PA using 5763 and an 807, the crystals being ground by hand to the desired spots on 7 MHz from surplus 10X types; the receiver is a BC-348L with a 200 Hz drift between transmit and receive, while the aerial is some 132 feet of wire in the loft—18 feet up and bent five times to make it fit. With this set-up, the twenty-metre log includes VK3RJ, KV4AA, 8P6JH, PY5CMS, PY7HQ, JW5BSM, VE2WQ, and a score of assorted W's.

G3PPR (Sherborne) next, and Rod has been in the process of settling in to a new QTH this last month which has rather put a damper on things; on top of all this the Open University has been calling for it's pound of flesh! Rod has hopes, though, of lighting the boiler under the AR88D this coming month, but the transmitter will have to await the erection of aeriels.

21 MHz

The school station which G3PPR controls has a 7 MHz dipole up; they found conditions on 7 and 21 pretty poor at times when they could get on, but they did manage to *nearly* make contact with UA9UUB!

While waiting for his EP2SL call sign to arrive, there has been some pretty careful earwiggling going on, and Stephen says he has heard HA9IARU, HZ1AB, JA's, JY3ZH, JY5HH, OD5FB, OD5FI, OHØNA, WD9FCC/VQ9, YI1BGD, ZL's, 5Z4JE and 8P6CP.

At the time his rig gave up, G3NOF was on 21 MHz, at 2300, at which time W, KH6 and VK were good, and on the previous morning around 0700-0930 lots of KH6. (Other mornings showed no signs of KH6 propagation). ZK1DR got away, but CN8AK, FO8AK,

FR7BE, JH2BNL, K6AXC, KH6BZP, KH6DD, KH6GMP, KH6RG, TU2ITU, VR80 (Don's 332nd country), VY0CA, W6IXN, W0UA (Colorado) and WB4OGP/KH6.

At G4DMN a few sorties were made on to the band, to yield contacts on SSB with WB4OGP/KH6, UM8FZ, VK, VY0CA and 5H3FW.

G2HKU remarks that for once his direct mail copy of *Short Wave Magazine* landed on time, doubtless as he was in the middle of a row with the local post office; using his post-code he still gets letters from Norwich via Burton-on-Trent in 4-5 days by first class mail! However, while he was waiting, Ted applied himself to some CW and raised K7RDG in Arizona, LU1HDC and PY1BOA.

G4BHE offers a small selection on this band, having been on Ten for 90 per cent of his operating time since the turn of the year; it includes AA7A, JA8SCD, K0SST, VE7DFS, VY0CA and WB7PHV.

G3PKS (Wells) says there wasn't a lot to report, but much of his casual operating time was spent on the band, CW yielding UL7PBI, JR2DWW, VU2BK, JA1ITS, KP4FHL, JA3EPT/MM off the African Coast, VU2BK again, N4AR, EP2LA, W2AMS (who was troubled with much QSB, dropping right out for a minute or so and then coming back up again so that contact could be re-established and the QSO completed), and YV3AD. An account follows of the 'ITU Zone' contest of May 20, in which Jack had three little spells. The first, from 1500-1530z, yielded JF1CO, WO1UB, PY4OD, ZX4ITU, and JA4YF; the second was from 1730 to 1815z and it gave UL7PBY, HA7KS, SP5BOX, UA1ZX, WA4WSB, SP9KBY, JA6VM, PY1BOA, PY1KE, PY2BY, HA5KNN and LZ2EY/MM near Madeira. The final spell was from 1900 to 1950z, and this gave with K6ZM, UC2SE, PY5WSS, PY4WAS, PY4WOD, ZX4ITU again, UK9ANN and WB2GKZ for a natter. Just shows what can be found under casual knockabout conditions.

On 21 MHz, G6TC notes his best contacts as being with PY1, PY4, W5, W6, KV4AA, UH8CS, JR3IAF and JA6AFO.

GM3STV (St. Andrews) has a note in to say he worked the phoney to end 'em all—this one was signing an *FW8* callign (Wallis and Futura Is.), but in the course of his QSO he said his QTH was Idiot Is. and his name Cretin! At least he knew his own worth to the world.

