

# *Amateur* RADIO

For all two-way radio enthusiasts

**Morse Report**

**Running QRO:  
The pros and cons**

**Construction:  
A junk box PSU**



**On test: Yaesu FL7000  
solid-state HF linear**

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Full Range Stocked

Model	Description	RWC Price
FAS14R	Remote ant switch (FC757AT)	79 50
FBA5	Empty battery pack	7 80
FC700	ATU/power meter/dummy load	129 00
FC757AT	Auto ATU inc WARC bands	299 00
FIF65	Comp. iface for Apple II	54 50
FL2100Z	HF 1.2KW linear 1.8-30 MHz	749 00
FNB2	10 BV nicad pk for FT208/708	24 50
FNB3	Nicad for FT203.9/703.9R/HH	36 50
FNB4	Nicad pack for FT209RH etc	43 50
FP700	20A power supply	169 00
FP757GX	Switched mode power supply	159 00
FP757HD	Heavy duty power unit	185 00
FRA7700	Active ant for FRG7700	8800
	All band RX	44 50
	60-950 All-mode scanning RX	569 00
FRG8800	Receiver ATU for FRG7700	49 50
FRG9600/MK2-RW	VHF conv for FRG7700	8800
FRT7700	VHF converter	85 00
FRV7700A/B/C/D	2mtr HH 1 5W	192 50
	2mtr HH 2 5W	219 00
	2mtr HH 3 5W	225 00
	2mtr HH C/W empty b/case	239 00
	2mtr handheld 3.7W	269 00
	2mtr handheld 5W	265 00
	VHF 25W transceiver	P.O.A.
	VHF 25W transceiver	339 00
	45W 2mtr transceiver	P.O.A.
	2mtr multimode	349 00
	6mtr multimode transceiver	249 00
	70cm HH 1 5W	219 00
	70cm HH 2 5W	235 00
	70cm HH 3 5W	245 00
	70cm HH 1 8W	235 00
	70cm HH 3W	269 00
	70cm HH 4W	270 00
	2mtr base station	869 00
	All band all mode 100W TXR	869 00
	70cm multimode transceiver	P.O.A.
	2W	P.O.A.
FT980	Gen coverage + Ham band transceiver	1739 00
FVS1	Voice synthesizer for FT270	2700
	YAESU amateur radio log bk	2 00
	Base station desk m phone	69 95
	Speaker MIC for FT203.9 etc	18 95
	Fist/mobile MIC for FT757 etc	16 50
	Mobile bktm for FT290R	29 50
	Mobile DC unit for FT208.	209 etc
	AC power unit for FRG9600	13 50
	World zone clock	37 50
	Oscar/Sat unit for FT726	112 50
	Switch unit	17 50
	Switch unit for YH1	15 00
	Switch unit	15 25
	External loudspeaker	15 50
	H setboom MIC for SB1 2/3	16 50
	H setMIC for FT203/209 etc	16 50
	Mono headphones	16 95
	Lightweight mono h phones	16 50
	Helical antenna for FT290R	6 99
	Speaker MIC for FT208/708	25 50
	Speaker MIC for FT290R	18 50



Full Range Stocked

Model	Description	RWC Price
AH7000	25-1300 MHz TX, RX antenna	79 00
AT150	Matching automatic ATU for IC735	
BC35E	Desk-top charger for all nicads	65 95
BP3	Standard Nicad pack	27 95
BP4	Empty battery box for cells 6X	8 95
BP5	High capacity q/charge 10 8V Nicad	57 50
DC1	12V mobile regulator pk (2E)	16 95
EK243	Curtis keyer unit for IC735/745	53 00
EK257	FM unit for IC771	38 50
EK310	Speech synth. unit for 271 etc	41 95
HP1	Mono headphones	32 50
IC-AHI	3.5-30 MHz mobile ant	189 00
IC-AT10	100W auto ATU	329 00
IC-AT15	Matching automatic ATU for IC735	289 00
IC-AT50	500W automatic ATU	455 00
IC-CP1	Mobile ch'ing lead c/lighter	6 50
IC-HM9	Speaker MIC assy	19 95
IC-PS30	Power supply unit 25A cont	339 00

Model	Description	RWC Price
IC-UT 16	Voice synth for IC27 series	26 00
IC02E	2 mtr LCD k board 2W 1 ceiver	289 00
IC120	1W 1296 MHz mobile (40MHz cov)	533 00
IC271E	2 mtr all mode 25W b/stn	759 00
IC271H	High power 100W version of IC271E	959 00
IC27E	25W 2 mtr FM mobile 9 memories	379 00
IC27H	45W version of IC27E	419 00
IC28E	New 25W Super 138-174 MHz	325 00
IC290D	25W version of IC290E	499 00
IC290E	10W multimode 2 mtr mobile	479 00
IC2E	2 mtr HH thumbwheel 2W	185 00
IC2KL	1KW PEP linear auto band switching	1250 00
IC3200E	Dual band 25W 1 ceiver	499 00
IC471E	UHF m mode b/stn 32 mem	879 00
IC471H	75W version of IC471E	999 00
IC4E	70cm thumbwheel H/H 2W	279 00
IC505	3 10W 50MHz SSB(FM) transceiver	459 00
IC735	New all mode all band 1 ceiver	879 00
IC745E	All band SSB AM/CW gen cov TX-RX 16 mem	975 00
IC751E	All band all mode 1 ceiver 32 mem	1350 00
IC04E	70cm LCD keyboard entry handheld 2W	285 00
ICR7000	New all mode scanning RX 25 Mhz-2GHz	879 00
ICR71	All band short wave 1 ceiver 32 mem	775 00
LC11 14	Leatherette case assy for IC02/4E	7 77
LC1 2/3	Leatherette case for IC2.4E	6 50
PS15	External power supply 20A	139 00

SAE FOR LATEST ICOM LEAFLETS, NEW MODELS EXPECTED  
 RWC TOP 100

Model	Description	RWC Price
ADONIS AM303G	Base stn FM SSB m phone	39 95
ADONIS AM503G	Base stn FM SSB comp mic	52 50
AKD WA1	120-450MHz wavemeter c/w ant	24 95
	c/w 30W amp	249 00
ALINCO ALM-203R	2 mtr HH transceiver 3.5W	239 00
ALINCO EDH-25	DC/DC 12V converter	13 50
ALINCO EMS-20	Speaker MIC for ALM203	18 50
ALINCO ESC-3	Leatherette case and strap	14 50
AOI-MIC DM300	600 OHM replacement microphone	6 50
AOI-MIC DM301N	600 OHM replacement noise can MIC	7 50
ARM-ANT TRAV-JRM	Travelling Jim portable 2 mtr ANT	7 99
BREMI BRS35	10A 13.8 volt power supply unit	59 50
CRITON LS88B	6 OHM replacement ext loudspeaker	6 60
DAIWA SA450M	2 way 2.5KW coax switch 0-900MHz	17 50
FDK FDK 725X	2 mtr 25W FM mobile transceiver	269 00
FDK FDK	2 mtr multimode transceiver 750XX	499 00
GAMMA 2MTR S-JIM	Gamma twin slim Jim type ant	9 50
	5/8 mobile	19 50
GAMMA 3-5A PSU	3-5 AMP power supply unit	19 50
Hi-mound HK703	Straight key	29 25
Hi-mound HK704	Straight key	19 25
Hi-mound HK705	Straight key	16 65
Hi-mound HK707	Straight key	15 50
Hi-mound HK708	Deluxe straight key	49 95
Hi-mound MK703	Squeeze key c/w base	28 95
Hi-mound MK705	Squeeze key	25 65
Hi-mound MK706	Squeeze key	23 50
Hi-Q Hi-Q coil	2X coil formers/insulators (pat-pend)	7 50
HOXIN 70N2DX	Dual band 6/8 + 3X 5/8 mobile	25 90
HOXIN 70N2M	144.432 dual band 1.2W + 2.5W mobile	22 85
HOXIN 70N2V	Dual b/base ant. 3.6 long	39 00
HOXIN HS-358	430MHz tripple 5/8 6 3dB	33 78
HOXIN HS-770	144.432 duplexer 50W 30dB isolation	19 55
HOXIN HS-78F	2 mtr 7.8 fold over 4.5dB	16 95
HOXIN HS-88F	2 mtr 8.8 fold over 5.2dB	16 95
HOXIN SMC15SE	15 mtr 130W PEP mobile ant 1.72M long	21 50
ICS AMT-2	AMTOR/RTTY/CW/ASCII terminal unit	245 00
ICS RM-1	L-cost AMTOR/RTTY/CW/ASCII modem	69 00
Jaybeam 8XY-2M	2 mtr 8e crossed ant	41 50
Jaybeam LR1-2M	2 mtr omni-directional colinear	39 00
Jaybeam LW10-2M	2mtr 10 element YAGI	27 25
Jaybeam MBM48	70cm 48E antenna	40 75
Jaybeam Q4-2M	2 mtr 4 element quad	33 95

Full Jaybeam range in stock.

Please add £2.50 p&p for accessories, £5 for transceivers, Send £1.00 for Raycom catalogue (refundable) or send a large S.A.E. for latest used list and information.

Model	Description	RWC Price
MuTek BBBA	20-500MHz low noise wide band preamp	34 90
MuTek SLNA	2 mtr low noise RF switched preamp	33 95
MuTek SLNA	Optimised preamplifier for FT290R	39 00
MuTek TVVF50c	High performance 2M-6M transverter	189 90
RAYCOM Series II	12A PSU	49 00
RAYCOM	7 1 MHz traps c/w instructions	8 95
RCA 6146B	PA valve	12 85
REVCO 2044 5	Nest of dipoles w/band ant 26-500 MHz	69 00
REVCO Revcone	Wide band discone ant 30-500MHz	29 95
SUN-ANT KG208	10 mtr loaded 1.4W tilt-over SE10	12 50
SUN-ANT KG309	5.8 mtr tilt-over ant SE2	13 50
SUN-ANT SO239	Cast/chrome SO239 gutter mount assy	4 75

### RAYCOM MOD KITS

Raycom 757	FT757GX fast tuning mod kit improves VFO tuning	29 50
Raycom FBX-RWC MOD	LC7136-7 10 mtr FM mod kit kit c/w ins (Built & Tested)	23 50
Raycom LCLDNT	As above but kit of parts only	17 50
Raycom MOD (inc post)	LCLDNT 10FM mod kit	14 95
NEW STORNO QOM 713 55	Channel Mod Kit to 2M inc RPTR Shift	29 00

### RAYCOM ANTENNAS

Raycom 1.1 G5RV	Full size G5RV m/band ant	14 95
Raycom 1.2 G5RV	1.2 size G5RV m/band ant	13 95
Raycom 1.4 wave	145MHz 1.4 wave PL259 fitting	2 99
Raycom GP900	3db 800-1000MHz colinear c/w BNC	19 50
Raycom HBD	Highband dipole assembly	8 50
Raycom 2M HB9CV inc. Post	70cm HB9CV Inc. Post	9 98
Raycom 5.8 whip	145MHz 5.8 spring type s/steel whip	3 75
Raycom SO239-MAG	Magnetic mount SO239 c/w cable PL259	9 50
Raycom Swivel-mag	Swivel base mag-base c/w cable PL259	9 25
Raycom Trap-dipole	7 1MHz 7.1 dipole com kit	29 95

### RAYCOM RF POWER AMPS

Raycom V15L-145	2mtr 15W linear amp 1-3W input	49 50
Raycom V25F-145	2mtr 15W linear amp 1-3W input	48 50
Raycom V35L-145	2mtr 35W linear amp 1-3W input	59 50
Raycom V45F-145	2mtr 45W FM amp 1-3W input	62 50

### SPECIAL OFFERS

ARM ANT	Multi P-6 Multi-polarization P ant	36 00
Kopek AR1002	140-800MHz complete 50g loading 3-core auto-rotator	38 50
Raycom DNT	discone 60-500MHz	27 50
DNT M40FM	modified 10FM	49 50
DNT M40FM	unmodified CB27.81	29 50
ALINCO ALR206E	25W mobile	249 00
ICS AMT2	AMTOR/RTTY CW Terminal	169 00

### SCANNING RECEIVERS

YAESU FRG-9600 MKII very latest mod gives improved S METER on RX and extended coverage up to 950MHz  
 FRG9600/MK2-RW 60-950 All mode scanning RX 469 00  
 BEARGAT 100 VHF/UHF Handheld 259 00  
 REGENCY MX8000 AOR2002 429 00  
 REGENCY HX2000 VHF/UHF Handheld 259 00  
 NEW BEARGAT DX1000 10KHz-30MHz SW RECEIVER.  
 10 MEMORIES. ALL MODE INC FM. ALSO  
 SCANNING £329.00

### TONNA — Full Range in Stock

TONNA 20089N	144MHz 9 element port antenna N	27 95
TONNA 20199	144.435 9 + 19 element Oscar ant	36 50
TONNA 20419	432MHz 19 element ant	36 50
TONNA 20422	435MHz 21 element ATV	31 25
TONNA 20624	1296 23 element ant	27 95
TONNA 20809N	144MHz 9 ele fixed ant N	25 65
TONNA 20813N	144MHz 13 ele port ant	39 50
TONNA 20817N	144MHz 17 ele fixed ant N	47 83
TONNA 20818N	144MHz 9 ele crossed antenna N	41 50

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# Amateur RADIO



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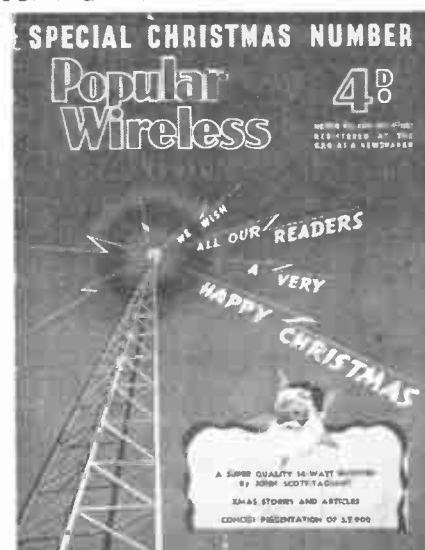
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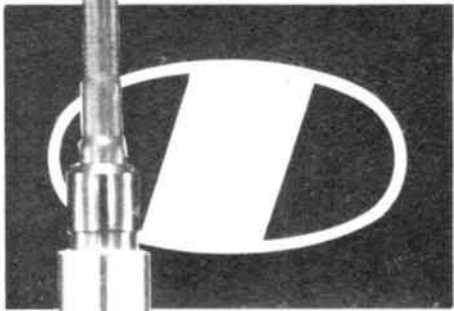
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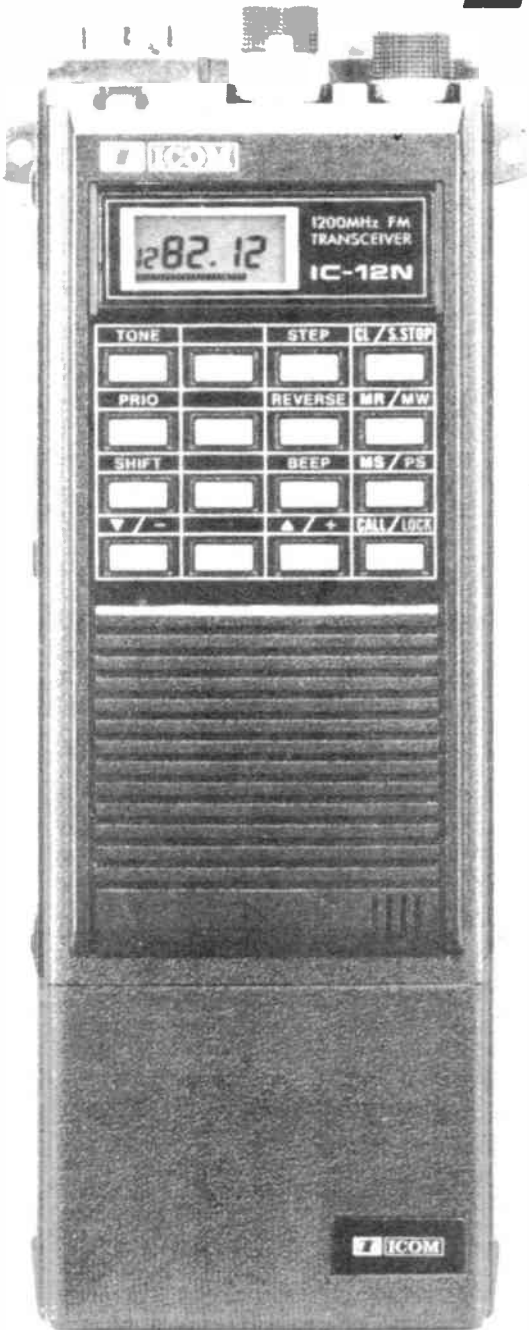
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# ICOM

## 2 NEW Exciting ICOM to give you that mo



### NEW! IC-12E, 1200MHz FM Handportable.

ICOM technology is on the move again, continuing to explore the Amateur Radio field, as a result ICOM present the IC-12E, 23cm. Amateur band, handheld transceiver.

The IC-12E has a 16 button keypad allowing direct access to frequencies, memories and scanning facilities. Ten memory channels store operating frequency as well as simplex/duplex and duplex offset frequency. A priority function allows another frequency such as a repeater or calling frequency to be monitored for activity. The memory scan function continuously scans all ten memories in sequence whilst a programmed scan searches between two limits.

The IC-12E is equipped with a 1750Hz tone generator for initial access to a repeater. Frequency coverage 1260-1299.9875Mhz with 5 frequency step rates. An internal power module provides 1 watt or LOW 100mw. as standard. This handheld is supplied complete with an IC-BP3 nicad battery pack, flexible antenna, A.C. wall charger, belt clip, wrist strap, personal earpiece and full operating instructions.

Also available for the IC-12E and other ICOM Handportables are a large range of optional extras including a variety of rechargeable nicad power packs, dry cell battery pack, desk charger, headset and boom mic, speaker mic, leatherette cases and mobile mounting brackets.

For more information on this handportable and other ICOM Amateur Equipment contact your local ICOM dealer or Thanet Electronics Limited.



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# LEVEL

## DATA TERMINAL

ICS Electronics Ltd recently announced the availability of the PK-232 intelligent terminal unit.

This unit is manufactured by AEA Inc of Seattle, USA, and is claimed to be the first unit in the world to combine packet, Amtor, RTTY, CW and ASCII transceive capability into one package. It will operate with any computer having a serial RS232 interface and suitable ASCII terminal emulation software.

Full status indication is provided on the front panel of the unit and mode control is exercised from the computer keyboard itself. HF and VHF modems are incorporated and the correct modem characteristics are automatically selected for the mode in use. A built-in multi-LED tuning indicator is provided.

In order that it can be simply connected to both an HF and

a VHF rig at the same time, two cables are provided which are selectable via a front panel switch. This unit supersedes the PK-80 packet terminal unit, as it is now available complete with HF modem and four extra modes at little extra cost.

Specialised programs for many personal and home computers should soon be available to drive the PK-232. The price of the PK-232 is £263.00 including VAT, plus £3.50 P&P and insurance.

For further details, send an SAE to: *ICS Electronics Ltd, PO Box 2, Arundel, W Sussex BN18 0NX. Tel: (024 365) 590.*

## WEATHER FAX

Also available from ICS is a new, compact FAX-1 facsimile receive terminal unit.

FAX-1 enables weather maps, press photographs and satellite cloud cover photographs to be copied from

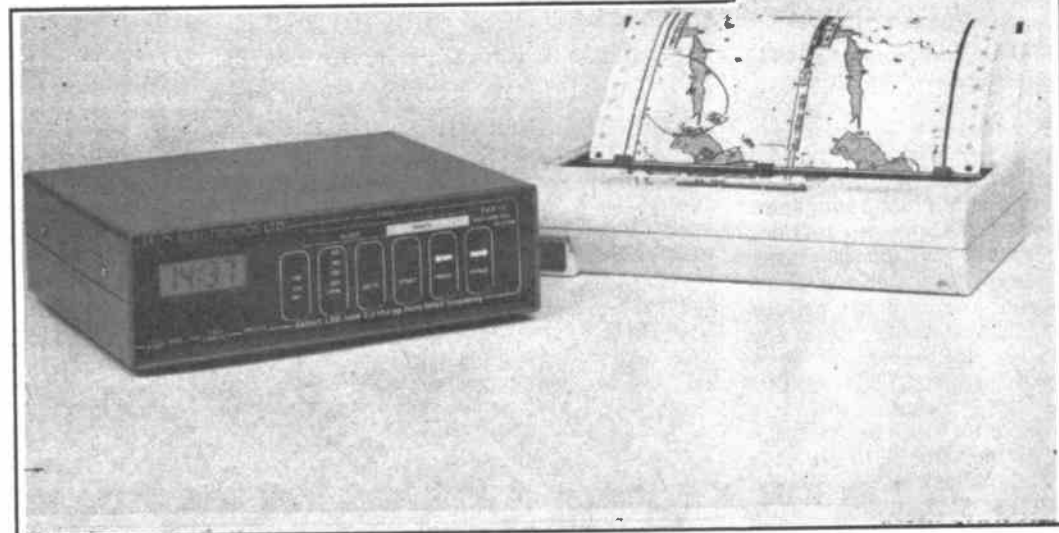
around the world. The micro-processor based system takes the audio output from an HF receiver and converts it into the signals necessary to drive an Epson FX-80 or compatible printer. Picture definition is claimed to be substantially better than home computer screen based systems and all common IOC and RPM combinations are copied automatically.

A timer with LCD display is built in to turn on the system at a preset time. Additionally, a 15 LED tuning display can be used to precisely tune the received signal. Front panel mode displays and buttons permit automatic operation of the unit to be overridden to give manual operation.

The power requirement is 12 volts dc at 400mA, and for portable and marine operation a compatible battery powered ink jet printer is available. A mobile mounting bracket is provided.

The price of the FAX-1 is £269.95 including VAT, plus £3.50 P&P and insurance.

For further details, send an SAE to: *ICS Electronics Ltd, PO Box 2, Arundel, W Sussex BN18 0NX. Tel: (024 365) 590.*



# All the latest news, views, comment and developments on the amateur radio scene

## TOUCH-KEY LCD

In response to market demands for a standard product, the Epson touch-key LCD type TCM-A0239-1 has been re-launched as a distributor available device, incorporating Super TN technology and an electro-luminescent backlight.

Epson's touch key overlays provide a direct touch capability for easy menu selection without the need to resort to a keyboard. The Super TN display technology provides high contrast and a wide viewing angle. This new product consists of an EG4401S-ER module with an X-Y type touch-key overlay giving a 256 x 126 dot display. The touch key consists of 13 x 5 matrix touch contacts each measuring 12 x 8mm, and is easily driven by standard keyboard encoding circuitry.

A wide variety of applications are possible, including for instrumentation control panels. The TCM-A0239-1 costs £440.

Further information is available from: *Epson (UK) Ltd, Dorland House, 388 High Road, Wembley, Middlesex HA9 6UH. Tel: 01-902 8892.*

## MINI PRINTER

In response to customer demands for a high speed version of the popular M150 mini printer, Epson (UK) Ltd's OEM Division has launched the M185 as the latest member of the M180 series.

The M185 now uses 5 solenoids instead of 4 in the M150, and can print 18 characters or 108 dots per line on 44.5mm paper. It has a considerably higher speed of 1.7 lines per second and a fast paper feed function of 4 lines per second. Reliability is 700,000 lines between failure and with 5V operation is ideal for battery use. Typical applications are hand-held terminals, bus ticket machines, EPOS and monitoring equipment. Its size is only 91 x 25 x 7mm.

Also announced is the new BA180 control board which enables any of the M180

series printers to be connected to a CPU. It accepts serial or 8-bit parallel data input and contains an on-board character generator. The size is 80 x 80mm.

For further information contact: *Epson (UK) Ltd, Dorland House, 388 High Road, Wembley, Middlesex HA9 6UH. Tel: 01-902 8892.*

## MINI PRINTER

A compact, versatile and reliable dot matrix printer chassis series, offering a choice of 24, 32 or 40 characters per line, is now available from Electronic and Computer Workshop Ltd.

Called the MP-250, this high performance printer series uses 58mm wide plain paper rolls and gives a choice of 144, 192 or 240 graphic dots per line, using a dot spacing of 0.33, 0.25 or 0.2mm. The mechanism gives a high quality print appearance useful in portable equipment, instrument front panels and other data printing applications.

The power supply requirement is a single +5V dc line with a current drain of just 2.5A peak. Typical MTBF

figure is 500,000 lines. The MP-250 printer chassis measures approximately 91 x 42.6 x 12.5mm and weighs 75g.

ECW can supply a range of standard controller boards and accessories including ribbons, paper rolls, moulded plastic enclosures and take-up spools.

For further information contact: *Electronic and Computer Workshop Ltd, 171 Broomfield Road, Chelmsford, Essex CM1 1RY. Tel: (0245) 262149.*

## DIGITAL VOLTMETER

New from Electronic Brokers is the Marconi Instruments' 2610, a micro-processor-based wideband digital voltmeter. It utilises a closed-loop thermal conversion technique to provide accurate true rms measurement of input signals of almost any complexity and with frequencies from 5Hz to 25MHz, as well as dc.

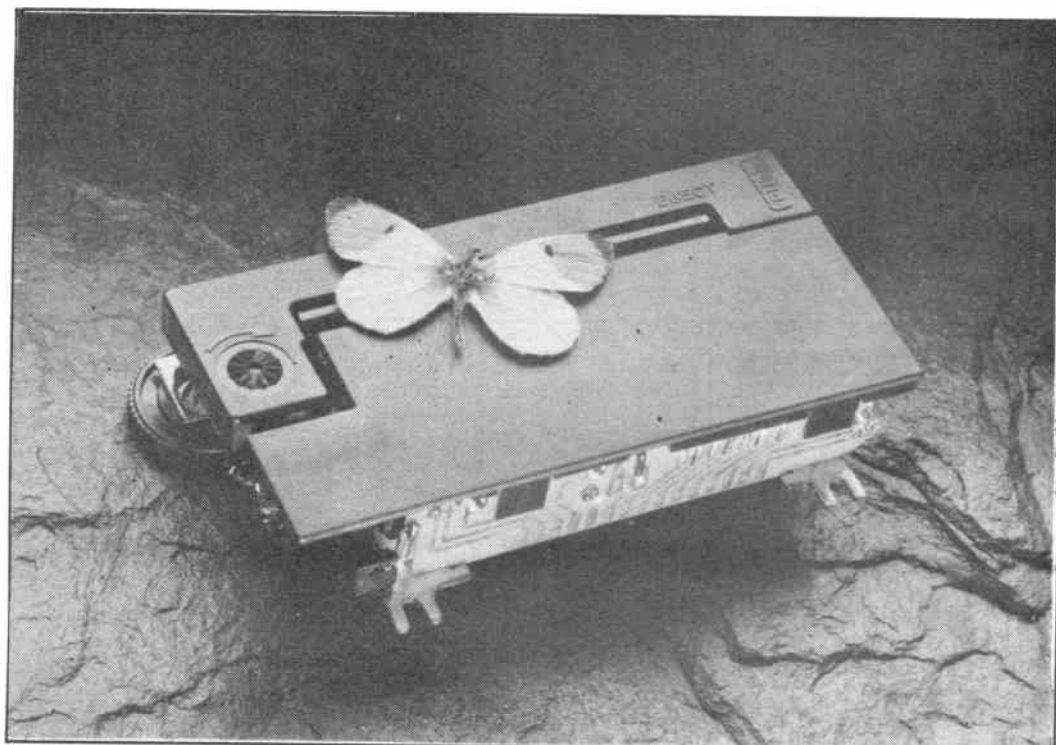
The 2610 offers full auto-ranging operation over seven voltage ranges from 2mV to 700V full scale. Manual range selection and decibel measurements (dBV and

dBm) are also provided. Selection of the dB mode can give an effective single dynamic range of 130dB, simplifying the testing of amplifiers and attenuators. Relative measurements, including frequency response checking, are made easy by the provision of an offset mode which enables either an input to the voltmeter or a keyboard-entered value to be stored as a reference level.

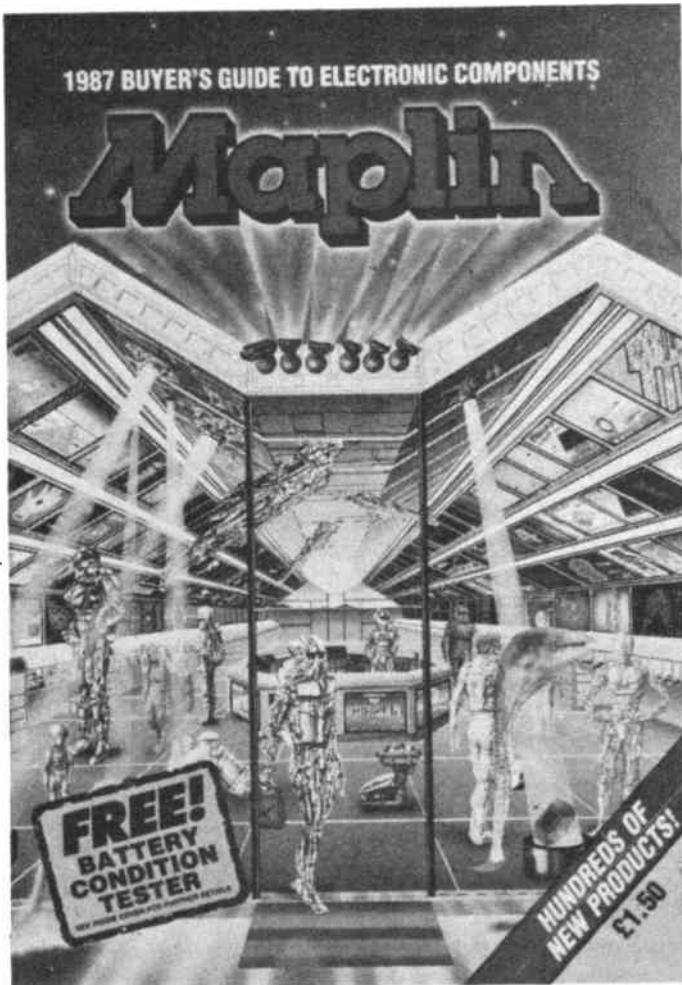
Readout is by a main LCD digital display, with an analogue dB meter also provided for convenience of operation when 'peaking', 'dipping' and similar measurements are made.

Available options include a general-purpose interface bus card, which fits entirely within the instrument and allows full programmability via the GPIB bus with talker/listener capability, and an internal battery and control unit which gives operation by internal Nicad rechargeable battery or external dc.

Further details are available from: *Electronic Brokers Ltd, 140-146 Camden Street, London NW1 9PB. Tel: 01-267 7070.*



## STRAIGHT & LEVEL



### MAPLIN CATALOGUE

The 1987 edition of *The Maplin Buyer's Guide to Electronic Components* features thousands of regular Maplin components and several hundred specially selected new items.

The trend towards own label or Maplin Precision Gold products is continued. In particular, the popular range of Maplin test gear and musical effect units is extended, with additions including digital clocks and traveller alarms. Also enhanced is the Maplin range

of connectors, capacitors and cables.

A free battery condition tester is available to all catalogue purchasers.

Also on offer is *Electronics - The Maplin Magazine*. The next two issues of the quarterly magazine are being sent free to all Maplin catalogue purchasers who return a special card. There is also an opportunity to win up to £100 credit.

For more information contact: *Maplin Electronics Supplies Ltd, PO Box 3, Rayleigh, Essex. Tel: (0702) 554155.*

### TANDY NEWS

The new Tandy Electronics Catalogue is now available, free, from 360 Tandy stores and authorised dealers throughout the UK. This full colour, 136-page catalogue contains over 2,600 items.

Tandy stores offer a range of audio, video and specialised electronic products and accessories, all backed by full Tandy guarantees. The range includes hi-fi systems, mini-portable TVs, business computers, in-car entertainment

products, disco and PA systems, telephones, microwave ovens, clock radios, scanners, CB radios, digital electronic test equipment, electronic components, mini-portable to 160W stereo speakers, electronic chess and toy robots, and remote controlled cars - for children of all ages (yes, including you!).

To obtain the new catalogue write to: *Tandy Corporation, Tameway Twr, Bridge Street, Walsall, West Midlands. Tel: (0922) 477778.*

### CIRKIT CATALOGUE

Featuring more than 3,000 products for the electronics hobbyist, the new 164-page Cirkit Catalogue is now available from leading bookstalls or direct from Cirkit at the cover price of £1.20.

Among the items on offer in the catalogue are: books; computers; connectors; hardware; inductors; kits and modules; test equipment; timers and counters.

There is also the opportunity to win a Hameg 20MHz oscilloscope (normal price £327) or many runners-up prizes of electronic equipment and components, by entering a free readers' competition.

For further information or to order a copy of the Cirkit Catalogue contact: *Cirkit Distribution, Park Lane, Broxbourne, Herts EN10 7NQ. Tel: (0992) 444111.*

### SATELLITE GEAR

Comex Systems Limited is continually expanding the company's range of satellite communications products.

