

# HAM

AN ARGUS SPECIALIST PUBLICATION

JUNE 1988 £1.30

# HAM RADIO TODAY

**CARRY ON CODING**  
Build our one-chip morse  
generator project

**NEW KENWOOD**  
**TH-25E 2M PORTABLE**  
**ON TEST**



## THE JUMBO HAS LANDED!

First UK review of Yaesu's exciting new FT-747 economy HF rig

**FREE! INSIDE THIS ISSUE 24-page SATELLITE TV SUPPLEMENT**



## RAYCOM gives you MORE PURCHASING POWER!

FOR FAST SERVICE PHONE IN YOUR ORDER WITH ANY MAJOR CREDIT CARD OR IN MOST CASES WE CAN OFFER YOU INSTANT CREDIT OF UP TO £1,000.00 (SUBJECT TO STATUS). RAYCOM ARE LICENSED CREDIT BROKERS. APR 29.8%, SUBJECT TO VARIATION. FREE CREDIT ON CERTAIN PRODUCTS AT LIST PRICES, 50% DEPOSIT AND SIX MONTHLY PAYMENTS. PLEASE TELEPHONE FOR MORE DETAILS AND APPLICATION FORMS.

**NEW HELPLINE 0836 282228 (until 9pm Daily)**

THROUGH YOUR CONTINUOUS AND VALUED CUSTOM, RAY WITHERS COMMUNICATIONS LTD. HAS MOVED AND EXPANDED TO ENABLE US TO OFFER YOU EVEN BETTER SERVICE AND PRICES - STILL WITH THE RAYCOM GUARANTEE, BEST EQUIPMENT, BEST SERVICE, BEST PRICES, BEST BACK-UP, AND PLENTY OF PARKING FACILITIES AND EASIER TO GET TO! WE NOW BOAST THE BEST CENTRAL FACILITIES IN THE COUNTRY, WHY NOT POP ALONG AND SEE THE LATEST TRANSCEIVERS, SHORTWAVE/SCANNING RECEIVERS AND ACCESSORIES? MOST OTHER PRODUCTS ADVERTISED IN THIS MAGAZINE ARE AVAILABLE AT RAYCOM, AND DON'T FORGET OUR EXCLUSIVE PRODUCTS AND MODS!

### NEW PRODUCTS

**NEW  
IC781**



Come and see the NEW ICOM IC781 HF Professional transceiver with built in Band Scope, Auto ATU and PSU, the new KENPRO RZ1 Mobile Scanner, the new YAESU VHF Base Station and Mobile, and the new FOX mobile Scanner . . . because of our purchasing power and overseas contacts we get the new models first! And offer the best introductory prices!

### ANTENNAS & ACCESSORIES

NOW AVAILABLE AT RAYCOM: CUSCRAFT, BUTTERNUT, HY-GAIN ANTENNAS, JAYBEAM, TONNA, MET, HAM-M ROTATORS, Call for full details, prices, availability and delivery costs.  
 ICOM AH7000 SUPER 250-1300MHz DISCONE £79.50  
 G5RV HALF SIZE HF ANTENNA ready to use .... £16.50  
 G5RV FULL SIZE HF ANTENNA ready to use .... £18.50  
 G8KW-TYPE 7.1MHz TRAP DIPOLE KIT S0239 £24.50  
 G8KW-TYPE as above for use with 300 OHM ... £23.50  
 G8KW-TYPE 2X 7.1 TRAPS ONLY, LESS CABLE £9.95  
 RAYCOM AIRBAND-VHF SIX ELEMENT DISCONE £12.50  
 RAYCOM DISCONE VHF 60-600MHz 8E 80239 £29.50  
 SUN KG209 SE2M 5/8 MOBILE TILT-OVER 259 £14.50  
 RAYCOM CAST GUTTERMOUNT C/W S0239/COAX £8.50  
 GAMMA TWIN 2 METRE SLIM JIM KIT inc. instr. £14.50  
 RAYCOM/RWC HB9CV 2 METRE 2E MINI BEAM £12.50  
 RAYCOM/RWC HB9CV 70CM 2E MINI BEAM .... £8.95  
 The above popular products POST FREE.  
 (UK mainland only)

### SCANNERS

### BEARCAR BY UNIDEN



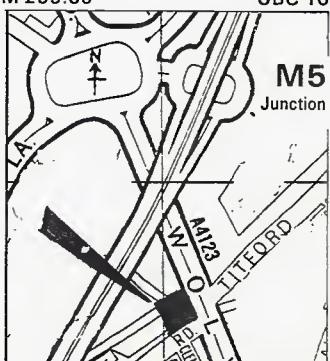
**UBC 175XL**



**UBC 100XL**

RAYCOM ARE TRADE AND RETAIL DISTRIBUTORS FOR THIS SUPERB RANGE OF QUALITY SCANNERS. THE POPULAR UBC 100XL HAND HELD HAS SOLD IN THOUSANDS, BUT IS NOW COMPLIMENTED BY THE UBC 70XCL POCKET SIZED HANDHELD. ALSO THE NEW COST EFFECTIVE UBC 50XL HANDHELD. SEE THE NEW MODELS IN OUR SHOWROOMS OR SEND A S.A.E. FOR DETAILS.

FROM £99.50



### ORDERING INFORMATION

ALL PRODUCTS WE ADVERTISE ARE NORMAL STOCK ITEMS OUR NEW MAIL ORDER DEPARTMENT CAN NOW DESPATCH MANY LINES SAME DAY, BUT PLEASE ALLOW UP TO 14 DAYS DELIVERY TIME IS SUBJECT TO CARRIAGE METHOD. IF ORDERING BY MAIL PLEASE INCLUDE CARRIAGE AND STATE YOUR DAYTIME TELEPHONE NUMBER. ALL PRODUCTS OVER £750.00 CARRIAGE FREE. PLEASE ALLOW TIME FOR PERSONAL CHEQUES TO CLEAR. PLEASE CALL BEFORE ORDERING AND FOR MORE DETAILS.

**PLEASE TEL: 021 544 6767**

### SPECIAL OFFERS

WHILE STOCKS LAST!	NORMAL	SPECIAL
YAESU FT26 BASE STATION C/W 2MTRS	£99.00	£695.00
YAESU YD844A BASE STATION MIC 600/50K	£39.95	£19.95
YAESU FT77 5W-120W 1.6-300MHz PA UNIT	£149.00	£75.00
YAESU HORN RELAY ALARM UNIT WITH 555	£12.50	£4.50
ICOM ICA20 AIR BAND CAA APPROVED H/H	£429.00	£379.00
ICOM ICA2 AIR BAND CAA APPROVED H/H	£399.00	£279.00
KENPRO KT400E 2W UHF PA/CHARGER	£279.00	£199.00
COLOUR-ROTA 40KG ROTATOR 3 CORE CABLE	£45.00	£37.50

Please ask for our SPECIAL OFFERS LIST, USED LIST, SCANNERS LIST, and LATEST PRODUCT NEWS. Please send a large S.A.E.

### BASE STATIONS

YAESU FT767GX RWC/MK2 ALL MODE/BAND BASE STATION	£1498.00
YAESU FT767GX RWC/MK2 AS ABOVE C/W 2 OR 6 METRES	£1590.00
YAESU FT767GX MK2 MODEL WITH IMPROVED FEATURES	£895.00
YAESU FT726R MULTI-BAND MULTIMODE SPECIAL OFFER	£695.00
YAESU FT767GX NEW MULTIMODE 100W HF TRANSCEIVER	POA
NEW YAESU FT736R MULTIMODE BASE STATION C/W 2 METRES	POA
ICOM IC735 HF HIGH PERFORMANCE MINI HF TRANSCEIVER	£892.50
ICOM IC275 2SW 2 METRE MULTI-FEATURE SUPERB BASE STATION	£949.00
ICOM IC575 10W 10 & 6 METRE ALL MODE SUPER BASE STATION	£949.00

CALL FOR BEST PRICES ON OTHER ICOM AND YAESU BASE STATIONS.

### SCANNERS

YAESU FRG9600 from the company who specialises in fitting extra options, as supplied to Government departments and professional bodies. We also upgrade existing models, please call for more details, prices, delivery and information.  
 Yaesu FRG9600 Basic Model Improved 'S' Meter + Sens. .... £465.00  
 Yaesu FRG9600/RWC MK2 60-950MHz 'N' Connector Fitted ..... £495.00  
 Yaesu FRG9600/RWC MK3 HF 100KHz-950MHz plus MK2 Spec. £595.00  
 Yaesu FRG9600/RWC MK3 HF 50KHz-950MHz Active Mixer ..... £625.00  
 Icom ICRT7000 25M-2GHz superb quality professional Rx ..... £859.00  
 Icom ICRT7000/AH7000 Receiver plus Matching Discone ..... £937.50  
 Kenwood R2 1 New 25-950MHz Mobile, Wide and Narrow AM/FM POA  
 Fox VHF-UHF Multi Function Mobile Scanner FM only ..... £139.00  
 Uniden-Bearcat UBC 50XL VHF-UHF 10ch H/held Scanner ..... £99.50  
 Uniden-Bearcat UBC 70XL VHF-UHF 20ch Miniature H/held .... £199.00  
 Uniden-Bearcat UBC 100XL VHF-UHF-Airband H/held Scanner ..... £189.00  
 Uniden-Bearcat UBC 175XL VHF-UHF-Airband Desk-Top ..... £175.00  
 BJ200 Mk2 VHF-UHF-Airband Military Airband H/held ..... £220.00  
 AOR 2002 25-550, 800-1300MHz Desk-Top/Mobile AM/FM ..... £469.00  
 Sony Air 7 Top Quality VHF-Airband Handheld Scanner ..... £245.00  
 Package deal on above MK3/5 FRG9600 c/w AH7000 discone, G5RV, PA4 AC/PSU, complete receiving station HF-UHF including delivery UK mainland. Add £100.00 to above price.  
 PACKAGE DEAL AVAILABLE ON ALL MAKES.  
 SHORT WAVE RECEIVERS  
 Yaesu FRG8800 Short Wave 100KHz-30MHz all Mode + Mem. .. £589.00  
 Yaesu FRG8800/FRV8800 as above with VHF Conv. fitted ..... £679.00  
 Icom IC-R7 HF Top Grade Communications Receiver ..... £799.00  
 Sony PRO80 HF/VHF Handheld Scanner c/w accessories ..... £345.00  
 Sony 2001D Short Wave/Airband DEI IIXF RX with ANI kit ..... £395.00  
 Many more makes and models in stock, PLEASE CALL FOR PRICES, DELIVERY COSTS and any advise or information, or send large SAE. (Insured post and packing £10.00. Carrier £12.50).

**SONY.** RAYCOM now appointed official Sony dealers, full range of both professional and domestic models available to order.

### YAESU

**FT 767 GX**  
**RWC MK2**

**YAESU**



Raycom offer our own improved version of this fabulous HF-UHF transceiver, we fit a small SMD chip component mod board in the VCO to improve the RX dynamic range by up to 20dB, FOC when purchased new from us. If you are lucky enough to own the FT767 already, send your unit + £59.50 and we will fit it for you! (inc. return carriage). Also available at some Yaesu dealers. SEE REVIEWS FOR DETAILS OF THIS ACCLAIMED MODIFICATION.

### HANDHELDS

\* = Extended Receiver coverage available, call for details.

YAESU FT727R/FNB4 2.5W (SW) DUAL BANDER. C/W CHRGR	£395.00
*YAESU FT23R/FNB10 2.5W (SW) 2MTRS C/W CHARGER	£249.00
*YAESU FT73R/FNB10 2.5W (SW) 70CM C/W CHARGER	£259.00
*ICOM MICRO 2E 2.5W 2MTR HANDHELD WITH CHARGER	£209.00
CTE1600 (SAME AS ICOM IC2E) C/W NICAD CHARGER	£179.00

Many other types of handheld stocked, please enquire.

### PORTABLES

FT290RMK2 2.5W MULTIMODE STANDARD ACCESSORIES	£399.00
FT290RMK2 2.5 WATT M/M AS ABOVE C/W NICADS CHRGR	£425.00
FT290RMK2/FL2025 (STD) WITH 25W LINEAR AMPLIFIER	£489.00
FT690RMK2 6MTR 2.5W MULTIMODE STANDARD ACCES	£399.00
FT690RMK2 6MTR 2.5W M/M AS ABOVE C/W NICADS CH.	£425.00
FT790RMK2 NEW 70CM 2.5W MULTIMODE DUE OUT SOON	£499.00

### MOBILES

YAESU FT211RH 45W 2MTR MOBILE WITH FREE	
1/4 WAVE ANT	£299.00
YAESU FT212RH NEW 45W 2MTR MOBILE DVS FEATURE OPT.	£349.00
*ICOM IC2E 2MTR 25W MOBILE WITH 5/8 ANTENNA	£359.00
Alinco Dual Band ALD-24E	£445.00
ICOM IC48E 70cm 25W	£428.00
ICOM IC3200 Dual Band 25W	£499.00

Compare our prices!  
 Many other types and makes stocked, please enquire.

Opening hours 9am-5.30pm 6 days, late nights Thursday & Friday till 7pm.



# HAM RADIO TODAY

## CONTENTS

VOLUME 6 NO 6 JUNE 1988

**Editor**  
Dave Bobbett, G4IRQ  
**Technical Illustrator**  
Jerry Fowler  
**Advertisement Manager**  
Christopher Harris  
**Classified Sales Executive**  
Evelyn Coombes

**Published by:**  
Argus Specialist  
Publications Ltd

**Distributed by:**  
SM Distribution Ltd

**Printed & bound by:**  
Adlard & Son Ltd  
Dorking, Surrey and  
Letchworth, Herts

**Design by**  
ASP Design Studio

**Editorial and Advertising  
address:**  
Ham Radio Today  
ASP Ltd

1 Golden Square  
London W1R 3AB  
Tel: 01 437 0626

(please mark your letter for the  
appropriate department)

**Subscriptions and back issues:**  
Ham Radio Today Subscription Dept,  
Infonet Ltd, 5 River Park Estate,  
Berkhamsted, Herts. HP4 1HL  
Tel: (04427) 76661/4

**Subscription rates:**  
UK £15.60, Europe £20.10,  
Middle East £20.30, USA \$30,  
Far East £22.00, Rest of World  
£20.60. Airmail rates on request.

**USA Subscription Agent:**  
Wise Owl Worldwide Publications,  
4314 West 238th Street,  
Torrance CA90505

**ARGUS PRESS GROUP** Member of the  
Audit Bureau of Circulation



Ham Radio Today is normally published on the first Friday in the month preceding cover date. The contents of this publication including all articles, designs, plans, drawings and programs and all copyright and other intellectual property rights therein belong to Argus Specialist Publications Limited. All rights conferred by the Law of Copyright and other intellectual property rights and by virtue of international copyright conventions are specifically reserved to Argus Specialist Publications Limited and any reproduction requires the prior written consent of the Company © 1988 Argus Specialist Publications Ltd.

All reasonable care is taken in the preparation of the magazine contents, but the publishers cannot be held legally responsible for errors. Where mistakes do occur, a correction will normally be published as soon as possible afterwards. All prices and data contained in advertisements are accepted by us in good faith as correct at the time of going to press. Neither the advertisers nor the publishers can be held responsible, however, for any variations affecting price or availability which may occur after the publication has closed for press.

## REGULAR COLUMNS

QRZ .....	12
Our monthly HF operating column featuring DX from the far Sahara to the Scottish Isles	
RADIO TOMORROW .....	42
Want to know what's happening? This is the place to look	

## 1988 READERS SURVEY

Why not fill in our survey and enter the free subscriptions draw! ..... 29

## REVIEWS

YAESU FT-747 - FIRST UK REVIEW .....	22
Just how good is this first HF economy rig? We find out.	
KENWOOD TH25E PORTABLE .....	34
Yet another contender for the popular 2m handy market is put through its paces	
USER REVIEW — BLACK JAGUAR SCANNER .....	46
The new pocketable BJ200 on test.	

## FEATURES

THE 5% COLUMN .....	39
Get the latest low-down on BYLARA activities with our bi-monthly update	
WHO WAS EDWIN ARMSTRONG? .....	49
Regenerative feedback and wide band FM are just two of this founding fathers development.	

## CONSTRUCTION

IAMBIC ELECTRONIC KEYER PROJECT .....	16
The first part of a single chip solution to electronic keyers using the reliable Curtiss IC	

HAM RADIO TODAY SUBSCRIPTIONS .....	10
ADVERTISEMENT INDEX .....	51
FREE READERS ADVERTISEMENTS .....	52
RETAIL NETWORK .....	56
CLASSIFIED ADVERTISEMENTS .....	57

# ICOM

## IC-4GE 70cm FM Handportable

The IC-4GE is the first in a line of new handportables to be announced from ICOM. The small compact style provides easy operating and rugged durability. Other models for 2mtrs and 23cm will be released later this year.

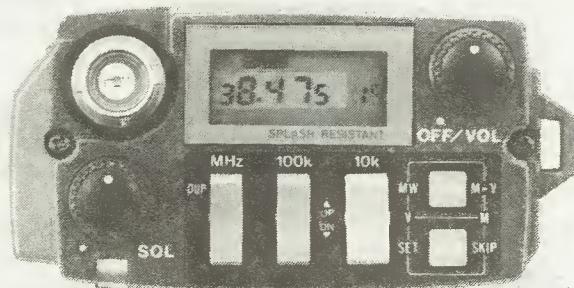
A full 6 watts of RF power is available when using the IC-4GE with the option IC-BP7 nicad pack. The IC-4GE is equipped with a total of 20 memory channels. Each memory can independently memorise frequency, offset direction and frequency.

All circuits are designed using low power dissipation techniques to create a special power save circuit in the transceiver. The power saver circuit functions if no signal is received or no switch operation is performed for more than 30 seconds. In addition, the power saver circuit can be turned off for packet communications.

Two different scans, programmed scan and memory scan are provided and in addition memory skip channels can be programmed to skip selected memory channels during memory scanning operating. The squelch monitor function allows you to monitor weak signals without having to adjust the squelch control. The high impact case is splash resistant by the inclusion of rubber gaskets. The IC-4GE is supplied with a IC-BP3 nicad battery pack, flexible antenna, AC wall charger, belt clip and wrist strap. It is compatible with many of the existing accessories for ICOM's IC-2/4 and IC-02/04 series of handportables.

Also available for the IC-4GE is a large range of optional accessories including a variety of rechargeable nicad power packs, dry cell battery pack, desk charger, headset and boom mics and new slimline speaker mics. For more information on the IC-4GE or any other ICOM handportable contact your local ICOM dealer or ICOM (UK) LTD.

◀ Actual Size ▶



**Icom (UK) Ltd.**

Dept HRT, Sea Street, Herne Bay, Kent CT6 8LD. Tel: 0227 363859. 24 Hour.

# Count on us!

## IC-575, 28/50MHz Dual band multimode.



Operating modes are SSB, CW, AM & FM. Power output is 10 watts (AM 4 watts) with a front panel control to reduce output for QRP operations. A pass band tuning circuit narrows the I.F. passband width, eliminating signal in the passband. A built-in notch filter eliminates beat signals with sharp attenuation characteristics.

Some PLL systems have difficulty meeting the lockup time demands placed on them by new data communications. This is why ICOM developed the DDS (Direct Digital Synthesizer) method. With a lockup time of just 5msec the DDS method allows the IC-575 to handle data communications such as packet or AMTOR. 99 programmable memories can store frequency, mode, offset frequency and direction. A total of four scanning functions for easy access to a wide range of frequencies, memory scan, programmed scan, selected mode memory scan and lock out scan. The IC-575 has an internal A.C. power supply, but can also be used on 13.8v DC for mobile or portable operation.

Optional accessories available are the UT36 voice synthesizer, the IC-FL83 CW narrow filter, SM7 external loudspeaker, HP2 communication headphones and SM8/SM10 desk microphones. Other transceivers available in this range are: IC-275E 2m multimode 25w, IC-275H 2m multimode 100w, IC-475E 70cm multimode 25w, IC-475H 70cm multimode 75w.