Ten Metres

The great improvement in the bands has seen a general QSY up in frequency, and we understand there have been contacts on 144 MHz between *KH6* and *W6*, while at the other end of the scale the exodus from 7 to 14 MHz has been quite marked—it is just as though, lemming-like, we have all stepped up a band at a time, until we get to a blank one!

G2ADZ (Chessington) is the Watcher of the Day on this band, always at the CW end. May has been a much quieter month, with some very good patches, and as a result some very good DX! Bill reports keying with VK8GG, VK8DB, 9M8HG (who at 80 is still operating from a rubber jungle), KV4AA, KV4CI/MM3, TI2LA, HI8MOG, CX8DT, ZP5NW, SU1IM, ZD8TM, ZS4MG/H5 (Bophuthatswana), ZE3JO, HK3DMD, OA4JR, CE3ZW, CE7AC, HM2JN, A4XHI, FG0GD/FS7 (St. Martin), FM0COO, ZZ6AM, LU6DKX/A78 (something to do with the World Cup), 9L1CA, F8RU/AP, ZL3GQ, *PY's*, *LU's*, sporadic-E European contacts and, of course, the Gotaways, such as 8P6FX, VP2VL, PZ1AP, YBONM, YBIKW, VK2, VK3, VK6, FG7AM, ZL1HY, ZL1AH and KZ5VV. One very odd day noted was May 27: with the beam looking West at 2130, F8RU/AP showed up calling CQ Europe. Turning the beam round to East made him disappear, so it was cranked round to West again and, hiding thoughts of phoneys, the chap was worked. The QSO was followed at 2300 by a QSO with ZL3GQ while the beam was facing WSW, the ZL having a dreadful echo on him which at times reduced his readability; but ZL3GQ worked a number of European stations including an EA running three watts.

All this having been said, we find G3PKS rather disagrees, the band having been poor and patchy at the

times when he listened, although the band opened very suddenly once or twice before tea-time, so that LU1HDC and ZS1PH could be snapped up. However, like so many before, Jack is of the opinion that "conditions" are to some degree a matter of activity—get on a "dead" band and call CQ, just in case!

Another largely ten-metre addict is G4BHE, who offers HP1XYA, J3AG, OA6CV, TU2ITU, VK0AS, VP5KK, WA2WYR/CX, 6Y5MD, 8P6GN, 8P6FX and 7P8AC. Barry also ran second in Europe in the Ten Ten, not to mention top *G* at the same time.

Quite an event to hear that G2HKU has been operating on Ten; but his CW has been talking to FGOGD/FS7, EA8URE and YV10B.

'CDXN' deadlines for the next three months—

August issue—July 6th
September issue—August 3rd
October issue—September 1st
Please be sure to note these dates.

For G4DMN Ten was *the* band, and Richard now has some 134 countries worked on the band in 1978. Recent DX worked included A9XBJ, C31PH, CX6RV, C5AK, EA6EV, GJ5AGA, HZ1AB, JY5RBM, OA6CV, OD5MR, PZ1AP, SV1JG, SV1JI (these two being on Crete), TJ2P, TR8RG, TR8GDC, UF6FCN, VP2AZB, VP5KK, VP9IJ, VK3NCT/M, OE6DK/YK, 5Z4PW, 7P8AC, 7X2KAR and 8R1R.

Ten seems to have managed to be dead at the times when G3PPR has been able to fire up the school rig, save for one very worthwhile VP2LI at 59+ which must have demonstrated to the boys just what amateur radio is capable of.

Odds & Ends

G3WW writes to point out some loose words in last month when we attributed to him some 1049 SS/TV contacts. We should have said that G3WW had worked some 1049 (now 1054) different stations on SS/TV during the period, many having been worked more than once, so that in fact G3WW has nearer 5000 QSO's on SS/TV.

How nice to hear again from

Mal, ZE3JO, now active from a new QTH, on the edge of an 855-acre farm; Mal has one of the farm's houses, which means that he can get up some half a mile of long wire if he feels so minded! He has in fact tried one of 1000 feet, last rainy season, but it lasted just five minutes before being struck by lightning! That was taken as an omen, and ZE3JO returned to his dipoles.