Now available is a complete DIY satellite TV system comprising a set top receiver, an LNB and a dish. The system is high quality, simple to use and easy to construct.

The basic receiver consists of a motherboard and compo-

nents kit, the AT1020 tuner module and the AT3010 demodulator module. The motherboard kit has the video and fixed sound circuitry and the two modules are mounted directly onto the board.

Details of all products available from Comex and a full price list can be obtained from: *Comex Systems Ltd, Comet House, Unit 4, Bath Lane, Leicester LE3 5BF. Tel: (0533) 25084.*

### CLAMP-METER

Electronic and Computer Workshop Ltd has announced an economically priced and simple to use clamp-meter, the Pantec CT3101, which has nine ac voltage and current measurement ranges.

Using a reliable, taut-band meter movement, the analogue CT3101 is a heavy duty design able to accommodate cable diameters of up to 28mm.

Supplied complete with carrying case, the meter measures 200 x 8.5 x 44mm and weighs 550g. ECW offers the CT3101 clamp-tester at an all-in price of £58.08, including post/packaging and VAT.

For further information contact: *Electronic and Computer Workshop Ltd, 171 Broomfield Road, Chelmsford, Essex CM1 1RY. Tel: (0245) 262149.*





# STRAIGHT & LEVEL

## DATACOMM ANALYSER

Electronic Brokers has introduced the Marconi 2871 data communication analyser, a combined pattern generator and error detector. It features extensive processing facilities which allow it to carry out comprehensive error-performance measurements in communications networks from 50bit/S to 150kbit/S.

Both 'out-of-service' tests and 'in-service' monitoring can be carried out, and the provision of GPIB and RS232C interfaces allow the analyser to be controlled from a remote source.

The 2871 can also be manually operated using the front panel keyboard, and a 7in CRT screen is provided to present a clear indication of both measurement settings and results.

A permanent record of the test results can be made available using an external printer.

The Marconi 2871 features a graphical display mode in which accumulated test pattern or frame alignment bit errors are presented in a graphical form.

As well as displaying the



error occurrences, the same timebase displays any loss of synchronisation.

The data communication analyser also has an autoprint facility which automatically outputs information via either the GPIB or RS232C control interfaces.

This identifies the event type, the time and date of the occurrence, resolved

to the nearest second, and the instrument identity number.

In addition to independent front panel operation, the 2871 provides for eight sets of measurement parameters to be selected and stored in non-volatile memory. The stored information can be recalled by the user whenever required. This

facility allows the user to switch rapidly from one test routine to another, whilst at the same time requiring the minimum knowledge of the test equipment's operating features.

Further information can be obtained from: *Electronic Brokers Ltd, 140-146 Camden Street, London NW1 9PB. Tel: 01-267 7070.*

## IRISH CONNECTION

K T Electronics, 'the first radio amateur equipment manufacturers in the Republic of Ireland', have a range of masthead preamplifiers on offer.

The AP2M86 is a 2m RF-switched masthead pre-amp with 27dB amplification, a noise figure of typically 1dB and a maximum through power of 30W. The supply voltage is 9-16V dc and the supply current at 12V is 65mA. It has a  $\pm 3$ dB bandwidth and is priced at IR£24.50.

A 4m RF-switched masthead pre-amp, the AP4M86, has a frequency range of 70.1-70.5MHz, 27dB amplification and a noise figure of typically 1dB. The supply voltage is 9-16V dc and the supply current at 12V is 65mA. Maximum through power is 30W. The AP4M86 costs IR£24.50.

The company's Meteosat masthead pre-amp, the MP2M86, has a frequency of 137.5MHz and amplification of 27dB. The noise figure is 1dB typical and the bandwidth is  $\pm 3$ dB. The supply voltage is 9-16V dc and the supply current at 12V is 25mA. It is

available for IR£14.50.

K T Electronics are also retailing a 2m receive converter, the RC2M86, which has an input frequency range of 144-146MHz and an output range of 28-30MHz. Amplification is 27dB and it has a typical noise figure of 1.5dB. The supply voltage is 9-16V dc.

All items are RF-shielded and the masthead pre-amps are water protected. Also available from the company are low noise TV masthead amps and power supplies.

For further details contact: *K T Electronics, Newbawn, Rathdrum, Co Wicklow, Republic of Ireland. Tel: (0404) 46521.*

## COMLINEAR OP-AMPS

The advanced Comlinear op-amps from Anglia Microwaves provide high performance transconductance amplification for converting current outputs from DACs to fast-settling voltage outputs.

Comlinear amplifiers, it is claimed, achieve a level of performance combined with simple application not previously possible with an

op-amp. No external compensation is required, although the models provide stable operation over a wide range of temperature.

Most current output DACs have a large output capacitance, causing a peak in the frequency response of the transconductance amplifier. Compensating capacitance can be added to reduce this effect or, alternatively, a series resistor may be inserted between the DAC output and the inverting input of the op-amp. The Comlinear 200 series, however, both controls the output capacitance problem and also any offset.

More technical information can be obtained from: *Anglia Microwaves Ltd, Radford Business Centre, Radford Way, Billericay, Essex CM12 0BZ. Tel: (02774) 58955.*

## DC/DC CONVERTERS

Bulgin's Power Conversion Division has introduced a new range of 5 Euromodule dc/dc converters rated at 100 watts.

Each model in the new DC100F series is fully cased in

a compact Euromodule with a DIN41612 H15 connector. The range covers nominal dc inputs of 24 or 48 volts with outputs of 5, 12, 15, 24 or 48 volts, and all products feature 500 volts dc input/output isolation.

For further information contact: *Bulgin Power Conversion Division, AF Bulgin & Co plc, Bypass Road, Barking, Essex. Tel: 01-594 5588.*

## RAPID RESULTS

Tom Tomlin of Ludford in Lincolnshire successfully passed the City and Guilds London Institute Radio Amateurs Examination this year after attending a course at the Rapid Results College.

He is now known as 'Golf, Three, Yankee, Foxtrot, Uniform', his father's old callsign.

Many students find the course easy to understand, especially the electrical theory and mathematics.

A free prospectus giving details of all courses is available from: *The Rapid Results College, Tuition House, 27-37 St Georges Road, London SW19 4DS. Tel: 01-947 7272.*

## CLUB NEWS

### What, no wombles?

The Wimbledon and District Amateur Radio Society have more serious considerations this month. 'Radio Communication and the Computer' is the subject of G4XLM's lecture on 7 November at 8.15pm. The venue is the Central Library, St Nicholas Way, Sutton, Surrey.

On 14 November G3AEZ will present a lecture entitled 'Electromagnetic Compatibility'. This will take place at the society's usual meeting place: St Andrew's Church Hall, Herbert Road, Wimbledon, London SW19, at 7.30pm.

Details are available from George Cripps, 115 Bushey Road, Raynes Park, London SW20 8DG. Tel: 01-540 2180.

### Catch a SPRAT

The autumn issue of SPRAT, the journal of the G-QRP Club, contains construction projects for a 14MHz SSB transmitter, a linear and stable VFO for 14MHz, a simple squeeze keyer with capacitive touch paddles, a QRP Tx and an HF QRP power meter.

The G-QRP Club is devoted to low power communication. If you are interested in joining and receiving four copies of SPRAT a year, contact Rev G Dobbs G3RJV, St Aidan's Vicarage, 498 Manchester Road, Rochdale, Lancs OL11 3HE. Tel: (0706) 31812.

### Crime watch

Security in the shack is a subject close to many a ham's heart as there is much expensive radio equipment to protect.

Recognising this, the Willenhall and District ARS is hosting a talk and video on crime prevention on 26 November. This will be of interest not just to radio amateurs; anybody who would like to make his home more secure will benefit.

The talk will commence at 8.00pm at the Cross Keys Inn, Lucknow Road, Ashmore Lake Road, Willenhall, Wolverhampton. Further details can be obtained from Dave Jackson G0EGG, 41 Colman Avenue, Wednesfield, Wolverhampton WV11 3RT.

### Future of repeaters

The Radio Society of Harrow has a lecture planned for 14 November entitled 'ATV repeaters and the future'. It will be delivered by Graham Shirville G3VZV. This will be followed on the 28th by the annual chairman's lecture. Details of times and venues are available from Chris Friel G4AUF on 01-868 5002.

The society publishes a bi-monthly newsletter, QZZ, for its members, described as 'one of the many by-products of a futile imagination' by its editor, G4AUF. If you want to judge for yourself, contact Chris on the number above for membership details.

### Exam delays

The latest IRTS (Irish Radio Transmitters Society) newsletter reports that the committee wants to hear from members who are experiencing long delays in obtaining the results of the Radio Experimenters' Exam or a response to new licence applications or extension of licence facilities (not including applications for 50MHz or FSTV).

Short articles and other contributions are required for the newsletter, so if you have any ideas contact Rod EI3CZ.

The address for all correspondence is PO Box 462, Dublin 9.

### ARMS for the poor

A new service that allows amateur radio enthusiasts to protect themselves against incurring heavy costs through expensive faults developing in their equipment has just been launched.

For an annual fee, based on a small percentage of the new retail price of the equipment, the Amateur Radio Maintenance Service will refund the repair bill, including parts, labour and carriage, from approved service agents throughout the country.

The man behind the scheme, Bernard Whitty G3HWX, says: 'What we are offering is an all-inclusive maintenance agreement that protects the amateur radio user against running up high bills for the repair of his equipment in the event of any type of failure.'

'Provided that the equipment to be covered is in full working order at the start—as far as the applicant is reasonably aware—we agree to

refund the cost of putting it back into service.'

Mr Whitty says that a two year old transceiver costing £1000 new could be covered against breakdown for £30 per year. 'Compare this with the cost of labour alone running at up to £17.25 per hour including VAT,' He says.

'Of course, some faults are more expensive to repair than others, but a fair example would be replacement of PA transistors; with labour and carriage charges you could expect to pay between £140 and £160.'

ARMS can be reached by writing to: *Amateur Radio Maintenance Service, Free-post, Ormskirk, Lancs L39 3AB.*

### Calling all bods

The Amateur Radio And Computer Club (AMRAC) was founded in April 1985 with the aim of encouraging the use of computer technology in amateur radio. Since that time the club has grown rapidly and now has members throughout the UK as well as in Europe and the Middle East.

The club produces a professionally printed bi-monthly newsletter of some 40 pages, as well as a hot news sheet in intervening months. The newsletter covers all aspects of computer communications including packet radio, ASCII, AMTOR and RTTY. All the popular makes of computer are covered. In addition, the club has arranged special members' discounts with selected companies, and also imports packet radio TNCs at advantageous prices.

Membership is £5 per annum and further details may be obtained from the secretary, Phil Bridges G6DLJ, at 9 Hollydene Villas, Southampton Road, Hythe, Hants SO4 5HU; or on Prestel mailbox 703847754.

### Happy birthday

Poole Radio Amateur Society will be running a special event station on Sunday 16th November from the Brownsea Room, Haven Hotel, Sandbanks, Poole, Dorset.

The station is being set up as part of the society's tenth anniversary celebrations, and will be mainly operating on 80m (SSB and CW) and other HF bands according to conditions, and 2m (SSB and FM) using the call GB4PRS.

The station will be operational from 0900 GMT until 2000 GMT and will be in WAB square SZ08. The locator is IO90AQ (ZK21g).

In addition to the station, a few local traders have been invited to exhibit. Anyone interested in amateur radio will be very welcome to come along. Visitors coming from the Isle of Purbeck should note that, because of its annual maintenance programme, the Sandbanks to Shell Bay ferry will *not* be operating.

The Haven Hotel was used by Marconi for some of his early tests. His first land station was at Alum Bay on the Isle of Wight, which was used in conjunction with another at Madeira House, Bournemouth, to carry out experiments with small vessels cruising off the Needles. From 30th September 1898 Marconi moved the Madeira House Station to the Haven Hotel, Sandbanks, which remained a Marconi station until 1926.

Special QSL cards will be available. More details may be obtained from Dave G0EQV on Poole (0202) 674802.

### Radio lunacy

Tom Clark W3IWI has successfully received packets bounced off the moon (Oscar 0), an achievement which he claims is a first.

He is currently in Fairbanks, Alaska on a temporary assignment for NASA where he is doing radio astronomy research. He has occasional access to a 65ft dish antenna which was recently put to use on 432MHz. With 100 watts he was able to copy his own packets very well after the round trip to the moon.

However, attempts to connect with Dave XE1 TU using a 20ft dish were unsuccessful. Full details of events appear in *Amateur Satellite Report* no 129, AMSAT's newsletter.

While on the subject of AMSAT, a new dial-in bulletin board has been established by Ralph Wallio W0RPK, Vice-President of Operations. The bulletin board will carry the latest AMSAT news and orbital data.

Users will require either a Bell 103-type modem for 300 baud service or a Bell 212-type for 1200 baud service. The modem should be connected to a local

telephone line and the user's ASCII terminal, and new users must be authorised by the System Operator (SYSOP) after their first contact.

The bulletin board is located in central Iowa and can be accessed on 515-961-3325.

The newsletter is published by the Radio Amateur Satellite Corporation who can be contacted at PO Box 27, Washington, DC 20044, USA.

## Aerial Circus

The new secretary of the Maltby Amateur Radio Society, Keith Johnson G1PQW, has submitted details of the society's schedule of events for November.

These are as follows: an activity night on the air on the 7th; 'Building a 100W Linear' on the 14th; a video evening (Aerial Circus from the RSGB) on the 21st; and 'Three in a Row' on the 31st, with mini lectures from three society members.

The society's callsign is G4SKM and it is affiliated to the RSGB. All meetings are held at 7.30pm at the Community Centre, Clifford Road, Hellaby, South Yorkshire, just off the M18 (Junction 1) between Rotherham and Maltby.

Further details are available from G1PQW on (0709) 814135.

## BARTG bargain

Readers who missed out the first time can now obtain 1985 copies of BARTG's excellent journal, *Datacom*, at reduced prices. Single issues (spring, summer, autumn or winter) are £1.50 each and the complete set of four issues is £5.00. Both prices include postage.

Interested parties should apply to Ian Brothwell G4EAN (Secretary), 56 Arnot Hill Road, Arnold, Nottingham NG5 6LQ.

## WACRAL

The World Association of Christian Radio Amateurs and Listeners is committed to the promotion of Christian friendship and fellowship over the air waves.

A regular newsletter is produced, and for more information on this and the association generally contact Len Colley G3AGX, 'Micasa', 13 Ferry Road, Wawne, near Hull HU7 5XU. Tel: (0482) 822276.

## Eyes peeled

The Worcester and District Amateur Radio Club is hosting a talk by Bob Osborne G4FJN on the Amateur Radio Observation Service on 3 November.

This will be followed on the 17th by the club's AGM, and a large turn-out is expected.

All club meetings begin at 8pm and the venue is The Odd Fellows Hall, New Street, Worcester. Details can be obtained from the secretary, D W Batchelor G4RBD, 14 Oakleigh Heath, Hallow, Worcester WR2 6NQ. Tel: (0905) 641733.

## Back to school

The Dunstable Portable Amateur Radio Group, in conjunction with the Dunstable Downs Radio Club, will be operating a special event station, GB2WGG, during Watford Grammar School for Girls' Annual Fête.

The group's members are being privately sponsored on the number of contacts made and all proceeds will go to the school. Contacts with other schools will be particularly welcome.

Operation will be on 1.8MHz, 3.5MHz, 14MHz and 144MHz SSB and CW. Details are available from Tony G0COQ on Luton (0582) 508259.

## Contributions wanted

The Stourbridge and District Amateur Radio Society meets on the first and third Mondays of each month at The Robins Wood Centre, School Street, off Enville Street, Stourbridge. Meetings commence at 8.00pm.

The society is seeking contributions to its newsletter, so if you have any ideas contact Eileen Tracey G4YBT on Brierley Hill 70097.

## Home-brewing

The Southgate Amateur Radio Club's schedule for November includes a home-brew constructional contest and a chance to win the G6QM trophy on the 13th. On the same evening there will be a slide show.

Meetings are held at 7.45pm on the second and fourth Thursdays of the month at The Holy Trinity Church Hall (Upper), Green Lanes, Winchmore Hill, London N21. Information is available from Dave Elson G4YLL on (0992) 30051.

## More feedback!

Ian G4NSD, who is responsible for the Biggin Hill Amateur Radio Club's newsletter, has been complaining about what seems to be a common problem for amateurs in his position: lack of feedback from club members.

He says: 'Where are you all? What about playing a positive role in the running of the club? Do you want it to continue? Are we meeting at the right time of day/day of the week/week of the month? What subjects would you like speakers to talk to us about? Do you want to concentrate on the technical side or the social side of our activities?'

We are sure many club organisers will sympathise, as no news is not always good news. So don't be apathetic - support your club. Your ideas could help inject new life into old hams, and perhaps encourage new blood into the hobby.

## EHN news

Ken Michaelson G3RDG, who is a contributor to both *Amateur Radio* and our sister publication *Radio and Electronics World*, will be visiting the Edgware and District Radio Society on 13 November to deliver a lecture.

The venue is the Watling Community Centre, 145 Orange Hill Road, Burnt Oak, Edgware, Middlesex at 8.00pm.

## IRTS news

The Irish Radio Transmitters' Society's (IRTS) latest newsletter includes details of a proposed new home-brew award. The purpose of the award is to encourage the construction of amateur radio equipment by clubs and individuals. Those interested should contact Gerry EI9DZ with their views on the idea.

Information on the society generally can be obtained from PO Box 462, Dublin 9.

## Pet subject

We recently received the autumn edition of *Hamster*, the journal of the Cheshunt and District Amateur Radio Club. Articles include *Computing and Amateur Radio*, *The First Year - Reminiscences of a Newcomer* and a construction project for a 50MHz antenna.

The club meets every Wednesday at 8.00pm in the

Church Room, Church Lane, Wormley, near Cheshunt, Hertfordshire.

## All steamed up

The Spen Valley Amateur Radio Society meets each Thursday at 8.00pm at the Old Bank Working Men's Club, Old Bank Road, Mirfield, West Yorkshire.

The November schedule of events includes a talk on steam engines by John Sykes G3YPC on the 6th and a computer evening on the 20th, where members are invited to 'bring along a micro'.

Further information can be obtained from the secretary, Ian Jones G4MLW, 54 Milton Road, Heckmondwike, West Yorkshire.

## Sporadic-E

The North Bristol Amateur Radio Club has a talk and demonstration on the subject of sporadic-E arranged for 14 November, to be given by Len G8UUE and Shaun G8VPG.

This will be followed on the 21st by an HF activity night and on the 28th by a CW activity night.

The club meets each Friday at 7.00pm at the Self-Help Enterprise, 7 Braemar Crescent, Northville, Bristol. General information is available from Alan Booth G4YQQ, 656 Southmead Road, Filton Park, Bristol BS12 7RD.

## Bridgend rally

The Bridgend and District Amateur Radio Club is holding a rally on 9 November at the Recreation and Leisure Centre, Angel Street, Bridgend, Mid-Glamorgan.

The doors open at 10.30am, with talk-in on S22. There will be a bring-and-buy stand and a special event station. Parking is free.

Further details are available from GW1OUP on (0656) 723508.

## QRP info

The Fareham and District Amateur Radio Club meets every Wednesday at 7.30pm. On 5 November there will be a lecture entitled 'RFI versus EMC', and on the 19th Alan G3CCB will present a QRP update.

For details of venue and the club generally contact the secretary, A S Chester G3CCB, at 'Deva Wood', 44 The Ridgeway, Down End, Fareham, Hants PO16 8RE.

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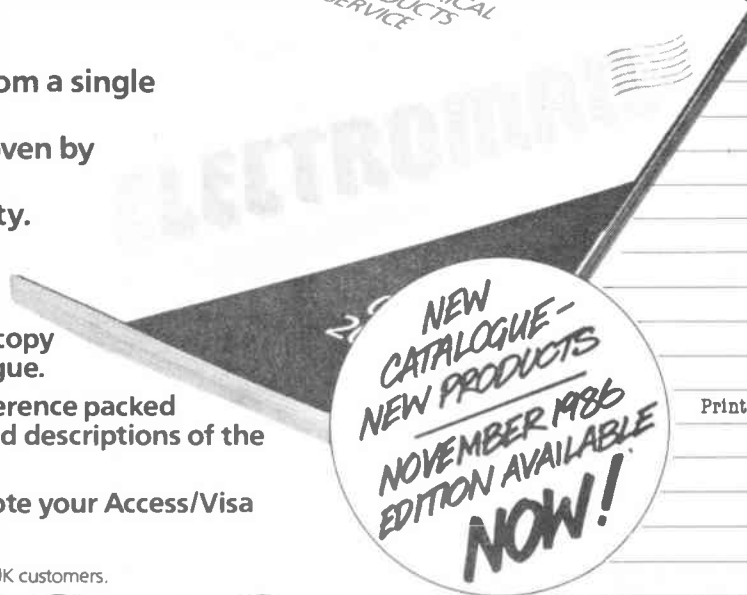
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Soldering and desoldering
Speakers & microphones
Suppressors & filters
Switches
Technical books and videos
Timers, counters, controllers
Tools & production aids
Transformers and wound components
Wiring accessories
Workshop equipment

# L·E·T·T·E·R·S

## DX FOUNDATION

I would like to hear from anyone interested in joining a United Kingdom DX Foundation. We have all heard of these great bodies in the States and I am sure that there are a great many amateurs over here who will be interested in promoting the better side of amateur radio, using the quieter bands, and camping out on desolate hills, etc (HI).

I have been on quite a few miniature versions of such expeditions with my local club and think that there are probably many more like-minded people in the UK.

**Martyn Bolt G4SUI QTHR, West Yorkshire**

## CW - OUTDATED MODE?

To add a useful addendum to the article *CW - The outdated mode?* in your August issue, Morse tests varying from 15 to 40wpm can be heard on 80 metres at least twice every month.

On the first Tuesday,



THE NATIONAL WIRELESS MUSEUM  
Arreton Manor, Isle of Wight

G3BZU (the RNAS station at HMS Mercury) commences transmission of the tests at 2000 local time (8pm) on a frequency near 3510kHz. On the last Friday, PA1AA starts at 2100Z on around 3600kHz. The address is Box 9, Amsterdam, Holland.

For readers well below the speeds mentioned, an idea would be to use an old-type 3-speed reel-to-reel tape recorder to record at the

highest speed, and then replay at the lowest!  
**Douglas Byrne G3KPO, IOW**

*Douglas Byrne is one of the founders of the National Wireless Museum (callsign GB3WM), situated at Arreton Manor on the Isle of Wight.*

*The Marconi Memorial highlighted on G3KPO's QSL card tells the story of the first wireless transmitting station*

*in the world, which was erected at Alum Bay in November 1897. On 6 December of the same year readable signals were exchanged with a steamer at sea, and in June 1898 Lord Kelvin sent the first-ever paid Marconigram.*

*A full account of the Wireless Museum will be published in this magazine soon - watch this space!*

## EN VACANCES

I am a keen SWL and on my recent summer holiday at the Hotel Interpalace, in Tenerife, I was interested to read on the hotel notice board that facilities are available at this hotel for radio amateurs.

The hotel director, Barry True, is a licensed radio amateur and his callsign is EA8BB. His equipment includes a Yaesu FT757 transceiver and an FD-4 window antenna. The special radio room is located on the roof of the hotel.

Barry True was born in Detroit, USA but now resides in Tenerife. He speaks English, French, German and Spanish and welcomes contact by radio or personal visits from radio amateurs, who will be assured of a warm welcome at the hotel. I am sure that there are many radio amateurs and short wave listeners who read *Amateur Radio* who would be interested in this information.

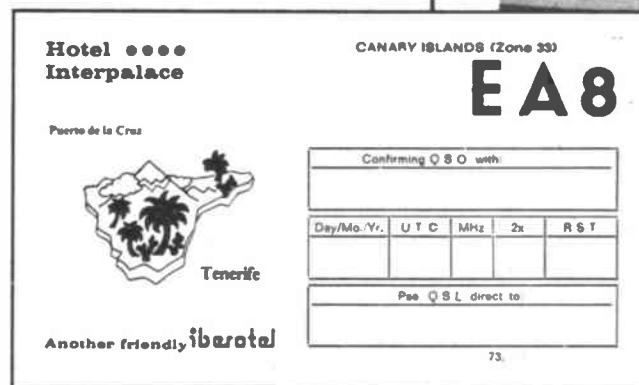
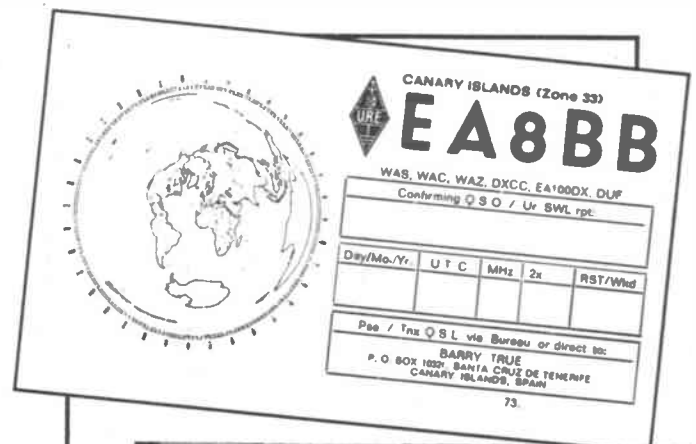
I am a travel agency manager and have been a short wave listener for the past 20 years. My present receiver is the Sony ICF2001D

and I enjoyed reading the Angus McKenzie test report in the May edition.

My son, Christopher, is an assistant air traffic controller at Exeter Airport. Also interested in amateur radio, Christopher qualified as a licensed operator 2 years ago with a Class B licence using the callsign G1ILY. He uses the Icom IC2E hand-held transceiver to contact fellow members of the Exeter Amateur Radio Club.

Thank you for all the interesting information that you publish in your excellent magazine.

**Douglas Sims, Exeter**



# DX DIARY

News for HF operators compiled by Don Field G3XTT

I am sure that those of you who went to the RSGB's HF Convention will agree that it was a great success. My own lecture on HF antennas for small gardens was well attended, so I hope to hear lots more G stations putting out good signals on the HF bands!

## Ferne Islands

A number of readers will have had the opportunity to work me in late September from the Ferne Islands off the Northumberland coast. I was there with Martin G3ZAY and Catherine G6OQA to put the islands on the air for the benefit of enthusiasts chasing the WAB Islands Awards and the IOTA (Islands on the Air) Awards. Unfortunately, the whole expedition was arranged at the last minute, so it was impossible to give advance warning in this column.

If you did work us and need a QSL we will be confirming all contacts via the bureau, or you can send direct to my home QTH or to PO Box 146, Cambridge.

In 17 hours of operation we were able to make 912 contacts with 44 countries. The operation was a 'first' in HF terms; previously permission

had been refused to operate from the islands, which are a designated nature reserve (although there had been previous VHF operations using hand-helds).

Even so, we were not allowed to stay overnight but had to travel out from the mainland each day.

## WARC bands

Table 1 lists those countries which have notified the IARU that their amateurs are now permitted to operate on the 18 and 24MHz bands. Contacts with these countries on these two bands now count towards the DXCC Award, but only if the contacts were made *after* the date on which the band became available in the countries concerned.

When interpreting the table, bear in mind that where a prefix such as 'G' is listed it may be assumed that other countries under that administration (in this case GD, GI, GM, etc) also have use of the band.

## CQ WW Contest

The SSB leg of the CQ World-Wide Contests will probably be history by the time you read this, but the CW section looks like proving to

be very interesting this year. The contest takes place over the 48 hours of the last full weekend in November (28/29), and at the time of writing several contest DXpeditions have been notified.

These include a major operation from the Turks and Caicos Islands, which I mentioned last month, and an operation from Barbados with a special 8P9 prefix. This latter group will be on both CW and SSB before and after the contest, and the operation will include 30 metres.

K1XM and KQ1F were looking for others to join them on a contest expedition to the Galapagos Islands (HC8), so let us hope this comes off. Another interesting one is a major operation from St Lucia (J6) by the same group of Americans who made such a good job of the V2A operation in last year's contest.

The ten operators will be there from 25 November until 2 December.

KX6DS will visit KC6 (E Caroline Is) for about a week, starting on 22 November and taking in the contest.

## IY4M

A robot station with the callsign IY4M is now operational from Italy on 28195kHz with either 20 or 2 watts output to a ground plane antenna. It transmits 'IY4M robot QRV. If you hear this station send your call twice, being careful not to leave any extra spaces between characters.

If the robot hears you, it will first ask for a signal report and then send you a

greeting in one of several languages. Whatever is the world coming to?

## USSR allocations

Table 2, from K1KI's 'USSR Tidbits', lists the allocations currently available to amateurs in the USSR. In addition, it is understood that stations with the highest class of licence are allowed to use 3650-3800kHz during eleven major contests each year (ARRL DX, CW WW and CQ WPX, VK/ZL, All Asia, LZ-DX, YO-DX, OK-DX, WAE and their own CQ-M). The mention of an allocation on 10MHz is interesting because, apart from a flurry of activity when the band was first released to amateurs, I have yet to hear any USSR stations on that band.

## DX news

DX News Sheet reports that DL5JP was expecting to be in China on business from October to December and was hoping to operate from BY4AA in Beijing. He will put in as much operation as possible on as many bands as possible.

Clipperton Island turned up again at the end of September, with a small group signing FO0XA. They were a good signal in southern Europe on 40, 20 and 15 metres, and were even heard on 10, but at the time of writing I am not aware of any UK stations working them. Unfortunately, they were only on the island for a couple of days.

However, there is already talk of another expedition next year. The place

Table 1

### Countries whose amateurs are authorised to use 18 and 24MHz

**18MHz:** A2, A3, A4, A9, BY, C6, C3, CT, DL, EI, F, G, H4, HB, HK, HP, HR, I, J2, J3, LA, LU, LX, OA, OE, OY, OZ, PA, PJ, SM, T7, TA, TI, TR, V2, V8, VK, VU, W, Y, YK, YS, YU, ZF, ZL, ZS, 3A, 3B8, 4S, 4X, 5B, 5N, 6W, 7X, 9J, 9K, 9M, 9N, 9Y

**24MHz:** A2, A3, A4, A9, BY, C3, CT, DL, EI, F, G, H4, HB, HK, HP, HR, I, J2, J3, LA, LU, LX, OA, OE, OY, OZ, PA, PJ, SM, 77, TA, TI, TR, V2, V8, VK, VU, W, Y, YK, YS, YU, ZF, ZS, 3A, 3B8, 4S, 4X, 5B, 5N, 6W, 7X, 9J, 9K, 9M, 9Y

is becoming a veritable hive of activity these days!

Ron ZL1AMO showed up as promised as VK9XI from Christmas Island. As usual he did a good job on CW, with excellent signals into the UK on 40 and 20 metres. Another CW enthusiast, G3PEK, was able to operate from the Seychelles as S79DX and was a fair signal into the UK on 15 and 20 metres.

SM7DZZ is now operational from the Maldiv Islands as 8Q7CH and will be there for a couple of years. He made a good start in September with lots of activity, including Top Band, so if you need this one you shouldn't have too long to wait. QSLs go to SM5DQC.

### Africa

George VE3FXT was expecting to be in Africa for 5 months from the end of October and may appear on the bands from any or all of the following countries: ZS3, ZS, A2, 3D6, 7P, V9 and H5. Lloyd and Iris Colvin, whose annual trip failed to get off the ground last year, are hoping to make it this year. They too will be in Africa with Malawi, 7Q7, featuring high on their list of priorities. Tom N4NW should have returned to Africa on 15 October. This time he will be based in Zaire (9Q5) and will be there for 2 years. Assuming he can get a licence, he has ambitious plans in terms of gear and antennas.

Kermadec Island looks as though it may appear on the bands again. The *DX Bulletin* reports that Peter Fisher ex-ZL9AA will start a one year tour of duty in October.

For island chasers, F6DYK, F6BDN and F6FCV will sign /SEI from L'île de Sein from 1-5 November. This island, which has the IOTA reference EU-68, has not been activated since 1974. QSLs go to F6DYK. Also, an operation is expected from Chausey Island (EU-39) from 7-9 November. I don't know what the callsign for this one will be.

K7CA plans to operate from McMurdo Sound in Antarctica as K7CA/KC4 from October to January. He will pay particular attention to the LF bands.

### Propagation

For much of September the sunspot number was zero, so we really cannot go any lower

### USSR amateur frequency allocations

CW	SSB	RTTY
1830-1930	1860-1930	
3500-3650	3600-3650	3580-3620
7000-7100	7040-7100	7035-7045
10100-10150		
14000-14350	14100-14350	14070-14110
21000-21450	21150-21450	21080-21120
28000-29400	28200-29400	28075-28125
29550-29700	29550-29700	

**Table 2**

during this cycle! Despite this, much DX continued to be available on 20 metres and the lower bands, while 15 and 10 metres produced some interesting short skip propagation into Europe. The CQ WW Contests are always an interesting indicator - it is amazing what can be worked during these events, even on 10 metres. It goes to show that openings are often more frequent than we realise, but only become apparent when there is high activity on the bands.