## IC-505, 50Mhz Transceiver

The IC-505 is a 6mtr BAND SSB, CW, FM (Optional) transceiver. It can be used as a portable or like other transceivers of this type as a base station unit. When used with an external 13.8v power supply the 505 gives 10 watts RF output, 3 watts or 0.5 watts on low power is available when using internal batteries. Other features include 5 memories with memory scan, program band scan, dual VFO's with split operation.

The easy-to-read LCD readout includes frequency, memory scan and call modes. Full metering of battery condition signal strength and power output is provided. When fitted with the optional EX248 FM unit the IC-505 offers 50MHz operation at an affordable price.



**Helpline:** Telephone us free-of-charge on 0800 521145, Mon-Fri 09.00-13.00 and 14.00-17.30. This service is strictly for obtaining information about or ordering Icom equipment. We regret this cannot be used by dealers or for repair enquiries and parts orders, thank you.

**Datapost:** Despatch on same day whenever possible.

**Acc & Barclaycard:** Telephone orders taken by our mail order dept, instant credit & interest-free H.P.





# South Midlands Com

SCHOOL CLOSE, CHANDLERS FORD IND. EST., EASTLEIGH,

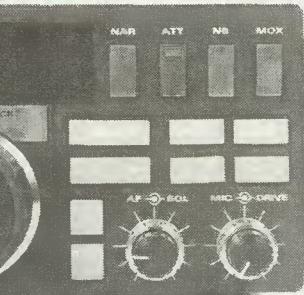
## FANTASTIC PERFORMANCE, FANTASTIC PRICE



The FT-747GX is a compact SSB/CW/AM and (optionally) FM transceiver providing 100 watts of PEP output on all HF amateur bands, and general coverage reception continuously from 100 kHz to 30 MHz. A front panel mounted loudspeaker and clear, unobstructed display and control layout make this set a real joy to use. Convenient features include operator selectable coarse and fine tuning steps optimised for each mode, Dual (A/B) vfos, along with twenty memory channels which store mode and skip-scan status for auto resume scanning of selectable memories. Eighteen of the memories can also store independent transmit and receive frequencies for easy recall of split-frequency operations. Wideband (6 kHz) AM and narrowband (500 Hz) CW IF filters are included as standard, along with a clarifier, switchable 20 dB receiver attenuator and noise blower. User programming for more advanced control by an external computer is possible through the CAT (Computer Aided Transceiver) System. The transmitter power amplifier is enclosed in its own diecast aluminium heatsink chamber inside the transceiver, with forced-air cooling by an internal fan allowing full power FM and packet, RTTY, SSTV and AMTOR operation when used with a heavy duty power supply.

MD-1B8 Base Mic ..... £79.00  
 MMB38 Mobile Mount .... £22.00  
 D3000568 FM Unit ..... £39.99  
 FP700 Standard P.S.U. . £195.50  
 MH-1B8 Hand Mic ..... £21.00

FIF232C Interface ..... £75.00  
 FC757AT Automatic ATU £349.00  
 FAS14R Remote Ant. SW £80.00  
 TXCO 747 ..... £28.95  
 FRB757 Relay Box ..... £10.50

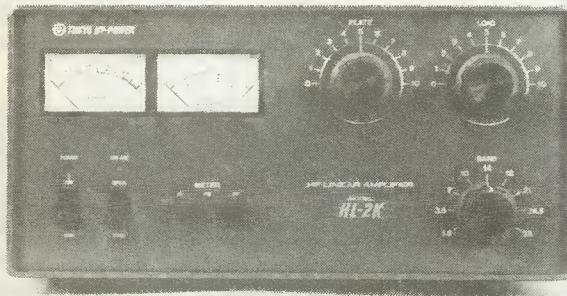


All major controls are grouped together for convenience and ease of operation.

FP757HD Heavy Duty P.S.U. ..... £239.00  
 FL7000 500W P.E.P. Linear ..... £1600.00  
 SP767 Ext. Spkr ..... £69.95

## FT747GX HF TRANSCEIVER RRP £659.00 inc. VAT

### 'HIGH POWER' by TOKYO HY-POWER



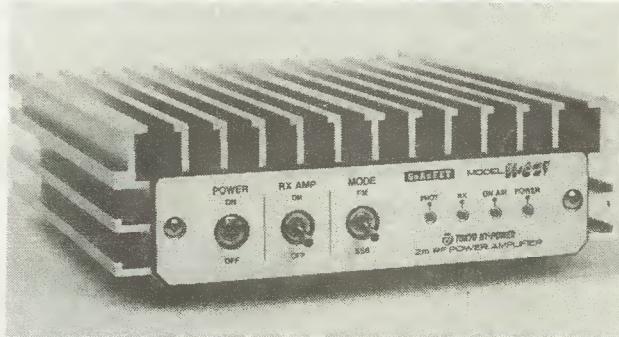
Introducing from TOKYO HY-POWER a range of superbly engineered, compact HF linear amplifiers. Designed to meet the exacting standards of operation on the HF amateur bands, yet remaining easy to operate and install.

#### General Specifications:

ALL HF BANDS INCLUDING WARC.  
 EXCITATION POWER: 70-120W  
 SUPPLY: 240V AC.

HL-1 KGX  
 1kW P.E.P.  
 2 x 4CX 250B  
 £945.00 inc. VAT

HL-2K  
 2kW P.E.P.  
 2 x 3 - 500Z  
 £1425.00 inc. VAT



Also available from TOKYO HY-POWER a range of VHF/UHF linear amplifiers. All these units are constructed from a heavy duty extruded case for max heat dissipation and strength, allowing continued high outputs even in the harshest environments. All the linears are complete with a low noise preamp as standard (except HL30V) and need a 13.8V DC supply

HL30V	2m	2W in/30W out .....	£54.00
HL37V	2m	3W in/35W out .....	£89.00
HL62V	2m	10W in/60W out max.	£119.00
HL110V	2m	2/10W in/110W out .....	£215.00
HL20U	70cms	2W in/20W out .....	£82.89
HL60U	70cms	10W in/50W out .....	£179.00
HL66V	6m	10W in/50W out .....	£119.00

LEEDS  
 SMC (Northern)  
 Nowell Lane  
 Industrial Estate  
 Leeds LS9 6JE  
 Leeds (0532) 350606  
 9-5.30 Mon.-Sat.

CHESTERFIELD  
 SMC (Midlands)  
 102 High Street  
 New Whittington  
 Chesterfield  
 Chasst. (0246) 453340  
 9.30-5.30 Tues.-Sat.

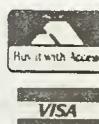
BUCKLEY  
 SMC (T.M.P.)  
 Unit 27, Pinfold Lane  
 Buckley, Clwyd  
 Buckley (0244) 549563  
 10-5 Tues. Weds. Fri.  
 10-4 Sat.

JERSEY  
 SMC (Jersey)  
 1 Belmont Gardens  
 St. Helier, Jersey  
 Jersey (0534) 77067  
 9-5 pm Mon.-Sat.  
 Closed Wed.

N. IRELAND  
 SMC N. Ireland  
 10 Ward Avenue  
 Bangor  
 County Down  
 (0247) 271875

BIRMINGHAM  
 SMC (Birmingham)  
 504 Alum Rock Road  
 Alum Rock  
 Birmingham B8 3HX  
 (021-327) 1497/6313  
 9-5 Tues.-Fri.  
 9-4 Sat.

AXMINSTER  
 Req. Ward & Co. Ltd.  
 1 Western Parade  
 West Sussex  
 Axminster  
 Devon EX13 5NY  
 Axminster (0297) 34918  
 9-5.30 Tues.-Sat.



Southampton Showroom open 9.00-5.00 Monday to Friday, 9.00-1.00 Saturday. Service Dept. open Mon.-Fri. 9.00-5.00.  
 AGENTS: JOHN DOYLE, TRANSWORLD COMMS, NEATH (0639) 52374 DAY (0639) 2942 EVE

DAVID STENNING, G4JA, LOUTH 0507 604967

## Serious about VHF/UHF? Then the FT736R is for YOU!



- ★ UP TO FOUR BAND CAPABILITY
- ★ LSB/USB, CW & FM
- ★ FULL DUPLEX CROSSBAND OPERATION
- ★ MEMORY STORAGE OF UP TO 230 FREQUENCIES
- ★ KEYPAD FREQUENCY ENTRY
- ★ FOURTEEN VFO'S
- ★ GLOBAL CALL CHANNEL
- ★ PROGRAMMABLE CHANNEL STEPS
- ★ ELECTRONIC KEYER OPTION
- ★ REMOTE PREAMPLIFIER SWITCHING
- ★ TXCO HIGH STABILITY REFERENCE OSCILLATOR

The FT-736R is a frequency-synthesized amateur transceiver incorporating up to four band modules covering the 50, 144, 430, and 1200 MHz amateur bands. The standard model provides 25 watts RF power output on the 144 and 430 MHz amateur bands in SSB, CW and FM modes. (10 watts output on the 50 and 1200 MHz bands).

Operating conveniences usually found only on HF transceivers, such as front panel adjustable IF shift and IF notch, a noise blower, all-mode VOX and three-speed selectable AGC are included. GaAs FET receiver RF amplifiers are provided in the 430 and 1200 MHz band modules.

The innovative memory system includes one hundred general purpose memories plus ten full duplex cross-band memories, one global call channel memory that can be recalled from any band or mode and up to four band-specific call channel memories, all of which store mode and receive and transmit frequencies independently.

In addition, fourteen vfos are provided: two general purpose plus one PMS (Programmable Memory limit Scanning) on each band, two special-purpose full duplex vfos, and up to four clarifier memories, one per band.

Each of the two full duplex vfos can be selected so that its receive and transmit frequencies and modes can be displayed and tuned independently, or linked to tune synchronously in opposite directions for satellite operation. You can retain twelve satellite uplink/downlink modes in the special vfos and ten full duplex memories at all times.

Naturally, with FM the predominant mode on the VHF and UHF bands, the FT-736R includes all manner of convenient features for both FM simplex and repeater operation, like a discriminator center tuning meter, special narrow FM mode (to cut adjacent channel interference in crowded areas) and Automatic Repeater Shift when tuned to 2-meter repeater subbands.

The FT-736R also includes a t/r-switched DC supply line for masthead preamplifiers, activated from the front panel, and digital input connection directly to the modulator for high performance packet radio tnc interfacing (preamps, personal computers and packet tncs not supplied by Yaesu).

### OPTIONAL ACCESSORIES

FEX736/50	50MHz module	£239.00	XF455MC	600Hz CW Filter	£60.00
FEX736/1.2	1.2GHz module	£425.00	SP767	External Spkr c/w Audio Filters	£135.00
FMP-1	AQS Message Processor c/w display	£189.00	MD-1B8	Desktop Microphone	£79.00
FTS-8	CTCSS Tone Squelch Unit	£45.00	MH-1B8	Hand Scanning Microphone	£21.00
FVS-1	Voice Synthesiser Unit	£33.00	FIF232Cvan	CAT/TNC Interface for Packet & CAT	£69.85
Keypoint Unit B	Internal Lambic Keypoint Unit	£15.95	FIF232C	CAT Interface for RS232 O/P	£75.00
TV-736	Fast Scan TV (ATV) Mod/Demod Unit	£159.00	FIF65A	CAT Interface for Apple II series	£60.00

**FT736R RRP £1450 c/w 2m & 70cms**

## HY-GAIN - LOW PRICES



Due to the strong pound and our special purchase we can now offer for a limited period, up to 15% discount on their range of antennas and 10% on their larger rotator Ham IV. Buy now whilst stocks last (from January 1st they increased their prices and if the dollar recovers prices could go up by 30% to 40%).

		Offer Price	P&P
12AVQ	Vert. 10-15-20M	£76.95	£71.00
14AVQ	Vert. 10-15-20-40M	£109.00	£95.00
18AVT	Vert. 10-15-20-40-80M	£172.00	£146.00
18V	Vert. 10-80M tapped coil	£48.50	£43.65
TH3Jnr	3 Ele. Yagi 10-15-20M	£299.00	£254.00
TH2MK3	2 Ele. Yagi 10-15-20M	£279.00	£249.00
EX14	5 Ele. 10-15-20M Explorer	£499.00	£449.00
TH5MK2	5 Ele. 10-15-20M T'bird	£649.00	£575.00
TH7DXX	7 Ele. 10-15-20M T'bird	£755.00	£669.00
153BA	3 Ele. Yagi 15M	£135.00	£121.00
155BA	5 Ele. Yagi 15M	£338.00	£288.00
204BA	4 Ele. Yagi 20M	£420.00	£357.00
205BA	5 Ele. Yagi 20M	£499.00	£425.00
DB10-15A	3 Ele. Yagi 10-15M	£209.00	£199.00
AR40	Famous Bell Type		£4.80
CD45	Medium Bell Type		Free
Ham IV	Heavy Duty Bell	£359.00	£329.00
T2X	Very Heavy Duty Bell	£449.00	£399.00

Prices subject to fluctuation.

### FREE FINANCE . . .

On many regular priced items SMC others.  
Free finance (on invoice balances over £120) 20% down and the balance over 6 months or 50% down and the balance over a year.

You pay no more than the RRP price!

Details of eligible items available on request.

### FREE S.M.C. SERVICE INTERLINK DELIVERY . . .

Free Interlink delivery on major equipment.  
Small items, Plugs, Sockets, etc. by post £1.75. Antennas,  
Cables, Wire & larger items. Roadline up to £5.75.  
Interlink delivery available, upon request, for items other  
than radios, from £7.30 depending on weight.  
Same day despatch whenever possible.

## ROTATORS

### ANTENNA ROTATORS

G-250	Bell type, Twist/Switch ctrl	£78.00	Carr.
AR40	Bell type, Turn/Push Control	£135.00	FOC
G-400RC	Bell type, 360 deg. meter	£169.00	FOC
AR50	Bell type, 5 pos. pre-select	£149.00	FOC
CD45	Bell type, meter readout	£219.00	FOC
G-600RC	Bell type, 360 deg. meter	£219.00	FOC
T2X	Bell type, meter readout	£399.00	FOC
HDR300	Bell type, Digital readout	£699.00	FOC
G-800SDX	Bell type, 450 deg. var. speed	£325.00	FOC
G-1000SDX	Bell type, 450 deg. var. speed	£368.00	FOC
G-2000	Bell type Meter ± 90 deg.	£445.00	FOC
G-400	Bell type, Meter ± 180 deg.	£149.95	FOC
G-500	Elevation, Meter ± 90 deg.	£149.95	FOC
G-500B	Elevation, H/D KR500	£259.95	FOC
G-5400	Azimuth/Elev. Dual control	£279.00	FOC
G-5400A	Azimuth/Elev. Computer cont.	£339.00	FOC
G-5600	Azimuth/Elev. Dual control	£369.00	FOC
G-5600A	Azimuth/Elev. H/D Comp. cont.	£389.00	FOC

### ROTATOR HARDWARE

9523	Support bearing Chan. Master	£19.95	£2.50
9523/FU200	Support bearing FU200 etc.	£21.95	£2.50
9525	Rotary bearing Guy type	£19.95	£2.50
KS050	Rotary bearing 1½" mast	£19.95	£2.50
KS065	Rotary bearing 2" mast	£29.95	£2.50
KC038	Lower mast clamp G-400/600	£16.95	

### ROTARY CONTROL CABLE

RC5W	5 way for G-400RC etc.	per/mtr £0.48
RC6W	6 way for G-250/400 etc.	per/mtr £0.56
RC8W	8 way for CD45 etc.	per/mtr £0.72

Free carriage on all rotators.  
Prices are inclusive of VAT.

### GUARANTEE

Importer warranty on Yaesu Musen products.

Able staffed and equipped Service Department.

Daily contact with the Yaesu Musen factory.

Twenty-five years of professional experience.

• 2 years warranty on regular prices Yaesu products.

**Bredhurst**  
electronics

SITUATED AT SOUTHERN END OF M23  
EASY ACCESS TO M25 AND SOUTH LONDON  
WE ALWAYS STOCK A GOOD SELECTION  
OF FREQUENCY REFERENCE BOOKS

**HF RECEIVERS**

		£ (c&p)
Lowe	HF 125	375.00 (-)
Icom	IC R71	825.00 (-)
Kenwood	R2000	£595.00 (-)
Kenwood	VC10 VHF Converter	161.94 (-)
Kenwood	R5000	875.00 (-)
YAESU	FRG 8800	639.00 (-)
YAESU	FRV 8800 VHF Converter	100.00 (-)

**JF TRANSCEIVERS**

		£ (c&p)
Kenwood	TS 940S	1995.00 (-)
Kenwood	TS 930S	1695.00 (-)
Kenwood	TS 440S	1138.81 (-)
Kenwood	TS 140S	862.00 (-)
Kenwood	TS 830S	1098.00 (-)
YAESU	FT 747GX	659.00 (-)
YAESU	FT 980	1795.00 (-)
YAESU	FT 757GX II	969.00 (-)
YAESU	FT 767GX	1550.00 (-)
Icom	IC 735	949.00 (-)
Icom	IC 751A	1465.00 (-)

**ANTENNA TUNER UNITS**

		£ (c&p)
YAESU	FRT 7700 Short wave listening	59.00 (2.00)
YAESU	FC 757AT	349.00 (-)
Kenwood	AT 230	208.67 (2.50)
Kenwood	AT 250 auto	366.00 (-)

**Featured transceiver Kenwood TS 140S**



Combines superb performance with simplicity at an attractive cost.  
Please ring for more details.

£862.00

**VHF HANDHELD RECEIVERS**

		£ (c&p)
FDK	RX 40 141-179 MHz FM	132.25 (2.00)
Signal	R537S "Airband"	69.51 (2.00)
Sony	Air 7	249.00 (-)
Sony	PRO-80 Receiver AM/FM/SSB 115KHz-223MHz	349.00 (-)

**VHF SCANNING RECEIVERS**

		£ (c&p)
Icom	IC R7000	957.00 (-)
YAESU	FRC 9600M 50-50MHz	509.00 (-)
AOR	AR 2002	487.30 (-)
Signal	R535 "Airband"	249.00 (-)

**2M TRANSCEIVERS**

		£ (c&p)
Kenwood	TH 205E Handheld	215.25 (-)
Kenwood	TH 215E Handheld	225.13 (-)
Kenwood	TH 216E Handheld	189.00 (-)
Kenwood	TR 751E 25 multimode	599.00 (-)
Kenwood	TM 2111 base station	940.00 (-)
Kenwood	TM 2211 base station	317.30 (-)
Kenwood	TH 225E Handheld NEW MODEL	258.00 (-)
YAESU	FT 211RH 45w FM Mobile	300.00 (-)
YAESU	FT 290RII multimode	429.00 (-)
YAESU	FT 232R Handheld + FN B10	255.70 (-)
Icom	IC 28 E Handheld	225.00 (-)
Icom	IC 02E Handheld	269.00 (-)
Icom	IC 28E 25w mobile	359.00 (-)
Icom	IC 275E base station inc. P.S.V.	1039.00 (-)
Icom	IC 3200E 2M/70cm FM mobile	556.00 (-)
Icom	Micro 2 Handheld	239.00 (-)

**70cm TRANSCEIVERS**

		£ (c&p)
Kenwood	TH 41E Handheld	218.00 (-)
Kenwood	TS 811E base station	1095.00 (-)
Kenwood	TH 405E Handheld	273.18 (-)
Kenwood	TH 415E Handheld	298.85 (-)
YAESU	70cm module for FT 726R	349.00 (-)
YAESU	FT 73R Handheld + FNB10	275.70 (-)
Icom	IC 28E Handheld	299.00 (-)
Icom	IC 475E base station inc. P.S.V.	1125.00 (-)
Icom	IC 48E FM Mobile 25w	449.00 (-)

**STATION ACCESSORIES**

		£ (c&p)
MC 50	Desk Microphone	46.08 (2.00)
MC 60A	Desk Microphone with Pre-amp	88.22 (2.00)
MC 55	Mobile Microphone with Control Box	52.67 (1.00)
MC 35S	Hand Microphone 4 pin	21.72 (1.00)
MD 188	Base Microphone	79.00 (2.00)
MC 43S	up/down Hand Microphone 8 pin	22.22 (1.00)
C 100	Mobile Speaker	13.50 (1.00)
LF 10A	Low Pass Filter 1kW	32.26 (2.00)
SP 40	Mobile Speaker	21.06 (1.00)
HS 7	Minijack headphones	15.80 (1.00)
YH77	Light de Luxe Headphones	19.99 (1.00)
HS 5	Deluxe Headphones	19.54 (1.00)
AEA PK 232	6 Mode Terminal Unit	269.00 (3.00)
VS 1	Voice Synthesizer Module	32.26 (1.00)
GC5	ICOM World Clock	43.00 (2.00)
CD600	CW and RTTY Dec-Decoder	215.14 (2.50)
KPC2	Kantronics Packet Communicator	165.00 (2.50)
Kent Morse	Key Kits	29.50 (2.50)
Kent	Twin-paddle Morse Key Kits	38.50 (2.50)

**ANTENNA BITS**

		£ (c&p)
HQ-Q	Balun 1:1 5kW PEP	13.95 (1.00)
Bricomm	Balun 4:1 1kW	13.80 (1.00)
Bricomm	7.1MHz Epoxy Traps (pair)	10.95 (1.50)
Self	Amalgamating Tape 10M x 25mm	0.75 (0.75)
T-piece	polyprop Dipole centre	1.60 (0.25)
Small	ceramic egg insulators	0.65 (0.20)
Large	ceramic egg insulators	0.85 (0.20)

**CABLES ETC.**

		£ (c&p)
UR-M	67 low loss coax 50 ohm per metre	0.75 (0.25)
UR-76	50 ohm coax dia 5mm per metre	0.30 (0.10)
UR-70	70 ohm coax per metre	0.35 (0.10)
UR-95	50 ohm coax dia 2.3mm per metre	0.40 (0.10)
4mm	Polyester Guy Rope (400kg) per metre	0.25 (0.10)
50 metres	16 swg hard drawn copper wire	6.95 (1.50)
75 ohm	Twin Feeder Light Duty per metre	0.20 (0.10)
300 ohm	Slotted Ribbon Cable per metre	0.32 (0.10)



ICOM

YAESU

Mail Order & Retail.