WA4WTG was in England earlier in the month, and found a copy of *Short Wave Magazine* on a book-stall. Bob was kind enough to drop us a line and say how much he liked it, and at the same time mentions that he is QSL Manager for 8P0A, 8P6AH, 8P6CP, 8P6BN, 4Z4DX, 4X4NJ, 4X4UF, 4X4VB, FY7AE, TJ1BF (only 1972), LZ1JF and LZ100JF. "Kappy" is himself an avid collector of British and Channel Is. stamps, and would be pleased to swap stamps with anyone in this country, beginner or advanced. Sad to say, he had to miss a chat with many of his ham friends in this country as the tour was covering the whole of G, GW and GM in a fortnight. For the record, the address is: Bob "Kappy" Kaplan, WA4WTG, 445 N.W. 202 Terrace, Miami, Florida 33169, USA. Incidentally, the home station is Drakeline including the Big Boots, driving a four-element Quad on a fifty-foot crank-up and tilt-over tower, so if you work him, you'll know where the big signal is brewed up and how.

Back in May last year we mentioned Winnie Powley at the age of 87 taking Morse by touch from the cone of a speaker, after losing sight and hearing; G3K LX tapping a couple of stories for her each week. We hear from G2NJ and G3K LX that she is now a Silent Key, after another heart attack. She must have been the oldest YL Tel. Op. and will be missed by those who knew her.

G2HKU and his gardening QRM have yielded the odd chuckle from time to time: this year he finds he can't cut the hedges because black-birds have nested there, and his usual mob of hungry birds in the morning have been augmented by a brace of collared doves—but none of that stops the grass growing!

Forty

Very few mentions this month. G2HKU used CW to work UA9WS, UL7EAJ and UK9AAN.

G3PPR and the school dipole have been active with some success during the afternoons; Rod would like to make skeds with other school societies for this band or Eighty on Wednesday afternoons, and for himself would like to natter with other students/staff of the Open University, especially those doing science or maths.

The only other reporter of QSO's on the band is G6TC, who offers W1-4, VK3MR, KV4AQ and LU5DXA.

Eighty

Again a sparse crop. G2NJ (Peterborough) reckons it was very poor until teatime, when the G stations began to rise to reasonable signal strengths. Of the portables, G2CAS of Harrogate has been out again; Nick worked him from the side of the river Tweed at Coldstream. Nick also heard G15DX signing GM, so it looks as if that doughty warrior has been enjoying Scotland again. Another was G3BFE/P, Eric, who was in Cotswold country. As for the QRP stuff, ON4TB near Antwerp was worked with three watts to an HW-8; at the same time F6ETI/M was also copiable on CW. G3HQQ was also worked, he also having three watts to the HW-8. G2FI (Wadhurst) is still operating very nicely with the left hand, and hoping to possess one of these little beauties ere long. G3SSJ in Hampshire, who is well-known for his interest in radio by-gones used an O-V-1 to the circuit published in *Wireless World* for June 1927 for a 100 per cent solid 35-minute QSO, reporting the G2NJ signals as 599. Readers with long memories may recall G14AEY, Dewar Twist, and the two racing pigeons who alighted on *M/S Bright Maersk* and travelled some 80,000 miles aboard her; Dewar is now aboard *M/S Bella Maersk*, and says he is moving to Perthshire in November, all being well.

For G4DMN there were a few late-night sessions on the air, which gave him contacts with TF30F, VP9IB, VP9HP, VY0CA, 4UIITU and 9Y4CR.

That's about the lot save to mention that G3PPR has been on the band and found it not too bad for inter-G working in the afternoons.

Top Band

Where have all the stations gone?—to misquote the song. G4FJU (Walsall) sticks to his last, and has crept up to 46 counties worked towards the CCA Award, but only 8 have so far come across with the QSL's. One small grouse from Ben is the way, when he has found a clear spot between the fishbone and the timebases and is calling CQ, he invariably gets someone back saying will he please QSY as they have a sked with a friend on this very frequency. As he says, it amounts to saying "Please will you give me your clear frequency" and is, to put it mildly both ill-mannered and liddish. Sked working on Top Band should always be a matter of one station calling the other on an otherwise clear channel, and if necessary shifting the odd few cycles to get out from under.