### Ten metres FM

Talking about 10 metres, my comments the other month about 10 metres FM prompted an interesting letter from David Seddon G4VCO. David has been on this mode since his licence arrived in 1983, having spent the grand total of £15 on gear and antennas. David started with 50 watts and a dipole and was able to work plenty of European DX via sporadic-E, especially when he later replaced the dipole with a half-wave CB-type vertical, purchased for £10.

DX included 4X4, ZC4, 5B4, HB0, C30 and CN. What is more, this was relaxed operating rather than the pile-up kind of situation often encountered at the SSB end of the band.

David's experience of day to day propagation on the band is that ranges of up to about 60 miles are common under 'flat' conditions, while distances of anything up to 200 miles are possible when lifts occur (which is quite frequently). There is a fair amount of mobile operation on the band, though considerably less than on two metres.

David also comments on QSOs he has made via the US repeaters, including one with W9KNI using a 2 metre handheld (several of the US repeaters are multiplexed, ie they allow crossband contacts

between 10, 2 and 70cm).

All in all David heartily recommends this band and mode, both for the cheapness and simplicity of getting QRV and for the interesting contacts which can be made.

I also received a letter from Angela Sitton BRS88639, commenting, among other things, on the interesting propagation to be found on 10 metres. Angela has previously operated on the 27MHz CB band, so is familiar with that part of the HF spectrum, and is looking forward to obtaining her amateur licence so that she can enter the fray on ten. Best wishes to you with both the RAE and the Morse test, Angela, and also to OM John BRS88837.

### Mount Athos

The controversy continues. I have recently seen photocopies of documentation showing that the Italian group who had hoped to operate from Mount Athos had received all the necessary permits from the Greek authorities as well as from the Holy Community.

Permission by the Greek authorities was then withdrawn after representations by Greek amateurs. The Italian group, who had already sunk a considerable amount of money and effort into the expedition were, understandably, not amused. They are also suggesting that the last major Greek operation from Mt Athos had no official

permit from the Holy Community and that the documentation submitted to the ARRL (American Radio Relay League) for DXCC acceptance was false. I wonder what the monks on Mt Athos make of all this?

### Contests

I mentioned the CQ WW Contests earlier in this column. There are some other minor contests during November, but probably the only one of note is the RSGB 1.8MHz event on 8 November starting at 2100GMT and running for 4 hours.

### Rockall Island

Unfortunately, the GB2RI operation failed to come off earlier this year. Rockall, as many readers will realise, is the most remote corner of the British Isles, almost 300 miles from the Scottish mainland and nearly 200 miles from the St Kilda group of islands. The rock (or rocks, as there are actually two) was annexed by the UK in 1955, presumably to establish claims to the surrounding ocean. Landing is relatively easy when the sea is calm, but calm seas are the exception rather than the norm in that particular corner of the Atlantic.

Several attempts have been made to persuade the ARRL that, if it were activated, Rockall should count as a separate DXCC country, but such a decision is very unlikely. Nevertheless, any operation from there would undoubtedly create lots of interest on the bands and would, of course, count towards the Islands on the Air Award. Watch this space for developments!

That wraps it up for another month. Don't forget to write and to send photographs of HF interest. My address again is 105 Shiplake Bottom, Pep-pard Common, Henley on Thames, Oxon RG9 5HJ.

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# SHORT WAVE LISTENER

TREVOR MORGAN GW40XB

Well, here we are in November, after a summer that bore more resemblance to Noah's flood or the Ice Age than a good, old-fashioned English summer! Nevertheless, many readers took the opportunity of putting the hedge trimmer to one side and switching on the receiver for a spot of serious listening.

## Patient listening

Take Gordon Blackney of Lowestoft, for instance. Gordon suffered an accident some time ago and has come to rely on the receiver for much of his entertainment. His hours of patient listening paid off with a claim for the Gold Prefix Award for such catches as AA4, AC2, AP2, A7X, CE6, DU9, HK1, J37, VK9, VP8, XE3 ZP6, 5N2, 8P9 and 9U5... to mention just a few! Gordon states that he finds the sunspot minimum better than expected this time round, with paths open to the USA and South America around midnight on 20m and Africa and Indonesia on the same band during the afternoons. Equipment consists of the Trio R600 with an ATU feeding a random length ended wire. Certainly does the trick, Gordon...well done!

Charles Morgan of Croydon has joined the lads and lasses on the WAB nets and is busy trying to fill his book! Some of you may be unfamiliar with the Worked All Britain Group, which has a large and almost fanatical following in the amateur radio fraternity. The group has divided the United Kingdom into well defined squares of 100km and then into smaller squares of 10km, the idea being to work or log at least one station in each of the squares. To assist in the quest, a substantial book listing all the squares in county order is available so that you can log them as you find them. Some of the squares are in awkward or uninhabited locations, which means that some hardy lads and lasses go mobile or portable to put these rarities on the air.

The nets are very busy with often more than twenty operators trying to contact the mobile or portable station. Keeping control of the situation is a volunteer 'controller', who keeps a list of the stations as they join the net and works down the list as each mobile reports in from a new square. You've got to be on the ball as new areas are called into the net, some of which can be very hard to copy, but the controller gives everyone a fair chance to make his contact and confirms it as a 'good one'. Accurate signal reports are important in this game and good listening techniques are essential if you are going to get anywhere. It is definitely contagious and I've personally got so hooked into trying to get a square that I've had a cold lunch more than once!

## Addictive

If you are interested in joining in the fun, write to K Draycott G3UQT, 175 Oliver Road, Kirk Hallam, Ilkeston, Derbys DE7 4JW.

Geoff Mersereau of Sheffield got in on the act this month with a claim for the Broadcast Listeners' Award for logging over 100 broadcast stations. Geoff uses the Trio R2000 with the Eddystone EC10 and Sony ICF5900W as back-up, and a UL1000 ATU feeding an RAK 3 double dipole doing the honours at the top end.

Regrettably, we have lost a listener from the scene...temporarily, we hope. Dave Howes of Rochester has entered the photographic hobby in a big way and has sold up his listening station to finance the new equipment. However, I hear that this may be a temporary desertion, as Dave has been one of our most active participants in the award scheme and was one of the early members of the ILA. Best of luck in the new hobby, Dave!

It's always a pleasure to have one of the licensed boys enter for the awards, and this

month I have pleasure in confirming a Gold Prefix Award for 1000 two-way contacts on SSB. Some of the choice prefixes worked were A71, AD6, AI6, CH5, CS2, CX7, DU7, DZ3, H44, HS5, J46, KY9/m, KZ6, PS8, PZ5, VP8, VQ2, XQ2, ZM7, 7J2, 9N2 and many that most of us only dream about. The lad with the 'golden touch', Stuart Seymour G4CPJ, has the line-up to catch them too, with the JST100 and TS440s coupled to a TL922 linear. A Hy-Gain TH7DXS and some dipoles are at the business end.

## Listener's corner

Back to the listeners now, with Gordon Garraway of Keynsham. He has used his FRG8800 to good effect to capture AA2, YB/, VK4, SB9, PP5, YT2, 5S3, LU6, 5B4, 5T5, J57, ZF2, YB4, YQ0, gaining the Silver award. Gordon has mainly scanned the twenty metre band for his best catches with the best time around 1900 or so. An especially interesting period was spent listening to the American hams organising relief during the Mississippi floods. Gordon also mentioned the passing of G4BKU, who had been a long time workmate and friend and who will be missed by all who knew him.

Steven Smith is a new name to the column. Steven, who hails from the Spalding area, uses the FRG7000, DX200 with converters for 2 and 70. A Commodore 64 and Vic 20 are coupled to a disc drive and printer for the readout side of the station. Steven is after a FAX machine suitable for weather map reception, so if you have one to dispose of please contact him at 'The Signpost', High Road, Whaplode, Spalding PE12 6TJ.

Another nice letter has arrived from Ray Williams of Grantham. Ray abhors the repeated snipes at the RSGB in the press and states that the society has always been of benefit to him since he joined in the '40s, when things were not so good, and he still supports it today. I have

repeatedly supported the society myself. Of course, not everything is 100%, but then what is? I also belong to a trade union and vote for a certain political party, but that doesn't mean that I agree with all their decisions. Like the RSGB, they represent their members and have to make decisions in the hope that they are carrying out the wishes of the *majority*, at the same time being painfully aware that someone will always disagree. The complaints always seem to come from those people who rarely, if ever, attend monthly meetings, only appearing at the AGM to keep their names in the book, with nothing constructive to offer for the benefit of the members. Every club, society or association has these people. They are a part of club life and something we have to live with.

Neil Latimir of Torpoint is another newcomer to the column. Using the Racal RA17, he finds his best time for listening is around midnight, scanning the broadcast as well as the amateur bands. Neil is looking for a BFO for the RA17L, so if you hear of one, let him know at 47 Chapeldown Road, Torpoint, Cornwall (tel: 812667). Neil is also an ardent sailor and a member of the RNLi Shoreline Group, so he is trying for the Lifeboat Award and regularly monitors the marine bands.

## Newcomers

Welcoming newcomers to the fraternity is always a pleasure and it's an added pleasure when it's a junior op! So, a hearty welcome to Zoe Stephens, newborn daughter of Sonia and Stuart Stephens of Bridgend. Congratulations! Stuart hopes to carry on his listening between nappy changes!

When I formed the International Listeners' Association with the help of this magazine two years ago, I little expected the response that I have had over that period. Numbering over 130

members at the time of writing, membership consists of listeners who have just come into the hobby, licensed amateurs who listen on the occasions when the DX is bad, and old-timers who have never deserted their receivers since first bitten by the bug.

**New friends**

During these two years, it has been my pleasure to meet or correspond with listeners in ten countries and it has been to my regret that my letters to overseas friends have always been in English. Remarkably, all but one of the letters to me have also been in English! Much to my chagrin, I cannot speak any foreign languages, not even the tongue of my adopted home country, Wales!

Thinking about it, we English are a lazy lot. When you consider that most of the 'foreigners' we speak to on the air speak to us in English, albeit sometimes falteringly, there are comparatively few of us that speak other than our native tongue. I have

often heard it said that the Russians never conduct more than a 'postage stamp' QSO, but I have heard more than one QSO between stations in the USSR and English speaking countries conducted in Russian, and they had quite long chats too. My brother, G4SUP, often speaks Dutch when contacting stations in Holland and often he is called by others who wish to make a QSO with the Dutch speaking English ham.

Wouldn't it be nice if we made an effort, me included, to add a new language to our vocabulary. If nothing else, we could make new friends in countries that we currently insist on speaking English to. We could gain the respect of many of our European friends. We could gain a lot more pleasure from our hobby too! Why not make a special effort to learn a language?

Once again proving that you don't need a 'super shack' to log the DX, our latest Gold Award claimant is Cyril Ball of Doncaster. Cyril used the Sony ICF7600D to log his first

500 and was going to change his gear.

However, he changed his mind and used the same receiver to get the Gold. Cyril mentions that RA4HA has a 'round table' daily on 14175 from 1700 - 1900Z when it is possible to log some of the more unusual contacts.

**Japanese precision**

It's amazing how much can be heard, even using the simplest of equipment. That is not to say that the ICF7600D is a simple receiver; on the contrary, it is a remarkable example of Japanese precision miniaturisation...but nowhere near the price or specifications of some of the better known receivers, such as the Yaesus, Trios or NRDs, which need a mortgage to purchase!

As many of our award hunters have proved over the past three years, it's not the receiver that really counts but the bloke using the controls. No matter how simple your receiver is, from a DCRX or a Vega to the latest in technical know-how, experience at the

controls makes all the difference. Watching an inexperienced operator at the controls of a super rig can make an old-timer squirm and it's no wonder that these older, more experienced listeners and operators moan about 'knob twiddlers' and quote lack of pre-RAE experience as being a major contributor to the bad operating one hears on the bands.

If you ever get the chance to watch a real old-timer in operation, whether it is as a log-keeper in a special event or contest or as a casual observer at his home base, take up the offer; you may learn a hell of a lot in a short time.

Well, that's it for this month. I'm under a lot of pressure for the next few months with the house being demolished around our ears, so if there's a bit of delay in receiving a reply to your letters, please bear with me until the end of November when things should be a bit easier. Meanwhile, have a good month and keep those claims coming! 73 es gud DX!

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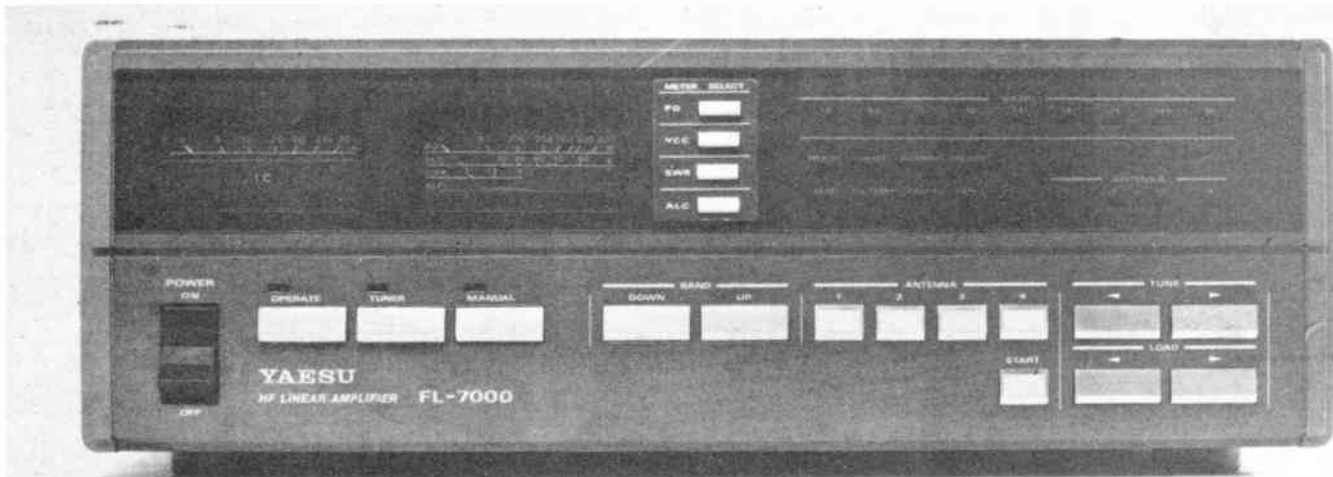
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## TESTS



## Yaesu FL7000 solid-state HF linear

I heard over a year ago that Yaesu were to produce a 500W solid-state linear with a built-in automatic aerial tuning unit, which would be compatible with their latest HF rigs. I saw an early sample in late June, and Amcomm-ARE kindly delivered a review sample to me about a month later. Alec Allan also supplied a Yaesu FT757GT, requesting us to carry out all the tests using the 757 as a drive source.

The only solid-state linear for HF that I have tried before has been the Icom IC2KL, which has virtually identical ratings and which also has automatic band changing when interconnected with Icom HF rigs. The Icom linear has worked well, but the intermodulation products, whilst being just about acceptable, have clearly not been as good as a decent valve amplifier. It was therefore very fascinating to have a look at Yaesu's product to see how it compared.

### The front panel

The handsome front panel has a large mains on/off switch on the extreme left. Nearby are three light touch main operating buttons, the first to enable the linear on Tx, the second switching on the auto ATU, and the third allowing you to change bands manually if you are using the linear with a transceiver which does not have Yaesu's data type band change information.

To the right of these buttons are up and down band change buttons and further right are four antenna selection buttons, for use when the linear is controlling the remote Yaesu FAS-1-4R coaxial aerial changeover switch. This accessory permits the linear to be switched to any of four antennas (or dummy load). On the right side are manual buttons for increasing or decreasing tuning and load

capacitance, the logic allowing you to do this to give a final touch-up to the ATU after automatic setting.

A start button enables the automatic tuning sequence to begin, the linear being automatically disabled during automatic tuning and a 'wait' legend being displayed whilst this is in progress. When auto tuning is complete the linear is enabled, allowing full output power to be presented to the load.

There are four meter buttons, selecting power output, HT voltage (normally 48V dc), SWR and ALC. In the top half of the panel is one meter which always reads total collector current, whilst the other meter's function is selected by the buttons. Various coloured LEDs in a row indicate the following: the selected band; the chosen antenna (normally antenna 1 when the external switch is not in use); linear 'ready'; 'wait'; 'warning' (indicates poor SWR); 'protect' (protection circuits have switched off the linear automatically when this lights up, requiring you to switch the mains off then on again); 'send'; 'PS temp' (power supply too hot); and 'fan 1' and 'fan 2' operating (as if you could not hear them!).

### The rear panel

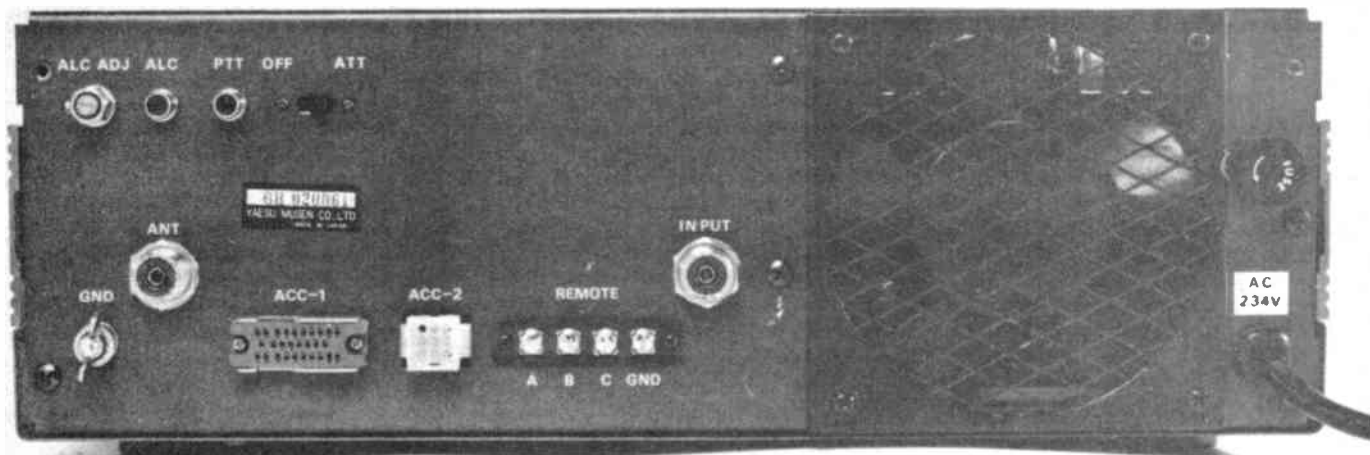
RF input and output sockets are SO239s, and a large 28-pin interconnection control socket is provided called 'accessory 1' for use with the FT980. An 8-pin 'accessory 2' socket is used for interconnecting PTT and band data with the FT757 or the new FT767, but both these rigs, for some odd reason, require a separate ALC phono to phono interconnection. A second phono socket on the rear is provided for external PTT, which can be used with the ALC socket when the linear is being interfaced with other transceivers.

There is an ALC preset pot on the back panel, and this should be very carefully adjusted to allow the linear to give a maximum carrier output power of 500W with the ATU switched out when the linear is feeding a dummy load. Also on the back panel is an attenuator switch. This is used to insert an internal attenuator if the linear is to be used with an HF exciter capable of delivering more than 100W. I checked the attenuation on 3.7MHz and it reduced the input drive by approximately 3dB, just about what is required for rigs such as the Yaesu FT102.

### Remote connection

There is a remote connection socket for interconnecting the external antenna changeover switch, and also a large earthing terminal which Yaesu strongly recommend should be interconnected with heavy braid to a good external earth. A large mains fuse and holder is mounted on the back and the mains lead is very heavy duty. The one on the review sample was terminated in a continental 2-pin plug, and this should of course be changed for a 13A one. Investigations have revealed that in the UK the linear will be sold with a 13A plug on it, together with a three-core mains lead.

Connection of the earth is essential before the equipment is plugged into the mains. The reason for this is that there are 0.01 $\mu$ F capacitors from live to earth (chassis) and neutral to earth, and there will be an appreciable earth current from these of up to 0.7mA. The open circuit voltage on the chassis ref earth will be 120V, and this is quite enough to give you a nasty kick. On one occasion my colleague and I tried to connect up in a hurry (the unit was fitted just with a two-pin plug), and I have to admit that we



were both 'bitten' by this leakage voltage – so you have been warned!

In my opinion, the suppression capacitors should have been much lower in value; about 1nF (0.001 $\mu$ F) would have been adequate. Linears from other manufacturers normally use either much lower values or just a larger capacitor from live to neutral, with very small ones down to earth. The linear should be used with a mains circuit capable of supplying up to 1.9kW, although I cannot see that it would ever draw anything like this power unless it was grossly misused!

### The Innards

The linear amplifier itself employs four devices fed in parallel push-pull, with input and output matching circuitry for 50 ohms. Low pass filters are provided for the various selected bands, and the output circuit includes a form of directional coupler with a microprocessor controlled logic from which the information to operate the automatic aerial tuning unit is derived.

The ATU settings for each band are stored in the lithium backed microprocessor memory, so when you return to a particular band the ATU changes to the positions that the capacitors and coil were in the last time that band was used. If you wish to retune automatically, you press the 'start' button. This causes the linear to cut out and the ATU to search for the best SWR. It should get down to below 1.2:1 and covers a range from around 3:1 downwards, ie reactances from 16 to 150 ohms on each band.

You should find that the ATU will cope with mismatches worse than this, but I did not want to try bad mismatches and risk equipment damage. A mismatch of 2:1 causes the linear to back down to half power, but it more or less achieves full power below around 1.4:1. The linear cuts out with mismatches worse than 2:1; an excellent means of protection.

The ALC feed, which must be returned to the exciter, is capable of delivering up to -9V, and this can be reduced if required for exciters which cut off with lower voltages. The maximum negative voltage should be easily high enough for all the rigs that I have recently encoun-

tered, including Trio ones which require around -7V for cut off. The PTT voltage is around 12V positive and when shorted the circuit passes around 10mA, which should not be a problem.

There is one particularly fascinating feature, the provision of extremely rapid changeover, which Yaesu claim is adequate for break in CW keying, packet radio, and even Amtor. I was not able to check this as I did not have the appropriate Yaesu accessories, but if, as Yaesu claims, the linear is capable of such operation, it is one of the very few linears that is. However, linear operation is not permitted under the UK licence regulations anyway since we are restricted to 100W carrier power at the antenna for CW and RTTY, etc.

The linear can be used to deliver 200W FM and 100W AM carrier fully modulated, and SSB operation allows for average duty cycles for up to about 30 minutes continuous operation. However, the circuits are protected against overheating, bad SWR, excessive input drive and excessive collector current, and any of these can cause automatic safety shutdown. Separate two-speed fans are provided under microprocessor control to cool the power supply and the PA devices.

### Subjective tests

I used the linear with the FT757, but I had to find an old Yaesu microphone in the junk box which is of a type usually supplied with the 757. The quality of the mic was not particularly good, but it was adequate. In trying the combination on 3.5, 7, 14, 21 and 28MHz bands, I asked stations to comment on two particular points. The first was to tune either side of the transmission and check for spreading, whilst the second was to compare the quality of the transmissions when the linear was switched in and out.

Stations reported the transmissions to be reasonably clean when I was transmitting at 500W PEP, which represented 400W PEP at the various antennas. They were not able to tell whether the linear was switched in or out if I was very strong with them, provided they did not look at their S-meters, and so it is clearly a credit

to Yaesu that the subjective tests were so favourable.

Two stations reported that they clearly preferred the quality of the transmissions that I put out from my normal set-up in which I use a Drake L7 linear, and whilst these two stations stated that the transmissions were not over wide they reckoned that a valve linear was normally rather better. Obviously, if a station is using a solid-state linear and is being received at an enormous signal strength, then differences between solid-state and valve linears become more marked.

### ATU alignment

I spent a considerable time trying out the aerial tuning unit auto alignment. On 80m my own antenna could be corrected to give a good SWR quite satisfactorily, but the irritation was that the system took much too long correcting it. I had my ear on the top of the linear so that I could listen to the whirring of the motors, and sometimes it took up to half a minute to achieve a match. One might think this is acceptable until one has used the Icom AT500, which can correct a mismatch of 5:1 down to less than 1.2:1 in around 1.5 seconds. What was alarming was that the SWR reading of r.y Rohde and Schwarz dummy load/attenuator read 1.2:1 with the ATU switched out, even after the ATU had matched at its best, and yet I know the load to be significantly better than 1.03:1 at HF, a Bird through-line wattmeter in the output circuit reading virtually no reflected power. Quite clearly, the SWR meter was maladjusted internally, which is rather surprising. I also noted that the power out meter was fairly inaccurate.

I was impressed with the trouble free operation of all the facilities, which worked exactly as described in the manual. However, I could not check out the Yaesu remote antenna switching system, as I do not have one. The linear is enormous and very heavy, the weight being 30kg and the size (WHD) 390 x 130 x 400mm. I have just one minor niggle about disconnecting the linear from the 757 – the band data lead plug was awkward to extract from the FT757 and I preferred the socket on the linear.

# G3OSS TESTS

## Laboratory tests

We first had a good look at the automatic ATU, tuning up into various antennas. The performance on 80m seems typical and, once a basic tuning had been stored in the middle of the band at 3.7MHz into my trapped dipole, tuning on low power (around 90W) took between 8 and 20 seconds. In each case the SWR meter read close to 1.2:1, but I was alarmed by the SWR reading when the linear was switched on since in each case the SWR degraded badly. The worst degradation was up to around 1.7:1, with a considerable corresponding power reduction. We had to touch up the manual up and down tuning and load buttons and, after perhaps a minute, got it down to around 1.2:1. In time, with much practice, one could obviously do this a lot more quickly, but as we had to do it on high power we wanted to be extremely cautious, improving it little by little. Since the ATU at high power on 80m seems so much worse than on low power something is clearly wrong with the metering circuit, but at least after touching up we did get full power output of 500W.

We noted that if a band was completely mistuned auto tuning could take as much as 30 seconds, after which time the 'ready' light came up instead of 'wait'. I am concerned that it was necessary to touch up, because it does tend to defeat the whole idea of auto tuning. We had similar experiences on the HF bands, and in one case the tuning took nearly one minute!

## Drive power measurement

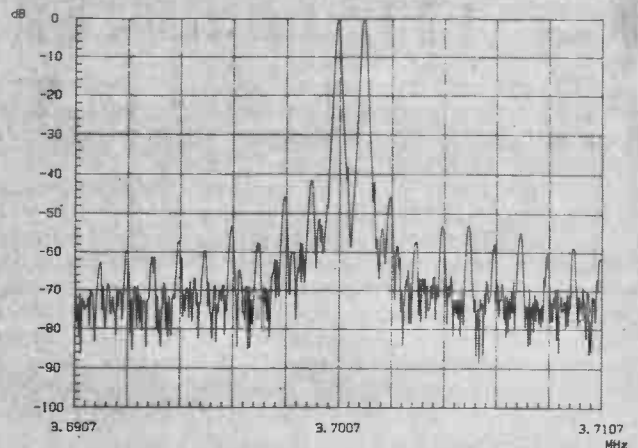
We checked out the amount of drive power required with the attenuator switched to the 'out' position and noted that the greatest gain was at LF, only 15W drive being required on 80m whereas 44W was needed on 15m. The input attenuator gave 3dB power reduction. We checked the input SWR as seen by the exciter and this was always at least quite good, 1.5:1 at worst. The actual power output indications varied from 20% over-reading to as much as 25% under-reading, and again this points to something strange about the metering.

The HT voltage was around 48V dc, and this voltage did not decrease noticeably under full output conditions. Full output of 500W usually required around 20A total collector current, showing slightly better than 50% efficiency which is about right for a solid-state high power linear.

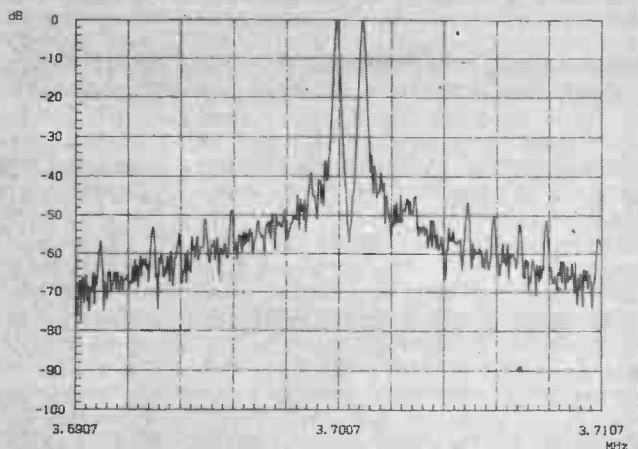
When switched in, the ATU typically lost about 10% power, ie 0.5dB, which is comparable with most manual high power ATUs.

We checked out the harmonics at an output level of around 500W, using the Marconi 2382 spectrum analyser. As can be seen from the table, all the harmonics were very well suppressed and much lower than Yaesu's specified -50dB. The worst reading without the ATU in was -65dB for second harmonic on the 7MHz band, whilst on some bands, with ATU switched in, no third harmonic was

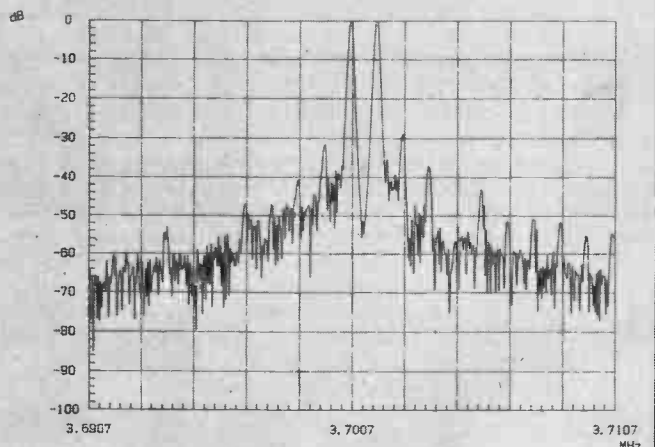
*Yaesu FT757 bare-foot. 100W PEP two-tone plot at 3.7MHz. Resolution bandwidth 100Hz*



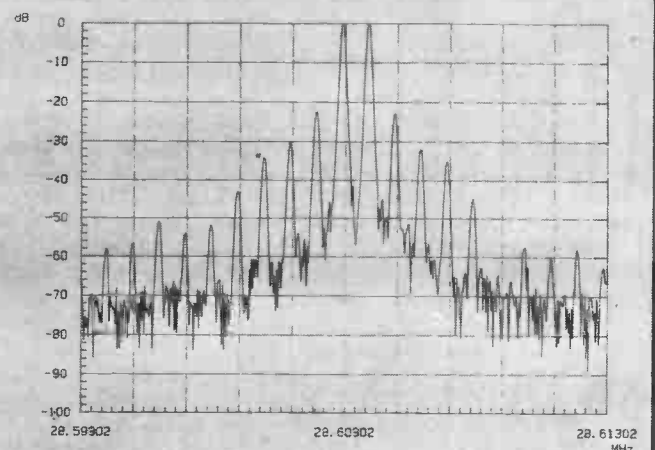
*Yaesu FT757/FL7000. 460W PEP two-tone plot at 3.7MHz. Resolution bandwidth 100Hz*



*Yaesu FT757/FL7000. 640W PEP two-tone plot at 3.7MHz. Resolution bandwidth 100Hz*



*Yaesu FT757/FL7000. 550W PEP two-tone plot at 28.6MHz. Resolution bandwidth 100Hz*



visible at all, whilst the second was as low as -76dB! It is quite clear that the low pass filtering on this linear is extremely good, and certainly good enough for all normal applications provided you tune it up correctly and avoid over-driving.

One of the most important tests of a linear is to look into the two-tone performance on all the bands that users will be likely to employ. We therefore checked the performance on the 3.5, 7, 14, 21 and 28MHz bands. Two-tones were mixed in the output attenuator section of a Marconi two-tone audio source and fed into the mic socket of the Yaesu FT757, and after much aggro sorting out earth and hum loops with the gear and choosing optimum levels for the exciter, we took many two-tone plots on the Marconi 2382 at around 500W output.

### Quite a good performance

Most of the plots scanned products up to  $\pm 10$ kHz, and in general they showed quite a good performance. First, look at the plot of the 757 on 3.7MHz running barefoot at 100W PEP. The third order products were way down on this particular sample, which is excellent, fifth order being even lower. What is fascinating, however, is that the high orders all seem to wobble around between -54 and -60dB and do not continue to fall, which I would class as satisfactory but not particularly good. A valve PA might well have a poorer third order performance, but higher orders would normally attenuate much faster. This performance should be borne in mind when looking at

the plots including the linear in circuit. However, don't forget that the exciter would have an even better performance at lower levels when driving the linear, as it requires an average of only a quarter of its full exciter power.