BREDHURST ELECTRONICS LTD.  
High Street, Handcross,  
W. Sussex RH17 6BW (0444) 400786

IF THE EQUIPMENT YOU REQUIRE IS NOT LISTED  
HERE PLEASE TELEPHONE FOR DETAILS.

## TX-3 RTTY/CW/ASCII TRANSCEIVE

The high performance, low cost system Split-screen, type-ahead operation, receive screen unwrap, 24 large memories, clock, review store, callsign capture, RTTY auto CR/LF, CW software filtering and much more. Needs interface or T.U.BBC-B/Master and CBM64 tape £20, disc £22. Spectrum tape £35, +3 disc £37 inc. adaptor board (needs interface/TU also). For VIC20 we have our RTTY/CW transceive program. Tape £20.

## RX-4 RTTY/CW/SSTV/AMTOR RECEIVE

This is still a best-selling program and it's easy to see why. Superb performance on 4 modes, switch modes at a keypress to catch all the action. Text and picture store with dump to screen, printer or tape/disc. An essential piece of software for trawling the bands. Needs interface. BBC-B/Master, CBM64 tape £25, disc £27. VIC20 tape £25. SPECTRUM tape £40, +3 disc £42 inc. adaptor board (needs interface also). The SPECTRUM software-only version (input to EAR socket) is still available £25, +3 disc £27.

**TIF1 INTERFACE** Perfect for TX3 and RX4, it has 2-stage RTTY and CW filters and computer noise reduction for excellent reception. Transmit outputs for MIC, PTT and KEY. Kit £20 (assembled PCB + Cables, Connectors) or ready-made £40, boxed with all connections. Extra MIC leads for extra rigs £3 each. State rig(s). Interface only available with Tx-3 or Rx-4 software.

**WORLD AND UK/EUROPE LOCATOR** Maps, great circles, distances, bearings, contest scores. Lat/Long, locators, NGR, hundreds of placenames. BBC-B/Master, ELECTRON ONLY. Tape £10.

**LOCATOR** Distances, bearings, contest scores. Lat/Long, locators. SPECTRUM, CBM64, VIC20 tape £7.

And for the BBC-B/Master, SPECTRUM ELECTRON, CBM64, VIC20.

**MORSE TUTOR 1** - 40 wpm. Learn by ear, practise using random letters, figures, punctuation, words. 40 plain language texts supplied or type your own. With learning guide, tape £6.

**LOGBOOK** Date, band, mode, call and remarks. Instant callsearch. Log printout. Tape £8.

**RAE MATHS** Unlimited practice and testing for the exam calculations. Tape £9.

All BBC and CBM64 programs are available on DISC at £2 extra.

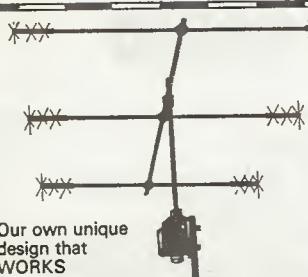
Prices include VAT and P&P, 1st Class inland, airmail overseas, normally by return. Eire, C.I., BFPO deduct 13%.

## technical software (HRT)

Fron, Upper Llandwrog, Caernarfon LL54 7RF.

Tel: 0286 881886





**ALTRON**

## COMPACT Spacesaver

### ANTENNAS

AQ6 20, 2 Ele and 3 Ele  
4 BAND, 6, 10, 15, 20 M  
AQ6-20 4 Ele **NEW**

Our own unique  
design that  
WORKS

CLOSE COUPLED - HI 'Q' - CAPACITY HAT LOADED YAGI

#### Special features:

- Unique Altron fully sealed coils for max stability
- Resonant length elements for improved VSWR (1-1)
- Selectively detuned for optimum performance and gain (no gimmick quad needed)
- Easy trim spokes with lock nuts and spares
- Minimized wind load and weight
- Double insulated elements

As reviewed by  
G4HCL in HRT  
APR 87

#### Typical performance

Antenna model	AQ-20/2E	AQ6-20/3E	AQ6-20/4E
Forward Gain Db	3.8 to 4.8	5.5 to 7.5	7 to 8
Front to Back Db	13 to 15	16 to 18	18 to 20
Side Null Db	-28	-32	-35
VSWR (typical)	1.1:1	1.1:1	1.1:1
Weight	7.5lb	12lb	16lb
Wind load	2ft <sup>2</sup> 0.18M <sup>2</sup>	3ft <sup>2</sup> 0.27M <sup>2</sup>	4FT <sup>2</sup> 0.37m <sup>2</sup>
Turning radius	76"/1930mm	96"/2438mm	117"/2971mm

PRICE + p&p £114.50 (10.00) £169.00 (11.50) £230.00 (11.50)

PRICES ARE INCLUSIVE OF VAT, TERMS, C.W.O. ACCESS, VISA, UK Mainland

**WE DESIGN - WE MAKE - WE SELL DIRECT. You get best value**

Callers welcome.  
Open Mon-Fri 9am-5  
Sat 9am-12.15pm

**ALLWELD ENGINEERING**  
Unit 6, 232 Selston Road  
S Croydon CP2 6PL  
Telephone: 01-680 2995 (24 hr) 01-681 6734

STOCK ITEMS NORMALLY DESPATCHED WITHIN 7 DAYS

## SMJ ELECTRONICS

Specialists in Semiconductors

#### Transistors

2N3055	£0.47	2SC945	£0.08	2SC2028	£1.30	2SK30	£0.37	BD235	£0.28
2N3773	£1.65	2SC1060	£0.59	2SC2029	£1.15	2SK33	£0.40	BD241	£0.34
2N3866	£1.10	2SC1061	£0.49	2SC2078	£0.74	3N201	£1.11	BD243	£0.30
2SA473	£0.42	2SC1096	£0.71	2SC2086	£0.43	3SK40	£1.27	BD244C	£0.33
2SA554	£0.10	2SC1213	£0.12	2SC2092	£1.41	3SK48	£2.26	BD245	£0.84
2SA608	£0.11	2SC1306	£0.74	2SC2097	£2.09	3SK88	£0.59	BD246	£0.75
2SA673	£0.13	2SC1312	£0.05	2SC2099	£19.25	3SK97	£2.08	BD902	£0.51
2SA678	£0.38	2SC1316	£0.22	2SC2166	£0.95	40673	£1.50	BF244	£0.39
2SA683	£0.20	2SC1359	£0.13	2SC2236	£0.22	BC107	£0.41	BF245	£0.39
2SA684	£0.31	2SC1384	£0.27	2SC2290	£24.85	BC110	£0.07	BF247	£0.25
2SA699	£0.66	2SC1390	£0.15	2SC2310	£0.15	BC109	£0.14	BFY51	£0.25
2SA700	£0.30	2SC1674	£0.15	2SC2314	£0.30	BC141	£0.26	MRF237	£3.39
2SA925	£0.26	2SC1675	£0.14	2SC2320	£0.10	BC142	£0.19	MRF238	£13.64
2SA999	£0.10	2SC1678	£0.80	2SC2385	£16.20	BC182	£0.06	MRF450	£13.50
2SA1012	£0.64	2SC1815	£0.10	2SC2539	£10.82	BC184	£0.10	MRF450A	£13.80
2SA1015	£0.11	2SC1909	£0.92	2SC3020	£12.90	BC212	£0.06	MRF454	£22.94
2SB525	£0.24	2SC1945	£3.41	2SD234	£0.46	BC214L	£0.08	MRF455	£23.65
2SC380	£0.09	2SC1946	£1.23	2SD235	£0.41	BC238	£0.06	TIP29C	£0.26
2SC495	£0.35	2SC1947	£2.29	2SD313	£0.56	BC639	£0.12	TIP30C	£0.29
2SC536	£0.10	2SC1957	£0.69	2SD325	£0.43	BC640	£0.13	TIP31C	£0.27
2SC710	£0.11	2SC1969	£1.58	2SD330	£0.48	BD131	£0.42	TIP32C	£0.33
2SC711	£0.09	2SC1970	£1.52	2SD380	£4.26	BD132	£0.32	TIP41C	£0.35
2SC730	£3.63	2SC1971	£2.95	2SD471	£0.29	BD135	£0.22	TIP42C	£0.36
2SC828	£0.05	2SC1972	£2.21	2SD837	£0.71	BD139	£0.22	TIP120	£0.38
2SC900	£0.27	2SC1973	£0.51	2SD880	£0.41	BD140	£0.25		
2SC930	£0.17	2SC2002	£0.25	2SK192	£0.23	BD201	£0.33		

#### Books

Screwdrivers Guide to CB  
PLL Data Book  
Cybernet Service Manual  
Uniden Service Manual

#### Crystal Filter

This is a 10.695MHz 1kohm 10kHz bandwidth crystal filter suitable for most FM CBs. The filter greatly reduces cross modulation (bleedover) and is extremely easy to fit.

**Active Filter Boards**  
A 10.695MHz active filter specifically designed for the HAM International and NATO 2000 type CBs. This board significantly reduces image reception and cross modulation without affecting sensitivity.

Price £6.90

#### Integrated Circuits

7805	£0.40	HA1377	£1.90	LC7120	£2.75	RC4558	£0.55	TDA1010	£1.15
7808	£0.38	HA1388	£3.81	LC7130	£3.26	S042	£2.50	TDA1011	£1.37
7812	£0.39	HA1392	£2.54	LC7131	£3.21	TA7061	£0.76	TDA1020	£2.28
7815	£0.37	HA1394	£2.72	LC7132	£2.89	TA7120	£0.48	TDA1021	£3.89
7818	£0.59	HA1397	£2.55	LC7137	£2.77	TA130	£0.98	TDA2000	£0.74
AN240	£1.28	HA1398	£2.27	LC7140	£2.00	TA1304	£0.98	TDA2001	£1.81
AN655	£0.19	HA1400	£1.19	MC989	£1.15	TA200	£0.91	TDA2004	£1.81
AN731	£1.37	HA1402	£0.84	M51102	£1.85	TA7217	£1.22	TDA2005	£1.65
AN7140	£1.05	HA1412	£0.94	M51153	£1.86	TA7222	£1.22	TDA2020	£1.81
AN7178	£2.95	HA1440	£0.58	M51155	£1.94	TA7227	£2.08	TDA2030	£1.30
BA402	£0.59	HA14201	£1.19	M51157	£1.84	TA7240	£0.08	TDA2611	£0.79
BA521	£1.55	HA14220	£1.41	MB3712	£0.99	TA7241	£1.96	UFC1028	£0.95
BA656	£1.19	LA4250	£2.23	MB3756	£2.06	TA7277	£1.93	UPC1032	£0.73
CD4001	£0.28	LA4400	£2.59	MB3756	£1.94	TA7277	£2.05		
CD4008	£0.89	LA4420	£1.32	MB8719	£4.12	TA7274	£1.96	UPC1161	£0.91
CD4011	£0.11	LA4422	£1.13	MC1723	£0.48	TA7310	£0.68	UPC1182	£1.04
CD4049	£0.25	LA4440	£1.89	MC3357	£2.11	TA7502	£0.99	UPC1185	£1.81
CD4066	£0.34	LA4445	£1.90	MC3359	£2.33	TBA800	£1.34	UPC1186	£0.71
CD4069	£0.18	LA4460	£1.71	MM5108N	£3.00	TBA810T	£0.49	UPC1230	£1.80
HA13001	£2.16	LA4461	£1.71	NE567	£0.62	TC9106	£0.60	UPC886	£1.65
HA1366W	£1.33	LB1405	£0.97	PLL02	£7.59	TC9109	£4.38	UPC2816	£5.34

We have listed only a small proportion of our stock. Please feel free to contact us with your requirements. All prices are quoted are the one off prices, discounts being available for quantities of ten or more of any one device.

Same day despatch on all items in stock. Cheque/Postal order with order. Please add 70p postage and packaging on all orders under £10.00. All prices are exclusive of VAT.

All mail order to:- 55 Slateford Road, EDINBURGH, EH11 1PB. Callers Welcome. TEL: 031 337 6950/031 337 2446.

# MULTIMETERS

BY

**Cirkit**

## Affordable Accuracy

A comprehensive range of quality Multimeters at very competitive prices

### DIGITAL

All models feature full ranges, large 3½ digit LCD, low battery indication, auto zero and auto polarity, strong ABS casing, 10 Amp range (except DM105), overload protection. Prices from £21.50 to £65.00. Battery, spare fuse, test leads and manual included with each model.

### ANALOGUE

A choice of four meters with prices ranging from £5.50 to £21.00, with DC sensitivities from 2kV/V to 30kV/V. All models include battery, test leads and manual.

Please add 15% VAT to all prices and 70p for post and packing.

**HC774**  £31.00

A compact, pocket sized autoranging multimeter featuring: 200mV-1kV DC volts, 200mV-750V AC volts, 200mA and 10A DC or AC current, high and low current resistance ranges 2k-2MΩ and 200-200kΩ, 10mm LCD, display memory and hold, auto/manual range selection and basic accuracy of 0.5%.

**Cirkit**    
Phone or write for full catalogue price £1.20 to  
Park Lane, Broxbourne, Herts EN10 7NQ.  
Telephone (0992) 444111.

## THE NEW TEN TEC PARAGON Synthesized Transceiver

An addition to the TEN-TEC range of top quality equipment from the U.S.A.

This general coverage all mode receiver tunes from 100KHz to 29.9999MHz. Modes USB, LSB, CW, FSK, AM, (FM optional). Sensitivity SSB/CW/RTTY 0.15uV. Dynamic range: 100dB on SSB. Blocking and 3rd order Intercept, very impressive figures. Transmitter 200 watts D.C. Input. CW Sidetone, Speech compression.

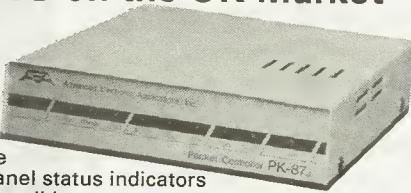
We also stock KW Traps & Dipoles; Antenna switches; Baluns; Fritz Baluns; Butternut & Cushcraft Beams and Verticals. MFJ (U.S.A.) ATU's; Packet Radio Terminal and RTTY/ASCII/CW computer interface etc.

**KW COMMUNICATIONS LTD.,**  
Vanguard Works, Jenkins Dale, Chatham, Kent ME4 5RT.  
Tel: (0634) 815173. Telex: 965834

# ICS

## EVERYTHING FOR DATA COMMUNICATION BY RADIO

### The Best Value Packet Radio TNC on the UK Market



PK-88

- ★ Compact size
- ★ Nine front panel status indicators
- ★ NetRom compatible
- ★ Compatible with PK-87-Host Mode Control
- ★ TTL/RS232 inputs and outputs
- ★ 32K RAM buffer
- ★ Full range of high quality driver software for IBM-PC, Commodore 64 and BBC
- ★ Built in personal mailbox
- ★ All leads and plugs supplied

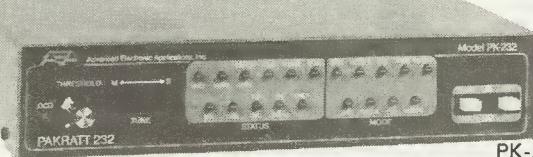
**Only £109.95 inc. VAT**

Post and Packing: £2.50

- Applications programs for most popular personal computers.
- Complete weather facsimile demodulator/printer system only £399.95 inc. VAT.

Applications assistance - always. Send large SAE for further production information.  
Visitors by appointment. Prices may vary according to prevailing exchange rates.  
Prices include VAT at 15%.

### The World Standard Multi-Mode Data Controller!



PK-232

- ★ Now with seven modes: Amtor, Packet, RTTY, CW, ASCII, Facsimile and Navtex.
- ★ Superb send/receive facsimile software for IBM-PC and Commodore 64.
- ★ Unique SIAM signal acquisition and analysis capability
- ★ Firmware upgrades available for earlier PK-232s
- ★ Excellent Host Mode software support.

**Still only £269.95 inc. VAT**

Post and Packing: £4.00

VISA



**ICS ELECTRONICS LTD.**

P.O. Box 2, Arundel, West Sussex BN18 0NX  
Telephone: (024 365) 655 (2 lines) Fax: (024 365) 575

# HAM RADIO TODAY

## WISH YOU WERE BETTER INFORMED?

GREAT  
NEW  
RATES

Please begin my subscription(s) to HAM RADIOTODAY with the  
I enclose my cheque/postal order for £..... made payable to Argus Specialist Publications Ltd.  
or debit £..... from my Access/Barclaycard No. .....  
valid from ..... issue .....  
NAME (Mr/Mrs/Miss) .....  
ADDRESS .....  
Postcode .....  
Signature .....  
Date .....  
Please use BLOCK CAPITALS  
and include postcodes



FIXED IT, YET?

12 issues UK	£15.60
12 issues Europe	£20.10
12 issues Middle East	£20.30
12 issues Far East	£22.00
12 issues Rest of the World or USA	£22.00 \$30.00

Air Mail Rates Given on Request

Send this form with your remittance to:  
INFONET LTD., 5 River Park Estate,  
Berkhamstead, Herts. HP4 1HL



# NEVADA

THE UK's SCANNER SPECIALISTS

## BLACK JAGUAR MKII

### POCKET SCANNER

Switchable between AM/FM.

Complete with NiCad Charger

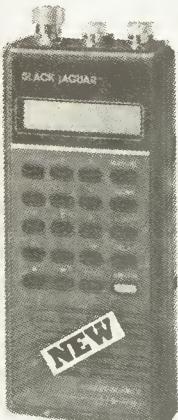
Frequency range:-

26-30MHz, 60-88MHz,

115-178MHz, 210-280MHz,

410-520MHz.

Extended coverage possible on some ranges with reduced sensitivity.



**£235**

### Bearcat 100 XL

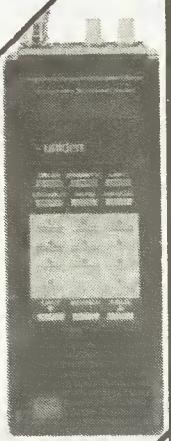
Hand held scanner with 16 channels.