G2HKU has the only other report to offer, he having as usual swapped SSB reports with PA0PN and PA0INA and CW with OLIAXU.

So, there it is. Isn't it about time we had a "thing" on Top Band?—we've had no entries for the Top Band Table this year and only G4FJU seems to be after CCA. He has worked enough stations to give an indication that the band is not completely unused for inter-G working. How about some of the people who, having gone up to two-metres and finding the S-channel and R-channel phobia too much of a bore, coming back down to Top Band again? Remember—Use or Lose.

Finale

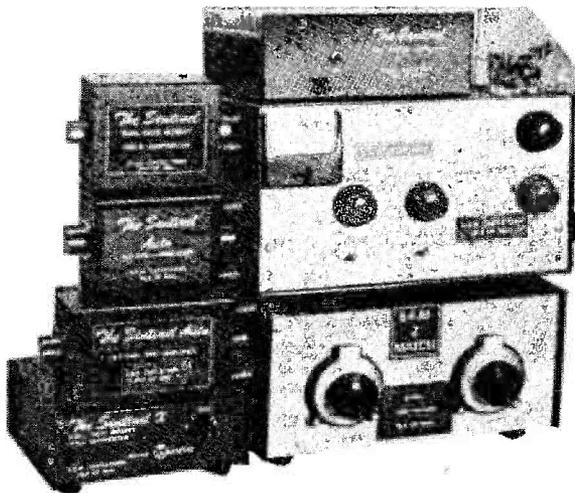
That's it for another time; mail for next time, please, to arrive by July 6 (just like it says in the 'box' in the piece), where we show the forward dates as well. Address, as ever, to "CDXN," SHORT WAVE MAGAZINE, 34 High Street, Welwyn, Herts. AL6 9EQ.

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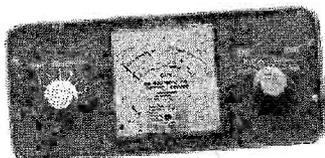
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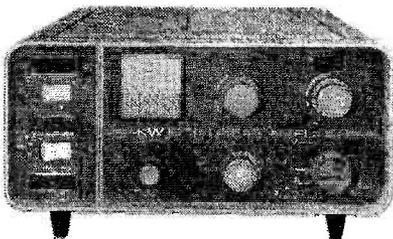
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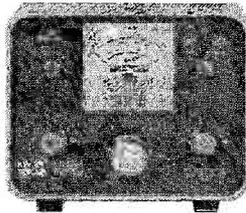


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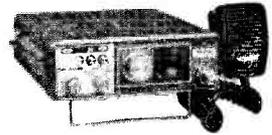
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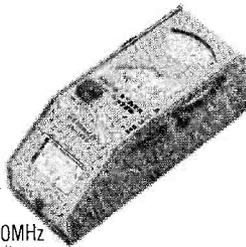
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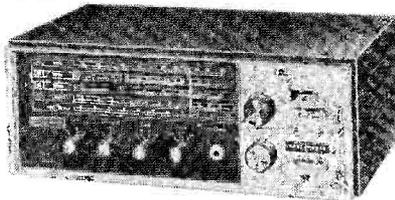
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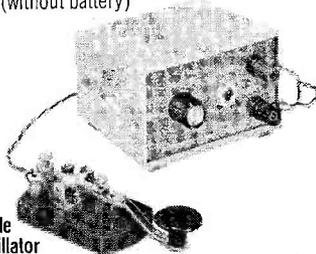