### Baffling problem

At 460W PEP output on 3.7MHz the overall performance with the linear was good, and similar to that of the exciter on its own. One can see that there are some cancellations, however, and a lot of noise around the passband of the SSB filter, which rather baffled me as we made many attempts to eliminate it. We then took the power up to 640W PEP, as high as we felt it was reasonable to go, by adjusting the ALC preset. The third order products were still at a surprisingly low level, averaging -30dB, whilst higher orders fell in a similar way. The odd product can be seen to completely cancel between the distortion of the exciter and that of the linear.

Looking at the other plots, the worst performance was on the 28MHz band with the linear delivering 550W. The third order products are a little high, and at  $\pm 10$ kHz offset they can be seen to have dropped to about -60dB, which is adequate. The performance of the linear is probably quite a lot better than this, for the 757 barefoot was itself not particularly good on the HF bands, a barefoot 14MHz plot at 100W PEP showing third order products of around -28dB. My conclusion here is that the linear is somewhat better than the Icom IC2KL at

full power, but the latter improved considerably when the power was reduced to 400W PEP. I did not try plots from an alternative exciter, as Amcomm-ARE and I both thought it fair to check the complete system as a total entity. The 7MHz plot was similar to that at 3.7MHz, whilst other HF bands were slightly better than the 28MHz performance.

It seems probable that the total system gain, after the ALC controlled amplifier, was rather on the high side, thus emphasising mic amp and IF noise which tended to increase the noise level seen on the plots. The noise was generally around each of the products on some of the plots, but time precluded deep investigation of this.

### Alternative systems

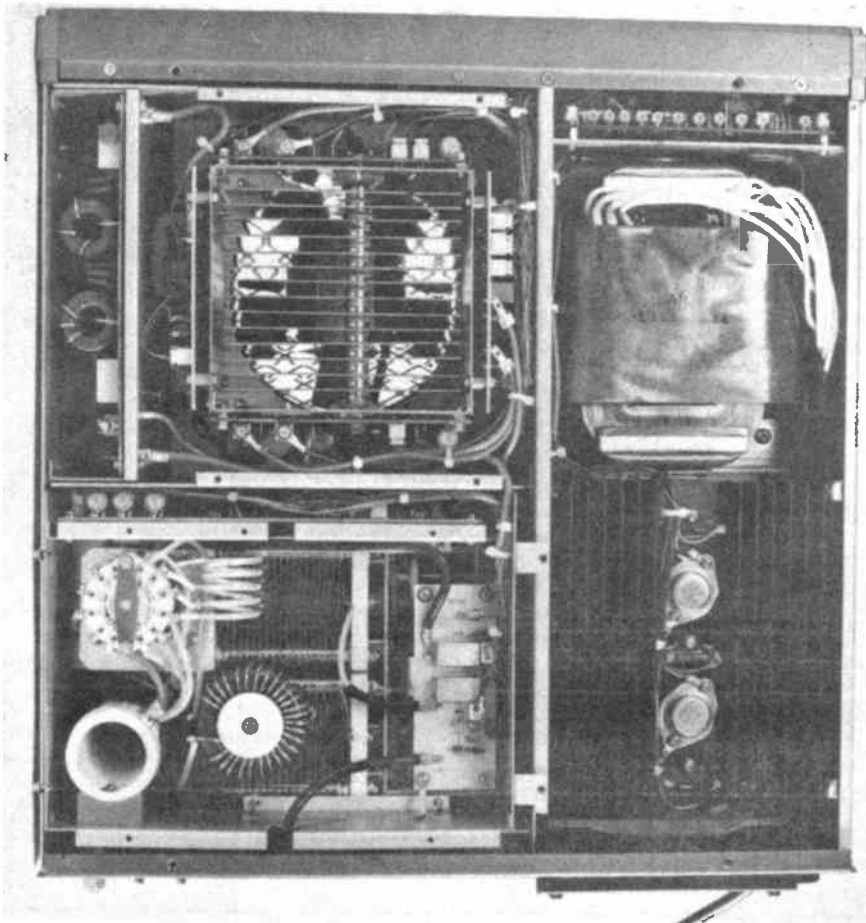
The advantage of the Yaesu FL7000 is that it has the power supply, the linear and the auto ATU in one enormous unit, whereas alternatives invariably split the linear and the ATU. Many linears, including the IC2KL solid-state Icom and the Drake L7 valve model, split the linear and its power supply into two units. Thus, the equivalent Icom set-up to the Yaesu FL7000 is the IC2KL with its separate power supply and the IC AT500 automatic ATU.

If you require the finest possible linear amplification, then there is no doubt that a valve linear is better. Trio, Yaesu and Drake, for example, all make superb linears with extremely low IM products at 500W PEP. The valve models are also capable of 1kW PEP output, which allows you to compensate for a very lossy feed line!

The only auto ATU that I have tested as a separate unit which is capable of coping with 500W PEP throughput is the Icom AT500, which I use myself. When tested into a dummy load, it has coped with 1kW PEP without any trouble at all, the matching taking no more than an average of 1.5secs and the average SWR then being around 1.1:1. This model would be quite suitable for use with any of the linears mentioned, but only Icom rigs can give the compatible band data dc levels to work the AT500 band change automatically. The AT500 has manual band selection, though, as does the Yaesu FL7000.

If you want a complete system with auto linear, ATU and automatic band selection from the rig, then your choice is between the Yaesu system with the FT757, the FT980 or the new FT767 combined with the FL7000, or one of the Icom rigs fitted with band data together with the IC2KL and IC AT500. The Icom system therefore has four units, including the transceiver, whereas the much less expensive Yaesu system is only two units, although the linear itself is huge.

The Yaesu includes very comprehensive metering and allows you to touch up the ATU manually and select the required antenna. The Icom system will feed up to four preselected antennas, but you cannot actually select more than one antenna for each band without





## G3OSS TESTS

external manual switching.

The final decision will probably depend upon which transceiver you have, for the FL7000 will obviously be easier to use with one of the Yaesu rigs mentioned, but you may well be attracted to it even if you have another make of transceiver. Similarly, the IC2KL and the IC AT500 can be used with other equipment, but then you will have to change each unit to the required band. Since the choice between the Yaesu and Icom linears seems mainly dependent upon the choice of transceiver, my personal opinion is that the Icom system with a rig such as the IC751A is the one to go for, if you can justify the price, but you should be pleased with the FL7000 as a companion for your Yaesu transceiver.

### Conclusions

I am most impressed with the Yaesu FL7000, although it is very expensive and necessarily includes the auto ATU mainly as a means of protecting the linear itself. You may well need an external ATU with a high power dummy load position if you regularly use

### Yaesu FL7000/FT757 combination test results

	3.7MHz	7.05MHz	14.2MHz	21.3MHz	28.6MHz
Input drive for 500W output	15W	17W	26W	44W	36W
ATU bypassed 2nd harmonic	-68dB	-65dB	-71dB	-70dB	-72dB
ATU bypassed 3rd harmonic	< -83dB	-71dB	-68dB	-71dB	-76dB
ATU in 2nd harmonic	-69dB	-66dB	-68dB	-76dB	-75dB
ATU in 3rd harmonic	< -83dB	-79dB	< -84dB	< -83dB	-77dB
3rd order IM at stated power	-30dB/640W	-37dB/480W	-35dB/500W	-26dB/500W	-22dB/550W
15th order average product from two-tone test	-53dB	-54dB	-50dB	-53dB	-55dB

antennas that present a considerable mismatch to a 50 ohm source.

You would be well advised to set up an external ATU to its straight through position, switched to a high power 50 ohm load when you auto tune the Yaesu linear on low power.

Having done this, you can then set up the antenna match on the external ATU, again on low power, and only then go to high power on the linear. You will probably then have to touch up the FL7000 or the external ATU, with very great caution, to achieve the best match to the solid-state PA.

The FL7000 is very well made and extremely well protected, and its price at

£1,399 is much less than the Icom IC2KL, even before the addition of the AT500. However, I still feel that you would be better off with a Yaesu valve linear, which should be a lot cheaper and has a higher power rating anyway.

### Thanks

I would like to thank my friend, Dick Grubb W0QM, who assisted me with many of the measurements and subjective trials, and both Roy Brooker and Jeff Ginn who also helped with measurements. Very many thanks also to Alec Allan of Amcomm-ARE for the loan of the Yaesu system so soon after it was released.

## DM1000 POCKET MULTIMETER

from AB European Marketing

Very recently in the columns of this magazine I noticed an announcement about this meter, and thought it would be fascinating to examine in the lab.

This remarkable mini model is little larger than a credit card, although it is somewhat thicker, of course. The test leads are permanently attached and are terminated in long and convenient prods, the leads being 380mm long. The meter has a rotary switch which selects dc volts (2, 20, 200 and 450V fsd), ac volts (with the same range as dc), resistance (2k, 20k, 200k and 2Mohms fsd) and a continuity position which buzzes when the probes are touched together, and which can also be used for diode testing. The meter is powered by two LR44 mini batteries, each giving 1.5V. A tiny screw has to be removed from the back panel, which then allows the panel to be slid off to reveal the batteries.

### Display features

The liquid crystal display has 3.5 digits and is simple to read, the figures showing up well even out of doors in broad daylight.

The display also gives the chosen units and a decimal point where applicable. Most usefully the instrument is dual polarity, and thus a minus sign comes up on the display when you are measuring a negative voltage.

When you turn the instrument on with the mode selector rotary, you can hear a little 'pip' which immediately indicates that the batteries are OK. There is also a low battery warning marker on the display, which comes up just before the



batteries are totally exhausted (less than 1.25V). The meter measures 108x54x8mm and weighs a mere 70gm.

We started by getting a feel for the instrument, and found that it was very easy to use and extremely handy. At first glance one might think it is bad practice to have attached test leads, but in my lab almost every meter's test leads walk so far that there is usually a scrabble for any

lead that will fit when we are inevitably in a hurry.

Therefore, as the meter itself is so small, I think on reflection that the attached leads are a blessing. It is perhaps a pity that the importers did not supply any form of crock clip attachments for the probes, but perhaps this is asking too much.

We set up a Time Electronics type

## G3OSS TESTS

2003N dc lab standard source for checking the dc ranges, and we also compared the readings with a Hewlett-Packard 3478A 6-digit multimeter which we know to be extremely accurate. On the 2V dc range, sending an extremely accurate 1V dc, this little meter managed 0.999V, ie 0.1% accuracy, which is remarkable. A source of 100mV read 99mV and 10mV read 9mV, and thus the final digit was only one in error.

On the 20V dc range, 3V read at 2.97V whilst 10V read 9.93V. We did not have time to calibrate voltages for the higher ranges, but since the lower ones were so well within specification I rather doubt that the accuracy would be worse than the claimed 1.3% of range  $\pm 4$  digits! The input impedance on the dc voltage mode is between 11 and 12Mohms, which should be high enough for normal purposes.

### ac range measurements

On the ac voltage range we checked the input impedance out at 12Mohms, as the specification was not clear as to whether it was different on ac and dc. We checked the frequency response for an input level of 200mV, and frequencies from 150Hz to 300Hz gave virtually identical readings to 50Hz whilst 1kHz was approximately 3.5% low. 2kHz was reading -10% and attenuation was very rapid at higher frequencies. The reading

was just 100mV by 6.8Hz, and it is rather a pity for us amateurs that the manufacturer could not have used a rectifier with a much wider response to allow us to check general audio frequencies.

As with all the other ranges, the ohms range changed automatically. You cannot actually select a range, although I do not think that the absence of manual ranging is a real disadvantage. Resistances below 2kohms generally read extremely accurately, just the final digit being up to two digits out, whilst higher resistance values generally read within 0.5% up to 2Mohms. The claimed accuracy is 2% of range  $\pm 4$  digits, but it was always at least four times better than this.

The continuity mode gave a buzz when the resistance placed between the probes was less than 3600 ohms, although this border line depends very much upon the battery voltage, as explained in the manual. The diode test is very basic, checking only how the diode switches on and whether it switches off with the connections reversed. You can note the actual readings; one is supposed to be at least twice the other, although the actual numbers are meaningless.

The manufacturers have even thought of continuity testing for deaf people, for a small symbol comes up on the LCD when the buzzer sounds.

The manual can be described as satisfactory, but my colleague Jeff Ginn noted the most awful boob: the power consumption is stated to be 3mV! There are, of course, the usual instructions such as 'store meter in a cool dry place (see specifications)' and 'always switch meter off when not in use'.

The meter comes with a useful fold-over wallet with a Velcro clamp for the probes. This is the smallest multimeter that I have yet checked (unfortunately, so many firms do not seem to bother to contact either the magazine or myself to offer equipment for review), and I feel I can recommend it strongly for everyday routine use.

### Mobile asset

It would be the ideal instrument to take out with you when you are mobile or on portable expeditions, and it may well save you much frustration in an emergency when you are trying to find a fault. It can easily be stored in a pocket. Just the instrument to have up your sleeve when you are buying valves at a rally to check whether the heaters are continuous!

The DM1000 is available via mail order from AB European Marketing Division, Forest Farm Industrial Estate, Whitchurch, Cardiff, South Glamorgan CF4 7YS, at a cost of £28.95 including VAT and postage.

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# QRO THE PROS & CONS

by Angus McKenzie G3OSS

Many amateurs run as high a power as they can nearly all the time in the belief that such power helps them get more contacts. Obviously, QRO (high power) helps to get that elusive DX QSO, but it is very surprising how much DX can be worked using relatively low power if you have an effective station putting out a good clean signal into a well sited antenna. Here are a few guide-lines concerning the use of QRO, and also some of the annoying problems that you will find occurring when you switch that big linear on.

## QRP success stories

There are many QRP (low power) enthusiasts who take a pride in working DX using surprisingly low power. I hear much the same story about running QRP from HF enthusiasts, as well as VHF, UHF and microwave operators. I have even had a lot of fun with QRP myself and, although pride may be a slight sin, I am quite proud of some QRP QSOs that I have had over the years. Very frequently, we hear of people who discourage the use of high power claiming that one of their friends regularly works 200km, running 3W of CW on 144MHz with consistently good results. I was told by an RIS officer once that a friend of his worked the world with 10W, questioning whether I needed a linear at all on the HF bands.

One must analyse these situations to get at the truth, as so often when one really digs deep one finds that the station concerned either lives at the top of an enormous hill or has a massive antenna system. Alternatively, it may have taken five years to have that one astonishing QSO with upper bongo land, in which he received a report of 4-1-9 when he was only running 10W into a ground plane antenna, the QSO lasting only one minute before he was blotted out!

One can work almost anything with QRP, but it is often necessary to be incredibly patient and totally dedicated. The fact that you can communicate once in a year with a given DX station means comparatively little, apart from the pleasure it gives the operator, and the knowledge that the operator is obviously patient and probably has a good antenna system.

What may be more to the point is that one may wish to establish a reliable contact with a DX station much more frequently, and perhaps have more QSOs per hour in a contest, provided that it does not cause distress to others.

I can remember my excitement in 1979 when I was running 100W PEP on

28.88MHz, whilst listening to 50.1MHz crossband duplex. I came across VE1ASJ who was running QRO, and who was so strong that I asked him to cut down his power. He reduced it to 10W and then 1W, and I was still receiving him at 5/9. At this stage he inserted a special 1W Bird meter plug, and proceeded to calibrate peak powers of 100mW and finally 10mW. At 10mW winkle power he was still 5/4, and I have a cassette tape to prove it; I also reduced my power considerably on 28MHz.

I will never forget this remarkable experience, for the path was around 5000km and I understand that the power used was about the lowest on record for a Q5 SSB QSO across the pond. The problem here, though, is that such a QSO would only be possible once or twice in an 11 year period, and I have since had many QSOs with the same station with much higher power on 28MHz.

## All part of the hobby

One can often communicate with a station using QRP on one band, whilst one needs QRO and very good conditions on another. There is always the excitement of making a solid contact with a reasonable degree of nattering with a DX station, and I have found that QRP can be fairly restricted at times and a burden on the station at the other end, who may have to struggle to get good readability. This is all part of the hobby, though, and very often in a DX pile-up on VHF or UHF, when I am running QRO, I make a point of listening for the weakest stations that I can hear, as they are more likely to be real DX.

Of course, one must consider what real DX actually is. I am just as pleased to work a station running 1W from Manchester as another running 400W in southern Scotland, but I am even more satisfied if I can manage to work any station further afield! What can be slightly irritating is to receive a 5/9 call from a station, say, 100km away when I am specifically looking for DX, but one should remember that the caller may actually be calling to give you information about DX.

Undoubtedly, much of the success in working QRP comes from having a superb antenna system, and stations such as G3BDQ have worked the world on 160m with just 8W of CW. At the peak in the sunspot cycle during 1980 I had the most enjoyment when I ran just 10W FM around 29.6MHz into a vertical antenna, working all over the US via both simplex and US repeaters. I could easily have run 100W into my TH6 beam, but this would

have been very selfish as the additional ERP would have stopped other people using the same channel in other directions.

## The dangers of QRO

We should all be taking much greater care when we run our linears, to avoid using up too much bandwidth. There is nothing more annoying than to hear someone running a powerful solid-state linear on 144MHz and occupying up to 50kHz of band space, especially when he is having a long natter with a station only 15km away who is giving him 5/9++. Even when solid-state linears are driven well within their ratings, they tend to generate far worse intermodulation products than a valve linear stage, but the problem is that there are too many, poorly designed solid-state amplifiers on the market. Some are extremely poor at low drive levels, producing very bad cross-over distortion, whilst others are dreadful when driven fully.

Some makes advertised for, say, 10W drive for 100W out require only 5W input for 80W output, and so are over specified. I once came across a 'linear' which was diabolical, its specification stating that it required 3W input for 100W output, yet it was one of the most non linear machines available. The result, when it was driven from a Yaesu FT290 tweaked to give a badly distorted output of 4W into the linear, can well be imagined. It is not surprising that a new amateur who buys a linear for his 10W rig gets howled at by many stations who comment on the bad spreading. The transceiver is probably giving at least 12W PEP output, when the linear requires only 5W to give a moderately clean output.

## Poor set-up

Unfortunately, many receivers overload badly when there are high signal strengths on the band. Sometimes a report of spreading can be due to a poor receiving set-up, in which a poor front end is driven nearly crazy with an external pre-amp that has excessive gain! Thus a really clean signal will apparently be very wide, but will sound clean with another station having a better receiving set-up.

If you are running QRO, you may find yourself in trouble with interference problems. The interference immunity of many of today's electronics, including TVs, videos and hi-fi systems, seems to be a lot worse than older equipment, and so it is better to use QRO very carefully. You will have to remember that when you are using a high gain beam, you are in

fact generating a lot of ergs in the direction in which the beam is pointing, and it is not always the next door neighbour who will get the maximum field strength, especially if the antenna is high up. Over-driven linears are more likely to cause trouble than one that is driven optimally.

It is probably better to use a high gain antenna that is high up than a lower gain one that is only 8 or 10 metres above ground level. A high gain signal will only be very strong with other stations in line with it, whereas a lower gain system will put out a very strong signal locally over a much wider area. High power is useful for attracting attention at a great distance, but once the beams are aligned either end in a DX QSO, it is often possible to reduce power and continue without any problem.

The moment that you add a linear, you are more likely to get RF feedback into the microphone leads and the transmitter's input circuitry, as well as the sensitive synthesizer. If you have a bad SWR on your antenna, you may well get as much as 25W back in the shack if you are using very low loss co-ax and a linear delivering 400W at the antenna. This returned power can cause you a lot of trouble, but the situation can be improved radically by improving the match on the antenna.

## Frequency pulling

One of the problems that I have often heard when a station puts the linear on is that of frequency pulling or FMing. This is caused by some of the high output power creeping back into the dc regulator circuits which feed the local oscillator in the transverter, or even in the transceiver. Some rigs were never designed to drive high power linears, and examples of these are the Belcom Liner 2 and even the ubiquitous Yaesu FT290. However, it is possible to get an FT290 to behave very well with very careful adjustment of the PA stage, which should include backing down the output power with the ALC preset to no more than around 2.5W PEP. When this is driven into the appropriate BNOS linear it can produce quite clean signals, as I noted in my review of the latter some two years ago.

In this case it is the receive side that lets the operator down, as the FT290 has an appalling input intercept performance and other strong stations in the neighbourhood may cause the little FT290 quite a lot of distress! If you notice a station that seems to be changing frequency by 100Hz or two as it is modulating, and speech peaks seem to move sideways, then it is helpful to let the station know that there is local oscillator pulling going on. Very often the fault disappears when the linear is switched off.

## A good antenna system

Before you consider adding a linear on the LF, HF or VHF bands, you should have a look at the efficiency of your antenna

system. A well sited antenna on HF, correctly tuned and fed with good feeder, may well give such an improvement over your original system that you may find you don't need a linear after all. Good earthing on LF bands can often make an enormous difference, and in any case is good practice. This becomes even more important if you do add a linear.

I have always thought it more important to spend money and time on the antenna system first and add a linear later, when you are convinced that you need it for the sort of contacts that you are interested in. There can be a 10dB difference in the effectiveness of a station using a very good beam and very low loss co-ax, when compared with a mediocre installation. This is particularly true on VHF, where you can lose many dBs by using poor co-ax on a long run.

## Linears and the sunspot cycle

It would be true to say that at the peak of the sunspot cycle you can get out surprisingly successfully, especially on 28MHz, with a very simple antenna and relatively low power. We are now at the minimum part of the sunspot cycle, though, and as there are so many stations who are running high power with good antenna systems you may find that you have great difficulty in getting good contacts on HF using modest power. The poorer your antenna system is, the more trouble you will have. Dipoles or ground planes, let alone trapped verticals, will not do very well, unless you are extremely patient. DX is very competitive, so you are more likely to need a linear at sunspot minimum.

When conditions are good I often switch my linear off and continue my QSO, and only switch the linear back on again if bad QRM comes up, or conditions are beginning to fail. If you run a sked on HF you may well find that you have to keep your linear on to avoid someone else taking the channel over, and one has to remember that during most weekends only the 14MHz HF band is open, so thousands of stations all round the world will be running SSB simultaneously between just 14.1 and 14.35MHz. Don't be surprised if there is a lot of QRM, and if a station is receiving you strongly then turn your linear off; somebody else may be able to use the frequency more easily in a completely different direction than the one you are working in without causing you much interference.

Don't be surprised to hear stations bobbing up who ask you to move because they have been on frequency for the last hour, when you have been there as well. Propagation is constantly changing, especially at sunspot minimum, and we all have to try to live together on the band. When you are running a linear, it is all the more important to ask if the channel is in use before calling CQ. You may not hear one end of a QSO, but the other end may bomb into your station when it is their turn.

There will be some paths for which you will almost inevitably require a linear, and a good beam as well, and I regularly work a friend in Colorado every Sunday afternoon. At the moment it is rare that I can get away with turning the linear off, as the path goes over the North magnetic pole and is a difficult one over to the Rockies. At the moment W0QM has to use CW half of the time, but I can usually remain on SSB as he gets much less QRM than I do because of his location. At sunspot maximum we use the 28MHz band, almost always without linears, and for a few years in between minimum and maximum we nearly always use 21MHz, turning on the linears when necessary.

## Linears and EMC

In my experience, EMC problems tend to increase with the square of the power being used, ie you are likely to have four times the number of problems running 200W PEP than with 100W. The onset of an EMC problem is often rather sudden, especially with modern electronic circuitry, and a good knowledge of the use of appropriate filters is essential. The RSGB now stocks some excellent filters and ferrite rings, which are available from RSGB HQ, and it is quite surprising how a carefully chosen filter, such as an HPFS high-pass with inductive braid breaker, can completely cure a television set interference immunity problem. I will be going into this subject in greater detail fairly soon, but in the meantime I strongly recommend following RSGB guidelines.

## A final resumé

If you do want to use a linear, then make sure that you are not over driving it and that you are putting out a clean transmission. Don't just accept the report that your transmission is clean from one station, as there are a few stations around that feel that it is more tactful to say that everybody is putting out a good signal.

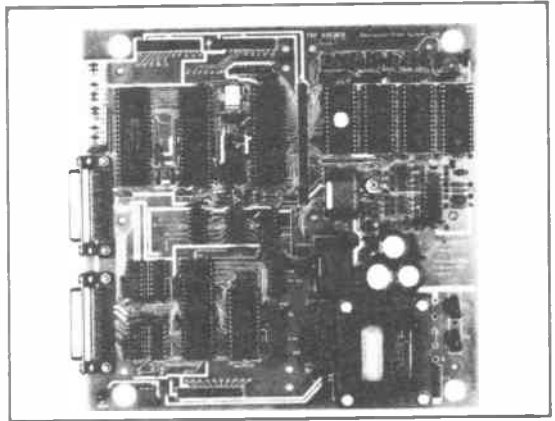
It is far more helpful to everyone if you politely criticise a bad transmission, as not only will the band be cleaner as a result, but there will be fewer interference problems around. Try running the lowest power necessary to keep a solid QSO going with a local. This is just as important with FM as it is with SSB. If you use a beam and low power on FM on a particular QSO, other stations can use the same channel behind you without mutual interference.

If you do want a good burn up by working DX with QRO, then be aware of all the consequences. Turn the input to the linear down when you can, and consider turning it up again at the end of a QSO to establish the next contact—you may then be able to turn it down again. It is a great temptation to keep everything going flat out in a contest, but this can be the most dangerous time for causing problems. If you are likely to be on for very many hours, then use less power as a norm and use that reserve of power when it seems necessary.

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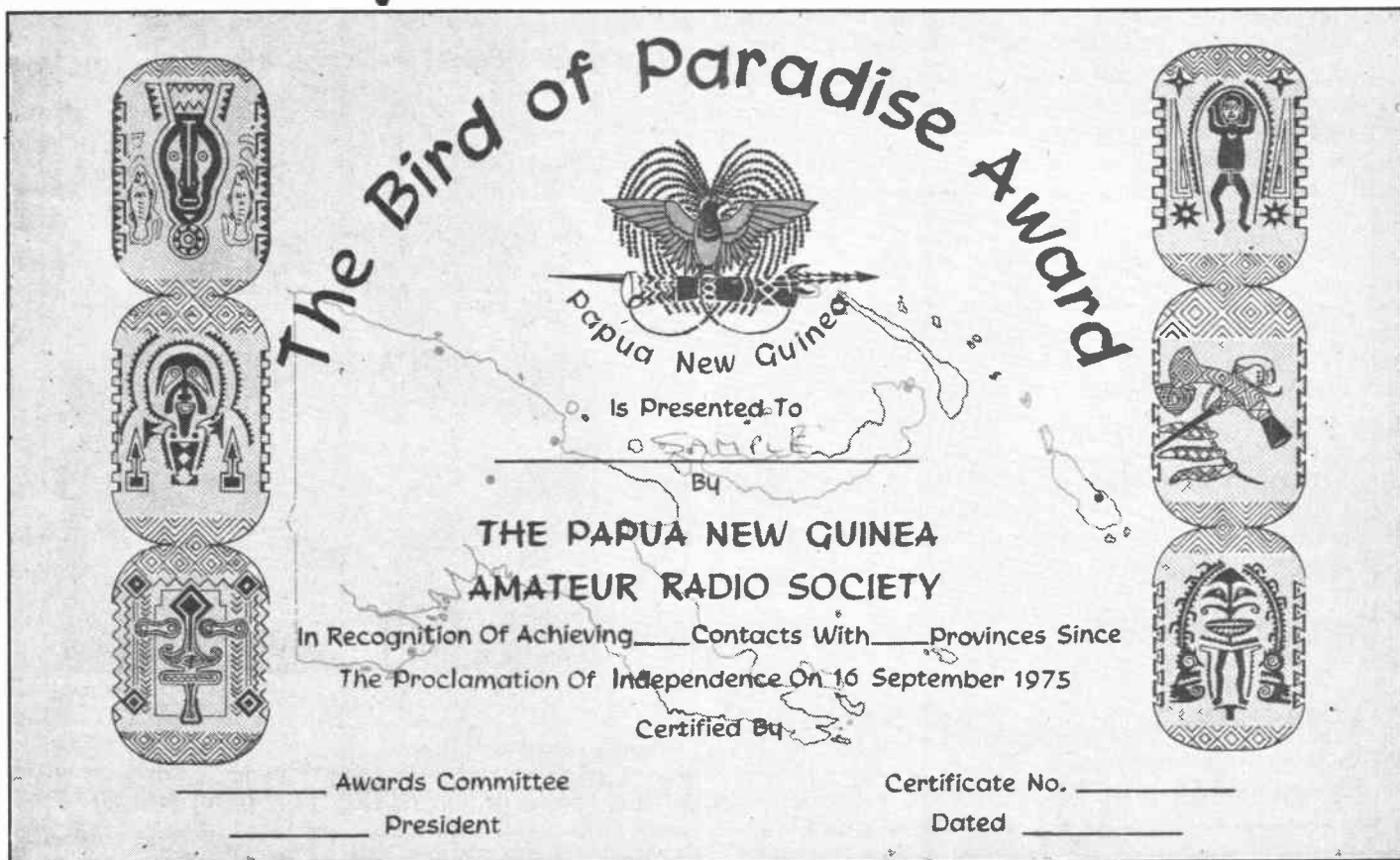
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# World of Awards



In most hobbies there is the person who likes the competitive aspect of the chosen hobby. Thousands of individuals enter this and that competition and as a result many exhibit cups, ribbons, certificates and other trophies in the parlour. These awards are displayed with pride and are proof of some goal achieved. Many are carefully treasured.

In the world of amateur radio there are also individuals who thrive on a bit of competition; many look for some sort of challenge and something to set their sights on. This article will try to give the reader some insight in to this exciting area of the hobby.

The radio amateur is indeed fortunate. What other hobby offers you instant communication with the outside world? Even with the most mediocre of stations, given a bit of diligence and a bit of propagation assistance, outside contacts are possible. Several countries can easily be worked. It is as a result of this that many amateurs start off on the 'countries chase' – the thrill of chasing DX. Like any other hobby, to be good at it you need interest, knowledge and patience.

To introduce myself, the name is Jim and I became interested in amateur radio back in 1947 in Singapore. You will see then that I am what is usually referred to as an old-timer. In any case, if you get as much fun and interest out of the hobby as I have had then fine. Amateur radio is a tremendous hobby with something for everyone.

## Awards

The majority of awards are in the form of certificates, and are usually framed and displayed on the shack wall. There are, of course, several trophy and plaque type awards. These will not concern us in the immediate future.

The reasons for trying for some tangible proof of an achievement are numerous. I think basically you either have an interest in such things or they have no appeal to you.

The number and diversity of the awards available world-wide would fill this magazine for some time to come. Having said that, there are many awards which over the years have built up a solid and meaningful reputation. Some of these awards are fairly easy – however, such a statement is leading with the chin. What is easy for one fully equipped station can be quite the opposite for the average ham.

However, since a great many amateurs are excited by HF band contacts to other countries, the DXCC Award (by the ARRL) would be a good place to start.

## National societies

Most national societies promote awards which encourage the outside amateur to look towards their country.

In the case of the RSGB, in addition to the above outlook, there is a strong tendency to encourage activity between Commonwealth countries, for obvious reasons. The JARL (Japanese Amateur Radio League) sponsors several excel-

lent awards for working Japanese cities, prefectures and so on.

So you will find that most national societies offer awards. As discussed earlier, the DXCC Award is a major international award and is sponsored by the ARRL (USA).

Many radio clubs are proud of their individuality and want other amateurs to look towards their area. Awards generally involve working twenty of the club members, ten of the regions of the country, 15 major cities, etc. The certificates offered can be very colourful and interesting, sure to attract comments in your shack. They always make a good talking point with visiting amateurs.

Having set one's sights on a particular award, there are several things to be considered.

You will have to keep some sort of record, perhaps nothing more special than a separate notebook. (For a long time as a G station I kept my DXCC score in a school exercise book suitably ruled. I still have this book). You will need to keep track of what you have worked and you may have to diligently set out to get QSL cards. However, note that many awards do not need actual QSL cards to be sent. Many awards have official check-points for cards or log extracts (if actual QSL cards are not a requirement). You may need your log extracts verified by two local amateurs, etc. In short, you are in for a bit of book-keeping and a bit of application. Computers are great for storing this sort of information.

by Jim Smith P291S

The point I am trying to make is that many of these awards are only as good as the individual's honesty. For myself I can see little point in displaying some certificate achieved as a result of 'playing the system' and I hope you agree.

#### The cost

Many awards are issued free of charge. Club, association or society funds are used to cover the main costs. Usually there is a mailing charge and this may be requested in IRCs or actual cash.

In some cases, however, you may have to submit QSL cards. DXCC is an example of this and this of course can be an expensive item. However, in the long run I don't think the expense of mailing cards is going to be a factor. It really depends on how much you want the awards and, when equated to the time and effort expended in achieving the award, this cost is likely to be very small.

Make sure that you read the fine print and do as the awards committee requested when setting out conditions for the award. Do what you can to do things right, submitting a clean and legible application and so on.

I must confess to a little bit of bias as far as your first award is concerned. The Bird of Paradise Award, which I organised, would be quite difficult for someone starting from scratch now, with declining sunspot activity. Indeed, many awards will be very difficult to achieve. However, the award is ideal to cover a few of the points made and, judging by the response, has achieved its original goal: to get people interested in the P29 area.