Memory scan covering:-

66-88 MHz, 118-174 MHz,

406-512 MHz.

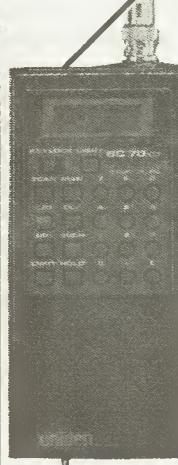
Complete with carrying case, earphone and charger unit.



**£189.99**

### Bearcat 70 XLT

Pocket size scanner with 20 memory scan covering:-  
66-88 MHz, 136-174 MHz,  
406-512 MHz.  
Complete with carrying case, earphone and charger unit.



**£179.99**

**NEW LOW PRICE**

### Bearcat 50 XL

A super NEW low cost handheld scanner with 10 memories and covers:-  
66-88MHz, 136-174MHz, 406-512MHz

**£99.99**



### Bearcat 800 XLT

40 Channel Base Scanner  
Covers: 29-54MHz, 118-174MHz,  
406-512MHz, 806-912MHz.

**RING FOR PRICE**

**JUST ARRIVED**

### Bearcat

**580 XLT £225**

**100 XLT £255**

Both have 100 memory Channels and cover 29-54MHz,  
118-174MHz, 410-512MHz.  
DC supply/charger extra.

**£24**

### CTE DISCONE WIDEBAND ANTENNA

Receive 70-700MHz Transmit 70-500MHz  
Power 500W. 8 Elements/High Quality

**£24**

**SEND FOR OUR BUMPER CATALOGUES  
OF AMATEUR CB, SCANNING ETC.  
ONLY £2 (includes a £2 voucher)**

USE YOUR CREDIT CARD FOR IMMEDIATE DESPATCH

**HOTLINE (0705) 662145**

NEVADA COMMUNICATIONS

189 London Road, North End,  
Portsmouth PO2 9AE. Telex: 869107

# GAREX ELECTRONICS

## WEATHER SATELLITE SYSTEM

This is the genuine MICROWAVE METEOSAT system, 24 hour geostationary (prediction charts not required).

Not to be confused with cheaper, computer add-on devices that normally utilise the VHF Satellites which are only usable for a few minutes at a time.

Our complete plug in and go package requires no computer, no software, and can be up and running, including dish alignment within 10 minutes.

Nothing more to buy: Dish, Microwave Receiver, Frame Store, 12" B/W Monitor AND ALL PLUGS & CABLES £995.95

Expandable to include VHF Satellites and colour. Designed by Timestep Electronics, now supplied by Garex.

## VHF SYSTEMS

VHF Active Antenna + 35mm cable £74.75

VHF 10 Channel Receiver £155.25

Colour Frame Store (suits VHF & Microwave) £454.25

SAE for full details and prices of other 'separates'

\*\*\*\*\* \*\*\*\*\* \*\*\*\*\* \*\*\*\*\*

## GAREX VHF RECEIVERS

The celebrated Timothy Edwards designs now owned & manufactured by GAREX.

★ A simple but versatile design capable of covering spot frequencies in the range 25-200MHz.

★ Excellent sensitivity (typically better than 0.4uV for 12dB SINAD).

★ Double superhet (10.7MHz and 455kHz IFs).

★ Choice of IF bandwidths from weather satellite to '12.5kHz' PMR standards.

★ The basic receiver is single channel crystal controlled.  
Multichannel options.

★ 2 watt audio output stage having a low quiescent current.

★ Size: 153 x 33mm. Requires 10-14v DC supply.

### PRICES:

Stock Versions: (fully assembled, aligned & tested boards) 6m, 4m, 2m & Weather Sat. versions: £49.95

Complete cased versions & special options: details & prices on request. Crystals can be supplied if required; most popular 2 metre frequencies and the currently active Weather satellites are readily available. Crystal prices on request.

Mains power supply module: £15.50

## THE GAREX VHF PREAMPLIFIER

★ Compact size: 34x9x15mm

★ Up to 26dB gain

★ Can be made for any frequency in the range 40-200MHz

★ 3dB bandwidth ±3MHz (at 145MHz)

★ Uses BF981 (0.7dB NF at 200MHz)

★ Input & output impedance 50 ohms

★ 1dB compression: +10dBm

★ Saturated output: +15dBm

★ Supply voltage 8-17v DC at 5-10mA

Stock Versions: (fully assembled, aligned & tested boards) 6m, 4m, 2m, & Weather Sat: £11.45

Other versions: prices & details on request.

## ★ NEW ★ HIGH PERFORMANCE 2 METER PRE-AMPLIFIER

★ 3 band-pass stages for improved selectivity.

★ 16dB gain with 1dB NF.

★ RF switched (failsafe action); gas-filled relays assembled, tested PCB (boxed version on request) £42.50

## Main Distributors for REVCO ELECTRONICS LTD.

Ask for details of the latest REVCO "Whippet" and "Kwikfit" antennas and solderless co-axial adaptors (see PW June 87).

Prices include UK P&P and 15% VAT

Ask for details of our Interest Free Credit



## GAREX ELECTRONICS

HARROW HOUSE, AKEMAN STREET, TRING HP23 6AA

TEL: TRING (04428) 8580

and CHEDDINGTON (0296) 668684

Callers by appointment only

# QRZ



SØRASD was first activated in October last year during a DXpedition by Martti Laine, OH2BH and Arseli Etxeguren, EA2JG. For DXCC purposes, anyone working SØ can submit QSLs for credit from 1st June this year — it counts as "Western Sahara," the same as the former EA9 Rio de Oro. SØRASD is still active, with Naama Zeine-Eddine, S01A, operating.

It was nice to receive several letters commenting on the first two "QRZ" columns which appeared in the February and April *Ham Radio Today*, and also on my "A Class B's Guide to HF" in the March edition. John King, G4VJK, of Horley,

"offending" stations was 9N1RN, AP2SK/9N1, 9X5BJ, VP5EE, CO7AM and FR5DX.

I cannot comment on the other callsigns mentioned, but unfortunately the last-mentioned (who used to be FROFLO) does seem to be

## More HF DX'ing news from Steve Telenius-Lowe, G4JVG

Surrey took me to task somewhat for writing "a few DX stations have been accused of collecting dollars and IRCs and not coming up with the goods (QSL cards when sent direct with return postage) ... I believe these are usually explained by failings in the postal system rather than any deliberate desire to defraud". John listed several examples where he sent QSLs direct, with IRCs, self-addressed envelopes, and in some cases dollar bills to help with postage, but without receiving replies. His list of

one of the few who, frequently, does not "come up with the goods". I know of several people who have had difficulties in receiving a QSL from this station, but in *DX News Sheet* no. 1307 of 2nd March, in the list of QSLs received, was one from — yes — FR5DX. So don't give up, he obviously does have some cards printed and maybe eventually you will receive one, John (though it is probably not worth sending out any more IRCs).

Perhaps one worthwhile tip would be not to put any mention of

"amateur radio" or any callsign on the envelope when posting QSLs to stations, especially those in third world countries. This is because postal workers in some countries are not as honest as those here and they get wise to the fact that people from affluent western countries often send money or IRCs to amateurs, and the letters are often not even delivered. S79WHW once sent my own envelope back to me with his QSL: it had been crudely ripped open across the middle and the contents removed, but, oddly then delivered to him! These things unfortunately do happen, and I do still believe that the number of amateurs who deliberately collect IRCs and dollars without sending anything back is, mercifully, very small.

## Stations Confirmed

During the last few weeks, I have received QSLs from the following DX stations, for QSOs made in the last four or five months: VU4GDG (a colour picture of the Andaman Islands), SØRASD (a full colour folder-card), FJ5BL on St Barthelemy Island in the Caribbean, 7X5AB, ZL7AA on Chatham Island, and CT3EU which is the second callsign of Dick King, G3PFS, from Norfolk, who visits Madeira several times a year. He has a well equipped station there, consisting of an Icom IC-751, IC-2KL 500 watt linear and Hy-Gain "Explorer 14" tri-band beam and is always happy to have a natter, especially with other British stations, except when he is operating in one or other of the contests.

## Gripes

Which brings me to a letter from Mr J D Bolton, G4XPP, of Timperley, Cheshire, who complained somewhat vigorously about



CT3EU is none other than Dick King, G3PFS, when operating from his second home on the island of Madeira. Dick is often found in the contests and also having a natter on the HF bands.

contests and DX stations in general, peppering his letter with phrases such as "crude anatomical protuberances", "bull manure" etc, and suggesting that contestants and DXpeditions be "shot". Hopefully, Mr Bolton's letter is not to be taken too seriously, after all amateur radio is only a hobby and should be fun, but it is true that DXing and contesting does raise high passions. He complains that "mindless brain fever takes over the bands" when an exotic DX station or DXpedition is activated — but you don't have to join in, Mr Bolton, so why get so hot under the collar about it? I have often heard the twenty metre band almost deserted from about 14250-14300kHz when there is a really rare DX station on 14195 and everyone is trying to work it. That leaves a great part of the band free for people just like who are not interested in working the DX stations: really, you ought to be *grateful* to them for coming on! The same applies with contests: most contests are either CW or SSB events only, so even if part of the band is cluttered up by contestants, the other part should be relatively free of QRM. An international agreement has seen to it that the three new WARC bands, 12, 17 and 30 metres, are contest-free, so even, on the very rare occasions when there is a mixed-mode contest on (which, incidentally, I do not like either) you will always find peace and quiet on those bands.

### More on QRP

Mr Bolton goes on to say: "the people I admire most are those who use QRP because in spite of the power mad operators these QRPs prove that you can work anything at anytime given a clear frequency". I would not agree that you can work anything anytime, even using high power, let alone QRP, but has it ever occurred to you that the real skill lies not in the guy using the QRP, but in the guy at the other end receiving it? There is no great skill in sending your callsign to a station which you can hear easily, all the skill is in the "power mad operator" being able to correctly receive a

This DXpedition to the Italian island of Cirella was just one of the many summer expeditions to islands put on specifically for those working for the "Islands on the Air" awards.

### CIRELLA ISLAND

DX EXPEDITION

IOTA EU 87 (39° N - 15° E)



I8 NSK/ID8  
IK8 GGQ/ID8  
I8 AQR/ID8

signal near and often below the noise level. All that QRPs need is persistence. I would not dream of tarring all QRPs with the same brush, but I have often found QRPs' operating standards to be very poor: they have drowned out weak DX stations, often on a difficult propagation path, with their shouts of "QRP! QRP!", in an attempt to work me when I have been in a DX location or in a contest. Now QRP to QRP — that is something different, and I will be the first to congratulate genuine QRP to QRP SOQs, especially DX QRP to QRP contacts.

Despite what you might think, Mr Bolton, there is far more skill involved in contest operating than "the insane bawling of CQ contest, CQ contest"; you have to be a very good operator, have a good knowledge of propagation and unusual band openings, an encyclopaedic knowledge of callsign prefixes and world geography, and exceptionally good ears. Most serious contest operators are not at all bad mannered or ignorant — if someone comes on top of your frequency in a contest and they have a bigger signal than you, you shrug philosophically and QSY, there is no time to be bad mannered if you are operating in the contest seriously. On the other hand, I was once rudely told (not requested) to move off a certain frequency because someone had a sked in fifteen minutes time and expected a clear frequency for it (in the middle of the twenty

OHØ/G4JVG ÅLAND ISLANDS (IOTA EU-02)  
G4JVG/SMØ LIDINGÖ, SWEDEN (IOTA EU-84)



STATION	DATE	GMT	MHZ	MODE	RST
				2xSSB	

PLEASE/THANKS QSL

STEPHEN TELENIUS—LOWE

I operated from the Åland Islands and from Lidingö Island in the Stockholm archipelago and found myself much in demand by the IOTA award hunters.

metre phone band and in the middle of a contest!). The truth is that there are polite and rude operators in all aspects of amateur radio and I don't suppose DXers and contestants are any better or worse than any other type of operator. Don't forget that amateur radio is supposed to be fun, and just because *you* do not like one particular aspect of the hobby it does not follow that everyone else feels the same.

### A Word From The Highlands

Brian Sergeant, GM8KQK near Glasgow, said he enjoyed reading "QRZ" (I hope it may encourage you to get a GMD callsign, Brian) and kindly sent on a report by Paddy McGill, GM3MTH, on some of the eleven special event stations that the Midlanark Amateur Radio Society organised in eight months of 1987. Paddy writes, "The first outside event was from Culzean Castle in Ayrshire for the first of six stations for the National Trust of Scotland — GB2NTS. Operation took place from a glass house at the castle called the orangery. Our normal practice was to set up the aerials on a Friday evening and start operating Saturday morning but this time for some unexplained reason we got all aerials up and sets working in under two hours — we were never able to repeat this time scale again! The director, a real gentleman, sent over our breakfast at 0800 which was very well

received (after operating through the night). The other memory is of my sore feet after standing around dealing with the hundreds of visitors we had, and very little if any sleep. We had the loan of a portable tower from Norman Brown of Beith, Ayrshire. This is manufactured by him under the name of *Tennamast* and is a towable, tilt-over, wind-up tower which we put up to fifty feet with a rotator and a 2 el. Western yagi on top.

Brodick Castle, Isle of Arran — a lot of great memories for this one — firstly a puncture on the way to the ferry, and of course the spare was covered by equipment. It was raining when we got there, but the rain eased off and then the man-eating highland midges came out to feast as it became very humid. It was funny to see six amateurs all dressed up with only their eyes showing, putting up aerials, but the beasties still got to the flesh! This time we had two ladders 20ft each which we joined together and on top placed a stub mast, a rotator and the Western DX32 beam which has worked like a dream and taken a lot of hammering and not complained. It was quite a frightening experience to see this array go up! The rangers looked after us and gave us a trip around part of the thousands of acres the NTS own on Arran, including a mountain. The only vehicle which could do the trip was a Land Rover with four wheel drive using low ratio.

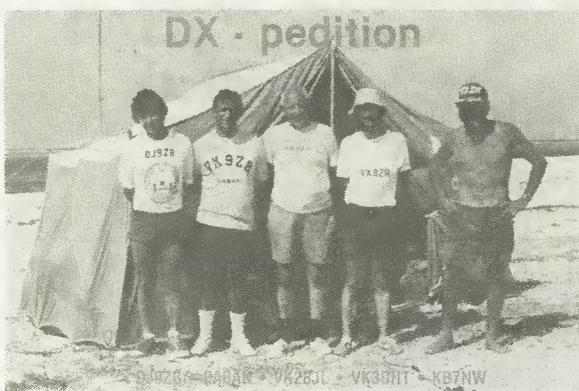
### On to Iona

Isle of Iona, now there's a lovely place and nice people. You get a wonderful feeling of peace, the place is so relaxing. The scenery is lovely and the water round the island has a fantastic green colour. There is plenty to see, from the abbey to the whistling caves. There are no cars allowed on Iona, so all the equipment must be man-handled on and off the ferry, which was christened the "motorised skip", for that is what it looks like. It was blowing a gale and the platform at the front of the ferry was swinging ten feet from left to right over deep water, the waves were covering it at times, and of course it was raining as well. The trick was to wait for the ramp to come onto the runway and at the same time the waves subside and then with a transceiver in your arms jump for it, and back out again and so on until all the equipment to run three stations was aboard. It will take me a long time to forgive the ferry captain for what happened next — we had just got all the gear aboard and I was trying to keep the sets dry from waves coming over the side. The other three members were parking the vehicle, when off he goes with only me aboard and the other three stranded on the Island of Mull! It was rough when we arrived and I had to unload all the equipment in a hurry myself, uphill, and I was on my knees when I finally got all the gear onto the slipway just out of reach of the water line. Fifteen minutes later our host's son arrived with a tractor and trailer and transported it to our destination about a mile from the pier. Another half an hour and my three companions strolled up to the house — we stayed with Mrs Diana MacCormick, a dream of a lady, who let us have the complete run of her home. The food was marvellous, so good things do come to those who suffer for amateur radio!

I would urge your club to have a go at a special event station. All you need is a) an idea, b) a sponsor, c) equipment, d) willing workers (six good lads can run any event). We are lucky at Midlanark to have a great crew of members, but any help I can give anyone, all you have to do is ask. Hope you enjoyed the ramblings of an Irish adopted Scot".

Thanks to Paddy and Brian for

# MELLISH REEF & WILLIS ISL.



VK9ZR

MAY 1982

VK9ZR on Willis Island has been active again recently. The same call was used by this DXpedition in 1982.

this look behind the scenes at some of the very successful special event stations that the Midland Amateur Radio Society has put on recently. I would have loved to have seen Paddy leaping over the deep green water onto the lona motorised skip with a transceiver tucked under each arm — a pity you did not send any photographs!

## DXpeditions

If you want to get a taste of DXpeditions, but cannot afford a trip to Bouvet or Clipperton Island, a special event station, especially on one of the islands around the British coast may be the answer. Many amateurs are working for the various IOTA (Islands on the Air) awards, with require QSOs with stations on certain islands around

the world. Each island or island group is given a reference number, prefixed by the continent, for example EU-13 for the Channel Islands, AS-06 for Hong Kong Island or NA-73 for Ambergris Cay (in Belize, V3). Several island groups around Britain count towards this award, for example, the Farne Islands (off the coast of Northumberland), the Inner Hebrides, and Outer Hebrides, the Orkneys, the Island of Scilly and St. Tudwal's Islands (GW), but others such as the Isle of Wight and even the Isle of Man count only as the British Isles. The IOTA awards programme is administered by Roger Balister, G3KMA, La Quinta, Mimbridge, Chobham, Woking, Surrey, GU24 8AR, who has produced a catalogue of the six hundred or so islands in

the world which count towards this award. It is available for £1 from the above address.

Amateurs interested in the IOTA awards are often to be found around 7095kHz, especially on Saturday mornings, and 14260kHz on Saturday afternoons, but during the summer months, when there are often DXpeditions to many of the European and North American islands, activity can be heard at almost any time during the weekends around these frequencies. When I was in Scandinavia last year and in 1986 I activated Lidingö Island, in the Stockholm group, and also the Åland Islands, and found myself much in demand whenever I went near 14260kHz.

Willis Island, in the outer Australian Great Barrier Reef, is somewhat more exotic than the above places (it also counts for IOTA — OC-07) and has been activated again recently. I heard VK9ZR working mainly Swedish stations up on 14315kHz at 1120 GMT on 13th March. His signal was weak, but fully readable much of the time. This is the same callsign that was used for the DXpedition to Willis Island and Mellish Reef in May 1982.

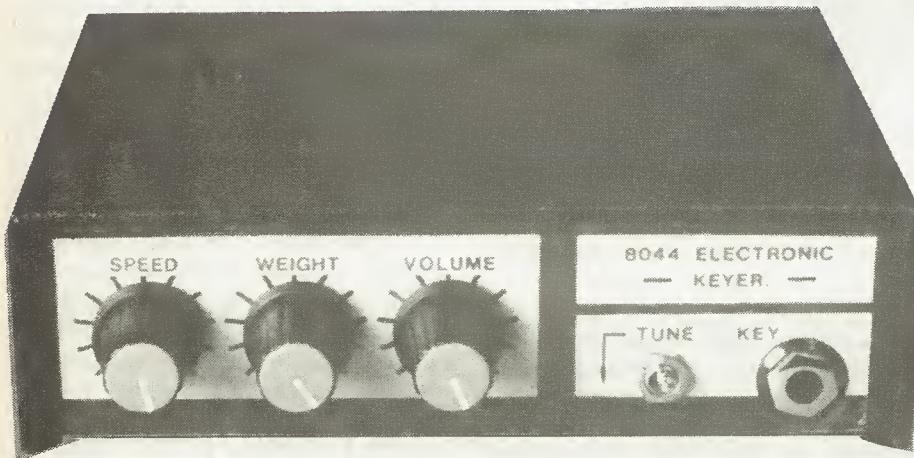
Another rare DX station heard recently was ET3JIN, in Ethiopia, on 21295kHz at 1045 GMT also on 13th March. The operator, who was obviously Japanese, was asking for QSLs via JA1BK a famous Japanese DXer who has been instrumental in activating several very rare countries in recent years. I was not aware that there was any legal activity from Ethiopia at present, but this one sounded genuine enough.