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144-030	b	b	b	b	b	b	b	b	b	b	b	b	b	b
144-4/433-2	b	b	b	b	b	b	b	b	b	b	b	b	b	b
144-480	b	b	b	b	b	b	b	b	b	b	b	b	b	b
144-800	b	b	b	b	b	b	b	b	b	b	b	b	b	b
144-850	b	b	b	b	b	b	b	b	b	b	b	b	b	b
145-000/50	b	b	b	b	b	b	b	b	b	b	b	b	b	b
145-050/R2T	b	b	b	b	b	b	b	b	b	b	b	b	b	b
145-075/R3T	b	b	b	b	b	b	b	b	b	b	b	b	b	b
145-100/R4T	b	b	b	b	b	b	b	b	b	b	b	b	b	b
145-125/R5T	b	b	b	b	b	b	b	b	b	b	b	b	b	b
145-150/R6T	b	b	b	b	b	b	b	b	b	b	b	b	b	b
145-175/R7T	b	b	b	b	b	b	b	b	b	b	b	b	b	b
145-200/R8T	b	b	b	b	b	b	b	b	b	b	b	b	b	b
145-300/S12	b	b	b	b	b	b	b	b	b	b	b	b	b	b
145-350/S14	b	b	b	b	b	b	b	b	b	b	b	b	b	b
145-400/S16	b	b	b	b	b	b	b	b	b	b	b	b	b	b
145-500/S20	b	b	b	b	b	b	b	b	b	b	b	b	b	b
145-525/S21	b	b	b	b	b	b	b	b	b	b	b	b	b	b
145-550/S22	b	b	b	b	b	b	b	b	b	b	b	b	b	b
145-575/S23	b	b	b	b	b	b	b	b	b	b	b	b	b	b
145-600/S24	b	b	b	b	b	b	b	b	b	b	b	b	b	b
145-650/R2R	b	b	b	b	b	b	b	b	b	b	b	b	b	b
145-675/R3R	b	b	b	b	b	b	b	b	b	b	b	b	b	b
145-700/R4R	b	b	b	b	b	b	b	b	b	b	b	b	b	b
145-725/R5R	b	b	b	b	b	b	b	b	b	b	b	b	b	b
145-750/R6R	b	b	b	b	b	b	b	b	b	b	b	b	b	b
145-775/R7R	b	b	b	b	b	b	b	b	b	b	b	b	b	b
145-800/R8R	b	b	b	b	b	b	b	b	b	b	b	b	b	b
145-950/S38	b	b	b	b	b	b	b	b	b	b	b	b	b	b

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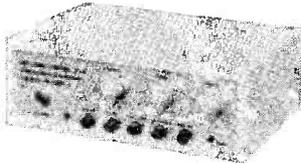
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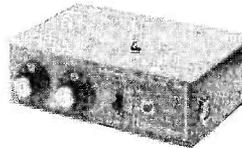
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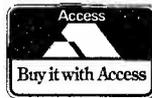
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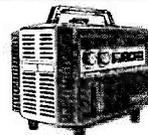
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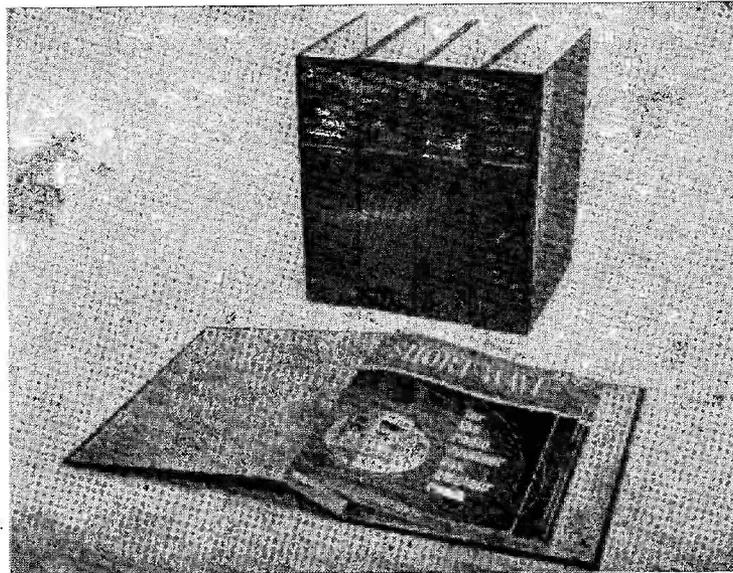
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