Details are as follows:

- It is issued by a national society – the PNGARS (Papua New Guinea Amateur Radio Society).
- It was sponsored to encourage outside amateurs to look towards Papua New Guinea.
- Going after the award educates the amateur in the topography of PNG. It makes them aware of the main regions and cities of this diverse country.
- Application does require payment but this covers air mail postage to the award holder.
- A further point is that no cards are required, only a certified list of log extracts. Thus, expensive mailing of QSL cards is not required.

Since its inception some years ago over 500 BOP Awards have been issued. Of course many are from Australia, New Zealand and the Pacific area. However, there are also many from outside this immediate area, so it is fair to say that it has attracted much attention.

We shall take a look at some of the awards sponsored by the International Short Wave League and this will give a better idea of the range of the awards available. The ISWL has long been a well-known and respected organisation.



Members have access to a good QSL bureau and, in addition, through the awards programme a wide range of activities is encouraged.

The certificates offered are simple, straightforward and well-produced. All are printed on white card and two colours are used. Black printing carries the award title and details etc. Another colour is used for the woven motif border and sets the certificate off. All carry the ISWL logo and motto: 'We span the globe'. The awards are offered to short wave listener and transmitting amateurs alike.

#### Century Club

For verified contact/reception of 100 countries as defined on the ISWL Country List, with stickers for each additional 25 countries up to 350.

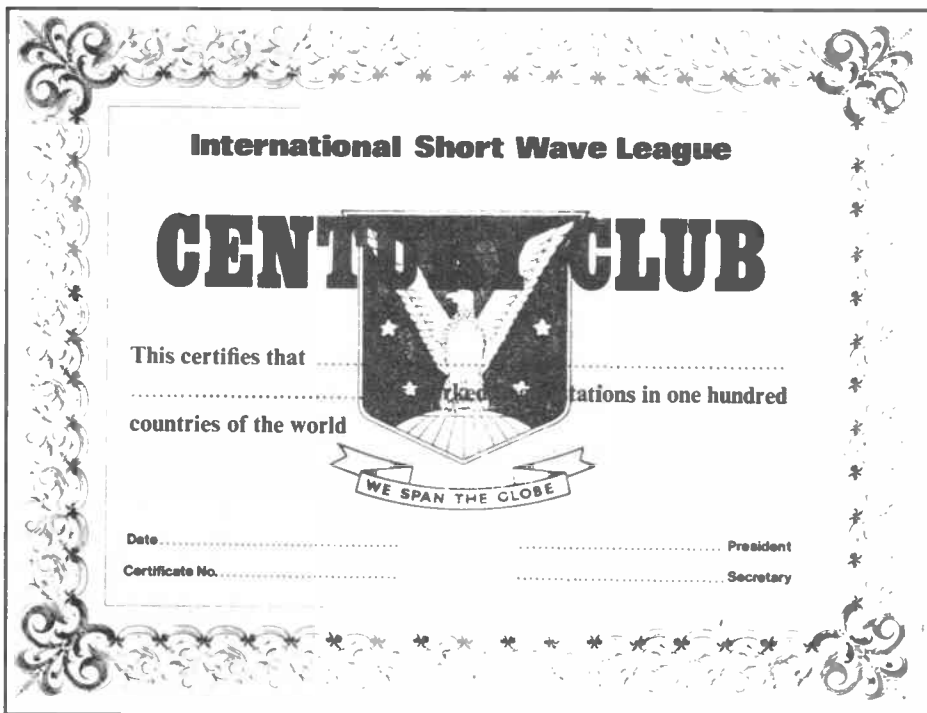
#### Continental Award

For verified contact/reception of 10 stations in each of the six continents; a total of 60 QSLs.

#### States Award

For verified contact/reception of the 48 states of the USA plus KH6 and KL7; a total of 50 QSLs.





### Commonwealth Award

For verified contact/reception of 50 different countries within the British Commonwealth of Nations (SW BC listeners need reception of only 30 countries).

### European Award

For verified contact/reception of 50 different countries within Europe (SW BC listeners need reception of only 35 countries).

### Pacific Ocean Award

For verified contact/reception of 45 different countries which have at least a part of their coastline on or in the Pacific Ocean, eg VE,W,VK,KH6, etc (SW BC listeners need reception of only 30 countries).

### Monitor Award 1

For verified contact/reception of 25 ISWL members licensed since 1 January 1985, with stickers for each additional 25 members up to 200. Licensed members may count QSLs from ISWL listener members, together with licensed members' cards. A list of members is produced annually and is available from the HQ for 20p or 2 IRCs.

### Monitor Award 2

This is issued for verification of 225 members, with stickers to 400.

### Monitor Award 3

This is issued for verification of 425 members, with stickers to 600.

### Zone Award

For verified contact/reception of 25, 50 or 75 ITU zones as defined on the ITU zone map. A country/zone/continent/prefix list is available from the league's HQ or Awards Manager for 35p or 3 IRCs.

### VHF Country Award

For verified confirmation of working/hearing 10 countries on VHF, including television. Stickers issued for 20, 30, 40, 50, 60 and 70 countries.

### 5 Band DXCC Award

For verified contact/reception of 100 different countries, on each of 5 separate bands (500 contacts in all).

### Short Wave Broadcast DX Award

Available to any BC listener for verified reception of short wave broadcast stations in all 6 continents with the number of countries needed in each continent detailed in Table 1.

Full details of ISWL membership with the benefits of its QSL bureau can be obtained from: *The Secretary, ISWL HQ, 88 The Barley Lea, Coventry CV3 1DY.*

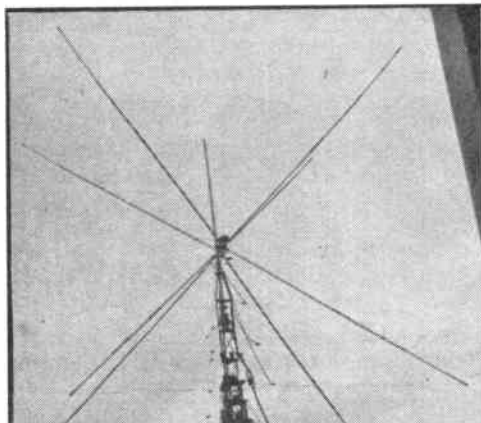
Each award is a coloured certificate, available to all, members or not. Send your GCR list of QSLs together with £1.50 if in the UK, \$5.00 if in the USA, or 10 IRCs for each award (free to ISWL members) to: *ISWL Awards Manager, Mr Clifford A Tooke, 6 Chelmer Avenue, Rayleigh, Essex SS6 7TB, England.*

Table 1

SHORT WAVE BROADCAST DX AWARD (NO OF COUNTRIES)							
	Europe	Africa	Asia	N America	S America	Oceania	Total
Class 1	35	40	35	12	10	8	140
Class 2	30	30	27	10	7	6	110
Class 3	25	22	18	7	5	3	80
Class 4	17	15	10	4	3	1	50

COUNTRIES OF EUROPE			
C31	Andorra	CT1	Portugal
CT2	Azores	DL	West Germany
DM/Y	East Germany DDR	EA	Spain
EA6	Balearic Is	EI	Eire
F	France	FC	Corsica
G	England	GC	Jersey (see Notes)
GC	Guernsey	GD	Isle of Man
GI	N Ireland	GM	Scotland
GW	Wales	HA	Hungary
HB	Switzerland	HB0	Leichtenstein
HV	Vatican	I	Italy
IS	Sardinia	JW	Svalbard
JX	Jan Mayen	M1/T7	San Marino
LA	Norway	LX	Luxembourg
LZ	Bulgaria	OE	Austria
OH	Finland	OH0	Aaland Is
OJ0	Market Reef	OK	Czechoslovakia
ON	Belgium	OY	Faroe Is
OZ	Denmark	PA	Netherlands
SM	Sweden	SP	Poland
SV	Greece	SV	Mount Athos
SV	Rhodes	SV	Crete
TA	Turkey (Europe)	TF	Iceland
UA1, 3, 4, 6	USSR (Europe)	UA2	Kaliningrad
UA	Franz Josef Land	UB	Ukraine
UC	White Russia	UO	Moldavia
UP	Lithuania	UQ	Latvia
UR	Estonia	YO	Rumania
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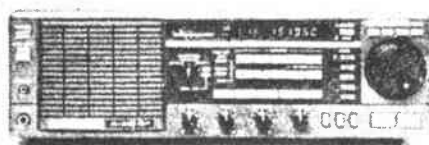
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1081 DX-31	Dipole 10 15 20m 2KW p&p	£97.75
1082 DX-32	2 elements 10 15 20m 2kw pep	£161.00
1083 DX-33	3 element 10 15 20m 2kw pep	£224.25
1084 DX-34	4 element 10 15 20m 2kw pep	£310.50
1085 DX-31/32	Conversion kit DX-31 to 32	£88.00
1086 DX-32/33	Conversion kit DX-32 to 33	£88.50
1087 DX-33/44	Conversion kit DX-33 to 34	£92.00
1089 DX-103	3 element 10m Yagi or 27MHz	£97.75
1090 DX-105	5 element 10 Yagi	£143.75
1093 DX-40K	Converts DX 31/2/3/4 to 40m dipole	£103.50
1096 DX 24/Q 2	ele quad 2, 10, 15 & 20m	£230.00
1097 DX 26/Q 2	ele quad 2, 10, 12, 15, 18 & 20m	£251.75
1099 DX-7/14-2/6 2	ele 40m, 5 ele on 20m, 50 boom	£806.00

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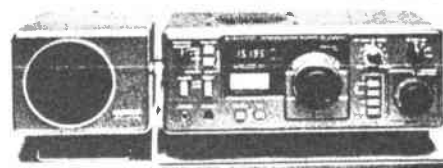
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# A CHEAPO PSU

There are a lot of useful projects which are cheap and easy to build. One of these is a small power supply, always useful for powering various items which are being built or even for powering low current modules such as small receivers.

When making a power supply the easiest way is to use a ready made regulator IC, but often it is more convenient to use components out of the junk box and tailor the design to what is available. This design uses components which are likely to be found in most junk boxes.

The output voltage can be set to the exact voltage required, although it has been designed to operate at about 12 volts. The circuit includes short circuit protection. This is, of course, a vital requirement for any supply to be used around the shack.

## Design requirements

The initial requirements for the unit were that it should be simple and should provide around twelve units at up to 200mA. If greater currents were required, then larger capacitors, transistors, transformers and so forth would be required and the supply would cease to be a 'junk box' project.

Looking at the circuit itself it can be seen that the rectifier and smoothing circuits are quite straightforward. It is, of course, always advisable to use full wave rectifiers, which enable better smoothing to be obtained with smaller components.

However, this can be achieved in one of two ways, dependent upon the type of transformer which is to be used. The first way uses a centre tapped transformer and two diodes, whereas the other uses a transformer without a centre tap and a

bridge rectifier or four diodes. These configurations are both shown in *Figure 1*. Normally there is little difference between the performance of these two circuits, and the decision as to which one to use will depend upon the type of transformer which is available.

## The chosen design

In order to keep the design of the regulator circuit simple whilst maintaining adequate regulation, a two transistor configuration was chosen. The basic circuit is shown in *Figure 2*. Tr1 is the series regulator transistor and this actually controls the current flow, and hence the voltage at the output. Tr2 acts as a differential amplifier comparing the Zener voltage with a portion of the output voltage.

Normally the voltage of ZD1 is about half of the required output voltage, meaning that the base of Tr2 has to sit at about half the output voltage.

To understand just how the circuit works, we need to take a closer look at it. Imagine that the circuit is turned on and operating. If for some reason the circuit requires more current, then the voltage will tend to fall. This in turn would mean that the voltage at the base of Tr2 would also fall. This would cause Tr2 to turn off, raising the voltage at its collector, which in turn would allow more current to flow through Tr1 and thereby maintain the voltage at the output. Conversely, if less current is required the circuit will again be able to compensate for it in a similar manner.

The other feature incorporated into this circuit is current limiting. This is provided by a very simple yet effective idea I came across fairly recently. The two diodes D5 and D6 together with R2

are all the extra components which are required. Under normal operating conditions only a very small voltage will be developed across R2 and the diodes will not conduct. However, when the voltage rises to over about .7 volt this adds to the voltage across the base emitter junction of Tr1 and the diodes start to conduct. When this occurs, Tr2 is prevented from applying more corrective action to give more current above this 'knee' point, as shown in *Figure 3*.

## What components?

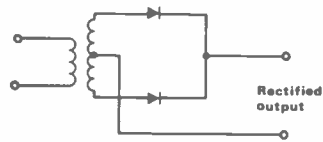
The components list shows the actual components which were used on the original power supply. However, as this is meant to be a PSU from the junk box, and it is unlikely that everyone's junk box will be the same, some comments on the components are included.

The first one is the transformer. This should be capable of giving at least 17 volts peak under load. It should be remembered that transformer outputs are quoted in rms voltages and therefore the peak output will be higher than this by a factor of  $\sqrt{2}$  or 1.414.

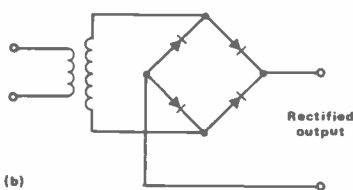
This voltage is required to accommodate the voltage losses arising from the drops across the rectifier diodes and to give enough voltage drop to enable the series regulator transistor to operate correctly.

In order to obtain a 17 volts peak a 12V rms transformer might just do, but a 15V rms transformer would be fine as it would give a peak output of around 21 volts. If a 12 volt transformer was to be used it might be necessary to lower the output voltage of the regulator to enable it to operate correctly. In addition to the correct voltage output, its current rating must also be considered. As it is required

**Fig 1** Two methods of achieving full wave rectification

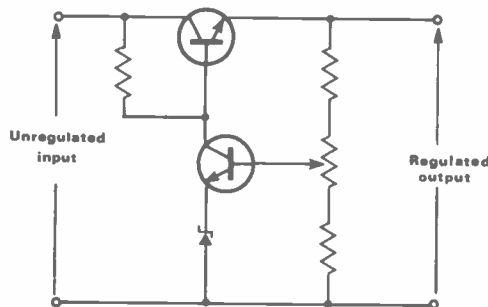


(a) Using a centre tapped transformer

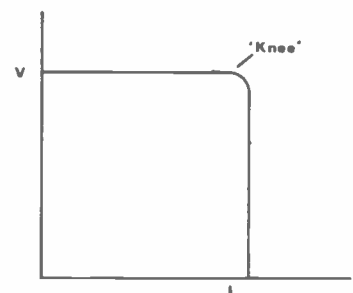


(b) Using a bridge rectifier

**Fig 2** Basic regulator circuit



**Fig 3** Current limiting characteristic



# JUNK BOX PROJECT

to give 200mA output, a transformer with a 5VA rating or slightly higher would be adequate.

The rectifier diodes are not critical. Diodes in the IN4000 series were used because they were cheap and likely to be found in junk boxes. However, any diode or bridge rectifier with a rating of over 50 volts and a current rating of an amp or more would suit.

The smoothing capacitor can be almost any electrolytic of around 2200 $\mu$ F which has a working voltage greater than the maximum peak voltage the transformer is likely to generate. Although one with a 25V working voltage may seem suitable, it is always advisable to under run them, and one with a 40V or higher working voltage would be far more suitable.

### No problems

The two transistors in the design should present very few problems. Tr1 is a power device capable of dissipating about five watts. The T1P31 was chosen because it was easy to mount, but any other similar power device, such as a 2N3055, could be used. The other transistor was a BC108, but again any similar low power audio transistor with a reasonably high HFE could be used equally as well.

The specification for the Zener diode is not too critical. Although a 5.1V Zener was used, any diode with a voltage approximately half the required output would be suitable because the variable resistor gives a large amount of variation.

The two diodes used in the current limiter were IN914s. The performance of these is hardly critical and any suitable small signal silicon diode would suffice.

All the components have been chosen to be very common. If a suitable equivalent cannot be found around the shack then the types shown are all available cheaply from components stockists.

### Construction

The layout of the circuit board is not particularly critical. However, if a few simple points are borne in mind some trouble may be saved. Firstly, it is advisable to keep all wires carrying the current reasonably thick, although as the maximum current is only 200mA there is no need to make them too thick! It is also worth mounting the series pass transistor on a heatsink. Although the transistor specified should be capable of dissipating the heat under normal conditions, it does need a heatsink when operating under short circuit conditions. The most convenient way to do this is to mount the transistor onto the box (if it is metal). If this is done it will be necessary to use an insulating washer set because the case of the transistor will almost certainly be connected to its collector.

The prototypes were built on plain Veroboard using pin and wire techniques. This was done because it is far easier to lay the circuit out logically than if the Veroboard with strips is used. Hopefully, using this approach less mistakes should be made!

### Final point

The final point to be made is to ensure that the power supply is properly earthed. This means that both the metalwork and the 0V line are taken to the mains earth. This should prevent the unit becoming live if anything does go wrong.

### Conclusion

This power supply has proved to be very useful. It has powered a number of small projects which have been built and has not failed.

The short circuit protection has proved to be very useful because, although one does not plan to short the output, it does invariably happen on occasions.

It should be possible to obtain most of the components from the junk box. However, if they do have to be bought the cost should still be quite reasonable. The most expensive items are likely to be the box or transformer.

Even if it is necessary to purchase some of the components secondhand, this should prove to be a worthwhile and useful project.

### Components list

C1	2200 $\mu$ F 40V
C2	100 $\mu$ F 15V
R1	390R
R2	4R7
R3	1k
R4	1k variable
R5	1k
D1-4	IN4003
ZD1	5V1
Tr1	TIP31
Tr2	BC108
D5-6	IN914
T1	13V rms
S1	DPST 250V ac
F1	500mA

Fig 4 Circuit diagram of the power supply

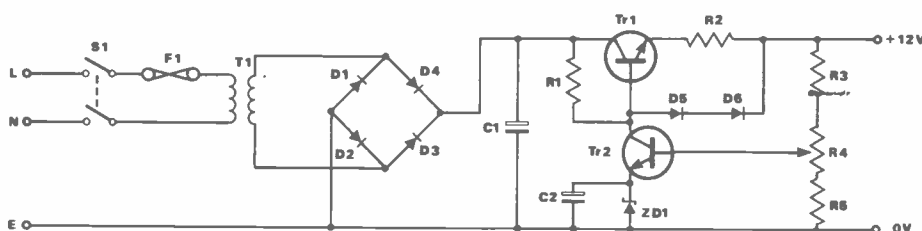


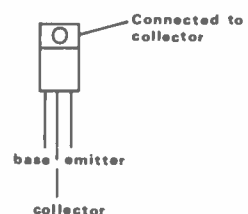
Fig 5 Component information

Diodes



BC108  
collector  
base emitter

TIP31



# British Callsigns and Licences

## A history by Ian Poole G3YWX

Since the early days of radio, licences have been issued to people who wanted to get on the air. Over the years the terms of the licences have changed dramatically, with the result that today's licences bear almost no resemblance to those issued in the early days.

Not only have there been changes in the licences, but also in the callsigns issued to stations. The story behind the development of licences and the way in which callsigns were issued reveals a lot about today's structure.

### Beginnings

The very first licences were issued as far back as 1905. They were issued because it was thought necessary, even in these early days, to have control over any wireless stations which were to be set up. By June 1906 sixty-eight people held licences, including Dr J A Fleming of University College London, the inventor of the diode valve.

These early licences were issued to people who could prove that they intended to conduct experiments in wireless telegraphy. This factor remained the reason for issuing amateur or experimental licences right up until 1939. Initially these experimental stations were not issued with callsigns, but in 1910 they were issued with three letter callsigns for identifying themselves over the air.

Transmitting activity continued, with people carrying out a wide variety of experiments, up until the outbreak of war in 1914. At this time all licences were suspended and any transmitting or receiving apparatus was impounded. In fact it was made an offence to possess any wireless equipment, a fact which one individual learned the hard way when he was imprisoned for merely possessing some receiving apparatus.

After the end of the war the authorities did not start issuing licences until 1920. In order to obtain a licence the applicant would not only have to satisfy the Post Office that experimental tests were to be carried out, but also that he was competent in the use of transmitting equipment. In addition to all of this a Morse test, set at 12 words per minute, had to be passed. Callsigns were again issued with the licences, but they had a different format to the pre-war ones. They consisted of a number (initially 2),

followed by two letters. Some of these callsigns became very famous, such as 2LO and 2MT, which were early broadcast stations.

In these early days the frontiers of wireless achievements were moving very fast. The distances over which contacts were being made were constantly increasing. Initially contacts were only being made within countries, but it became increasingly common for contacts to be made between stations in different countries. Then, in the winters of 1922 and 1923, some transatlantic tests were carried out and the first contacts were made between Europe and America.

With these advances came the problem of having an international system for callsigns and a way of identifying the country of a station from its callsign. Initially stations unofficially started prefixing their callsigns with simple prefixes, such as 'F' for France, 'U' for USA, and 'G' for Great Britain.

### Many proposals

In order to resolve the situation officially, various proposals were made by the licensing authorities in the different countries. However, it took some time to resolve the problem as the ARRL favoured a different solution to Britain and some other countries. The eventual outcome was the system we use today, and although many of the prefixes have changed there are still a large number which remain the same. Examples of these include G, F, HB, LA and PA, to mention only a few.

Returning to the British scene, licences were being issued at an increasing rate and, as well as using the prefix G2, callsigns with the prefixes G3, G4, G5, G6 and G8 were also issued. All of these were, of course, followed by two letters.

In addition to the experimental transmitting licence, another form of licence was introduced. This was known as the artificial aerial or 'AA' licence. It was normally issued to first time applicants for transmitting licences and allowed them to construct and test transmitting equipment.

However, the transmitter output had to be fed into a dummy load or artificial aerial so that no RF was radiated. Callsigns were issued to AA

licence holders and they were in the format of the figure '2' followed by three letters. No prefix was included in the callsign as these should not have been heard over the air. Having held an AA licence it was then possible to submit another proposal to the Post Office for a full transmitting licence, outlining tests which would require the radiation of RF.

The issue of licences and operation continued in this manner until the outbreak of war in 1939. The last day of amateur, or experimental, operation in the UK was 31 August, and then from the beginning of September all equipment was impounded for the duration of the war.

### 1945 onwards

After the end of the war in 1945 it was some time before amateur licences were reintroduced. In fact there was some annoyance amongst British amateurs that many countries in the Mediterranean area were allowed to operate well before any licence proposals were made in the UK. It was not until December 1945 that the Post Office announced that pre-war holders of transmitting and artificial aerial licences could apply for new amateur licences.

The new licence was fundamentally different to the old experimental ones. They were true amateur licences and did not include any of the annoying restrictions of the pre-war ones, such as the prohibition of calling CQ – British stations had to use 'TEST'.

The first licences were duly issued in mid-January 1946, but operation was initially only permitted on the 5 metre band and part of ten metres. However, in July of that year other bands were released for amateur use.

The callsigns which were issued were the same – G2, G3, G4, G5, G6 and G8, plus two letter calls for those who held pre-war transmitting licences. Those who held the artificial aerial licences were given callsigns in the series G2 plus three letters corresponding to their old callsign, but with a G prefix.

New applicants for licences had to prove their technical and operating competence by passing a radio amateurs' examination and a Morse test. However, there were exemptions for those who could prove they held equivalent qualifications from the services. For

these new licences callsigns were issued in the series G3 plus three letters.

The G3 series of callsigns continued to be issued until 1971 when G3ZZZ was issued and the series was exhausted. Then G4 plus three letter callsigns were issued. However, with the increase of interest in amateur radio, partly brought about by the influx of people from Citizen's Band radio, callsigns were issued at an increasing rate. With this the G4 series was comparatively quickly finished and Class A licences were issued with G0 callsigns.

## Mobile

There are many things which the present day licence allows which are taken for granted. However, even after the war there were many restrictions that do not exist now. One of these was that no mobile operation was allowed. Although there had been considerable pressure on the Post Office to allow it, doubts existed as to its safety and this delayed its introduction.

However, in 1954 a new licence schedule was released and this made provision for it. In order to operate mobile a separate licence was required in addition to the main one. It cost £1 per year on top of the £2 which had to be paid for the main one. Just as now, the suffix /M had to be added to the callsign.

Over the following years mobile operation increased with a lot of activity on Top Band, and then with the dramatic increase in the use of VHF and UHF in the late '60s and early '70s these frequencies also became increasingly popular for mobile use.

The separate mobile licence remained until the new licence schedule was introduced in 1977. Amongst many other changes, the new schedule allowed all amateur stations to operate mobile as part of the basic licence.

## Television

With the interest in television growing rapidly in the 1950s and it becoming more a part of everyday life, the Post Office decided to introduce a television transmitting licence.

This was introduced in 1954 at the same time as the mobile licence. Television transmissions were only allowed on bands above 420MHz. In fact, in order to obtain a TV licence it was only necessary to pass the RAE, but if a TV only licence was obtained it was not possible to send any sound to accompany the video – an ordinary sound licence was required for that.

Initially callsigns in the G3 series were issued with a /T suffix to indicate that it was a TV licence. Obviously if the holder of a current sound licence applied for a TV one then he would just use his own call with a /T suffix for any TV transmissions.

As the years passed it was felt necessary to rationalise the TV licences, and accordingly, in 1964, all holders were issued with callsigns of the form G6 ★ ★ /T. These callsigns remained in

force until the new schedule was released in 1977 allowing all licences to use TV without the need for a separate licence.

The basic concept of the terms of the amateur licence had remained almost unchanged since it was first issued in 1945. However, in 1964 a new type of licence was launched. The Class B licence, as it was termed, was open to people who had passed their radio amateurs' examination but it did not require them to have passed any form of Morse test. However, it did limit operation to phone and to bands in the UHF spectrum or higher. Callsigns for this type of licence were in a new series, G8 plus three letters.

Although the initial response was slow and the rate at which they were issued was less than that for the Class A licence, it did encourage occupancy of the UHF bands. At this time there was no commercially available equipment for 70cms of the type we see today, and it still represented quite a challenge to set up a station for these frequencies.

In 1968 the terms of this licence were changed to allow operation on 2 metres. This proved to be a great success because not only did it increase the numbers of licences being issued, but it also increased the occupancy on 2 metres.

The G8 callsigns were issued until 1981 when the G6 series was started. Just as the number of applications rose for Class A licences, the same occurred for Class B ones. This had the effect of the G6 callsigns soon becoming exhausted and the G1 series was started.

## Reciprocal licences

With amateur radio becoming more accepted, many of the restrictions were lifted. This paved the way for allowing amateurs to operate in different countries under reciprocal licensing agreements.

In Britain the first reciprocal licences were issued in 1966. They were issued with callsigns in the series G5AAA to G5LZZ for Class A licences and G5MAA to G5ZZZ for Class B.

These callsigns continued to be issued until recently when it was decided that it was not necessary to reserve a separate set of callsigns for reciprocal licences. Accordingly all holders of reciprocal licences were issued with a new callsign in the standard series, leaving the G5s free for possible re-issue in the not too distant future.

## GB stations

Special event stations, beacons and repeaters all use the GB series of callsign, regardless of where they are located in the UK. Originally only GB3 and then GB8 prefixes were used with only a very few exceptions. One of these was GB2SM at the Science Museum in London, and another GB7RS which was a beacon and news service located at the RSGB headquarters in the early 1950s.

However, with the increase in the number of special event stations and the introduction of repeaters, some rationalisation was required. Nowadays repeaters are issued with callsigns in the series GB3 plus two letters and beacons with GB3 plus three letters.

Special event stations can now use a very wide variety of prefixes which partly follow the normal callsign structure. In other words: GB2, GB4, GB6 and GB8 plus two letters and GB0, GB2 and GB4 plus three letters for Class A licences, then GB1, GB6 and GB8 for Class B licensed stations.

Although these stations were originally licensed by the same department that issued the ordinary amateur licences, they are now issued by the RSGB on behalf of the Department of Trade and Industry, and during 1985 over 1500 special event callsigns were issued.

## Other prefixes

So far, only callsigns using the prefix G have been mentioned. Of course, there are all the prefixes for the other countries in the United Kingdom: GD for the Isle of Man, GI for Northern Ireland, GJ for Jersey, GM for Scotland, GU for Guernsey and GW for Wales. Until recently Jersey and Guernsey collectively used the prefix GC as the Channel Isles.

Over recent years there have been several other prefixes which have been used to mark special occasions. The first of these was in 1977 when all stations in the UK were allowed to use the prefix GE. This was to mark the Queen's Silver Jubilee and the prefix could be used for the whole year.

Then in 1984 a station was set up using the callsign GK0JFK. It was operated from the site of the Kennedy Memorial at Runnymede, just outside Staines. The site was actually donated to the American Government and is therefore American soil. Because of this the prefix incorporated both G and K.

The next set of special prefixes was issued in 1985 to coincide with the VE day celebrations. During the week of the celebrations about 100 special stations were set up using the GV prefix.

Finally, the prefix GR was used for a while. Late in 1985 Tom McKenna mounted an expedition to Rockall. During his stay on the rock he used the callsign GR1TM on the amateur bands, but unfortunately this was not licensed.

## Conclusion

Amateur operation in the UK has come a tremendous way since the early days of spark transmitters, coherers and experimental licences. By past experience the hobby should be able to look forward to a bright future, with extra facilities and less restrictions. Of course, the latest advance is the release of the 50MHz band.

This, together with many other examples, shows that amateur radio is thought of as a worthy user of very valuable spectrum space.



My observations on the need for beginners to learn more about actual operating before going on the air have brought a number of letters.

G3MCK feels there is a need for guidance for new operators on how to conduct basic QSOs, especially on the importance of receiving properly. 'Many people I work do not copy what I send, in spite of sending R. And they do not answer my questions,' he comments.

G4MRP mentions that, having learned the code, new operators do not know what to expect when they try to use it on the air. When he trained in the RAF in 1940, code and operating were learned together as soon as 10/12wpm was attained.

Trainees were put into cubicles in a complex of 'out-stations', with a controller putting operators in the net in touch with each other. This useful system is obviously difficult for individuals to arrange, but it could be a good club project. Setting up such a wired network, with outlets in different parts or corners of the premises, and using it as a regular training facility would be most useful for beginners.

GM4ZGD, Morse tutor for the West of Scotland ARS, described in detail how his classes prepare learners to get on the air as well as simply learning Morse. Among other things, two mock stations are set up in the classroom, with the participants instructed that communication with each other must be entirely by Morse. George feels that some knowledge of basic procedures should be included in the official Morse test.

I shall devote a future column entirely to this subject, and will refer again to the WOSARS system. If anyone else would like to tell me about their current training methods, I would be pleased to hear from them.

#### Future of Morse

This subject has also produced an interesting response. There seems to be a feeling that I said amateur Morse was on the way out. What I tried to say was that we are nearer than ever to a situation that has been forecast for years, and that those interested in keeping Morse as a viable amateur mode ought to begin discussing the matter in a constructive way.

G4VXJ commented that there have been rumours about the use of Morse ceasing since the 1930s, when he first went to sea as a wireless operator. He feels that R/T – with the associated problems arising from various accents and dialects and their effect on the pronunciation of phonetic spelling – will never entirely replace an unambiguous Morse transmission.

He also points out that many governments, directly or indirectly, encourage amateur radio, and usually have a cadre of fully or partly trained communications personnel available who, as the satellites are blasted from space, will be falling back to good old HF Morse!

Vic Simpson, call not known, feels that even if distress communications are digitalised, a fair amount of routine traffic will continue by CW. 'Why else



## Tony Smith G4FAI takes his bimonthly look at the world of dots and dashes

should a chum of mine be working like mad to get up to 25wpm at marine college?' he asks.

#### Disaster

G3KSU, on the other hand, sent me a cutting from *The Guardian* of 5 September which reports, among other things, a run down in the teaching of Morse at GCHQ. He thinks that abandoning the Morse test, if we ever come to it, would be an absolute disaster for *real* amateur radio. He also drew my attention to a report by G8PG in September's *RadCom* that Spain has re-introduced the Morse test. This, apparently, followed action by EA amateurs, many of whom, to show their disagreement with the 'no Morse test' decision, voluntarily took and passed the test despite being offered a 'no code' HF licence!

On a practical note, G3GJW suggests that Morse enthusiasts would serve themselves best by forming a special interest organisation, concerned with CW education and training etc, similar to the BARTG and other specialist mode societies. 'Instead of being just one minority interest for any national radio society, such an organisation would have the benefit of all their members' time, interest and effort'.

G3KXF suggests that amateur radio exhibition stations should feature Morse more often since, in his experience, the public find the station more interesting, and non Morse amateurs are frequently bitten by the CW bug after experiencing such events. The idea of a more positive projection of Morse, in PR terms, needs to be explored further, and I shall return to this later.

#### Inaugural contact

G6YQZ drew my attention to a report in the *Rochdale Observer* about the official opening of the Oldham Amateur Radio Club's new shack on 12 June. Bert Donn G3XSN, RSGB Region 1 representative, made an inaugural contact on the key

with Ursula VP2MDY, in Montserrat, a one-time special ops agent who dropped behind enemy lines during WW II.