All you CW operators — don't forget the CQ WPX contest on 28th-29th May. This is the CW leg of the WPX contest, the SSB part of which was in March. I hope to be participating in the latter and will give a full report next time. Meanwhile, I would appreciate reports on your activity in contests, what DX you have worked, or if you have organised any special event stations or DXpeditions to islands or elsewhere.

Please send your report and especially photographs of events, stations or antennas to me, Steve Telenius-Lowe, G4JVG, "Penworth", Tokers Green Lane, Tokers Green, Reading, RG4 9EB.



# Electronic Keyer Project



*Sick of your simple up/down keyer? Want to give electronic morse a try? Then why not build this project by Terry Grice, G4PSL*

For several decades morse code has been used as a highly effective means of communication by both amateur and professional radio operators alike. Modest equipment requirements, economical use of the radio spectrum, and for many amateurs the sheer enjoyment to be had, contributed to its continued use.

The straight morse key provides the simplest means of producing morse code and both the amateur and professional morse tests demand the use of this type of key when sending. On passing the test many operators continue to use the straight key, just as many however graduate to some form of electronic keyer. Such keyers allow a more relaxed style of sending and help to reduce operator fatigue during long operating sessions.

## The Electronic Keyer

An electronic keyer is used in conjunction with a single or dual lever paddle unit. Two popular modes of keying exists, the principle

of each is as follows:

i) Bug Mode. This mode of keying may be implemented by mechanical or electronic means. In either case a single-lever paddle is employed,

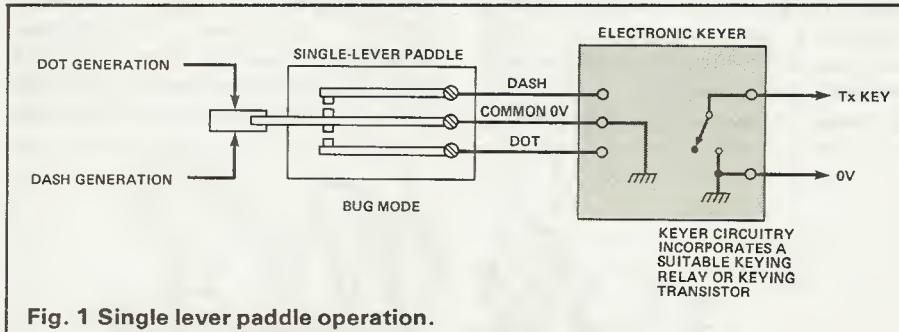


Fig. 1 Single lever paddle operation.

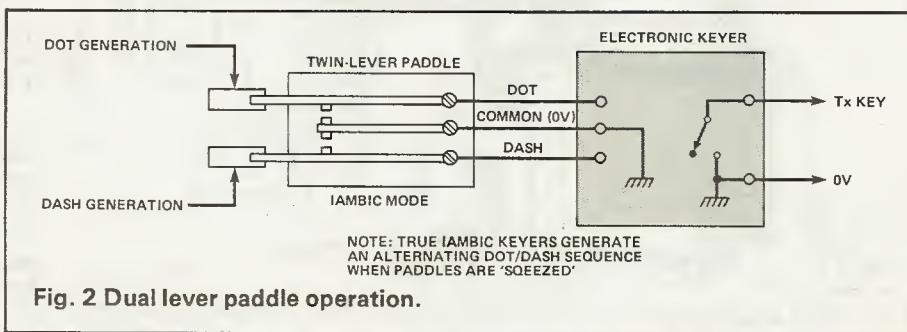


Fig. 2 Dual lever paddle operation.

8044/8044B	
V <sub>SS</sub>	1
DOT KEY	2
R <sub>DOT</sub>	3
C <sub>DOT</sub>	4
C <sub>DASH</sub>	5
R <sub>DASH</sub>	6
DASH KEY	7
R <sub>SPEED</sub>	8
	16 V <sub>DD</sub>
	15 MAN KEY AND WT
	14 KEYED OUTPUT
	13 C <sub>PITCH</sub>
	12 RC <sub>PITCH</sub>
	11 R <sub>PITCH</sub>
	10 C <sub>SPEED</sub>
	9 RC <sub>SPEED</sub>

Fig. 1 Single lever paddle operation.

8044M/8044BM	
V <sub>SS</sub>	1
DOT KEY	2
R <sub>DOT</sub>	3
C <sub>DOT</sub>	4
C <sub>DASH</sub>	5
R <sub>DASH</sub>	6
DASH KEY	7
R <sub>SPEED</sub>	8
C <sub>METER</sub>	9
	18 V <sub>DD</sub>
	17 MAIN KEY AND WT
	16 KEYED OUTPUT
	15 C <sub>PITCH</sub>
	14 RC <sub>PITCH</sub>
	13 R <sub>PITCH</sub>
	12 C <sub>SPEED</sub>
	11 RC <sub>SPEED</sub>
	10 METER

Fig. 2 Dual lever paddle operation.

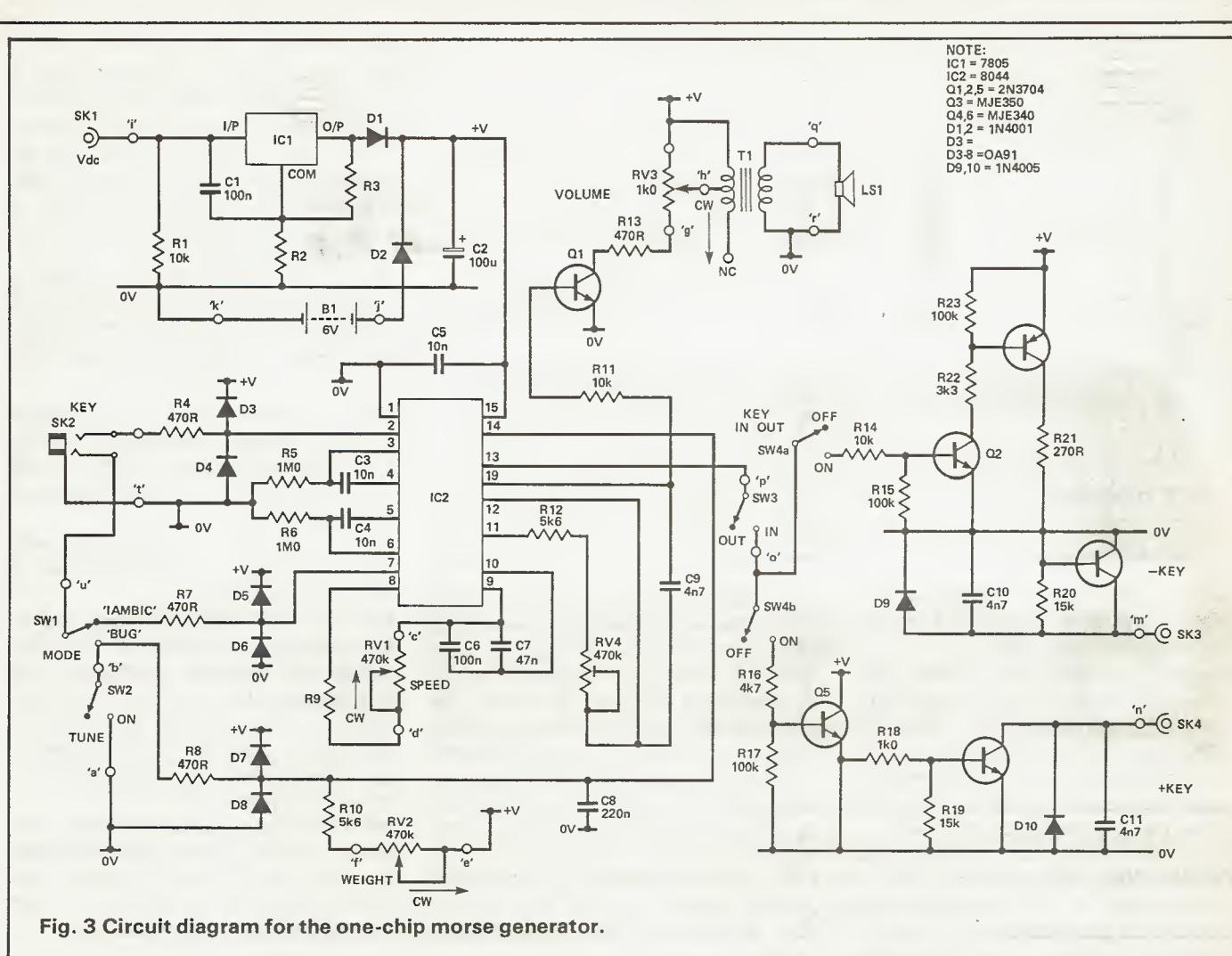


Fig. 3 Circuit diagram for the one-chip morse generator.

'sidesweeping' the paddle in one direction, resulting in the keyer producing an accurately timed string of dots. Dashes however, are produced manually by swiping the paddle in the other direction. The electronic keying arrangement is illustrated in Fig. 1.

ii) Iambic Mode. This more recent mode of electronic keying employs a twin-lever paddle. When the dot paddle is pressed a continuous string of accurately timed dots is produced. When the dash paddle is pressed a continuous string of

accurately timed dashes is produced. If both paddles are closed (squeeze keying) an alternating series of dots and dashes is generated starting with a dot or dash depending on which key is pressed first. A single-lever paddle may be used, however, squeeze keying will not be possible. The twin paddle arrangement is illustrated in Fig. 2.

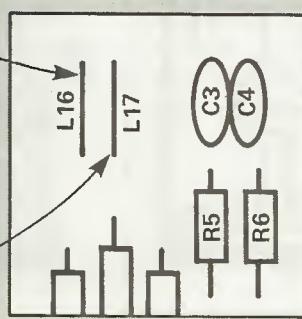
In order to key a transmitter the electronic keyer must incorporate a suitably rated relay which exhibits a sub-millisecond response time or, as is more often the practice nowa-

days, a keying transistor may be used. Two transmitter keying methods are usually catered for, these being 'grid-block' keying — where a negative voltage, often in excess of -100V DC, is switched to ground, and 'positive' keying — where a positive voltage is switched to ground.

### The Curtis 8044 CMOS Keyer IC

The keyer described in this article is designed around the Curtis 8044 integrated circuit, a 16 pin dili

**LINK 6: INSTALLING LK6 CONFIGURES THE KEYER FOR BUG KEYING MODE**



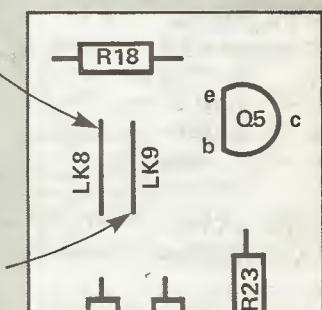
**LINK 7: INSTALLING LK7 CONFIGURES THE KEYER FOR IAMBIC KEYING MODE**

Fig. 4 Link details for permanently selecting iambic or bug mode.

**LINK 8: INSTALLING LK8 SELECTS THE POSITIVE KEYING CIRCUIT**

**LINK 9: INSTALLING LK9 SELECTS THE NEGATIVE (GRID-BLOCK) KEYING CIRCUIT**

Fig. 5 Link details for selecting positive or negative keying.



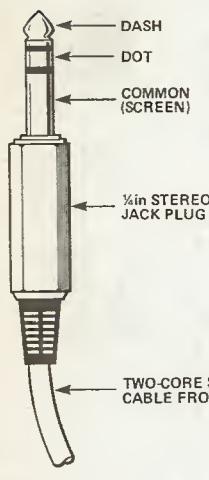


Fig. 6 PL2 wiring.

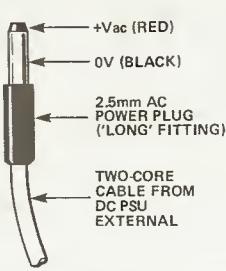


Fig. 7 PL1 wiring.

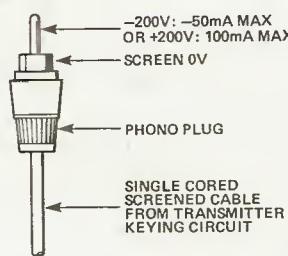


Fig. 8 Keying line wiring.

device specifically designed for iambic operation. The 8044 offers the following features:

- Lower power consumption: Any DC supply voltage in the range 4V to 10V may be used. At 16V DC quiescent current consumption is less than 50 $\mu$ A. This eliminates the need for a power on/off switch even when the unit is battery packed.
- Self completing dots, dashes and spaces: Once a dot, dash or space is commenced it is impossible to prevent its completion at the exact standard length. It may not be extended or cut short by improper key action.
- Dot and dash memories: Dots, and

to a lesser extent dashes may be lost if the operator attempts to 'lead' the keyer, ie. tries to produce a dot whilst a dash is in progress or tries to produce a dash whilst a dot is in progress (due to the relatively short duration of a dot and latter tends to be less of a problem). By incorporating dot and dash memories the operator may lead the keyer by one element. Furthermore, when using a twin paddle key a tap on the dot paddle allows a dot to be inserted into a series of dashes and vice versa.

● Speed control: Using external timing components upper and lower speed limits may be set to suit individual needs.

individual needs.

● Weight control: Perfect morse dictates a dot, space, dash ratio of 1:1:3. By adding a variable resistor this ratio may be adjusted to produce a heavier dot and dash (increased weighting) producing a smoother sound useful for cutting through interference.

● Sidetone generator: This inbuilt audio-frequency oscillator allows keying to be monitored. The audio pitch is controlled by an external RC arrangement.

● Key debouncing: The paddle contacts are debounced internally, the necessary time-constant is set by external values of resistance and capacitance.

● Keying output: This output will source enough current to drive a NPN keying transistor.

● Tune and straight key input: Connecting this input to ground will cause the sidetone generator and the keyed output to turn on. This allows a tune facility to be incorporated. It also allows the keyer to be configured for bug mode or straight key operation.

● RFI immunity: To prevent false triggering by RF on the paddle leads, the dot and dash inputs are connected to internal low impedance pull-up resistors.

## Circuit Description

The complete circuit diagram is given in Fig. 3. The unit may be powered from any external 12V to 14V DC power supply via rear panel mounted sockets SK1. The wiring arrangement for the matching plug

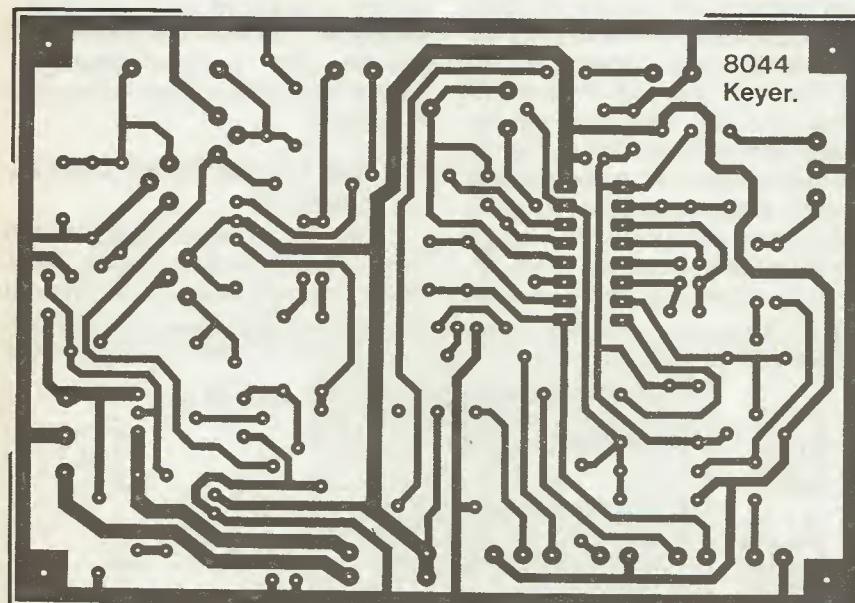
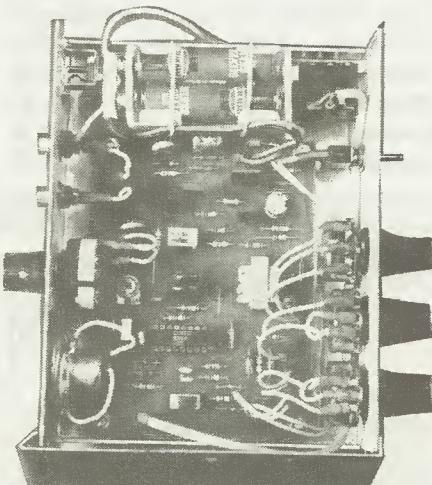
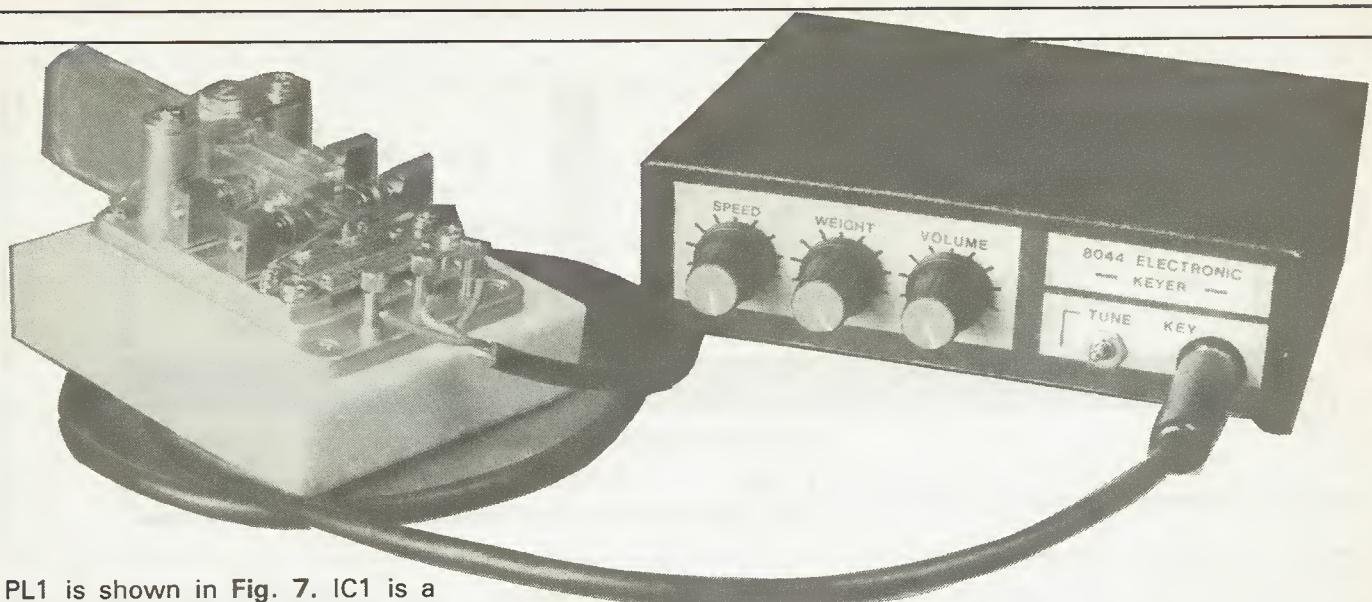


Fig. 9 Full size PCB foil seen from copper side of board.





PL1 is shown in Fig. 7. IC1 is a 7805UC voltage regulator which gives a regulated output voltage of +5V with respect to its common connection. The voltage at the junction of R2/R3 is around +3V with respect to OV. This raises the output voltage to +8V with respect to OV. D1 and D2 form a diode switching circuit with automatically switches out the internal 6V battery power source, B1, when an external supply is connected; upon disconnection the circuit will revert to battery operation. R1 holds IC1 input at OV when no external power source is present. C2 reduces supply rail ripple and C5 decouples IC2.

A single or dual lever paddle can be connected to the keyer via the front panel mounted socket SK2. The wiring arrangement for plug PL2 is given in Fig. 6. D3, D4, R4 and D5, D6, R7 protect IC2 dot and dash inputs, pins 2 and 7 respectively, from static, whilst C3/R5 and C4/R6 provide timing for the internal dot and dash debounce circuitry. SW1 (MODE) is a DIL pcb-mounted switch which allows the keyer to be configured for either iambic or bug mode of operation. If only one mode of operation is envisaged then this switch may be replaced by a pcb link resulting in

reduced construction costs. The necessary pcb link wiring is shown in Fig. 4. When the keyer is operated in bug mode D7, D8 and R8 protect the manual key/weight input, pin 15, against static. C8, R10 and the front panel mounted potentiometer RV2 form the weight control circuit, clockwise rotation of this control adds increased weighting. If this facility is not required RV2 can be omitted and R10 should then be connected to the +V rail. This will be achieved if pcb pins 'e' and 'f' are replaced with a wire link.

Keying speed is controlled by the front panel mounted potenti-

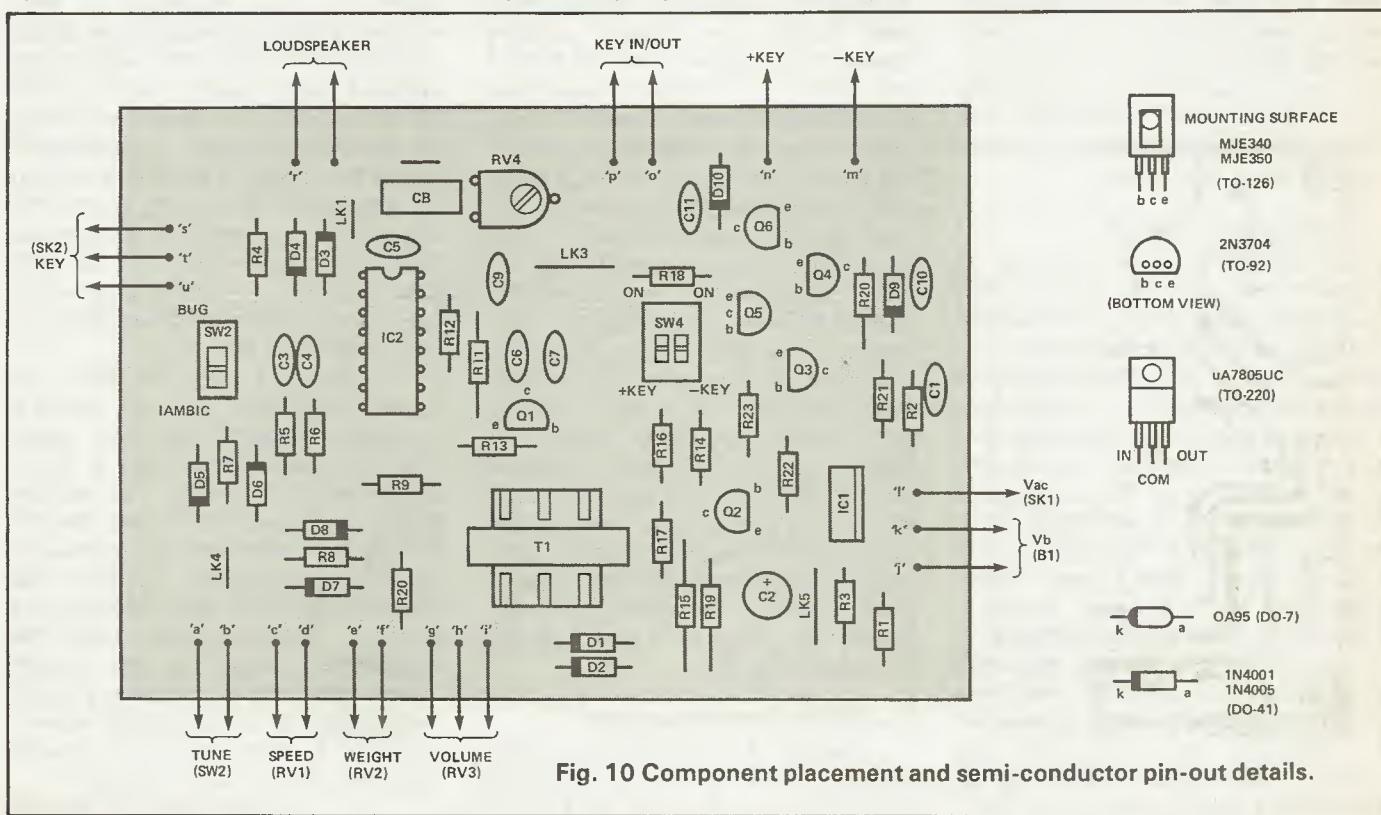


Fig. 10 Component placement and semi-conductor pin-out details.

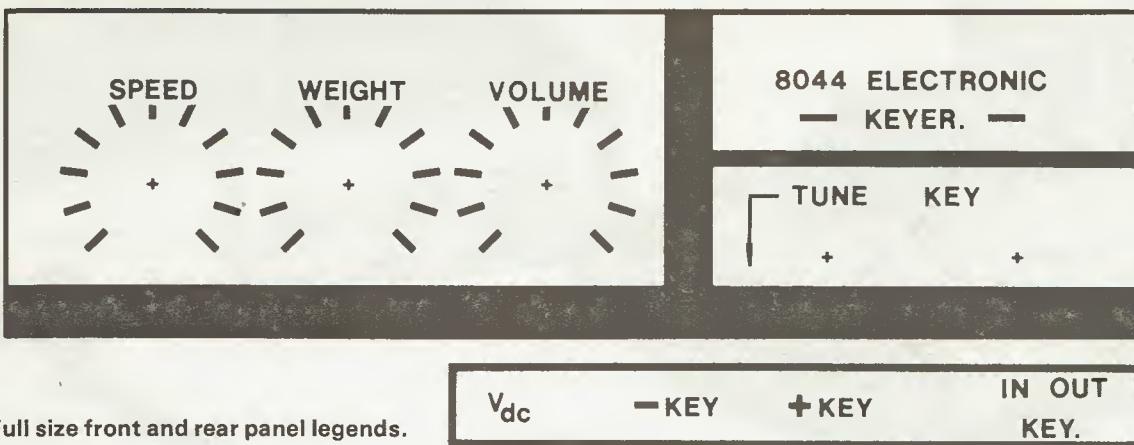


Fig. 11 Full size front and rear panel legends.

ometer RV1 in conjunction with C6, C7 and R9, these capacitors should be good quality mylar for stability. The values shown offer a speed range of approximately 50 wpm.

The sidetone generator output is available on pin 13 and the pitch is controlled by C9, R12 and pcb mounted potentiometer RV4 which may be adjusted to produce the most acceptable note. This tone is fed via current limiting resistor R11 to the base of Q1 which drives the primary winding of the radio matching transformer T1. Sidetone volume is adjusted by front panel mounted potentiometer RV3 and if frequent battery operation is foreseen R13 may be included which limits maximum sidetone current to around 6mA. Increased audio output may be achieved by replacing this resistor with a pcb wire line when maximum sidetone current will increase to 12mA.

### Output Keying

A keyed output voltage is present on pin 14 and in the quiescent state this pin sits at OV whilst a keyed dot or dash sends this output high to +V for the duration of the keyed element. This output may be used to drive either one or both of the discrete transistor keying circuits depending on the settings of SW3 (KEY IN-OUT) and SW4 (KEY SELECT). SW3 is mounted on the chassis rear panel and when switched to the 'out' position, neither of the keying circuits is driven. SW4 is a dil pcb mounted dual spst switch although wire links may be installed in place of a switch if preferred, the necessary pcb connections are shown in Fig. 5. With SW3 and SW4a closed, grid-

block keying is possible, R14/R15, R22/R23 and R20/R21 forming base bias networks for Q2, Q3 and Q4 respectively. When the voltage on pin 14 goes high, base drive is applied to Q2 causing all three transistors to saturate in rapid succession. This results in the transmitter being keyed to ground by Q4 via the rear panel mounted socket SK3. The maximum recommended values of grid-block voltage and current are -200V and -50mA for 'key-up' and 'key-down' conditions respectively and D9 protects the keying circuit against inadvertent reverse voltage connection across Q4-C10 is a high voltage ceramic decoupling capacitor. When SW3 and SW4b are closed positive keying is possible, with R16/R17 and R18/R19 providing base bias for Q5 and Q6 respectively. When a high voltage is observed on pin 14, Q5 and Q6 saturate rapidly, keying the transmitter to ground via the rear panel mounted socket SK4. Maximum recommended 'key-up' and 'key-down' values are +200V and +100mA respectively; D10 protects the keying circuit against incorrect polarity connection across Q6 and C11 is a high voltage ceramic decoupling capacitor. When the front panel mounted switch SW2 (TUNE) is closed both the keying output and the sidetone output of IC2 produce a continuous output in order to facilitate transmitter tuning. (The wiring arrangements for plugs PL3 and PL4 are shown in Fig. 8).

### PCB Construction

Details of the artwork and component layout for the single sided pcb are provided in Figs. 9, 10. The

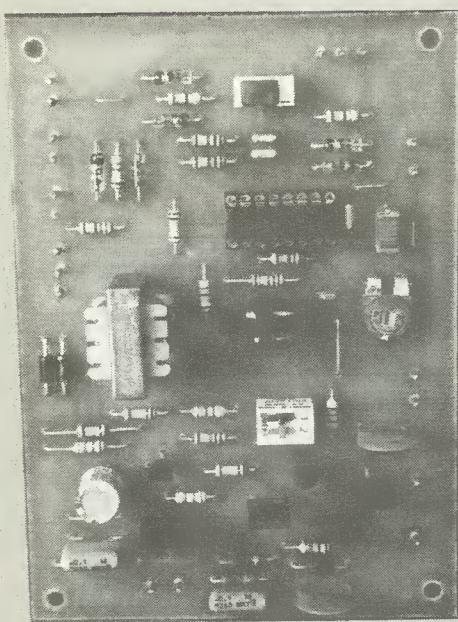
pcb holes for RV4, D9, D10, IC1, all power transistors and veropins need to be drilled 1mm diameter and all the remaining holes are drilled 0.8mm diameter. The four pcb fixing holes should be drilled to provide M3 clearance.

Commence assembly by soldering the twenty one veropins and five pcb links into place. Install and solder down resistors R1 and R23 along with capacitors C1 to C11, observing the polarity of C2. Next fit variable resistor RV4, transformer T1, pcb switches SW1 and SW4 soldering each into place. If the switches are replaced by hard-wiring the links, these are best soldered onto veropins so permitting wiring changes to be made with ease at a later date. Mount and solder a good quality sixteen pin dil IC holder onto the board checking for correct orientation. Do not install IC2 at this stage, it should remain in its anti-static packaging until final assembly is complete. Observing polarity, install diodes D1 to D10 and connect a suitable heatshunt (eg. a crocodile clip) to each leg in turn soldering into place.

Transistors Q1 to Q6 and voltage regulator IC1 are the last components to be installed, again observe polarity and use a heatshunt when soldering. Throughout assembly, component leads may be trimmed off after each component is soldered into place; bending the legs over by about forty five degrees prior to soldering will keep the component close to the board. When assembly is complete a visual inspection of the board is recommended to ensure that no solder bridges exist between tracks.

Continues next month

## Parts List and Costing



### RESISTORS

R1, 11, 14	10k
R2	180R
R3	220R
R4, 7, 8, 13	470R
R5, 6	1MO
R9, 15, 17, 23	100k
R10, 12	5k6
R16	4k7
R18	1k0
R19, 20	1K5
R21	270R
R22	3k3
RV1, 2	470k pot lin
RV3	1k0 pot log
RV4	470k hor. s-min preset
All 0.33W 5% carbon film	

### SEMICONDUCTORS

D1, 2	1N4001
D3 - D8	OA95
D9, D10	1N4005
TR1, 2, 5	2N3704
TR3	MJE350
TR4, TR6	MJE340
IC1	uA7805UC
IC2	8044

### MISCELLANEOUS

SW1	pcb dil SPDT single
SW2	sub-min toggle SPDT
SW3	rotary 1-pole 12-way
SW4	pcb dil SPST dual
SK1	2.5mm power socket
SK2	1/4" stereo jack socket
SK3, 4	phono socket
PL1	2.5mm 'long' power plug
PL2	1/4" stereo jack plug
PL3	phono plug (black)
PL4	phono plug (red)
T1	audio transformer
LS1	LT700
	48mm 8 ohm loudspeaker
	IC holder 16 pin
	battery box 6V
	battery clip PP3

### CAPACITORS

C1	100nF ceramic
C2	100uF 16V elect
C3, 4, 5	10nF ceramic
C6	100nF mylar
C7	47nF mylar
C8	220nF polyester
C9	4n7 ceramic
C10, C11	4n7 500V ceramic

It's easy to complain about advertisements. But which ones?

Every week millions of advertisements appear in print, on posters or in the cinema. Most of them comply with the rules contained in the British Code of Advertising Practice.

But some of them break the rules and warrant your complaints.

If you're not sure about which ones they are, however, drop us a line and we'll send you an abridged copy of the Advertising Code. Then, if an advertisement bothers you, you'll be justified in bothering us.

  
**The Advertising Standards Authority.**  
**If an advertisement is wrong, we're here to put it right.**  
**ASA Ltd, Dept 2 Brook House, Torrington Place, London WC1E 7HN**

This space is donated in the interests of high standards of advertising.

# FT-747 Economy Rig

## REVIEW



At the 1987 Leicester Exhibition, Yaesu proudly unveiled a prototype sample of the FT-747 transceiver, details of which were revealed in the Jan 88 issue of *HRT*. The exhibition team met with Mr. Hasegawa and Mr. Yokoi of Yaesu, chatted for a

### Features

The set covers all the HF amateur bands of 1.8MHz-29.7MHz, with USB, LSB, CW and AM modes of operation. Crystal filters of 500Hz (CW), 2.2kHz (SSB), and 6kHz (AM) are fitted as stand-

**Yaesu breaks new ground with their brand new economy HF rig. Chris Lorek, G4HCL, investigates – has cost-cutting meant corner-cutting?**

while, and 'Voila' — the first production set to land in the UK came under immediate scrutiny!

As technical complexity increases, rigs tend to get more and more expensive, however, at the moment this set is the cheapest HF multiband rig on the market, selling at £659. As such it is around the same price as a VHF mobile multimode (never mind a VHF base station) so the Class B amateur who's just passed the morse test, and is looking for a trade-in may not be too hard done by. As an alternative to a 'basic' second-hand HF rig or as a starter rig it could be ideal, the brown cardboard box that arrived at the HCL abode was opened in anticipation.

ard; the 2.2kHz SSB filter may also be switched in for general CW tuning and for AM reception in crowded band conditions. FM capability may also be added as a plug-in option, this having its own 8kHz wide filter suitable for 10kHz or 12.5kHz channel spacing. A general coverage receive facility is also provided which lets you listen over 100kHz to 30MHz continuously if you fancy a little light relief with the propaganda broadcast stations after listening to 20m operators complaining to each other about the QRM everyone else is causing!

A maximum 100W transmit output power is provided, the set being powered from an external 13.8V DC supply drawing 19A

maximum. Optional power supplies are of course also available, the FP700 is a 'standard duty' unit suitable for normal SSB/CW and reduced power FM/Data, or the FP-757HD 'heavy duty' model for full-power RTTY/AMTOR rag chewers and the like. As you might expect, there are few 'frills' to be found, such as RF processors and VOX (voice-operated-transmit switching on Tx) or such niceties as IF shift or notch controls on Rx. The set does however, have an all-mode squelch fitted for quiet monitoring or scanning around, and a noise blanker and RF attenuator is fitted to improve reception when the QRM gets tough. As will be seen later, computer enthusiasts also have some extra little features fitted as standard that increase the set's versatility:

### Frequencies and Memories

The front panel of the set sports an uncluttered array of controls, rocker switches control the operation mode (USB, LSB, CW etc.) and VFO/memory switching. The large tuning knob rotates in soft 'click step', stepping the operating

frequency in 25Hz increments in normal tuning use on SSB/CW, 1kHz steps on AM, and 5kHz steps on FM. By pressing the 'fast' button, this modifies the steps to 2.5kHz, 10kHz and 12.5kHz respectively for fast tuning around when looking for signals or QSYing from one part of the band to another. To get from one part of the spectrum to another, a press of the 'band' button alters the rotary tuning knob into a band-change control, stepping in 500kHz increments over 100kHz to 30MHz. The main knob also functions as a receive clarifier control with a ±9.975kHz range to keep track of drifting stations, and a 'lock' button is provided to prevent accidental frequency shifts. Semi-break in operation is provided for CW use with sidetone from the speaker, an internal potentiometer sets the delay time.

### VFO's

Two digital VFOs, A and B are fitted, these may be used independently or in 'split' mode where one is used for transmit and the other for receive, (vital when chasing the latest DX expeditions to virtually-unknown islands in the middle of the Pacific!). Twenty memory channels are fitted, each storing simplex or split Tx/Rx frequencies; mode, and scanning status, in memory mode the tuning dial is used to select the required memory channel. A single button push allows you to transfer the VFO frequency to memory and indeed vice-versa, if you're operating split VFO the memory channel automatically stores this for you. Any or all of the selected memories may be scanned for activity in conjunction with the squelch control, the set halting for five seconds on a memory that has a strong enough signal to raise the squelch. A 'priority' scan is available where a preset frequency is briefly sampled for activity every few seconds while you're listening to another frequency.

A large backlit LCD (Liquid Crystal Display) shows the operational frequency, memory channel, operation mode and scan mode, 'busy' (squelch raised), split frequency operation, clarifier, frequency lock, and band tuning mode. A small internal speaker is fitted behind a grille on the front

panel, next to this is an eight pin mic jack accepting an optional hand or desk microphone, Up/Down/Fast buttons on the mic also allowing you to QSY around as an alternative to the tuning knob.

### Computer Connections

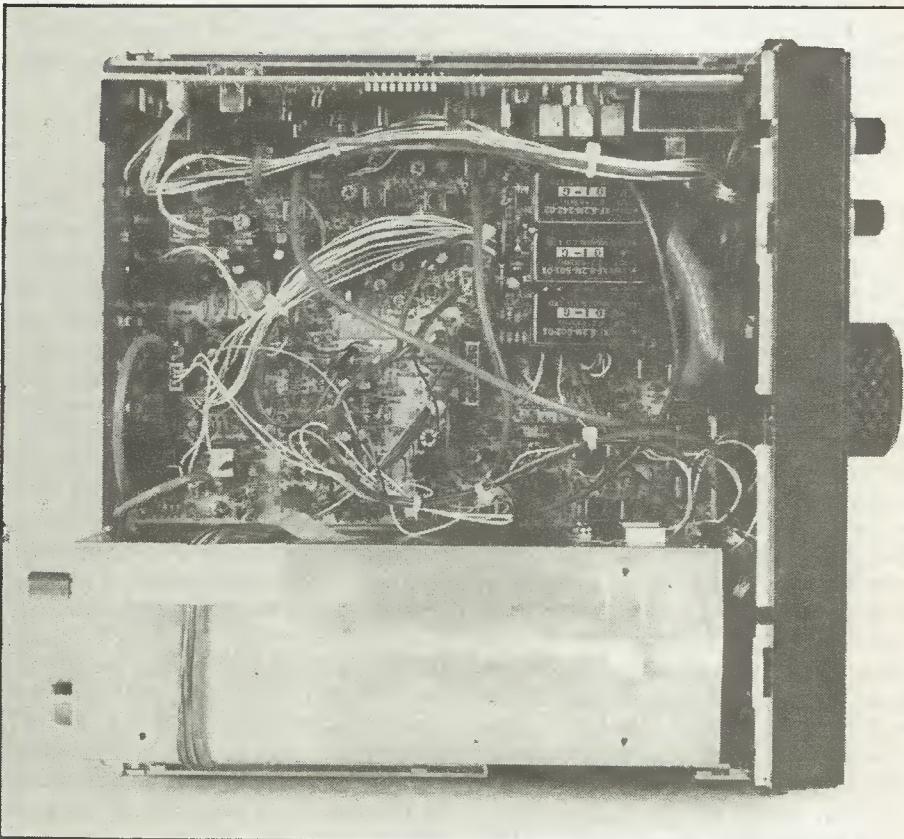
If you're a computer whizz kid, and you'd like an endless number of memories together with remote control of the Rx and Tx frequency and selection of the operating mode and memory channel, Yaesu have fitted their CAT (Computer Aided Transceiver) circuitry as standard. This uses TTL level serial data signals at 4800baud, 8 data bits with 2 stop bits and no parity; several pages of information with worked examples are given in the supplied manual on this subject. Optional computer interface units also permit connection either to standard RS-232C devices or alternatively direct to an Apple computer. Further sockets are fitted to the rear panel for connection of a Packet TNC (Terminal Node Controller) or RTTY terminal unit for the amateurs who like to let their fingers do the talking as well as the tuning.