It was a nice story, reported in a regular amateur radio column, *QSP*, by Derek Nicholls G1AYR. It was a surprise to find a local newspaper carrying such a column, and even more surprising to find Morse so prominently featured.

I would be more than pleased to receive copies of any other media reports on Morse activities. Send them to me and I will try to mention them in this column.

#### Morsum Magnificat

By the time this appears in print, the first issue of the English edition of *Morsum Magnificat* will be available, containing articles about vintage Morse keys, the early telegraph in Australia, Thomas Edison's enthusiasm for Morse, the high speed clubs, a CW monitor and much more.

Future issues have articles such as an 'ear-witness' account of the first transatlantic amateur contacts in 1923, Japanese Morse and the problems it can bring (!), the story of a Morse class in German-occupied Holland, the life story of RAEM, electronic keyers, projects to help today's CW operators, news, views and so on.

CW is the most international of all radio modes, and the idea is to have a journal read by Morse operators around the world, leading to a better understanding of Morse and its background in each other's countries. Hopefully, it will also lead to better and more enjoyable use of Morse on the air.

Incidentally, experience with the Dutch language edition has shown that *Morsum Magnificat* is the only journal bought by amateurs that their wives actually enjoy reading as well! The cost is £6 a year for four issues. Just send me a cheque payable to *Morsum Magnificat*, or an SAE for further info to: 1 Tash Place, New Southgate, London N11 1PA.

# COMAX TELEREADER

A user review of the CD670  
by Ken Michaelson G3RDG

I recently wrote a user review of the Pocomtor AFR-2010 CW/RTTY all mode decoder for another publication. That unit might be considered to be the Rolls Royce of decoders and is priced accordingly. The Comax CD670 Telereader, manufactured by Proto Co Ltd of Japan, does not aim so high and the prices of it and its two associated units, the CD600 and the CD660, reflect this. It is not, however, a greatly inferior unit. I have been using it for the past month or so and have been very pleased with its operation.

A brief specification is as follows. As neither a block diagram or a circuit was supplied with the review unit, I can only tell you that there is a large PCB measuring approximately 165mm (6.5 inches) x 240mm (9.5 inches) on which there are 31 integrated circuits. This board also carries the power supply, with its associated voltage regulator on a heatsink, and the 1 amp fuse.

There is a second PCB on stand-offs at the left-hand front of the unit. This measures approximately 58mm (2.25 inches) x 70mm (2.75 inches) and has the EPROM containing the program on it together with one other IC. A third PCB contains the LCD display ICs, of which there are five.

The board measures approximately 178mm (7 inches) x 32mm (1.25 inches) and connection of the two boards to the motherboard is by plugs, sockets and ribbon cable.

The unit will copy CW, RTTY (5 unit Baudot code CCITT no 2) and AMTOR (SITOR CCIR 476), which includes FEC and seven unit ASCII (CCITT no 5). The

reception speeds are: CW - 4 to 30wpm; RTTY (Baudot) - 45.45, 50 and 74.2 bauds; AMTOR (SITOR) - 100 bauds; and ASCII - 110 and 300 bauds.

The input impedance is 470kohms but it will function with impedance values between 8K and 470K. It has a normal 'telegraph key' input. The audio frequency input for both CW and RTTY is variable, CW having a centre frequency of 800Hz which is adjustable between 700 and 900Hz, and RTTY being variable between 1275 and 2125Hz.

The unit gives several outputs for display. First of all, there is the 5 x 7 dot matrix liquid crystal display on the Telereader itself. This consists of two lines of 40 characters each. Then we have the video output. There are, in fact, three video outputs: a UHF demodulator at a frequency of 591.25MHz  $\pm$ 10MHz, a composite video signal with a horizontal sync frequency of 15.75kHz and a red/green/blue output with a horizontal sync frequency of the same value as the composite video.

In the case of the external CRT, the display is 40 characters x 17 lines x two pages. There is also a CW random generator for code practice. This sends the alphabet, numerals and punctuation marks at speeds between 4 and 30 words per minute, and I must confess that when I had a go at this facility my results were not all that good! There is also a Centronics compatible parallel printer interface built in. Finally, there is a keying output which switches up to 25 volts at a maximum of 60mA.

The unit requires 12 to 14 volts dc at 700mA and its dimensions are 260mm

(10.25 inches) wide x 75mm (3 inches) high x 185mm (7.5 inches) deep. It weighs 1.5kg (3.3lbs). The necessary cables and plugs were supplied with the unit, ie, a cable with 3.5mm plugs at each end to go from the receiver to the CD670, a length of co-ax with the special 8-pin DIN plug for the video take-off, and a length of twin flex with two unsoldered 3.5mm plugs to be used as required.

The CD670's case is entirely made of steel. The body is finished in dark grey/green, the paint being a type of matt crackle. The liquid crystal display opening is approximately 155mm (6.25 inches) wide x 17mm (0.75 inches) high. To the right of the switches are two LEDs (both red) for 'mark' and 'space' indication. Further to the right are two rotary controls. The left-hand one is labelled 'RTTY tone' and the right-hand one is labelled 'Monitor VR'. This controls the volume of the monitor oscillator.

There are seven different coloured push-buttons along the bottom of the front panel. From left to right, the first is 'power on/off' in red, then 'RTTY/CW' in white, followed by 'Mode' in grey, 'UOS/auto' in black (UOS meaning 'unshift on space'), 'speed' in blue, 'norm/rev' in light green and finally 'page' in dark green.

The operation of the power switch is obvious. Pressing the 'RTTY/CW' switch alternates between RTTY and Morse. When one is in the RTTY state, the word 'Baudot' appears on the lower line of the display, and 'UOS=off' is shown above the 'UOS/auto' switch in black. The words 'speed = 45B' are also shown (the 'speed' switch is a three-way one going through 45B, 50B and 75B and then back again to 45B). The last display in the Baudot mode is 'sense = norm'.

When the unit is switched on the four switches - 'RTTY/CW', 'mode', 'UOS/auto' and 'speed' - can all be altered to suit the operator's requirements. Thus, one press of the white switch will put you into the CW mode and a second press will bring you back into the RTTY mode. When in the CW mode, the third (grey) switch is inoperative. This is the 'mode' switch, which is a three-position switch giving 'Baudot', 'TOR' and 'ASCII' in sequence.

Having described the display when in the Baudot (RTTY) mode, the next press of the mode switch shows 'TOR' with 'UOS=off' or 'UOS =on' and 'sense





# COMAX CD670

```
563 LXMWNPFOX JUMPED OVEVHVVMXTG 123&567890 DE KRH51
TH QUICK BROWNFOX
PED OVUR THE LAZY DOG 1234567890 DE KRH51
THE QUICK BROWN FOX JOPED OVER THE LAZY DOG 123
567890 DE KRH51
THE QUICK BROWN FMJSTD OVER THE LAZY DOG 1234567890 DE KRH51
THE QUICK BROWN FOX JUMPED OVER THE LAZY DOG 1234567890 DE KRH51
THE QUICK BROWN FOX JUMPED OVER THE LAZY DOG 1234567890 DE KRH51
THE QUICK BROWN FOX JUMPED OVER THE LAZY DOG 1234567890 DE KRH51
THE QUICK BROWN FOX JUMPED OVER THE LAZY DOG 0234567890 DE KRH51
THE QUICK BROWN FOX JUMPED OVER THE LAZY DOG 1234567890 DE KRH51
```

Example of a RTTY printout at 75 bauds

```
NNNNN
ZCZC 120 29512
SIFIJWP EFKL 282100
AAXX 28214
02836 4-82 21805 10147 20104 40156 55001 81071=
02897 42782 43506 10188 20124 40179 53004 81470=
02911 42870 41905 10155 20134 40182 57001 81041=
02935 42984 12801 10152 20117 40185 53000 81040=
02963 42981 12304 10141 20113 40201 58001 80001=
02974 42982 10000 10155 20119 40198 50002 80001=
```

Example of a RTTY weather transmission

=norm' or 'sense=rev', according to what position these switches happen to be in. The third pressure brings up 'ASCII' with 'speed=75B', '110B' or '300B' again according to what position this three-way switch is set at. The last display in the 'ASCII' mode is 'sense=norm' or 'rev', controlled by the light green switch.

Another facility incorporated in this unit is code practice. Once in this mode the transmission speed can be increased by one word per minute up to 10 words per minute, and from then on by 2wpm to the limit of 30wpm. To return to normal decoding operation you have to switch the unit off and start again, when the display will show 'Baudot UOS=off, speed= 45B, sense= norm'.

I used this unit for about a month, and was very pleased with the results (apart from my copying of the Morse in the code practice mode!). Using the 'RTTY tone' control it was possible to tune a station at different positions of the dial; I could increase the audio tone to escape an interfering signal and then turn the 'RTTY tone' knob towards 'high' until the unit responded to the incoming signal.

The operation of the 'mark' and 'space' LEDs was excellent and made tuning a signal an easy matter. The reception of commercial stations transmitting Baudot at either 50 or 75 bauds was very easy. The only trouble was that there are a great many stations on the bands today transmitting something which sounds like the Baudot code no 2, the one we all know, but in fact isn't. There is Baudot CCITT no 2 with bit inversion, Baudot code no 1 variable and also with bit inversion, Baudot mode 32 and quite a number of others which sound just like our good old-fashioned RTTY.

So, actually finding a station was not so easy. However, I have the *Guide to Utility Stations*, published by Klingenfuss Publications, and this lists all sorts of RTTY and SITOR/Amtor stations with their frequencies. There is also a great number of stations which sound just like SITOR, but there are enough real SITOR stations over the HF bands to make it well worthwhile listening.

Personally, I found it easier on the eye to read the incoming signals on the monitor screen instead of the two line liquid crystal display on the unit. In order to see the LCD display clearly it was necessary to tilt the CD670 until the front panel was more or less vertical and the display area roughly at right angles to the eyes. Also, by having the signal shown on

```
NNNNNN
0'
(++++) A28R71
ON EMBAS UNSFC BYHDI M-1M
-ROGRD
ZA
```

```
POUL 49
LHADLI BENDJEDID RETURNS TO ALGIERS
ALGIERS, JULY 17 (APS) - PRESIDENT CHADLI BENDJEDID RETURNED HOME
YESTERDAY (WEDNESDAY) FROM BRUSSELS WHERE HE UNDERWENT A SUCCESSFUL
SURGERY. HE WILL CONTINUE HIS CONVALESCENCE IN ALGERIA.
ON HIS ARRIVAL BENDJEDID WAS WELCOMED BY POLITUBRO MEMBERS AND
SUPERIOR GOVERNMENT OFFICIALS. (END) RDB
```

1532

```
099) 54
ALGERIA - TUNISIA
TUNIS, JULY 17 (APS) - ALGERIAN TUNISIAN COOPERATION IN THE FIELD
OF INFORMATION WAS ON THE AGENDA OF THE 2ND SESSION OF THE MIXED
FOLLOW-UP COMMISSION WHICH OPENED HERE THIS MORNING. THE SESSION WAS
CHAired JOINTLY BY MOHAMMED CHERIFK ANANE AND FETHI HOUEIDI,
RESPECTIVELY DIRECTORS OF INFORMATION AT THE ALGERIAN AND TUNISIAN
INFORMATION MINISTRIES. (END) RDB
```

1533  
NNNNN

RTTY printout from APS Algeria, El Djaza'ir, 14932kHz

the monitor screen one had the advantage of having 17 lines (approximately 640 characters on each page) with two pages, either of which could be recalled by pressing the dark green 'page' switch.

Note that when you are using a monitor screen in the 'TOR' (SITOR/Amtor/FEC) mode and an FEC signal is detected, the word 'idle' will appear on the screen and as soon as data begins to be processed by the unit this will alter to 'TRAF'. This is also the case when receiving 'ARQ', except that one does not have the word 'idle' but only the word 'TRAF' when data is being received. The LCD display does not give this information because there are only two lines of display.

When receiving CW the telereader is fairly sophisticated when decoding the characters. For instance, the standard code length is one unit for a dot and three units for a dash. The CD670, however, will allow a deviation of between two and four units for a dash. This takes into account hand-sent Morse, so that there is a greater chance of perfect copy.

Also, the standard length for a word space is seven dots, but the CD670 assumes a word space when no code is received for two dot lengths and a space is provided equal to one character. Since the microprocessor in the unit is always calculating the average

```

R-----D_VL LH HVFUMCMNTTQLLLL 5H3ZO DJ31W
I0J0E G4XS V GRYAD SM6ASD GW4UMR DJ0CM G3WHO G4FIF
G3IUO I2VXJ PABRYG GW&30ZM G4XVF HB9CRE G3HKA
GM3DJT GM3SAE G4HNJ YV6BTM G6VS ECBAIJ G G3RDI3FWY G4AYB DH4NA
N EA3VF EA4BW G4-( 0-0K63(9GX 15GJK G4YZB HB9ACD
```

\*OUPECBAJ+ +?DEG2\*-FMGWD IAGPLX ON ETIUMT KHZ 2147 . MON 28 JUL

```
HELLO SEULIO
SORRY BOUT THE SHORT MESSAGE I HAD A POWER CUT..@PLEASE LET ME KNOW WHEN YOU ARE
COMING TO ENGLAND IT WOULD BE GREAT TO SEE YOU AGAIN..
ALSO WHEN DOES THE EW CALL START EABAIJ SO SO AS TO CALL YOU DETWBY THE CORRECT
TITLE..
73 FOR NOW DE BOB G4WWD
```

Example of Amtor

```
I UG K CO DE Y5Z Y5M Q5X 4G K CO DE Y5M Y5M Q5X 4G K E C_ DE Y5M Y_ Q__G K CO DE
Y5K Y5M Q5X 46EK CO DE Y5M Y5M Q5X 46K A CO DE KIM _5Z Q5X 4G K CO DE Y5M KIM Q
```

Example of CW transmission

# COMAX CD670

length from the preceding eight characters, the read-out is not upset by any variations in the sending.

An interesting point is that the display shows an underline if it receives any character that can't be decoded, and when it receives a 'BK' sent as one character it shows ". A similar action takes place when the 'AS' is sent. We then see '- ' on the display. The actual tone to which the unit is adjusted to receive CW is 800Hz, so that the receiver needs to be tuned to that audio frequency. As soon as this is done, the 'mark' LED flickers in sympathy with the incoming signal and the message is

decoded on the two-line LCD display (and either the TV/monitor and/or the printer, depending on which has been connected). One cannot, of course, use the 'page' facility with either the two-line display or the printer.

To conclude, in my opinion the CD670 gives value for money, a good choice of modes for reception and is simple to operate. It is well built and its operation uses up to the minute technology. The great number of interesting transmissions which can be decoded means that one can spend hours with a receiver and the unit just listening. In fact, I have hardly switched on my rig at all during

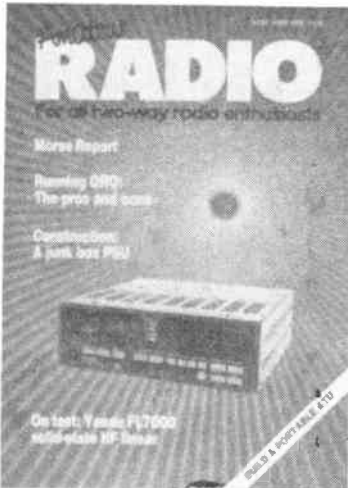
the time I have had this CD670 to review. There is always something to read.

Naturally, it is better if one has a general coverage receiver as this increases the number of stations one can resolve. I would recommend it to anyone thinking of extending their range of activities. You would be surprised at the way the bug of listening gets you!

The price of the CD670 is £286.73 including VAT, and carriage is extra at £7.00. Thanks are due to Lowe Electronics Ltd, Chesterfield Road, Matlock, Derbyshire DE3 5LE (tel: (0629) 2817/2430/4057/4995) for the loan of the unit.

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# PORTABLE ATU FOR 80m

by L B Uphill G3UCE

Planning a holiday recently to the West Country, and wishing to work/alternative on 80m with my FT7B, I had to seriously think about what ancillary gear it would be necessary to take, with consideration given to luggage limitations; the power supply was a must and left very little space for the station ATU.

The week before the holiday, tests were made with two 66ft lengths of wire, one length on the ground as a ¼-wave radial and the other into a tree as a ¼-wave aerial.

It was impossible to get the SWR lower than 5 to 1, even after shortening and lengthening the aerial. It was therefore decided to make a small preset ATU that could be used with any odd length of wire thrown out of a bedroom window. As it would be used in an upstairs room, a synthetic earth system had also to be devised.

A pi network was initially decided upon and used with 75ft of wire, as subsequent tests with shorter lengths had caused slight problems due to the minimum capacitance of 200pF of the 500pF mica compression trimmers used in place of conventional air spaced capacitors. A series circuit was found to tune any odd length of wire down to 12ft more easily with the particular coil used. Both circuits are given and can be tried with slight changes in the wiring (see Figure 1).

## Coil winding

The coil, 4in long by approximately 1½in diameter, cut from a length of plumbing pipe, was wound with a total of 45 turns of plastic covered wire (rating 3-5 amps), with room left at each end of the former for one trimmer. The R/S trimmers used had a ¼in screwed thread at the rear to hold them in position, and they were simply pushed into a ¼in hole drilled at each end of the coil, as shown in Figure 2.

Every fourth turn of the coil was tapped, and this was achieved by finding the length of wire needed to make 4 turns and adding an extra ½in. Each end was

then bared ¼in. Twelve similar lengths were then prepared and the ends of each length twisted together and soldered. The subsequent taps were then all in line when wound on the former, and made excellent connections with miniature crocodile clips. As an SWR meter was needed to tune the ATU it was decided to take a small Welz SP10X (4in x 2¼in) which was on hand.

The next problem was what to house the ATU in and, as a preference was felt for a plastic box, the kitchen cupboards were raided when the XYL was out. A sandwich box, 6¾in x 5in, proved rather large for the ATU alone, but nicely took the SWR meter as well, giving it complete protection from damage (Figure 3). A ¾in hole drilled in a suitable position in the box allowed the input connector of the power meter to stick through and connect to the PL259 co-ax lead to the transceiver.

## Earth system

The earth system, as essential as the aerial in an end-fed system, consisted of another tapped wound coil of 50 turns on 1½in former. Utilising this full inductance enables the radial earth wire to be a minimum of 16ft. A longer radial would need tapping down the coil to achieve ¼-wave resonance and a shorter radial would mean more turns on the coil. This radial wire was hung out of the window and down in to the garden, whilst the aerial wire went across to a nearby tree.

The earth radial was brought into resonance with a 6 volt 0.3 amp bulb in series. Across the bulb, in parallel, was a 5 watt 5 ohm resistor, necessary to stop the bulb from blowing a 50 to 100 watt transmitter, but not necessary in a 10 watt transmitter. The radial wire must be connected directly to the transmitter earth and not to the ATU, to avoid RF burns.

With the aerial and earth wires in position, tune up was fairly simple. I injected some RF until the SWR meter rested on *reflect*. At this stage the antenna tap should initially be about the

middle of the coil and the co-ax tap about the third. The trimmers were then adjusted alternately until a combination of trimmers and taps reduced the SWR to a low level. The bulb in the earth system should now glow slightly, according to how much RF is being fed in, and the earth tap adjusted for maximum brightness. Once resonance of the radial had been achieved, the bulb was shorted out. Final adjustments were then made to the ATU trimmers.

## Used in practice

In practice this worked very well, and a daily sked was maintained for two weeks with G3UEC, also on holiday in Norfolk.

Theoretically this ATU could be used on other bands, but limitations are caused by the 200pF minimum capacitance of the trimmers when fully unscrewed. They did, however, handle the 50 watts from the FT7B very well, and subsequent tests with a TS130S on 100 watts still showed no signs of breakdown. If the SWR meter was not needed, and it should be noted that maximum glow of the bulb does not necessarily indicate low SWR, then the ATU could be housed in a very small box.

Fig 3 ATU layout

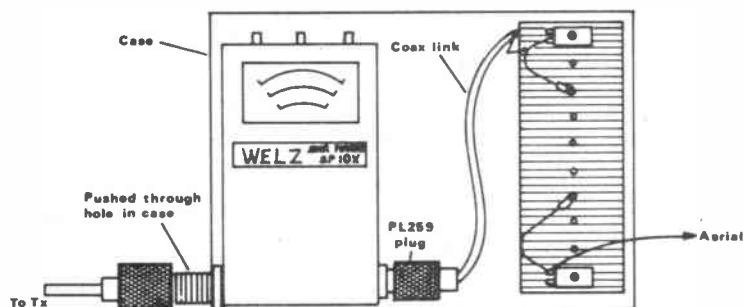


Fig 1a Pi network

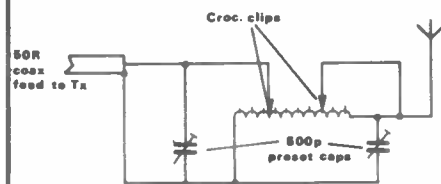


Fig 1b Series network

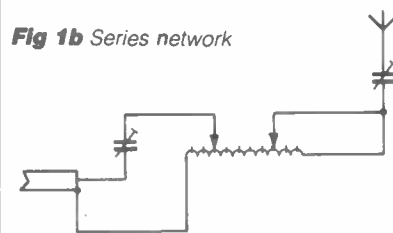


Fig 2 Coil construction

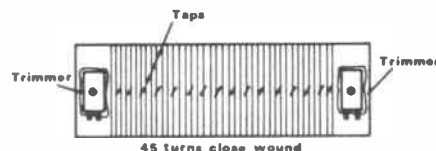
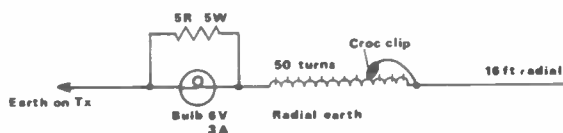


Fig 4 Earth system



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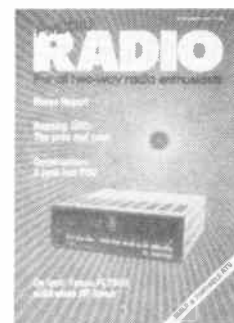
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# EXPERIMENT AND ACTION

## DAVID LAZELL RECALLS HOW RADIO ENTHUSIASTS HELPED TO MAKE HISTORY

Amateurs in Britain are an under-rated lot. They do not have streets named after them – nor, for that matter, bars of soap. Yet there's no doubt that when the pros and cons of the Great Human Experiment are weighed up (not a job any of us would want to do) those radio amateurs will come out shining. They will be as much a part of history as the Domesday Book and King Alfred burning his buns.

Few today recall that it was a radio amateur – Mr Gerald Marcuse – who initiated the Commonwealth short wave service undertaken by the BBC. In 1928, this gentleman asked for, and obtained, permission to broadcast on short wave to certain pink parts of the atlas then known as the British Empire.

The word 'broadcast' might be an ambitious choice for those early experiments, but Mr Marcuse's short wave work prompted the 'powers that be' to take up the idea. This led to a grand scheme of things known as Empire broadcasting on the short wave frequencies.

The debt today's radio users owe to early pioneers goes back further than that. Amateurs were around in 1906, some of them corresponding with Signor Marconi himself.

### RSGB beginnings

By 1913, there were enough radio enthusiasts in the metropolitan area to form the Wireless Society of London, and this organisation later became the Incorporated Radio Society of Great Britain.

Although the 1914-1918 war closed down amateur operations, short wave enthusiasts lost none of their hopes for world-wide friendship through short wave. Indeed, the traumas of the war prompted them to try even harder to build up international friendship.

Less affected by the European war, the American enthusiasts were keen to develop transatlantic links. Whilst Britain and the USA are sometimes said to

be divided by a common language (bearing in mind what slang can do to Shakespeare), the fact that we were both English speaking countries helped, for example, in exchange of correspondence about signal strength, etc, following Morse contact.

Last year was the sixtieth anniversary of that first, epoch-making contact between G2KF (Mr J Partridge), of Wimbledon in south-west London, and an amateur in Connecticut, USA. As Connecticut was the home of the legendary publicist and showman, Phineas T Barnum, the contact was most appropriate.

### Contact down under

A year later, in 1924, G2SZ (Mr G Goyder) of Mill Hill, London, made a two-way contact with New Zealand. Contact with the busy radio world down under was also symbolic, for it was the flight of an Australian aviator, Sir Charles Kingsford Smith ('Smithy'), that gave a further boost to amateur radio in Britain.

'Smithy' flew his famous aircraft, 'The Southern Cross', in a famous transatlantic flight in June 1930. He installed a short wave transmitter in the plane, and invited amateurs to tune in for his call sign, VMZAB. To put this monitoring on a well-organised basis, the Radio Society of Great Britain invited some two hundred of its members to join in the radio-watch, which proved very successful. Newspaper coverage helped to bring the concept of amateur radio to a wider audience, too.

Incidentally, during 1982 Dick Smith, Australia's best-known and probably busiest of all short wave radio distributors, celebrated another aviation anniversary, that of Jim Mollison's transatlantic flight. Dick used a Bell Jet Ranger helicopter for the world's first transatlantic flight in a rotary-wing aircraft, and subsequently flew on to Sydney. During his journey, Dick used a

Collins HF220 for normal HF communications – and also to make over one thousand contacts with amateur operators around the world!

### Antipodean contacts

British amateurs always had a lot of interest in Antipodean contacts. One amateur, G201 (Mr William Lucas), commented in a 1930's publication: 'I remember hooking up with an Australian amateur one day, who turned out to be a girl of eleven operating the station of her father – a superintendent of a fire station in Brisbane, Queensland.'

Mr Lucas, who could claim contacts with over two thousand American operators and three hundred Canadians in 1937, added 'I have been in touch with expeditions in the Polar regions and others exploring the Amazon, and at one time was instrumental in passing on a message for help to aid a stranded exploration party in Greenland.'

Radio amateurs thought of themselves as researchers and experimenters. It was still a hobby restricted to a small number of people, compared with the booming interest (if you will excuse the pun) it has today.

### Great potential

In the mid 1930s the number of amateurs world-wide was thought to be no more than fifty thousand, but Mr Lucas had no doubt of the potential: 'I can see the time when the busy businessman will be calling his office, from his car or train, by radio-telephone. I can speak to my home now from my car, providing I am within a radius of five miles, using a wavelength of five metres.'

It's odd to think that it has taken so many years to develop mobile radio communication, for executive use, to even today's limited availability.

The 1930s were halcyon years, long before governments had decided to allocate vast sums of money to the use of

radio waves for military purposes. That woodpecker somewhere in Asia was still no more than a gleam in an electronic culture's eye.

Becoming an amateur was not especially hard, but there was an element of 'freemasonry' about it, in the sense that personal initiative was a major factor in bringing promising young men into the hobby. Anyone over the age of sixteen could apply for an 'Artificial Aerial' (AA) licence, which cost a mere ten shillings (50p) per year.

Applicants had to answer a few technical questions on an application form, and give brief details of the 'radio experiments' they wished to pursue. Licences were issued by the GPO Engineer in Chief from his offices at Armour House in London. The licence allowed the successful applicant to install transmitting equipment as required to carry out the experiments indicated on the form. However, no radio signals were to be permitted beyond the environs of the licence holder's premises. You will see that the era of several hundred watt CB rigs was still only a nightmare, or teenage fantasy.

## G licence

The G licence, permitting a radiated signal, was the next step up the ladder and confirmed the successful applicant as an accredited hobbyist. It was granted only after successful completion of a Morse test, conducted by the GPO. Speed was perhaps modest, at twelve words a minute, but high standards were required. By the way, the test cost five bob (25p).

Various other criteria were applied by the GPO in granting a G licence, and the applicant had to detail the kind of radio

'experiments' he wished to undertake. Regulations required that the 'frequency of all transmissions will be controlled by a piezo-electric (quartz) crystal'. In looking through stacks of journals from that period, I have yet to find a single complaint about the waywardness or inefficiency of a radio ham. Quite a remarkable record, when you think of all those 'experiments'...

Although the experimental approach may have been a little over-emphasised, there's no doubt that amateurs had a lot of exploration on their hands. Indeed, this must explain the move downwards to 40 metres, then to 20 and 10 metres. Experiments confirmed that shorter wavelengths could be used for effective international communication.

The five metre band seems to have excited a lot of lively speculation, not least in the boy's stories of that period. Many of these yarns, though published in Britain, had an Australian background, the result perhaps of those historic short wave contacts.

Take, for example, the tales of Athol Price the detective, penned by a man called Arthur Russell. In his *Twenty Six Radio Stories for The Boy's Own Paper*, he made 'grateful acknowledgement of the kind assistance by Marconi's Wireless Telegraph Co Ltd with regard to the details of wireless apparatus' - so the tales were well-informed.

Some had to do with pirates who were either foiled by radio or otherwise conquered by bright lads who had passed their G licence test. Athol Price had the assistance of Bob Rankin, in true Sexton Blake and Tinker style.

## Detective story

In one of the stories, a criminal is detected on the five metre band: "Price changed his broadcast receiver for one of the short wave type. Here were stations innumerable. He changed his coils until he was able to tune down still lower, including a special device of his own invention. 'Five metres', he muttered. 'Not much chance of...'

"Then, from out of this void, came a gruff, raspy voice. The transmission of this lower wave was difficult. The words were badly modulated. But Detective Price was able to understand most of what was being said." (From *War In The Air*).

Another Australian epic by the same writer was set in desert island surroundings where a grey-haired hermit experimented with telegraphing along a beam of light using the 'Murray Code', a set of symbols arranged by a man named Murray (which seems logical, when you think of it).

Another tale involved a lad who picked up a coded message on six hundred metres, and deciphered it just in time to catch some crooks using it for foul purposes. Yet, among the straight stories, there were predictions - like the radio operated bomb, which has, alas, become so much a part of news bulletins in our time.

## SWL interest

Many of the 1930s hobbyists began with one-valve sets costing around £7 to £10, offering perhaps no more than two amateur bands. But whilst the serious amateur 'experimenters' were relatively small in number, the interest in short wave listening was far greater. Advertisements for multi-wave sets and special short wave receivers invited the consumer to tune into the world's four thousand stations.

This wealth of station sources prompted some people to actually log every station they could find, in the hope of taking in all the world's transmitters. Typical of the interest was the report, in a 1935 publication, referring to 'a 24-hour tour of the world'. This reported that, in July of that year, Mr R Lawton of Whitefield, Manchester, Secretary of the Manchester Chapter of the International Short Wave Club, was assisted by a fellow enthusiast in a round-the-clock (twenty-four hour) logging of short wave stations world-wide.

'The aerial we used is a very efficient indoor one,' Mr Lawton wrote, 'consisting of sixty feet of wire across the ceiling of an upstairs room in the form of the letter W, with a fifteen foot down-lead to the receiver, making seventy-five feet of wire in all. The earth is an ordinary copper tube. The receiver used was an eleven-valve Philco, which covers a range of 13.5 to 200 metres on the short wave band.'

In an astonishing and well-detailed tour, Mr Lawton picked up stations on all the continents, plus two ocean liners, the Bremen and the Majestic. He also spent some interesting moments with American police transmissions in several American states, plus a lighthouse off Buffalo, New York State. All of these were voice transmissions.

Mr Lawton wondered why interest in the short wave hobby was not more evident, considering that one could pick up all the continents in some two hours or so. Probably, the medium wave transmissions of the new commercial radio stations in Europe were tempting listeners to the soap operas and dance bands that are still recalled, on disc and on radio programmes, all these years later.

## Golden era

Amateurs were certainly keen to explore radio, in terms of techniques and how far they could reach. It was, I suppose, the golden era of do it yourself on short wave, though I am sure that today very many are happy to have access to the glistening technology of the 1980s.

Had I been born twenty years earlier, I might have been a member of the Radio Boys' Club, described by Arthur Russell in *The Boy's Own Paper* collection. They were experimenting with low-powered radio sets fitted on motor-cycles all those years ago - but they did have some problems with 'the etheric impulses of the transmitter'. Well, don't we all...?

In July this year Mr. R. LAWTON, of Whitefield, secretary of the Manchester Chapter of the International Short-Wave Club, with a friend, spent 24 hours without a break in logging the short-wave stations of the world. The results achieved are described below.

## A 24-HOUR TOUR OF THE WORLD

The aerial we used is a very efficient indoor one, consisting of 60 feet of wire across the ceiling of an upstairs room in the form of the letter 'W', with a 15-foot down-lead to the receiver, making 75 feet of wire in all. The earth is an ordinary copper tube. The receiver used was an eleven-valve Philco, which covers a range of 13.5 to 200 metres on the short wave band.

At exactly 9:30 p.m. we made a beginning on the 19-metre band, the first station heard being W8NK Pittsburgh. It was coming through quite well, and we stayed here half-an-hour. The only other stations receivable in that band at any reasonable strength were the German, and BBC, stations D J B and G S F; a very weak signal was heard from W2NE, Wayne, N.J.