Other connections to be found at the rear of the set include a phono jack fixed level AF output for tape recording or digital demodulators, external ALC (Automatic Level Control) for output power reduction, PTT input and Tx output switching, TTL level bandswitching signals for optional linear amplifier or aerial tuning unit control, and the usual external speaker, CW key, DC power and aerial connectors.

The set measures 238mm(W) × 93mm(H) × 238mm(D) and weighs 3.3kg. A hinged stand is fitted at the front of the set to allow it to be tilted upwards for base station use, a mobile mounting bracket is also available as an optional extra if required. The set comes supplied with a fused DC power lead, spare fuses, and an operational manual.

### In Use

On unpacking the box, I must confess I was a little surprised at the very light weight of the set, on closer inspection I found that the case was actually made of internally metallised plastic rather than pressed metal, could this be a new trend in transceivers going in same direction as computers have?



Conventional 'chipless' design with a modular PA/fan unit means easier servicing.



The rear panel features a variety of data interfaces in addition to the standard controls.

Reading through the instruction manual was very refreshing, Yaesu seem to have written this with the beginner in mind as well as the experienced HF operator, with advice on how to use the set correctly rather than just how to control it. For instance, "Avoid changing frequency during transmission. First return to receive, then do your tuning!" and "Never start transmitting (except into a dummy load) without first listening for a few minutes to make sure the frequency is clear, and then transmit your call-sign. This prevents accidental interference to other stations". This may sound rather obvious to you, but possibly not to a newcomer eagerly trying out a HF set for the first time.

In the shack I connected the set to my 25A power supply and started to have a tune around on the bands using a variety of aerials. I first tuned into the SW broadcast bands while reading the manual and the first thing I noticed was a very sharp cutoff between one station and the next. Comparing this with one or two other transceivers having general coverage facilities, and indeed my own FRG7700 receiver, put the 747 in rather a good light! The AM crystal filter was certainly very useful, I was pleased to be able to copy weak and watery broadcast signals which I normally would have been struggling with, very nice. After having read and thoroughly digested the manual to the melodic tunes of Radio Sweden and the like, I progressed onto the amateur bands to talk to the world.

As the 'set' does not come supplied with a microphone, I tried both the standard Yaesu hand mic I

keep in my shack and my full-blown desktop graphic equaliser/compressor mic that I normally have connected up to my FT-107M HF rig. When having the odd ragchew QSO on the LF bands of 80m and 160m I received very good audio reports, but I did occasionally find it hard going on 20m under QRM conditions unless I used the compressor mic. This really is due to the fact that I have been used to a built-in RF speech processor which the FT747 doesn't have, but performing a quick comparison between the two rigs with no RF compression in fact showed identical performance on transmit.

### On Receive

On receive I experienced no problems in blocking effects from adjacent strong signals, even when operating at night on 40m without the RF attenuator, but the band did seem a little more 'noisy' than what I was used to. The background 'mush' level was that bit greater and was not improved with the attenuator, hence not being caused by intermodulation mixing effects (where several strong signals mix and combine in the receiver circuits to produce other unwanted signals). A much closer test where I slowly tuned up to a strong AM carrier showed a gradual increase in noise level, suggesting synthesiser reciprocal mixing caused by limitations in the internal oscillator noise. I am however, being very critical here, as one must remember it is basically a budget set!

After having my fill of vocal modulation and being a believer in

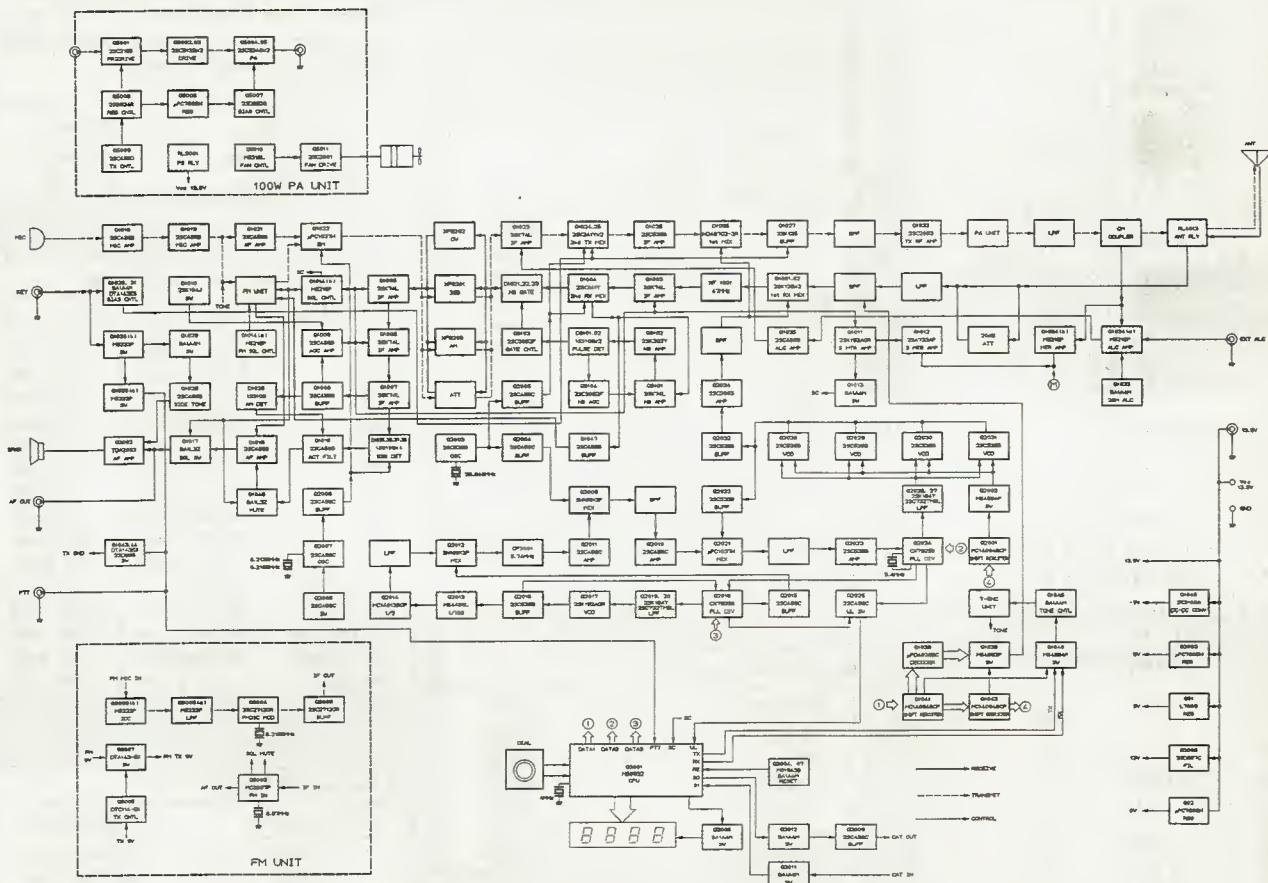
effective spectrally-efficient digital communication, I decided to see how the set's plastic case stood up to the presence of adjacent computer RFI 'hash', and whether the internal case metallisation was really doing its stuff. Coupling my all-mode terminal unit to the set gave very good results, I left the set tuned to the packet radio segment of 20m and watched all the international mailbox information rapidly filling my monitor screen. I had many successful contracts, and once received a nice surprise when HI8EL (Dominican Republic) decided to connect to me in heavy QRM conditions after seeing my callsign floating around on the air!

In use, the integral cooling fan only came on after I had been transmitting for around a minute or so, and was fairly quiet in operation. The metal section on the rear panel did get quite warm though as this forms part of the PA heatsink. I found the internal speaker to be perfectly adequate for normal listening and I never needed the volume control to be above the 25 per cent mark showing there was ample to spare for the odd stint of mobile operation and the like. The position of the speaker, ie. on the front panel, also helps quite a bit by directing the sound where it's needed, at the operator rather than onto the table top.

### Inside the Box

The set is very easy to open up, I managed to gain access to all the insides in less than two minutes. The circuitry is made up of two main RF boards, the screened PA unit with its internal fan, and a digital control board fitted to the front panel. You can easily get access to both sides of the RF circuit boards for fault-finding and repair purposes, the notable lack of dreaded 'chip' components together with an easy-to-get-at layout also suggests easy repair by the individual rather than returning the set to one's dealer for a minor fault.

To quote an example, a few service engineers will know that for some time Yaesu have used a filament light bulb in the receiver aerial path to prevent severe damage to the front end circuitry from high voltage pulses such as storm-induced static. From my limited personal experience of 'looking at'



Block diagram of the new FT-747, showing the optional FM unit and the 100W PA version.

sets that have suddenly gone faulty belonging to amateur friends, this bulb has a habit of blowing frequently, and is such a simple thing to replace if you know about it and can get to it. For the first time to my knowledge Yaesu have actually given clear details in the user manual on where this is and how to replace it, positioning it in an obvious place, so there's no excuse for the average owner not getting the soldering iron out!

The block diagram shows the general theoretical circuit arrangement used, the receive signal being filtered and fed straight into a pair of 2SK125 FETs in the first mixer, producing an IF of 47.055MHz. A monolithic dual crystal filter follows to provide roofing selectivity, further mixing to 8.215MHz follows where the main selectivity takes place in the large multi-pole crystal filters. The transmit signal is also generated at the second IF, being

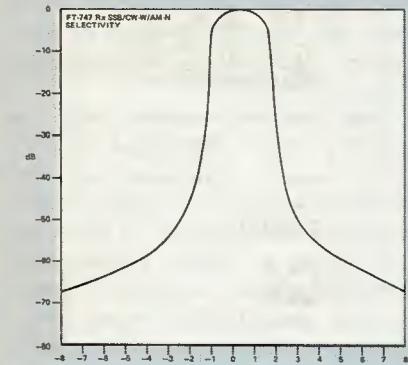
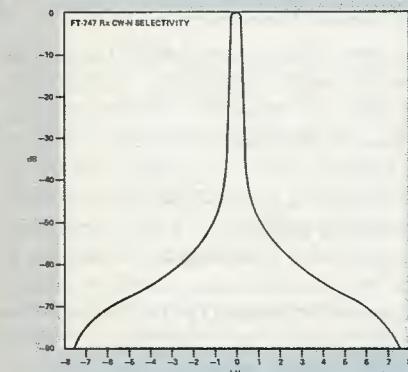
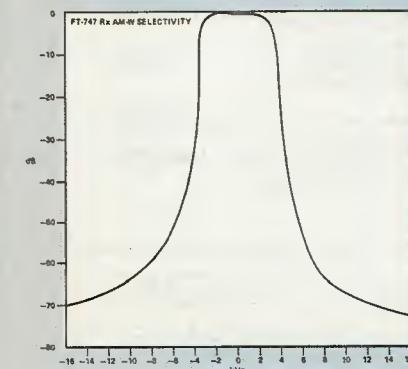
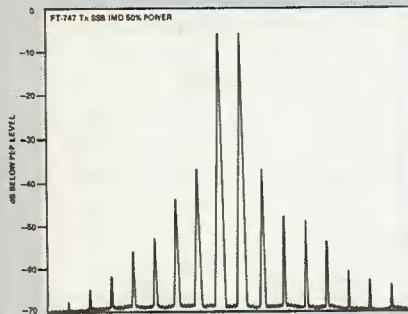
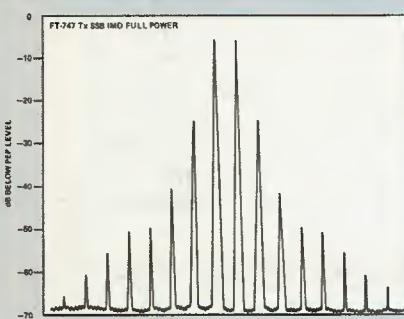
mixed to final frequency and amplified by a pair of 2SC3240 transistors in the 100W PA. The usual multi-loop synthesiser controls four VCOs to cover the tuning range in octave segments, an M50932 CPU provides the overall transceiver control.

### Laboratory Tests

The measured receiver sensitivity was reasonably constant throughout the HF coverage range, just starting to tail off at 29MHz. The blocking performance was very good, better than I would have expected from the set, especially broadcast-band rejection in the presence of weak amateurs. In all, the dynamic range of the front end circuitry was very good, but the set did fall down on its close-in selectivity as witnessed from the single-signal selectivity plots I took. This is due to synthesiser reciprocal mixing effects, where superimposed noise

on the voltage controlled oscillator mixes with adjacent unwanted signals to produce on-frequency noise. In its intended use I believe this would not be a real problem, if you're going to start serious contest operating and the like with monster aerials then watch out. However, if you're in that league, you'll probably be prepared to pay far more than the FT747 price for your main transceiver! When tuning close into a strong unmodulated signal I could detect no 'birdies' caused by synthesiser frequency breakthrough which is very good.

The transmit power was remarkably well regulated at the 100W mark right across the frequency range, the current drawn being just under 19A at 13.8V when transmitting a 100W carrier. The harmonic outputs were well down, only on the 24MHz band did I manage to find a pair of spurious outputs, separated from the main



## Laboratory Results

### Receiver

Sensitivity Input level required to give 12dB SINAD		
Freq. MHz	SSB/CW	AM
1.8	0.211	0.901
3.5	0.242	0.993
7.0	0.251	1.08
10.05	0.286	0.990
14.0	0.251	0.862
18.0	0.304	0.980
21.0	0.219	0.925
24.5	0.265	0.945
28.5	0.295	1.13
29.5	0.330	1.50

**Blocking** Measured as increase over 12dB SINAD level of interfering signal, unmodulated carrier (SSB/CW), causing 6dB degradation in 12dB SINAD on-channel signal

Spacing	Level
+50kHz	92dB
-50kHz	91dB
+100kHz	99dB
-100kHz	99dB
+200kHz	106dB
-200kHz	107dB

**Image Rejection** Increase in level of signals at the first IF image frequency, and the IF frequency itself, over level of on-channel signal to give identical 12dB SINAD signals

Freq. MHz	Image Rej.	IF Rej.
1.8	9.75mV 93dB	1.56mV 77dB
3.5	5.18mV 87dB	2.13mV 79dB
7.0	5.74mV 87dB	3.01mV 82dB
10.05	4.61mV 84dB	3.93mV 83dB
14.0	4.31mV 85dB	4.41mV 85dB
18.0	3.97mV 83dB	7.75mV 88dB
21.0	3.05mV 83dB	6.67mV 90dB
24.5	2.18mV 78dB	1.51mV 75dB
28.5	1.99mV 77dB	1.33mV 73dB
29.5	1.86mV 75dB	1.28mV 72dB

### Transmitter

**3rd Order Intermodulation Rejection** Increase over 12dB SINAD level of two interfacing signals giving identical 12dB SINAD on-channel 3rd order intermodulation product

Spacing	Level
50/100kHz	87.5dB
100/200kHz	87.5dB

### S-Meter Linearity, 14.25MHz

Indication	Sig. Level	Rel. Level
S1	2.10uV pd	-25.4dB
S2	2.90uV pd	-22.6dB
S3	4.56uV pd	-18.7dB
S4	7.32uV pd	-14.6dB
S5	10.7uV pd	-11.3dB
S6	14.2uV pd	-8.8dB
S7	19.9uV pd	-5.9dB
S8	29.8uV pd	-2.4dB
S9	39.3uV pd	Odb ref
S9+10dB	122uV pd	+9.8dB
S9+20dB	253uV pd	+16.2dB
S9+30dB	599uV pd	+23.7dB
S9+40dB	2.67mV pd	+36.6dB
S9+50dB	18.3mV pd	+53.3dB
S9+60dB	132mV pd	+70.7dB

### S-Meter S9 Level

Freq. MHz	Sig. Level
1.8	45.6uV pd
3.5	40.1uV pd
7.0	37.9uV pd
10.05	44.5uV pd
14.0	39.3uV pd
18.0	43.5uV pd
21.0	36.6uV pd
24.5	39.7uV pd
28.5	42.0uV pd
29.5	57.4uV pd

### TX Power

Freq MHz	Max. Power
1.8	98W pep
3.5	100W pep
7.0	99W pep
10.05	98W pep
14.0	98W pep
18.0	98W pep
21.0	98W pep
24.5	97W pep
28.5	98W pep
29.5	97W pep

### Harmonics/Spurii

Freq. MHz	2nd	3rd	4th	5th	Spurri
1.8	-63dBc	-60dBc	<70dBc	-70dBc	<-70dBc
3.5	<-70dBc	-70dBc	<70dBc	-70dBc	<-70dBc
7.0	<-70dBc	-70dBc	<70dBc	-70dBc	<-70dBc
10.05	-65dBc	-65dBc	<70dBc	-70dBc	<-70dBc
14.0	-66dBc	-66dBc	<70dBc	-70dBc	<-70dBc
18.0	<-70dBc	<-70dBc	<70dBc	-70dBc	<-70dBc
21.0	<-70dBc	<-70dBc	<70dBc	-70dBc	<-70dBc
24.5	<-70dBc	<-70dBc	<70dBc	-70dBc	-58dBc
28.5	<-70dBc	<-70dBc	<70dBc	-70dBc	<-70dBc
29.5	<-70dBc	<-70dBc	<70dBc	-70dBc	<-70dBc



Clean and uncluttered front panel with clear LCD readout make the '747 an attractive rig to beginner or old hand.

carrier by  $\pm 2\text{MHz}$ , the set was otherwise extremely clean. The SSB intermodulation distortion, the amount of 'spreading' of the signal, was quite reasonable for a power

amplifier operating from 13.8V.

### Conclusions

This set seems to me to be an ideal 'starter rig', it offers reason-

able performance for a very reasonable price indeed. Remember that you also need to budget for a 19A DC power supply and a microphone to enable you to use the set. It isn't up to the class of £1,000 plus sets in its facilities but until recently that was all there was available in new rigs for the HF starter to buy. It is only let down by the reciprocal mixing performance of the synthesiser. The easy access for servicing is a very welcome step, a definite reversal of the trend some 'black boxes' are taking where if it goes wrong then it's back to the dealer!

Yaesu have, I believe, taken another pioneering leap at providing a cost effective set with basic overall facilities but having nice 'extras' such as multiple crystal filters included as standard. At one time the FT757 was the set for HF starters, I believe the FT747 will be just as popular, this time fulfilling a need for an economy rig, a need that has been around for quite a while.

*My thanks go to South Midlands Communications Ltd. for the loan of the review set.*

## ENTERPRISE ERA APPLICATIONS LTD.



E.R.A. Ltd., 26 CLARENDON COURT,  
WINWICK QUAY, WARRINGTON WA2 8QP  
Tel: (0925) 573118



## GET MORE ENJOYMENT FROM YOUR H.F. LISTENING!

IF YOU THOUGHT THAT RECEIPTION OF AN RTTY WAS COMPLICATED & REQUIRES LOTS OF EQUIPMENT THEN HERE'S THE ANSWER - THIS SMALL SELF CONTAINED UNIT IS FULLY AUTOMATIC AND SIMPLY CONNECTS TO YOUR SETS HEADPHONE OR SPEAKER SOCKET. NO INTERFACES PROGRAM TAPES OR VDU'S REQUIRED.

### LEARNING MORSE?

THE BUILT IN TUTOR IS SIMPLY THE BEST THERE IS. SEE WHAT IT SENDS OR PLUG IN YOUR KEY TO SEE WHAT YOU SEND! IN FACT IT'S SO GOOD WE SELL MORE TUTORS TO CW OPERATORS THAN THOSE LEARNING FOR THE FIRST TIME.