Leaving 19 metres we moved on up towards the 25-metre band, staying for a few minutes on 22.38 metres to listen to the Canadian commercial station CG33 at Brammondville, which appeared to be carrying out some tests. On 25 metres the first station heard was the French F.Y.A., coming over at great strength, as was also DJJ Zeven. Then we found a station which at first appeared to me to be a stranger to this band, but turned out to be a Columbian station HJ4BA at Medellin, which soon faded out. W8NK had by now appeared on 25.27 metres, but conditions on this band were not as good as on 19-21 metres.

The time was now just midnight and we moved on towards 31 metres, staying for a few minutes with Madrid E.A.Q. on 30.43 metres. The 31-metre band proved very disappointing on this occasion, as the only good DX signal heard was W2NAE, Schenectady. We just heard PRF5 Rio de Janeiro closing down. European stations such as DJJ Zeven, GSC Daventry, and CTAA Lisbon were all coming over at reasonable strength. Moving further up the band, CG34 Brammondville was heard calling London GCB, and VY4 Maracaibo on 32.83 metres was working telephony with another Spanish-speaking station.

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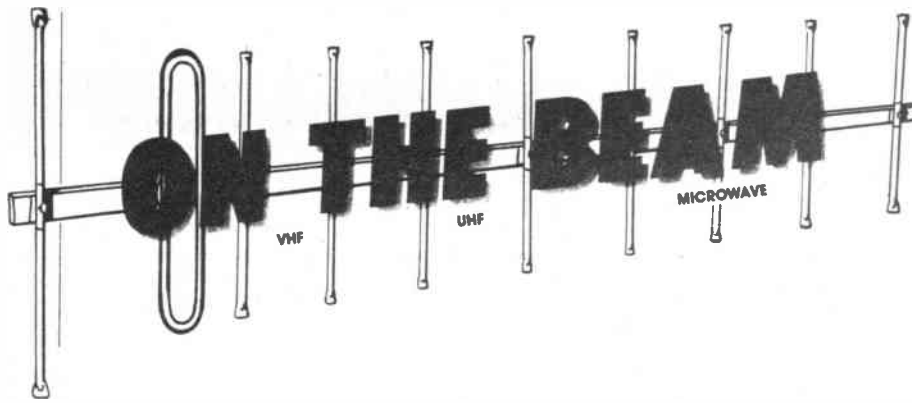
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## News and comment from Glen Ross G8MWR

Most of the amateur satellites seem to have the weirdest shapes, mainly described by words I cannot spell. How would you manage dodecahedron and how many faces has one of these got? One thing they all seem to have in common is that they do not get a lot of use.

Now we are being asked by AMSAT not to use Oscar 10 for the time being, due to the fact that they never did get the orbit parameters of this one right. It passes through the Van Allen radiation belt twice a day and this high level radiation has done no good at all to the built-in chips in the housekeeping circuits of the machine. The operating software has been rewritten to bypass the damaged area of memory, but it seems that as soon as they get it going again it suffers another body blow from Van Allen. AMSAT broadcasts will let you know when they eventually get it all sorted out.

### Successful launch

The new Japanese box is now flying around after a successful launch. This one is in a near circular orbit, similar to the Russian jobs and the earlier Oscar 7 and 8 units, and orbits in around two hours. The average length of time that the satellite is in view is about 15 minutes. This means that a fair amount of thrashing of the aerial system is necessary to track it as it goes across.

Do not be too worried if you cannot elevate the aerial to take advantage of the overhead passes. If you look at the geometry and the footprint you will realise that this is the condition that gives minimum distance coverage. The best ones are when the bird is just skating the horizon and then you can

'see' well round the corner, so to speak. These conditions are, of course, best met by a normal aerial system pointing at the horizon.

### The data

The input to the unit is between 145.9 and 146.0MHz, with the output between 435.9 and 435.8MHz and the sidebands being inverted to reduce Doppler shift. To clarify this, if you transmit using upper sideband you will hear your downlink signal coming back with lower sideband. There is a beacon signal running 100 milliwatts on 435.975MHz and a telemetry beacon running 1 watt of PSK on 435.91MHz.

There is also a digital transponder with input frequencies at 145.85, .87, .89 and .91MHz, but with only a single output at 435.91MHz running 1 watt and with a signal format of 1200 baud PSK. For those of you who like to keep track of these devices using a computer program it is hoped to give all the required data next month.

### Wallpaper

We have not had an update on the certificate front for some considerable time, so let us dig into the box and see what we come up with. If you thought that getting one of our awards was going to be difficult then take a look at the claims for Bronze awards for 144 and 432 submitted by G6LOH located near Banbury. The 70cm Bronze was obtained from a single one and a half hour period of operating and the two metre one took a little longer at three and a half hours. To add to the pleasure both awards were gained in a single twenty-four hour period! The best distance on two was to

DF8UK at 656km and on 70cm the work was done with G16ATZ at 421km. All of this was during the opening of 26/27 July.

Howard G6STI weighs in with a claim for two metre Gold, having achieved the distance part complete with YO2IS at 1644km during an early morning sporadic-E opening; he says he was barely awake at the time. G0CJL goes for two metre Silver with best contacts to LA8OJ and SP9FIH.

Dave Birch G6EJZ, from Trowbridge, claims a 144 Silver, his best DX being with OZ1BUK at a distance of 875km. He makes the point that these contacts were made using only 10 watts to a 10-element Yagi at 30 feet, the QTH being only around 150ft ASL. It proves that you do not need lots of power and a superb QTH to get results, although they do help.

### Even more

David Tanswell G6LAU gets a two metre Silver award, with his best DX being to EA1BLA at 1063km. Janice GM1KHV, from Insch, near Aberdeen, gets 144 Bronze, with the best contact being 500km to LA6OG. In the other direction contact has been made with OY9JD in the Faroe Islands: wouldn't most of us relish that one?

A family affair comes next with claims for 144 Silver awards for Chris and Jim G1FUT and G1FUU, both claiming SM7FJE at 917km as best DX. They also mention that daughter Carol G1OUT is well on the way to Bronze but that son Michael G1FUV is not very interested. It must be a real fight trying to get anywhere near the family rig when there is a lift on!

### Something special

G4NBS, located near Cambridge, goes for a 144 Gold, having already obtained his Gold on both 70 and 23cm. He asked if this would qualify him for a Platinum award and was probably delighted to find a special certificate endorsed 'First Platinum Award' enclosed with the Gold certificate. Tony brought up the question of whether the Shetlands would count as a separate country for the awards and, having considered it, the answer is yes to both Shetland and Orkney. They are so far away from most operators, including most of the Scots, that it seems a reasonable idea. If you have had a contact with these islands since 1 January 1985 then update your claim forms.

G8UYD comes in for a 144 Bronze with a best DX of 775km to GM8PNP. He mentions that all the requirements for squares, countries and most of the counties were met in one weekend of operating.

To round off the awards for this month we go to G4ASL in Surrey, who has obtained a 144MHz Silver using CW and SSB only. Another claim comes in from G6STI, this time for his 432 Bronze which was presented on one of the neatest computer generated forms I have yet seen. It included a printout of a map of Europe with the squares worked shown as crosshatching; very impressive. His best DX was with DL7QY at 793km. To finish we go to G1PEF, from Devizes, who





## ON THE BEAM

goes for the 144 Silver. His claim includes a contact with YU1LA at a distance of 1800km. If you would like details of these awards please send an SAE to the address at the end of the column. And remember: you do not need QSL cards to claim. If you cheat you only cheat yourself; you know if you really earned the award.

### Pave Paws

More news on the Pave Paws system, which is being installed at Fylingdales to replace the ageing 'golfballs' which have been a feature of the landscape for so many years and which could well give 70cm a nasty knock.

It appears that this will come into operation in 1990 and will cost £250 million. The Ministry of Defense is paying £25 million for the buildings and the other £225 million is the cost to the Americans of all the technical equipment to be installed there.

With that sort of expense guess who is going to be in command and how little regard is going to be taken of complaints about interference to our operating? Will the RSGB please tell us how they rate this threat and what action, if any, is being taken to minimise the problems. Perhaps we are worrying unduly about it and they could set the record straight. The problem is that, as usual, members are being kept in the dark.

### The Morse test

Heard on the air recently: 'Of course, the American novice exam is much harder than the RAE'. Really? The youngest American amateur that we know of is KA9VGW and she is just five years old. Another point to bear in mind is that it is impossible to get *any* licence in the States without taking a Morse test with a minimum speed of five words a minute.

However, you do not have to copy the text exactly as sent; you simply have to be able to give the sense of the message. If the sender gives 'Please move 5kHz higher' and you say he sent 'Please QSY up 5kHz' that does the trick. This is surely what the test should be about, simply understanding what is being sent, not proving that you are capable of receiving Morse accurately enough to take down five unit cypher code with no mistakes.

### Test centres

The RSGB Morse tests now seem to be getting into top gear in most areas, but have you tried getting an application form out of them? Several people have reported requesting a form up to three weeks before the test date and, despite repeated requests, have still not received one on the day they were hoping to take the test. There are also reports of very low pass rates (as few as

one person passing out of eight people taking the test if our informants are to be believed) which tend to make it look as though either the standard of applicants' Morse has fallen since the RSGB took over or that the previous testing authority was very generous in turning a slightly deaf ear to a few mistakes. I leave you to judge but, without doubt, the number of Class A licences issued has fallen to a trickle over the last few months.

### Horizontal

There is still a dedicated band of people using horizontally polarised FM on two metres, and I have been asked to remind you that if you want to have a try at this long distance mode you should listen around 144.65MHz in the all-mode section of the band.

This is, in fact, the old AM calling frequency but has been more or less taken over by the group. Why not give it a try from time to time?

### Close down

Do not forget that Shetland and Orkney now count as separate countries for our awards. Some suggestions have been put forward for 70 and 50MHz versions of the award and final requirements are being worked out.

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# SECONDHAND EQUIPMENT GUIDE

by Hugh Allison G3XSE

Four amateurs, none of whom had ever met before, were standing watching the gear arrive for the bring-and-buy stall at the Anglian Rally. One of the rally assistants heaved a Hewlett-Packard 608 signal generator onto the 'for sale' table.

'Anyone know anything about that? I'm looking for a decent signal generator', said one of the four.

'Yes', volunteered your know-all scribe, '10 to 480MHz in 5 bands, +7 to -125dBm, also calibrated half a volt to point one microvolts and dead stable. You could chuck it down a flight of stairs and it would still be on frequency'.

'I don't think I'd like to have carried it up the stairs in the first place', said amateur number three.

'I certainly wouldn't have liked to have met it coming down!' said the fourth.

## All the rage

The HP608 was all the rage in commercial labs up until about 5 years ago, and even now they can change hands on the professional market for £250. I have seen examples on the secondhand amateur market for £25 to £45, and if you have the room (they are big and heavy) you will be buying yourself a good bit of kit that will probably last a lifetime. The attenuator dial, as mentioned above, is calibrated in millivolts and dBm. This is a useful conversion chart in its own right.

Various versions were made, designated by a letter after the 608, which will do FM, have an internal 1MHz marker or will do pulse work, for example. All the variants that I have come across have AM (400Hz and 1kHz) built in, plus a percentage modulation depth meter. It is not generally realised that the RF output meter needle *must* line up with the thin red line on its face for the other mod depth meter to be accurate.

Although built to last, I have come across the odd one with a mechanical fault. Your scribe is not over gifted with nuts, bolts, caps etc, and if you are like me then ignore examples of the HP608 where the tune and attenuator dials are not as smooth as silk. The band change mechanism should also be positive, although they always require a fair bit of effort to get round. The companion to the 608 was the 606, which covered down from 10MHz, another good but heavy buy for about the same price. For an inexplicable reason there are quite a few 606s about, uncased, for £15.

## The Anglian Rally

This was at a new, bigger venue this year, with very good road signs, well spaced stalls and excellent catering. The

bad news was that there was no car boot sale area. The reason for this is that the local authority for the area has, apparently, a fixed attitude on the holding of car boot sales on any of its property, and that attitude is £250! As one of the organisers sadly informed me, he doubted if he could get 25 cars to shell out a tenner each so they had reluctantly dropped it. Shame!

## Japanese transistors

Quite a few years ago I mentioned in this column that most transistors in your average Jap wonderbox will not have 2S printed on them. Thus your novice repairer can spend some time trying to get data for a C1234 when it is, in fact, a 2SC1234. Your scribe recently ended up with egg on his face on a similar problem. I'd bought a Wood and Douglas 70cm pre-amp from a bloke on the flea market tables at Woburn. The pre-amp was said to be working but subsequent examination showed its RF device to be short circuited in all directions (if the seller involved is reading this, I hope you feel ashamed).

The problem was that the said device only had 219 written on it, and I did not know if the pre-amp was FET, GaAsFET or bipolar. After trying a few data books, I rang up Wood and Douglas and was told it was an NE219 (ordinary bipolar). Apparently a lot of the teeny weeny RF front-end and/or mixer devices that only have three numbers printed on them are NE types. Armed with this information, it was easy to repair the pre-amp, which then worked very well. Thanks must go to Wood and Douglas for excellent technical after sales back-up!

## AVOs again

I'm in danger of turning this column into an agony aunt page devoted to dodgy AVOs. The latest problem is the 15 volt battery, used on the higher ohms range. The aggro is that when the battery expires (unable to zero movement on said range) the hapless owner trots along to a photographic shop or similar with dead battery in hand and, as often as not, comes away with a different 15V battery to the one he wanted, having been told that the proper one is no longer obtainable. The new battery, however, doesn't have the rivet in each end. It is the hole in the rivet that holds in the battery and, although the AVO *will* work, every time it is put down the new battery will fall out of its contacts. I've come across some marvellous creations stuffed in the battery compartment to try and hold the wrong battery in!

However, all this is unnecessary anyway, since Ever Ready do still make the correct battery, it's just stocked under a new part number. This is BLR121 and most decent photographic shops can get one on order, with only a few days wait, if it's not in stock. Don't be tempted to take what they have and try and make do; it's not worth the effort.

## TS830S ALC problems

I have not had hands on experience of the following fault, but three people have told me about it so I will pass it on. The problem starts with incorrect indications on the meter when switched to ALC level and tuning up. If left to deteriorate (the standard amateur ploy), distortion and/or splatter results, often accompanied by the meter moving sharply up and down rather than showing gentle increases of PA drive. The meter appears to have a faulty movement on Tx, yet is OK on Rx. The solution is simply a new driver valve.

## Alinco ELH-230D

I've had a couple of Alinco ELH-230D linear pre-amps come my way for repair that are microphonic on receive. Often hanging on the end of 290s, these pre-amp/linears will actually give out what they are supposed to, ie 30W out for 3 in, and the switchable pre-amp isn't too noisy - unless microphonic. The first one that came my way was dealt with in the normal manner for an intermittent problem, ie fight your way through to the underside of the board and check for dry joints, etc. The trouble was, the soldering and general workmanship was superb. It took quite a while for it to dawn on me, after careful tapping about on the board with the blunt end of a Biro, that the cradle relays were the culprit.

I've come across intermittency on this type of relay before in video recorders, and quite often the tiniest amount of liquid (not spray) contact cleaner will do the trick, carefully removing any excess with a tissue. Stubborn cases will often respond to a bit of card through the contacts, although one I have just finished repairing had all the contacts too close together, so that it made its transmit and receive contacts at the same time. It was gently prized apart and this cured the aggro. Although I have not come across it myself, I understand that intermittency on transmit can come from the same source. A clue to this is the linear taking the right sort of current on transmit but not delivering the goods (ie watts) up the aerial, or only producing the 3 watts or so drive back out.

## SECONDHAND

### FDK Multi-2000

If someone offered you a two metre multimode that was working (and reliable) and capable of mains or 12V operation for about £100, you would probably think the seller was a loony. If the rig in question was a Multi-2000 then he has, surprisingly, got the price about right (I've seen one sell at £75, two at £90 and one at £120 this year). The receiver is all right sensitivity wise, obviously not in the super league but acceptable for a twelve-year-old design, and the transmitter seems clean enough. Reliability seems OK; the few that have come my way to be repaired have all had random faults on them, and probably the only performance failing that could be levelled at them is a slightly poor in-band strong signal blocking tendency. However, this is to be expected with a design of this vintage.

### Synthesizer problems

Why, then, the poor secondhand value? The problem is the synthesizer. A 200 channel phased locked oscillator (ie 10kHz steps up the 2MHz wide band) is controlled by three rotary switches, so to get to, say, 145.225 you have to crank round three knobs, then, assuming you were on an even channel (say 145.550), you have to then crank round a VXO control which is, inconveniently, in another row of knobs. Tuning the band is

thus a real pain. As one owner put it to me, QSYing is like trying to undo a combination lock every time. If you are really hard up then this is a rig to consider. You would get a lot of machinery for your money but the ergonomics are wrong. The price new, by the way, was £230 plus VAT in early 1974.

### Belcom LA106

I've had a couple of enquiries over the past few months about the above linear. Quite a few people seem dubious about them since they were designed to hang on the end of a Liner Two, and I can share their concern, but this amplifier is a superb bit of kit, given the price that they change hands at nowadays. Sold, when new, as a 240V powered 10W drive for 200 watts input, ie about 120 watts out, these boxes have always come out clean when I've had a nose around them with a spectrum analyser. One big plus in my book is that they also shove out a regulated 13 volts at 2.5 amps to run the driving rig, and I can vouch for their compatibility with a Trio TR9000, since my home two metre set-up is now a TR9000 into LA106, when required.

### Only SSB?

One reader was under the impression, incidentally, that the linear was only for SSB at the bottom of the band. This is not so. It is usable all over the band on all

modes. The receiver pre-amp gives 10dB of gain and a couple of readers have commented on the increase in sensitivity this has given them when ahead of a FT290. The 290 is not really man enough to drive the linear to full output but, of course, you are in no danger of flat topping (expect about 40 watts out).

### Fairly reliable

I've repaired only a few of these linears, all random faults, so I consider them reliable, and never yet have I replaced a PA bottle, so no trouble there. The handbooks (at least, all those that have come my way) are all in Japanese, although the circuit diagram is easy enough to follow. One other minor drawback is switching the linear on. They make a bit of a funny noise, a cross between a bang and an arc over as the mains switch is thrown, which can be really disconcerting at first. Take it from me, however, that this horrible noise, common on most and extremely loud on my own, is nothing to worry about; it is only the transformer laminations.

Price wise, when new in 1975 it sold at £165 plus VAT. Nowadays, expect to pay about a ton, £120 is absolute tops. Well worth thinking about, not as pokey as a Nag (though cheaper) and easier to use at home than, say, a BNOS or MM box if you haven't got the amps available at 12 volts.

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## FOR SALE

■ Sony ICF 2001 plus power supply, £100. Buyer collects or carriage extra. Call evenings or weekends 01-886 9363, Ivor (North London)

■ Two Yaesu FRG7700s, mint, boxed, manuals, £200 ono. One Trio 1000, mint, boxed, manual, £200 ono. One Trio 600, mint, boxed, manual, £150 ono. One Panasonic RF3100L, mint, boxed, manual, £110 ono. One MM2001, RTTY converter, mint, boxed, manual, £110. One Zenith VDU, mint, boxed, manual, £45 ono. Young, 345 Leasowe Road, Moreton, Wirral, Merseyside L46 2RE. Tel: (051) 638 6153

■ Ham International Concorde 2, extra 40 channels to total 160. In very good condition. Also Zetagi B70 amplifier. Also Zetagi B150. All ready for conversion to 28MHz. Price £130.00 together. Tel: Garsington 475 (Oxford)

■ Get going on RTTY the quiet way! As new Colour Genie for sale, complete with interface, RTTY, CW and other ham radio software, all leads and full instructions - bargain at £75, plus postage. Plenty of suitable software for Genie obtainable from UK source. Also for sale, new uncased Digivision green monitor, complete with 12V dc power unit - ideal for building into computer console or RTTY readout. £35 plus postage. Contact Nev Kirk, 54 Allendale Rd, Rotherham, Tel: Wickersley 541606

■ 3kW Kubota generator in new condition. 12V, 120V, 240V outputs. Has only run for 30hrs. Due to a succession of time wasters is now offered at £395. Their lost deposits are your gain. Tel: (0905) 620041 anytime and speak to Charles

■ SX-200 scanning monitor/receiver 26MHz to 180MHz VHF including a converter for 96MHz to 108MHz UHF, 380MHz to 514MHz UHF, vgc, £150 ono. Derrick Culey, 10 Heath View, Ford, Liverpool L21 0HA. Tel: (051) 928 6498

■ Valves: EL84s, ECC83s, EF86s, 50p each. EF50s, £1. EF37As, £1. 6P25s, £1. 1625s, £1. 807s, £1. KT88s, £2. QQV06-40, £2. QQV03-20, £2. TT21, £3. Several colour TV valves, new, boxed. QV04-7s, £2. QQV02-6, £2. EL37s, £2. EL35s, £2. EL34s, £2. E88CCs, £1. At £1 each: 6S57M, 65K7M, 6J5M, 12SH7M, 12SJ7M, 12SK7M, 12SA7M, 12H6M, 12A6M. Alloy series DK/DLs, etc. PG Robins G8BSK, 290 Priory Road, St Denys, Southampton SO21LS.

■ Icom IC490E 70cm multimode, 12 months old, £400. Icom IC290D 2m multimode, 11 months old, £350. Tono 4M70G 70cm linear, 12 months old, £120. Tono 2M90G 2m linear, 12 months old, £120. Icom SM8 desk mike, 2 line switchable, £50. Jaybeam PBM18 70cm beam, £20. MET 144-8T 2m beam, £15. Tel: Cliff (0634) 711438, Kent

■ Clearout: NATO 2000 multimode Tx/Rx, Protel AM601 compressor, stand, mike, combined PWR/SWR frequency counter, 13.8V PSU, 3 element beam, 26-30MHz, £180 ono. Dave. Tel: Seahouses 720273

■ Swan 500 HF rig, 80m to 10m with matching mains supply unit, mic and handbook, £190. FT790 mint condition, £250. MML 432/20, £45. Brand new 4CX250 plus two bases, £20. EHT transf 2000, 1500, 0 1500, 2000, very heavy, £15. Would exchange any above for QRP gear or test gear, eg good counter, etc. G0EWN. Tel: Sheffield 381781

■ Mouth watering American surplus in new condition. One radio set control type C1335 for Collins TRC-32. Green wrinkle 19in rack job, very heavy, buyer must collect, £20. Also two type IM-81/UP standing wave indicators with large meters, in grey wrinkle cases - very posh. £10 each plus postage. Also Bounton Radio Company glide path signal generator, type 232-A. Lovely job covering 300MHz area, £20. Buyer collects. Write Nev Kirk G3JDK, 54 Allendale Rd, Rotherham or Tel: Wickersley 541606

■ Valves. Boxed unused. 6K7GT, 6Q7GT, 6SA7GT, 6SQ7GT, 6SJ7GT. 12V types also. 50L6, 25L6, many

other octals. 6L7, 6F7, 6A7. SAE for lists please. Wanted AR88D. Also output tmmr for same. Have some valve sets for sale. Domestic types Ekco ac set 1935. Bakelite Philco, etc. No fancy prices. All valves ok or replace. Have sold over 1000 no complaints. A E Jeffrey, 42 Dennis Rd, Padstow, Cornwall PL 28 8DF

■ R1132A, R1392D, R1481, ex-RAF, all unmodified collectors' items. Also Minimitter TXM 160 to 10m AM, FM, CW, and AR88. Both were working ok. Ex-army DST100 d/s/HET 1450kHz to 30MHz rare collectors item, tatty but working, offers. Buyer collects. Tel: (0304) 367676

■ Have Zetagi B300P broadband HF solid-state linear amp, variable power output, six stage, 400W PEP max, 25dB pre-amp, input power 1-10W AM, 1-20W SSB. New 24.7.86. Also Zetagi C350 freq counter, six digit 0-350MHz 13.8V dc. Exchange for 2m hand-held or VHF, UHF scanner or part exchange for 2m multimode - FT290R, IC290D etc. Cash adjust either way. WHY? No phone. Details to: 03 SB, PO Box 18, Clacton on Sea, Essex

■ SEM tranzmatch, used once, surplus to requirements, £65. Sony ICF7600D, also surplus, £108. All as new, packing, manuals, etc. Tel: (0386) 832233

■ Trio TS120V with 500Hz filter, TL120 linear, with manuals, £375. BNOS 30A power supply, £100. Datong FL2 audio filter, £65. Daiwa CNA1001 auto ATU, £65. Or complete station, £575. A Treanor, 6 Upton Drive, Peakeith, Warrington WA5 2BZ. Tel: (0925) 52 2403

■ Eddystone 770R receiver 19-165MHz, £75. Trio 9R-59D general coverage. Trio JR500S amateur bands, manuals, Codar 70A, £35 the three. Or swap with cash for Commodore computer or WHY? Tel: Lymington (0590) 76603

■ Standard C58, CMB8 mobile mount bracket, as new NEC 1986, boxed with manual and all fittings used 2 months only, for £20.00 inc P&P within UK. Ian G6ZXN. Tel: (0380) 830383 after 6pm

■ Box of valves for AR88D, RCA, radio receiver. £10 plus postage. No telephone so write H Howard, 31 Westbourne Gardens, Folkestone, Kent CT20 2HY. All letters answered.

■ Heathkit SB104A, good condition, working order, no power unit (12V), includes matching speaker, £85. Tel: 01-697 8436, after 6pm

■ 10 metre multimode, USB, LSB, AM, FM, CW. Professionally converted, covers 27-6012 to 29-700, works well, £110. Tel: (0553) 760614 (Norfolk)

■ One Yaesu FRG7700 Rx without memory and Yaesu FRA7700 active antenna, £250.00. Also one Heathkit SW717 Rx, £45.00. One SR9 2 metre Rx, £30.00. Wood, 'Sylvania', Enzie, Duckie, Banffshire, Scotland AOS 20N. Tel: Clochan 378

■ Icom 751 plus extras, 7 months old, cost £1,460, o/a £1,000. NRD525, extra SSB filter, 8 weeks old, cost £1,200, o/a £850. MMS2, cost £169, offers £110. Trio CD10, cost £119, offers £80. AD370, cost £64, offers £45. Hansen FS603M, cost £62, offers £40. All items mint. Muirhead M100M g/c receiver, digital readout, 10kHz to 30MHz, all modes, vgc, offers. Tel: Dronfield 413413

■ TS520S, late model in mint condition, with original packing and manual, £320. TR7010, 144MHz SSB, never used mobile, vgc, also with original packing and manual, £90. IC202S modified with muTek RF stage and double balanced mixer, £140. Mirage B1016 160W amplifier for 144MHz, £110. Microwave Modules 144/28MHz converter, £8. Free with HF rig. Sensible offers invited on all above. Tel: (0256) 27220 evenings before 10pm or weekends (Basingstoke)

■ Have Yaesu FT1012D Mk III, cooling fan, FM/AM board fitted, absolutely mint condition, complete with KW107 super match with 1kW dummy load, built-in SWR meter, £595 or very near offer. Tel: Alf on Epping 75129

■ FAX, RTTY, CW computer decoder for C64, assembled and tested, £35. Program on disc or

tape, £10. Printout version, £5. J H Kocka, PO Box 1297, Parramatta 2150, Australia NSW

■ Trio TS530SP, new and still under Lowe's guarantee, unmarked, mint, boxed with small manual and passport, £600. SP230 spkr, new, boxed, £35. MC50 desk mic, also new and boxed, £30, or £650 the lot. G4MH mini beam with rotor, 20/15/10m, up one winter, £70. 10m FM, 29.3-29.700 in 40ch, c/w mic and diag, 5 pos antenna switch, N-type, gold-plated connectors, £30. G0CZU. Tel: (0946) 67599

■ Yaesu FRG7700 Rx without memory, plus Yaesu FRA active antenna, £250. Also Heathkit SW717 Rx, £45. Wood, 'Sylvania', Enzie, Buckie, Banffshire, Scotland AB5 2BN

■ Heathkit GR110 eight channel scanner (VHF), xtaled for S8 and 14-720, c/w manual and power lead, £25 ono. Maxcom 20E CB tncvr, converted for portable use, £25 ono. M/M 432MHz to 28MHz convtr, c/w instructions, £25 ono. Slim Jim ant, c/w instructions, £3. Plus any tips or books wanted for SWL hobby. Tel: (0392) 31941, ask for Ricky

■ JVC portable video system consisting HRC3 compact VHS recorder, including charger, mains PSU, standard VHS adaptor cassette, GXN5E low light colour camera with X6 power zoom, electronic viewfinder plus built-in caption generator. All in perfect working order, little used, immaculate condition, includes manuals, leads, original packing, £740. Dave G8MGD QTHR. Tel: Tewkesbury 294082 evenings/weekends

■ FRG7700 Rx, one owner, little used, £250. G2HJV, QTHR. Tel: Leamington Spa 25395

■ TS430S transceiver, fitted YK88SN SSB filter and FM430 units, very good condition, £600. Microwave Modules MMT144/28 transverter to match above, £65. Work well together on 2 metres, both units together, £655. Service manual for HF rig free. Would exchange all for good TS830S. Terry G4OXD. Tel: (0462) 35248 after 6pm

■ Yaesu FT480R 2m multimode tcvr, as new, boxed, £265. Tel: 01-961 6800 after 6pm

■ Trio complete base station set-up, comprising TR9130 2 mtr multimode transceiver with memory back-up, base plinth and phone plug. Matching SP120 speaker unit, the lot mint cond, £400. Buyer will collect, any trial at QTH. Tel: (0246) 410409, 9-5pm weekdays

■ 934MHz Reftec, plus base/mobile collinear, H100 co-ax plugs. Can be seen working, prefer buyer collects, £195. 165 metres hard drawn copper antenna wire, never been used, still in packet, £6 plus £1.50 p&p. Surface mounted relays by Omron, types MK3P 230V ac and others at MK2P ac 230V and dc 24V, all with holders. Relays, small with holders 600Ω and 700Ω, all 8 pin, £1 each, post paid. Tel: (0704) 892088 afternoon or evening, ask for Mike

■ Strumech Versatower, 13M20, standard series, model BP40, £350. Tel: (0772) 313860. If no reply tel: (0704) 892088, afternoon or evening, ask for Mike

■ Pan International Rx, 145kHz-30MHz, 30MHz-50MHz, 66MHz-86MHz, 88MHz-136MHz, 144MHz-176MHz VHF, 430MHz-470MHz UHF, good condition, £85 ono. Tel: Elgin 45478

■ TAU systems SPC3000 3kW ATU, with conversion for 10 metres, £240 or swap for a Drake MN2700 ATU. Tel: Rodney on Farnborough, Kent 58825

■ Trio R600, £210 ovo. Tel: Gateforth 8113

■ Realistic DX302 digital frequency readout communications receiver, £175 plus postage. Harvard H407 CB base station, legal, £50. Legal FM mobile CB, Colt 295 (a bit knocked about), £17.50. FDK Rx 40 receiver, 141-179MHz, synthesized 2, 5 and 7kHz steps, £80. Spectrum 48K various games, £1.25 each. Various rock LPs: Deep Purple, Hendrix, Uriah Heep, Thin Lizzy, £1.50 each. Double albums £2 each. Mike, 14 Doverfield Road, Brixton, London SW2 5NB. Tel: 01-674 0513

■ Yaesu FT209RH 2m FM hand-held, 5W/5W

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output, Tx/Rx 144-148MHz, programmable keypad, ten memories, built-in VOX, 6 months old, with case. Offers around £225. Also selling Global 1000 ATU, mint condition, offers? Tel: 01-845 4008 (Ruislip)

■ BC348R in good condition inside and out, £35. Apply A H Baker, 34 Wenny Estate, Chatteris, Cambs PE16 6BA

■ TS530S spkr mic, l/p filter, h/book, BC221 freq meter charts, SEM Z-match ATU plus 2kW h/b ATU, 1.8MHz h/b ATU, Trio 9R59DS Rx plus spkr, Toko hi mound key, SWR bridge, all leads etc for above plus box of junk, £600 ono. Prefer buyer inspect and collect, move forces sale. Tel: Peter. (0642) 456327 days.

■ Global AT1000 SWL antenna coupler, £20 plus post. Tonna 9 ele 144MHz antenna, used but in good condition, £10. Tonna 19 ele 432MHz antenna, new and unused, £16. Tel: (0926) 498388

■ Pye PF70 transceivers, Pocket phones, speaker mikes, aeriels, batts, £20 each. Rotator AR40, good cond, fault in cont box, £50. Tel: (061) 653 7525

■ Datong SRB2 'Wood Pecker' blanker unit, £60 ono. Jaybeam D15/23 23cm Yagi, brand new, £42. Yaesu SSB masthead, 2 metre pre-amp, £90. VHF comms/UKW, 2 metre, horiz/vert/circular phasing unit, £40. Yaesu YD148 mic (new), £38 ono. Tel: Paul G4XHF (0293) 515201

■ Lowe SRX30 general coverage receiver, with digital frequency readout, very accurate, £80 or nearest offer. Buyer collects. Tel: Sunderland 496528 evenings

■ Sommerkamp FT290 144-148MHz multimode. m4Tek fe and auto toneburst professionally fitted. Nicads, charger, all leads, mobile mount, carry case, helical antenna, not 'tweaked'. MM 30 watt linear (144/30LS), unused. All vgc and in gwo. Would exchange for best offer in 934MHz system (sorry no Reftec), or best and realistic offer. Tel: (04675) 339 or write: Gordon Adams, Staff Cottages, House of Daviot, Inverurie, Aberdeenshire AB5 0JE

■ NATO 2000, perfect, checked by Rodger D, £120. Tel: (0283) 221870

■ Polaroid Polavision instant movie outfit, c/w zoom lens movie camera, replay monitor in new condition, still in original maker's box. Offers or swap for GC HF vert ant with radials or consider any HF gear, WHY? Age not too important if in gwo. First come first served, NW London area if poss. Buyer collects. Tel: 01-906 4206, G0CIG not QTHR

■ Good home wanted for Corsor 1049 MkII dual beam oscilloscope (fault on channel 1). Any offers? Delivery in London or South East considered. Tel: 01-961 0780

■ AR2002 VHF/UHF scanning Rx, almost new, boxed, £385 or would exchange Realistic DX400 HF/Rx plus £200 cash adjustment. Buyer collects. Tel: Blackpool 27406 anytime

■ Four Siemens T100 75 baud teleprinters. Three bank keyboard complete with tape reperf, auto and 80V transformer. Serviced regularly. What offers for one or all of these great old machines? Tel: Vic Ashlee 01-300 7183

■ Yaesu FT101ZD (non-WARC), perfect, inc hand mic, £400. Drake MN7 160-10m ATU plus pwr/SWR meter and ant switching unit, £95. Yaesu FT208R 2m hand-held plus homebrew charger, £150. May p/ex for VHF/UHF scanner. Tel: Milton Keynes (0908) 310623

■ Trio TR2600E 2m Fm tcvr, DCS system, soft case, straps, battery case, includes 6 x AA nicads, £200. Dave GM4UGF, QTHR. Tel: (0382) 65205

■ Yaesu FT757GX with Tx mod, £850. FT707 PSU, £100. FC707 ATU, £100. Or £900 the lot. Mint condition. Tel: (078) 41217

■ Tristar 777 CB transceiver, CW, SSB, upper, lower, AM, FM, double superhet, low, middle, high band. Coarse, fine tuning, owner's manual, instruction manual, 12V dc (new crystals required for 10m conversion), £75. Alan Edwards, 32 Heldhaw Road, Bury St Edmunds, Suffolk IP32 7ES. Tel: (0284) 60984

■ Books for sale: Bennett College Correspondence Course text books, well illustrated with photos of ship and shore equipment of the late '10s-early '20s, 2 large vols, £10 p&p £2. 1938 Admiralty Handbooks, vols 1 and 2, £8 p&p £1.50. Elementary Principles of W/T by Bangay, Part 2 (1922), £2 p&p 50p. Short Wave Wireless Communication by Ladner & Stoner (1946), £3 p&p £1.

Ultra and Extreme Short Wave Reception by Strutt (1947), £3 p&p £1. World Radio Television Handbook (1979), £2 p&p 50p. Surplus Schematics Handbook by CQ, covers more than 80 items of WW2 surplus, £3 p&p £1. Surplus Conversion Manuals, vols 2 and 3, covers most popular items of American surplus, £4 p&p £1. Copies of manuals: Rascal RA117, £8 p&p £1. Eddystone 770u, £4 p&p 50p. Tel: (0823) 75776, 6-7pm

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■ TV, JVC 5 inch 3040, DX405 plus 625 lines, £65 ovno. Philips portable 12 inch 405 plus 625 lines, £65 ovno. Tel: (0283) 221870

■ 1986 call books, USA and DX, £10 each plus postage. Mr M J Faulkner, 35 Abbey Way, Farnborough, Hants GU14 7DD. Tel: (0252) 548561

■ Complete receiver station: Trio R600, Global AT1000 ATU, brand new Microwave Modules 144MHz converter and G5RV antenna. All in original packing and are in mint condition, sell for £240. Tony, Sunnyside, New Road, Coedpoeth, Wrexham, Clwyd, N Wales. Tel: (0978) 757435

■ Hi-mound manipulator squeeze paddle key on offer for £15 inc post, 1st class. A Skaiife. Tel: (0949) 20771 ext 361 or 362, weekdays 9.00am to 4.30pm only. No evening calls please

■ FT200 and ac PSU. Also SWR meter up to 2kW output. Transceiver aligned and revalved late 1985, little used since, all for £150. 24m RG58c/u 50 ohm co-ax included. Buyer collect. *Amateur Radio* mags, including numbers one, two and three, offers please. Field, 38 Victory Road, Whiteshill, Stroud, Glos GL6 6BD

■ Yaesu FP12, 12 amp PSU, SMC Oscar 2 10 FM, BNOS 12 amp PSU c/w amp meter. Datong PC1 HF upconverter. Listen to HF bands on VHF Rx Calscope Super 6 osc, home built 2m and 70cm transceivers, FM only. FT ONE crystal filters: CW (M) XF 8.9KC, CW (M) XF 10.7KC, CW (N) XF 8.9KCN. FT107/901 filter: AM XF 8.96A. Andy G4MYS. Tel: Southampton (0703) 782545

■ Icom IC751, £850. 200m new UR57, £50. 100m new UR67, £30. All carriage extra. G3FPD QTHR. Tel: (0403) 723205

■ Altron AQ6/20/3E mini beam. 6m to 20m, as new, used one week only. Permission granted for full-size beam, so must sell, £95 ono. Andy G0CCX QTHR. Tel: (0273) 516517

■ Trio TS515 and PSU, £200. Trio 2200GX, 11 channels fitted, £100. Lincr 2, £120. 15W 2 metre mobile amp, £15. Datong RF speech clipper, £25. HQ1 HF 2 ele mini beam, £50. AR40 rotator, £25. Labgear low pass ant filter, £5. Offers considered. Watson, 5 Sandalwood Road, Loughborough, Leics LE11 3PR. Tel: (0509) 266316

■ Marconi xtal calibrator, MoD TF1374, 240V, perfect working condx, £15. 150 yds UR57 co-ax, £50. USA Harmonium by Cornish Co, big and heavy but works OK, £100. Marconi WW2 Rx, ex-RAF bombers, MoD AD94, 150kHz to 18MHz, film dial, working, clean order, £55. Gas fire, Sunbeam, £10. Want 19 inch rack, with doors and castors, 5ft high, to take Rascal gear. Tel: (0908) 314095

■ Yaesu FT726R c/w 2m, 70cm, full duplex satellite

units. Mint condition. Boxed and with manual, £925. BL40X 80/40m trap dipole, £20. G4IOF. Tel: 01-722 7040

■ Radio shack clearance. Communication valves at quarter list price, most boxed: QV06-40A, QV02-6, QV03-12, QV03-20A, GR10M, G180/2M, G1/371K, 866A, 829, 931A, CV187, CV136, CV138, CV1076, CV1219, CV1178, A2599, A2900, A2426, DET22, 807 etc. Valves for most ex-WD Rxs: W/S19, W/S18, W/S21/22, T/R29, R103, R109, R107, R209, R210, R1155, R1132, C12 etc. Valves also for Eddystone Rxs from 345 to 770s, Marconi, Rascal, Redifon receiver valves available. State requirements, hundreds of types. Hill/Shaw, 86A High Street, Poole, Dorset BH15 1DB. Tel: Poole 680500 or 622051

■ FT790R multimode 70cm trans, good condition, with nicads and 5 element MET antenna, £240 ono. Tel: Halifax 54395 after 6pm

■ Thorn EMI oscilloscope type WM16, with wide-band amp, type 7/1, and differential amp, type 7/6. Large all valve oscilloscope. Any offers, swap WHY? Tel: Buxton (0298) 71834, ask for Nigel

■ TS820 matching SP820 spare PAs, £420. HQ-7 mini beam, £80. SEM transmatch, 160m-10m, £70. Tel: (08894) 78981

■ Yaesu FT290R, nicads, charger, PSU, 2 x ½ wave collinear, AR40 rotator, 9 element Tonna yagi, various poles and brackets, £275 ono. Also Vic 20, data recorder, RTTY software and interface, offers. Tel: (0926) 55391 after 6pm

■ Thandar TF200 freq counter plus TP600 pre-scaler and case, service manual and XI-XIO probe, all new, £150 plus post, the lot. Oscilloscope pro probe with all adaptors fitted, BNC still sealed in box, £10. Lots of b/new Pro software for TRS80 model 100 lap computer. Cost £30 to £150 each, sell £10 each. Hewlett Packard HP22 program calculator with charger and copy of instructions book, £25. All plus post. Tel: (0473) 85526 any time

■ 70cm hand-held Trio, TR3500, for sale or swap for 2 metre equivalent. As new condition, realistic offers. John Lowe, 23 Hoylake Drive, Tividale, Warley, West Midlands. Tel: Dudley 58549

■ Reftec 934MHz transceiver, original type, £125. Les Wallen 934MHz collinear aerial, £25. Postage extra. Ring me or my answering machine if interested! Tel: (0604) 844130

■ Marconi R1155 receiver, full working order, complete with spare set of valves and instruction manual, £65. J Button, 2 Duncan Road, Gillingham, Kent MF7 4EE

■ QRO! The ultimate 70cms linear: Tempo 2004A, hand-built by Henry Radio in the USA. Cruises at 400W but will produce lots more where legal. In new condition and complete with handbook, £1,150. TS430S with CW and AM filters, plus FM. In good condition and with original packing, £850 ovno. Tel: (0905) 620041 and speak to Charles.

■ Icom 745 SM6, £750. Mini quad, 10, 15, 20 metres, new, £110. All boxed. Dean Hall, 39 Manor Fields, Milford, Surrey GU8 5EQ. Tel: Wormley 3017

■ Rascal RA17L comm Rx, first class condition, £145. Icom IC2E hand-held 2m Tx with ext s/mic plus car batt adaptor, £140. Handic 0020 scanner, 66MHz to 470MHz, £175. Sharp car r/cass with Dolby, plus two quality shelf mount speakers, £75. Tel: Dennis 01-785 7314, evenings only

■ Yaesu FT290R, as new, boxed, complete with nicads, charger, soft carry case, £250 ono. Tel: (021) 3731754 (Birmingham)

■ AOR2002, £350. FT290, scratched case but elec perfect, suit new licensee, £85. Pye Cambridge 4m rig, AM/FM Rx, 2 ch fitted, £40. muTek 70MHz pre-amp, £20. Eddystone 770R, 20-165MHz Rx, £90. Buyers collect or carriage extra. Tel: (0734) 732393

■ Scope, Hitachi V152F 15MHz dual trace, 2 probes, carry cover, £175. Tel: (031) 668 3451 after 6pm

■ Icom IC751E, mike, ICPS20 power supply/speaker, RC10 frequency controller, FL70 wide filter, EX310 voice synthesiser, £1,195. Icom 2KL 500W HF all-band linear, plus IC2KLP5 attendant power supply, £1,200. Icom ICAT500 HF automatic all-band 500W ATU, £375. All boxed and immaculate. G4IOF.

Tel: 01-722 7040

■ R132/A receiver, one valve missing, otherwise working, plus power supply, also LW, MW, SW receiver, working, £40 the lot or will split. Tel: (061) 941 4021

# FREE CLASSIFIED ADS

■ MMT432/28S 70cm transverter, c/w plugs. Brand new, £125 ono. Also MML144/100LS linear amplifier, 1-3W input, mint condition, £100. Prefer buyer inspects and collects, but will forward if so desired, or deliver if in reasonable distance. Tel: (0684) 296769

■ Kenwood TS520SE HF, SSB/CW tcvr, plus external VFO and MC50 mike. Spare PA and driver valves, all in excellent condx, £385. Carriage extra. Bob, G4IXL QTHR. Tel: 01-200 6117

■ Super Star 2000, four blocks of 50 channels, covers 25.965 to 28.005MHz, no gaps, pristine condition, uses PTB12SA4X and PTZZ080A0X boards, easily converted to 10m or 6m, £175 ono. Tel: (0934) 511604 (Weston Super Mare), after 5.00pm

■ CB transceiver Super Star 360. All mode circuit sheet, new & boxed, £100. Or with ham master mic, £120 cash only. Communications receiver, electronic digital automatic search, 16 memory keyboard, clock, 150.70MHz - 8.75 - 108MHz. Cash only. Tel: 01-207 2326 or 207 0706

■ Sommerkamp FF790R transceiver, £240. Includes charger and mobile mount. Alinco 70cm linear amp, £40. Breml 5A power supply, £10. Channel master rotator, £35. Polar Electronics 2m linear pre-amp, £250. Enquiries Tel: Buxton 71874

■ Yaesu FR50B. Good condition, spare valves, manual, £90. HF Rx, ideal for newcomers. Tel: Lincoln (0522) 751856

■ Realistic DX400 scanning comm Rx, USB, LSB, AM, FM, mint condition, £165. Global 1000 ATU, mint condition, cost £60, £35. Trio 9R-59DS comm Rx, excellent condition, £90. Sanyo amp 25x25, new, unused, £40. JVC cassette deck, gwo £20. Sound air 083, eight channel scanning, VHF, FM, crystal controlled four channels fitted, FM 108-88, 2mtr calling channel fitted, marine and aircraft. Ex wo, £45. David Sommerford, 37 Collingwood Close, Peacehaven, Sussex BN9 8BG. Tel: 81095 eves w/ends

■ Exchange 7inch - 6inch inflatable yacht tender, complete with LJs, oars, etc, and 2HP Suzuki OB engine. All as new. Worth £250 for good HF rig, cash adjustment if required. Tel: Kidderminster (0562) 67026, any time

■ Pye FM Cambridge, boot mount in good condition. Fitted auto toneburst and crystallised on 6 channels, plus some info, £55. Decca 22 inch colour TV good picture and gwo, £45. Pyq U450 70cm Tx and Rx, Rx on RB4, Tx not crystallised. Both clean and gwo and manual. £25 the pair. 2m wavemeter, covers 2nd harmonic, £10. 8 inch disc drive, for spares or repair, £10. Windsor oscilloscope, works but trace a bit dull £10. Delivery possible within reason. Tel: (0778) 423433, Bourne, Lincs

■ Shack clearance of valves for:- R1155 ATO N, R107, R103 WS19, WS18, R208, all Eddystone receiver to 77U, all Racal to RA217s etc. WS22, WS29, AR77 & 88, all Marconi to 1970s, all ex-WD ex-RAF & RN radios. Valves for most transmitters and civilian radios. All half any list price. Ex American service equipment valves no problem. Mr Shaw, 86A High Street, Poole, Dorset BH15 1DB. Tel: Poole 680500 & 622051, ask for Mr Hill

■ Breml BRL200 mains linear, £45 ono. Tel: North Chapel (042878) 450 (West Sussex)

■ 24 domestic radios, some wood, some plastic cases. Swap for Racal RA17 receiver or cash offer. Tel: Brown, Horringer 441

■ Scanners: have thousands of interesting frequency allocations, also many scanner and radio mods plus all sorts of big circuits. For a list of what I've got send sae to PO Box 71, Bournemouth BH9 1PT

■ Complete collection of *Breaker*, mag offers. Tel: 01 831 0648 (daytime) and ask for Mike

■ TV, 6inch Vega mono, UHF, VHF, ideal for continental DX, £55. Tel: (0283) 221870, 8pm - 9pm

■ 2m SSB rig Totsuro TR2100M with muTek pre-amp, £100. SEM multifer, £30. Jaybeam D5/2m, £20. Richard G4TGJ. Tel: Potters Bar 51449 between 13th December and 10th January, or write QTHR

■ 2m NDI HC1400. Transceiver, 5 = 25 watts, mobile fixing bracket, £125 ono. Or p/exch for scanner plus cash. Mr L Fisher, 116 Claude, Plaistow, London E13. Tel: 01-472 9056 after 5.30pm

■ Icom 240 2m FM mobile transceiver, manual, PSU for base use, £60. Tel: St Albans (0727) 63726

■ SPC-300D aerial tuning unit by Cap Co Electronics. Handling capability 1KW, £170. Buyer collects. Confidential Frequency book by Oliver P Ferrell, 6th edition, £8 + 50p postage, including RTTY stations. 165ft+ hard drawn copper ant wire, still in packet, £7, postage £1. 'Wafer' fans 100V, 12/10W, 50/60Hz, mounted in die-cast alloy frame size 3½ inches x 3½ inches, £1.25 each, post paid. Mike. Tel: (0704) 892088

■ 60 ISW listener cards, multi-coloured with free ISWL emblem, stamped envelopes and 50 Currie SWL cards, £13.75 post paid. No time-wasters please on this listener card sale.

■ FDK700E, 2m FM 0-25W, variable control c/w mounting bracket and h/book, £140. Belcom LS102 10m CW/AM, FM/USB, 100Hz/1kHz steps, manual and auto scan on Yaesu MH1B8 mike, batt memory back-up with built in charge up system. Covers from 26-30m, output 10W, c/w mobile bracket, h/book and box also fitted, MM 144MHz conv for 2m listening, £210 ono. Wanted F VFO and F ATU. Brian Dixon G1UWV, Terridene Park Road, New Milton, Hants. Tel: (0425) 615860, after 5.30pm evenings

■ Yaesu FT290, nicads, charger, case, Tokyo hi-power linear, all with manufacturer's warranty, unused. Trio TR9000 complete base station incorporatory system base B09, PS20 PSU. Microwave Modules 40 watt linear, pristine condition, offers invited. Genuine reason for sale. Tel: (021) 449 7178

■ Yaesu FT726+2m board, 18 months old, v good condition, boxed, very little use on Tx. Best offer. Richard G6RPD, 390 Selbourne Road, Luton, Beds LV4 8NU. Tel: (0582) 599873

■ Yaesu FT One transceiver, all filters fitted, non-volatile memory, FM board, desk and hand microphones, £650. Scarab Systems terminal unit, £35. ICS MBA-TOR cartridge for C-64, £40. Fincher, 27 Albert Street, Tring HP23 6AX. Tel: Tring 6752

■ Wranger AR3300 26-30MHz AM, FM, SSB, CW. Amateur radio 5 memory channel, full scan, digital freq readout. Split freq operation, £365, as new. Zetagi TM 1000, £40 ono, unused. ZX Spectrum 128K with software. Any offers. Tel: (0298) 71834, Derbyshire

■ Yaesu FT480R 2 metre transceiver FM, SSB, CW, perfect working order, complete with mounting bracket, hand mic and desk mic, £275. Buyer collects or pays postage. (Hants area). Tel: (0428) 713248

■ DNT40 FM tcvr. Converted 10m FM. Not home-brew. Unmarked, vgc, £45 ono. Max, Retreat, Helham Green, Wareside, Ware, Herts SG12 7RE. Tel: (0920) 3564

■ Satellite receiver, cost £12K, ex-NASA, £250 ono. All aluminium, 3-4GHz, horn antenna, £7.50 carriage paid. Kenwood/Trio JR-310 Rx, APR-4Y receiver has S-meter, variable IF speaker/phones, pan, video outputs with circuits etc, £45. Aircraft band receiver, £100. 2C394 valve, £10. Bob Wright, 249 Sandy Lane, Hindley, Wigan. Tel: 55948

■ Trio R600 general coverage receiver in mint condition, comes boxed and with full instructions. Also KX3 Sky Coupler ATU with full Japanese instruction hi hi. Both items at bargain price of £320 ono. For the discerning SWL or an extra shack Rx, a very good buy. Tel: (0436) 5489

■ Cobra 148 GTL DX 11m, would convert, mint £100. M/m transverter 144 28R, 12 months old, £190. Tel: (0244) 534424

## WANTED

■ 2m multimode, have Super Star 2000, four blocks of 50, 25 to 28MHz for exchange must be good working order. Tel: (0934) 511604, after 5.00pm

■ MZ700 computer, as new, with software, built-in recorder. Exchange for AR88D receivers, must be in good condition. Tel: (0298) 77007

■ Shimizu five band HF rig, recently aligned and analysed. All modes and FM boards. Immaculate, straight swap for FT7 or CW only rig, etc. Tel: (0909) 566724 to view/discuss. Kevin Fox, 14 Plantation Avenue, North Anston, Sheffield S31 7DA. G4MDQ. Tel: (0909) 566724

■ Cheap 70cm TV Tx, anything considered, even non working. Collection possible. Tel: (0778) 423433, Bourne, Lincs

■ Software and hardware for Atari computer, RTTY transceiver, log, Morse Tx / Rx, Amtor etc. Mr

RJ Mortimer G1UPW, Shepperton Marina, Felix Lane, Shepperton, Middx TW17 8NJ

■ Video sync processor, design as published in British Amateur TV Club (BATC) *CQ TV* magazine No 129. Ready constructed and in full working order. Would also be interested in a commercially produced video sync processor. Details to: Mr DJ Oliver, 100 May Lane, Kings Heath, B'ham B14 4AG

■ HF rig FT107, FT101ZD or similar, Richard G4TGJ, Potters Bar, QTHR. Tel: (0707) 51449 between 13 Dec and 10 Jan

■ Eddystone EC10 Mark 2 receiver in perfect condition and tip-top working order. No faults. With Cat No 924 ac PSU if possible, with manual. Trio TL120 solid-state linear amp and PS30 PSU 20 amp 13.8V with cables, plugs and manuals. Also want manual or service sheet, circuit etc for Eddystone EB36 receiver. For sale: Home-made Crystal set, large coil. N Richardson, 2 Edna Road, Maidstone, Kent ME14 2QJ. Tel: (0622) 685443 evenings.

■ Sommerkamp 788DX 30-40 amp PSU. Any 707 accessories or SPC300 or 3000 ATU. Will exchange 48K ZX Spectrum, microdrive, interface one, cable, box and couple of cassettes plus B/W TV monitor 12in. Also have Plustro TVRDC TV rad music centre portable, will exchange all items if offered a good deal or split. Also have KW107 super match ATU plus KW227 ATU. Intelligent offers requested thanks. G4XPP QTHR

■ Exchange ATV station MM MTV 435 Tx, ATV conv Rx, RCA 2000 camera, 16mm lens, KGM 12 inch monitor and handbooks. For 70cm multimode Tx/Rx. Tel: Johnstone 24930

■ Newly licensed and I require a two metre rig. Something like Trio 700G, Yaesu FT221 or FDX Multi 2700 Mk11. Must have manual and in working order. Price etc to G1UWC C Burt, 339 Budshead Road, Whiteleigh, Plymouth PL5 4DY.

■ Exchange Sharp portable short wave receiver, 1.6MHz to 26.5MHz, battery or power unit, AFC BFO. Wanted Eddystone EC10 or similar. HC Bach, 52 Tudor Close, Belsize Avenue, London NW3. Tel: 01-794 9790

■ *RadComm* April '78 and March '81. *Short Wave Magazine* September and October '81. Also *Practical Wireless* containing the series of articles by Mr PD Rouse on the FRG7, commenced August '84. Also any other info on mods for the FRG7. All costs, P&P etc. Details to: Mr SJ Bishop, 22 John Street, Brightlingsea, Essex CO7 0NA

■ Heathkit SB-10U and VF-1U. Tel: Basildon (0268) 282373 after 6am.

■ Yaesu FC757AT auto ATU must be in prime cond. No rubbish, good price paid but don't go mad. I'm unemployed and money is short. Top price I can afford is about £120 to £150. I also have a Toshiba KT-4056 stereo Walkman, with EQ digital tuning and auto reverse which could be included in this deal. Tel: 01-637 5393, Terry, say you're personal caller.

■ 16mm GSAP Bell & Howell gun cameras, 24V, working, 50ft Kodak mag load. Made 1942/3 for use in aircraft. Black crackle finish. Also N9 American surplus cine cameras. Other 16mm cine required, WHY. Tel: Bath 706795 (0225)

■ Yaesu FC707, tuner, also FP707, PSU, both must be in good condition and working. Tel: 01-359 2276 (North London), evenings, after 6pm

■ Meccano spare parts, books, mags, etc. Any quantity, good price paid. Tel: Cyril, Ingrebourne (04023) 45969

■ Quality general coverage digital receiver required. Will consider up to half original cost. Offers to John Welsh. Tel: Maldon (0621) 54547 (Essex)

■ Daiwa Search Nine 2 metre receiver, good condition, fair price. Jim, Southport. Tel: (0704) 63746

■ Yaesu 780R 70cm transceiver, also Yaesu SCI station console. Tel: 01-764 6767, evenings. Chas

■ Still need Heathkit alignment generator, model HFW-1. Fully working with crystal fitted and sweep circuit components in good order. Manual and any correction sheets also if available with it. Manual, service sheet for original metal cased all system Sinclair microvision. How do you get the case off, my one won't budge? Want to avoid using force. Some ceramic valve holders for 6C6 version of HRO Rx, also screen cans and top caps with National logo, or defunct Rx to strip for spares. All

## FREE CLASSIFIED ADS

letters answered. M Shephard, 66 Westerland Avenue, Canvey Island, Essex SS8 8JS

■ Radio receiver R1155 XWD, prefer working but small amount of work not objected to. Also any power supply - 110 volt or 220-240 volt. Tel: 01-272 9275 (London)

■ Secondhand Trio R1000 or R2000, must be in mint condition. Good price offered. Tel: Elgin 45478

■ 144MHz portable Tx/Rx, IC202 or similar. Also 200MHz DFM. R Daly, 12 Stoney Lane, Newbury, Berks RG13 2NH

■ 10, 15, 20m G4MH mini beam and 2 metre beam. Also wanted: any details on any video tapes on ham radio for club. Workshop manuals for Heathkit 302 Rx and Datong auto notch filter. 7 St Olaf's Road, Stratton, Nr Bude, Cornwall EX23 9AF

■ Pye model M78F personal portable battery receiver. This set has the Pye rising sun emblem and is required for purely nostalgic reasons. Fair price paid for set in good condition. Please contact: Stan G3XON, 14 Dagden Road, Shalford, Guildford, Surrey GU4 8DD. Tel: Guildford (0483) 38953

■ Postcard (or any published photograph) showing the Marconi station at Alum Bay, IOW, between 1897 and 1900. There must be one! Books: Vol I of *Faraday's Experimental Researches in Electricity and SOS* by Karl Baarslag, pub Methuen 1937. Also seeking any Meccano crystal set hardware. G3KSU, Alan Williams, 11 Grange Avenue, Ryde, IOW PO33 3LS. Tel: (0983) 65551

■ Copy of Raynet manual, any edition, and copy of radio data reference book, any edn. VHF/UHF manual, any edn and all RSGB publications. Will pay postage etc. Any condition. Please contact Hudson, 29 Prioress Road, Canterbury, Kent CT2 8NX. Tel: (0227) 458464

■ Will exchange Sony 7800 non-digital in very good condition, for a Vega Selena 215. Also exchange Grundig Satellit 1400SL for FRG7 or 9R59DE. Les Taylor, 1 Cadley Close, Blandford Forum, Dorset DT11 7RY. Tel: (0258) 53933

■ Discone antenna 50MHz-500MHz, in good

working order, for disabled SWL. Revcone or similar. Tel: Ray (0476) 86047

■ FT707 transceiver, prepared to pay good price for unit in absolutely mint condition. Must be late model. D Chapman, 'Ferrytrees', Fleet Lane, Twynning, Tewkesbury, Glos GL20 8DG. Tel: (0684) 296769

■ Working or not working WKS1001, Midland 7001, Superstar 2000 or similar multimode or FM required for conversion to 10 metres. CB tcvrs (not hand-held type). J H Lepper G3JHL, Turlington, Salisbury Road, Shootash, Nr Romsey, Hants SO51 0GA. Tel: (0794) 512283

■ FRG7 wanted, West Midlands preferred. Farley Aldridge. Tel: (0922) 52110, 9.00am to 4.30pm, Mon-Fri

■ Bright emitter 2 volt valve for personal museum. Filament must be intact with pip top of glass reaction condenser, .0002 dielectric by Jackson Bros. Johnson G1SGO, 31 Edward Avenue, Jacksdale, Notts NG16 5LB

■ Icom 720A, HF linear, FL2100Z etc, HF beam tribander, slim mast, Altron etc, rotator, SEM transmatch, or Trio AT230 tuner, SM220 monitor scope, CW filters for Trio trcvr, pair of 813 valves, Trio 830S. Tel: (0740) 20100, South Durham

■ Ham International Jumbo base station or similar type of multimode CB base station, in good working order. Must have all frequencies incl LSB, USB, AM, FM and CW. I am prepared to pay your price (max £130) if satisfactory. HP terms can be arranged. Advertiser severely disabled and permanently unemployed. Dealer enquiry invited. All letters answered. Mr R Guiney, 134 South Seton Park, Port Seton, East Lothian, Scotland EH32 0BN

■ Sony TV511UK and Sony KV9000UB. Also an MK1024 electronic keyer. Must be in excellent condition. Tel: (0206) 394336 (Essex)

■ Wanted urgently for spares: dead R107 Rx, must be complete, very cheap. Please write to: Mr A Hawkins, 111B Parkers Square, Southgate, Run-corn, Cheshire WA7 2SG

■ G4MH mini beam, also FL2 and rotator. Does anyone know where we can get any video tapes

and cassette tapes on ham radio, for our club? Seaward, St Olaf's Road, Stratton, Nr Bude, Cornwall EX23 9HF

■ WW2 German or Resistance radio. Also nav radar equipment from German Wehrmacht, parts, books, etc, for display or repair. AR77 receiver. Offer British WS19, WS38, WS22 for swap. Also Collins S1JY with 3 mechanical filters available. Will collect. OZ8RO. R Otterstad, Vejdammen 5, DK 2840, Holte, Denmark. Tel: (010 452) 801875

■ 2 mtr hand-held in exchange for a 1984 Suzuki RM motorcross bike, which is registered for the road. W Hind, 4 Stuart Close, Kember Hill, Blackhall, Cleveland. Tel: Peterlee 862123

■ Shimizu SS105S HF transceiver. Cash waiting for good example. Tel: Brian (051) 6255781

■ Yaesu accessories YO901P, FC107 ATU, FTV transverter, FT7B, YC7B, Icom 271, Icom 471, TET 3 ele mini beam or WHY? Have lots of gear to swap, sell, p/ex or haggle. SAE for list. For sale: Yaesu FT980 plus options. Martyn Bolt, 112 Leeds Road, Mirfield, West Yorks WF14 0JE. Tel: (0924) 495918

■ Hand-held crystal scanners, anything considered. Pete. Tel: (0932) 67569

■ Comm produced or ready constructed video sync processor, tech details, illustrations. This unit is required to reduce jitter/picture roll in the hobby of DXTV. Mr D J Oliver, 100 May Lane, Kings Heath, Birmingham B14 4AG

■ R1155 receiver, either one, in good condition or suitable for spares. Also accessories for R1155-T1154 installation, Jones plugs, J switch, crew amp, loop antenna etc. Also set of screw-on front panel labels for R1155 receiver. Cash purchase or would consider swap for mint B40D ex-Admiralty HF receiver. Tel: (0380) 830428 (Wilts)

■ Portable HF, for example Yaesu FT757GX, marine mobile, MF/HF. Will consider any mobile model. D V Smith, 7 Clos Gors Fawr, Grovesend, Gorseinon, Swansea SA4 2GZ

■ Kenwood TS130S, preferably with AT130 and PS30. Will pay reasonable price for low mileage model in good condition. Tel: Milton Keynes (0908) 76984

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## Amateur RADIO

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 WIND RESISTANCE:-75 MPH  
 GAIN:- 2.5 dB  
 FREQ:- 28-30MHz

**£27.82**

## NEVADA TC58 5/8 WAVE

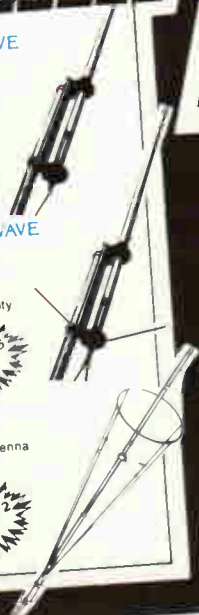
Using high grade aluminum and a low loss coil complete with small radiators this antenna is our most popular amongst the 29MHz fraternity  
 POWER:- 1KW  
 GAIN:- 35 dB  
 FREQ:- 28-30MHz  
 LENGTH:- 66 METRS

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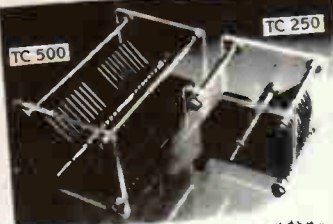
CTE MOD 737 50W FM AM/SSB/CW £44.76  
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 SUPPLY:- 13.8V DC  
 FREQ:- 26-30 MHz

Can be centred on 29.6 MHz or 28.5 MHz (state which) A new top quality amp which now features harmonic filter to reduce harmonic O/P

**£23.75**

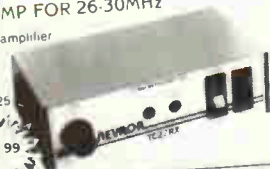


## NEVADA TC27 RX

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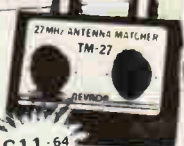
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