SEE REVIEW SEPT. '87 HRT OR RING FOR DETAILS.

## R.A.S. (NOTTINGHAM)

G6XBH  
G1RAS  
G8UUS

Radio Amateur Supplies  
Tel: 0602 280267



### Visit your Local Emporium

Large selection of New/Used Equipment on Show

#### AGENTS FOR:

F.D.K.  
AZDEN  
ICON  
YAESU  
ALINCO  
KENPRO

#### ACCESSORIES:

Welz Range  
Microwave Modules  
Adonis Mics  
Mutek Pre-Amps  
Barenco Mast Supports  
Agents for VODAPHONE & CELLNET

AERIALS: Tonna, Halber, Jaybeam, New Diamond Range of Mobile Whips  
Bring in your secondhand equipment for sale

JUST GIVE US A RING

Monday: CLOSED Tuesday-Saturday: 10am to 5pm

3 Farndon Green, Wollaton Park, Nottingham NG8 1DU  
Off Ring Rd, between A52 (Derby Road) & A608 (Ilkeston Road)

## QUARTZ CRYSTALS SAME DAY SERVICE

Any frequency from 2MHz to 55MHz. Orders received before 10 am are completed and posted THE SAME DAY! Just let us know; frequencies? holder sizes? circuit conditions? (i.e. series resonance or load capacitance). Just £9.50 inc. post and VAT. Cash with order or use our credit-card hotline

0703 848961.



McKnight Crystals

Amateur Radio Division (Dept Q)  
Hardley Industrial Estate, Hythe, Southampton SO4 6ZY  
Tel: 0703 848961 Telex: 47506 Fax: 0703 846532



# The TS-940S from Kenwood



It's not like me to be at a loss for words, but what can I say about the TS-940S which hasn't already been written in glowing terms by reviewers and users the world over. It must be significant that so many top amateur contest operators use the TS-940S in preference to anything else, because it's in contest conditions that a transceiver has to prove its ability. As Peter Hart said in his review for Radio Communications magazine:- "Both transceivers (he was testing the TS-930S as well) gave a most impressive performance when used on the air. This encompassed operation in several taxing contests such as 7MHz SSB and CW, CQ WW 160M, and ARRL. The receive performance was excellent in all respects, giving clean results with no trace of overloading on the lower frequency bands. The synthesisers were the best that I have ever used, both tuned like analogue VFOs with no trace of steps at low tuning speeds, and clicks were virtually non-existent."

He also went on to make general comments about the transceivers:- "On ssb transmit, with the TS-940S, excellent quality reports were received with the MC-42S microphone. The speech processor added real punch to the signal without distorting. The cw note was perfect, with a total absence of clicks on both semi and full break-in."

And he wasn't alone. Chris Lorek concluded in his H.R.T. review:- "Throughout the extensive on-air testing I grew more fond of this transceiver than any other I have operated. I was sorry to see it go. This does not often happen and I think it will be a while before I find a better set of its kind." As you read comments like this I think that you can begin to get some idea of the regard in which the TS-940S is held, but you may ask why Kenwood equipment is so appealing to almost every user, be they professionals like Peter Hart and Chris Lorek, or the chap who just enjoys the hobby of amateur radio. There is no simple answer, but Kenwood certainly put every effort into researching not only the "state-of-the-art" technology, but also how to make that technology easy to use by the operator of the equipment. This of course you can only appreciate by sitting down in front of the rig, so please go along to one of our branches or your nearest Kenwood approved stockist to see if the Kenwood approach

appeals to you. There's a simple test which I use myself when confronted by a new piece of equipment, and that is to try and use it without reference to the handbook - no I don't mean leave the key down with no aerial connected, just see if everything falls to hand. You will be amazed how easy this will be with the TS-940S, and also how difficult it can be with some other transceivers.

For complete details of the TS-940S, Kenwood produce a 12 page full colour brochure which tells you why I can't get all the message across in this small space. Why not clip the coupon on this ad. and ask for full details of the TS-940S and also the complete Kenwood catalogue. Although I mentioned before that the Penny Black was not adequate to cover postage these days, I am prepared to accept mint, unused copies of the Twopenny Blue. If you have the odd block of six lying around I may even swap you for a TS-940S.

One last point; you are considering spending a lot of money when you buy a TS-940S. For heaven's sake get it from an approved dealer and not from the "shady" sources. I have just had to console one poor chap who foolishly bought a TS-440S from such a source and sent it back to the supplier for repair. Six weeks later it had not been repaired, "We don't have an engineer" they said, and there is now a possibility that it has mysteriously disappeared.

Caveat Emptor.

John Wilson  
G3PCY/5N2AAC

**TS-940S £1995 inc. VAT**

Glasgow: 4/5 Queen Margaret Road.

Darlington: 56 North Road.

Cambridge: 162 High Street, Chesterton.

Tel. 041-945 2626

Tel. 0325 486121

Tel. 0223 311230

Cardiff: c/o South Wales Carpets, Clifton Street.

Tel. 0222 464154

London: 223/225 Field End Road, Eastcote, Middlesex. Tel. 01-429 3256

Bournemouth: 27 Gillam Road, Northbourne.

Tel. 0202 577760

Note: All our shops open Tuesday to Saturday inclusive.

**FREE**

Information is free; only the Post Office demand payment for handling it - and the Penny Black is no longer used. Send us £1 to cover Post and Packing and we will return not only the full colour Kenwood catalogue, but details of any particular rig you mention and lots of other information including latest prices.

## The RZ-1 from Kenwood



The RZ-1 from Kenwood is one of those receivers which doesn't fit into any of the usual categories, simply because it's unique. No-one has produced a scanner like this before, and judging by the demand it is something many people have been waiting for. 500kHz to 905MHz, AM, FM (narrow and wide), 100 memories which store frequency, mode, and even a text announcement which reminds you what was the station you programmed into channel 89 . .

The review by Chris Lorek really tells the whole story, but if you want a leaflet on this exciting new idea from Kenwood, you need only ask.

The price has settled out at £465, and the RZ-1 is currently available from stock - but hurry before the in-car entertainment chaps find out about it.

RZ-1. Something new, something unique, almost irresistible.

ps. We stock an interesting range of scanners including the new AR800 hand held which covers 75-105, 118-174, 406-495, and, wait for it, 830-950MHz. Keypad entry, extremely small, and priced at only £199. Amazing.

## HF-125 all mode receiver



We are understandably proud of the way the HF-125 has been received all around the world. We now have HF-125s in use in 14 different countries, and the receiver is being praised everywhere for its performance and quality. Not only is it being used world-wide, it's also being reviewed. A respected German reviewer says "The HF-125 is a serious piece of equipment, don't be deceived by the unassuming front panel and the lack of 'spectacular' features. The HF-125 will outperform most competitors. If you like an honest approach to receiver design, this is it: British Understatement at its best." That's a well balanced view from an internationally recognised expert, Rainer Lichte.

To show the care we tried to take over every detail, the same reviewer also says "Talking about manuals, this 24 page booklet is one of the best guides I've seen in years".

Mind you, he also comments on the somewhat plain appearance of the front panel, but of course we put the development money where we thought it should be - in the performance.

It may look different, but in the HF-125 you have a receiver which will comfortably outstrip competition in the real area where it matters - in use, on the air, listening to real signals.

And it's still only £375 inc. VAT.

Happy listening.



Last month I told you a little about the NRD-525 receiver, but more about the background to the JST-125 saga, and why we didn't sell it. I was surprised to find out that some people didn't actually know that we were an appointed JRC distributor, but that's our fault for not making it absolutely clear. The chap selling the discontinued JST-125 is of course what is euphemistically called "independent" of any connection with us.

The demand for the NRD-525 information was quite overwhelming; so much so that we ran out of colour leaflets and had to resort to photocopies, a thing I never like doing. Still, it's better to have the information in three tone grey and black than not at all. New brochures on the way soon which will hopefully include more details of the new JST-135. Sounds exciting from the advance news we get from the factory, and there are many examples of the JRC approach to providing really useful facilities such as

automatic tracking notch filtering and ECSS capability on AM receive. Add to that the full transceive function with the NRD-525 (unlike the interim JST-125), and you can imagine our eagerness to see the first samples of what we know is going to be a great new transceiver.

The NRD-525 information pack includes a lengthy review by a well respected German engineer, and it is really worth reading. The independent viewpoint is so valuable in assessing the truth about equipment, provided one can spot the reviewers personal "quirks", but in the case of the NRD-525, all comments are complimentary. I'm sure you will agree when you have the opportunity to handle the receiver at one of our branches.

Happy listening.

## The NRD-525 An extraordinary receiver

NRD-525 £1195 inc. VAT

## LOWE ELECTRONICS LTD.

Chesterfield Road, Matlock, Derbyshire DE4 5LE  
Telephone 0629 580800 (4 lines) Fax 0629 580020

# Kenwood TH-25E

## REVIEW



The amateur looking for a 2m or 70cm hand portable nowadays has a rather wide choice, this was rather different a few years ago when the TR220OGX shoulder-carried transportable set was quite a revolution. Nowadays portables come in all shapes and sizes, Kenwood currently offer their tiny TH-21E and TH-41E thumbwheel-controlled sets, together with the larger TH-205 and TH-215 series

for those who prefer something a little more chunky together with scanning facilities and the like. Their latest offering, which just hit our shores a few weeks ago, is the TH-25E 2m set, offering an array of

(1.6MHz on the TH-45E) repeater shift is available, selected by a small push button on the rear panel an adjacent 'Rev' button allows you to quickly check the repeater input frequency to see if you can hear your

*The 2m hand portable market is highly competitive these days – Kenwood have recently launched their latest offering to lure potential purchasers. Chris Lorek, G4HCL, takes us on a guided tour of the latest box of tricks*

facilities in a tiny package. Does it come up to the usual Kenwood performance we asked? Well try one they said, so here we go....

### Features

The TH-25E set covers 144-146MHz as standard and a similar looking TH-45E 70cm set covering 430-440MHz will also be available soon. The set measures 137.5(H) x 58mm(W) x 29.5mm(D) with the supplied 7.2V 600mAh Ni-Cad, as such it is virtually identical in overall size to counterparts from Kenwood's competitors. With the 7.2V Ni-Cad it gives a nominal 2.5W output with a switchable 0.5W low power level, an optional 600mAh 12V Ni-Cad steps up the maximum power to 5W. Further 7.2V Ni-Cad packs are available, a small 200mAh version for ultra-compact use, and a larger 1100mAh type for long duty applications such as all-day outdoor exercises. If you plan on travelling around where no recharging facilities exist, an empty battery case housing six standard AA cells is also available.

The set may cover the band in selectable 5kHz or 12.5kHz steps, a small click-step rotary tuning knob on the top panel controls the operating frequency in the selected step size, with a small 'MHz' button allowing you to quickly QSY from one part of the band to the other in 1MHz steps. The usual  $\pm$  600kHz

QSO partner direct. A switchable on/off auto-toneburst provides a half second 1750Hz tone at the start of your transmission for repeater access, or alternatively this may be internally linked to provide a 'push for tone' facility which nowadays is more suitable for UK usage. There is room inside the set for a plug-in optional CTCSS encoder/decoder, using the existing radio controls for operation, this option however, may or may not be available for purchase in the future so I would advise checking first with your supplier if this is important to you.

### Memories

Fourteen memory channels are available, storing frequency repeater offset, toneburst on/off and CTCSS function. A double button push also allows you to transfer any memory channel into VFO mode and hence allow you to manually QSY from it as you wish. Memory channels thirteen and fourteen may be used if you wish to program any Tx/Rx frequency split, useful if you want to transvert onto 70cm for instance. An internal lithium back-up battery retains your programmed memory information when the set is switched off. Scanning of the memories for a busy channel is possible by keeping the 'MR' (memory recall) button pressed for more than one second and any of the channels may be locked out of scan mode as

required to save it locking up on busy repeaters. Likewise a complete bandscan in the selected step size is possible in VFO mode by keeping the 'VFO' button pressed for one second. In each case the scan stops as soon as the receiver squelch lifts, ie. when a signal is found, and resumes five seconds later regardless of squelch state unless you manually halt it by pressing any of the push buttons or the PTT key. Multiple tone frequencies accompany most of the key depressions, these may of course be disabled if you get fed up with playing tunes on the radio!

### Bleep Bleep, You Called?

One novel feature provided with the set is a 'Tone Alert' system. Pressing the 'T.ALT' button mutes the radio speaker and lights a small 'bell' symbol on the LCD. When the receiver squelch raises, the set emits a series of bleeps lasting around five seconds, and sets the 'bell' symbol flashing until you press the 'T.ALT' button again to switch the radio back into normal operation. Who needs a pager!

To make your Ni-Cads last a little longer on quiet channels, a receiver economiser comes into operation ten seconds after the last key operation with the squelch closed. Unless the radio is in scan mode, this switches the receiver 'on' for 200mS every second, this mode being halted by any key operation or when the receiver squelch opens. As a further measure against flattening your

batteries by forgetting to turn the set off after use, an automatic 'power down' occurs after one hour of no received signals, the LCD giving you a suitable display to show you what has happened. One minute before this occurs, the set beeps at you to give a warning just in case you are indeed using it at the time!

The LCD panel shows the operating frequency to the nearest kHz together with selected memory channel, repeater offset, auto toneburst on/off, CTCSS mode and frequency, Rx busy, and relative receive strength and battery level on transmit via a bargraph along the bottom. Further small arrow and dot markers indicate scan and VFO modes and the selected tuning step size. Concentric rotary squelch and volume controls are fitted on the top panel alongside the BNC aerial connector, a side mounted PTT panel also has an LCD illumination switch and Rx 'monitor' switch incorporated, the latter raising the set's squelch to quickly check for weak signals or to defeat the CTCSS if fitted. A sliding bar on the front locks all the switch functions apart from those on the PTT panel to prevent accidental frequency shifts. A small 'Hi/Low' slider switch is fitted to the rear panel for transmitter power selection, and a pair of jack sockets are provided on the side of the case to enable an external speaker/mic to be connected.

The set comes supplied with the 600mAh 7.2V Ni-Cad and a slide-on mains powered charger, a helical

whip, belt clip, wrist strap, and a small rubber cover fitting over the jack sockets to prevent the rain getting in. The manual gives clear user instructions with operating examples, and includes circuit and block diagrams. A range of optional accessories include soft carrying cases, speaker/mic, a headset with PTT and VOX (voice-operated Tx switching), and even a water resistant bag if you plan to take the set along when cruising on your luxury yacht.

### On The Air

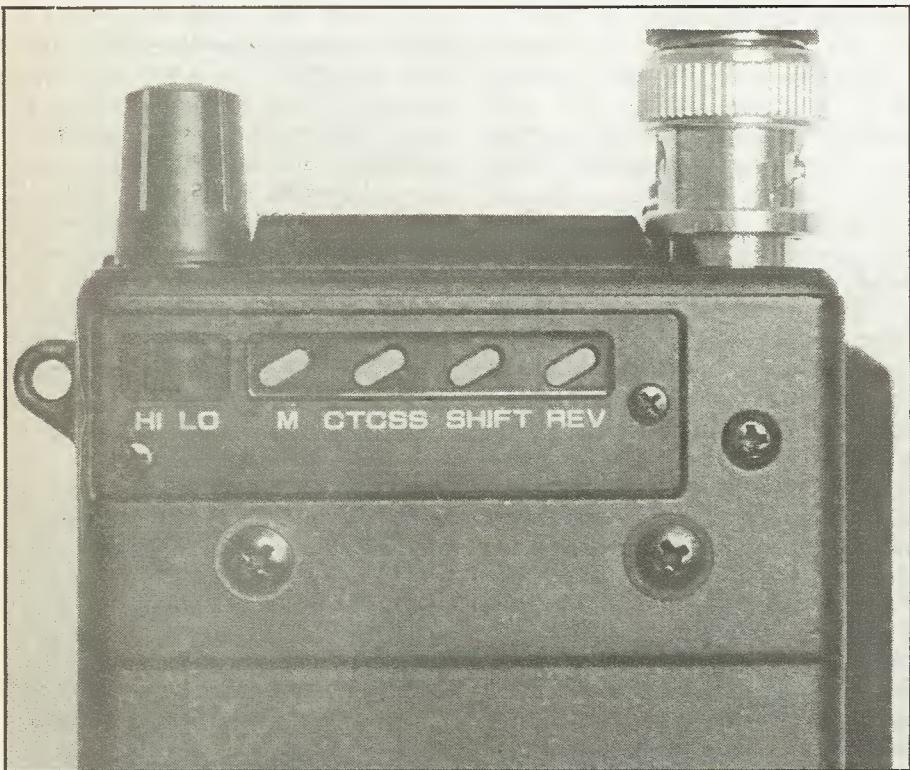
After charging the Ni-Cad, I switched the set on for an initial tune around and immediately thought that propagation conditions were 'up' from the signal levels I received from distant repeaters using the set's short 'rubber duck' helical. Similarly when attempting my first QSO into a 'local' 50km distant repeater, I was pleased to get a fully readable report back only to find I had been using the set switched to low transmit power? After admitting to myself that I'd better read the instruction manual, I set about programming the memory channels with its help. The fourteen channels were just about the right number to fit all the repeater channels together with the calling channel and a few local 'net' frequencies.

Kenwood provide a quick memory 'initialisation' method for the first ten channels where you may set the VFO to a given starting frequency and then automatically program ten channels in selected 12.5kHz or 25kHz steps upwards from your 'start' frequency. For instance by setting the VFO to 145.600MHz with 600kHz Tx shift, you switch the set off, press and hold the VFO button whilst switching on, and you instantly have all the repeater channels programmed for you — nice one Kenwood. I'm also very glad that the makers have allowed for a linkable 'push for tone' button for 1750Hz repeater access in place of their usual switched on/off burst, this being far more useful than an auto toneburst in my opinion.

As some areas, including my own, use 'odd' net channels on 10kHz steps dating from days gone by, I found it was possible to select 12.5kHz steps, store channels using



Close-up of the top panel controls and LCD.



Detail of the tiny rear panel controls.

these in some of the memories, then re-initialise the set with 5kHz steps and store channels using these in a couple more of the memories without upsetting the set. Although not stated in the manual, by shifting from memory to VFO mode you also transfer the tuning step size which some operators could find rather convenient.

### Out and About

I then set off on my merry way, the set accompanying me on shopping trips and other outings together with the odd car and coach journey. I found the small helical aerial very efficient in getting the transmit signal out and together with the apparently very good receive sensitivity I found that I could have the odd QSO in areas where my usual 2m portable had difficulty. When using the set all day, I was pleased to find the Ni-Cad lasted very well, I could have several QSOs combined with many hours of receive only operation without a recharge. Coupled with the small size, the set proved to be very handy — I wish I had smaller fingers to operate the buttons and knobs though! The rotary tuning control was very handy, far more 'user-friendly' I felt than various push buttons or keypads, I did however, find that it sometimes changed channels

before I felt a click from it, hence I needed to look at the display whilst tuning to make sure I knew where I was.

When occupied around the house and listening out on a quiet frequency for a pre-arranged call I found the 'tone alert' more than just a gimmick. The mid-volume but strangely-penetrating 'bleeps' certainly stood out above the usual background family noises, and if I was out of audible range then a glance at the flashing 'bell' symbol would tell me that activity had been present on the channel in my absence. When operating in environments such as on the road or in the middle of a town centre, I felt the available audio output from the speaker was only just sufficient without the set going into virtually unreadable distortion, I sometimes had to hold the set to my ear in these cases to understand what was being said. In normal use, fine, but I would recommend an external speaker if you were thinking about using it as a dual-purpose set in your car as well as out portable. Remember also that because the economiser cannot be disabled, use of the set for some modes such as packet radio could also be limited.

To add a final operating comment, I once left the set switched on in my shack without an aerial

attached, only to return a few hours later to see a large 'Po OFF' message on the display; no it wasn't the radio telling me what it thought of its treatment, but that it had gone into 'power down' mode. An intelligent radio compensating for a fallible human operator!

### Inner Workings

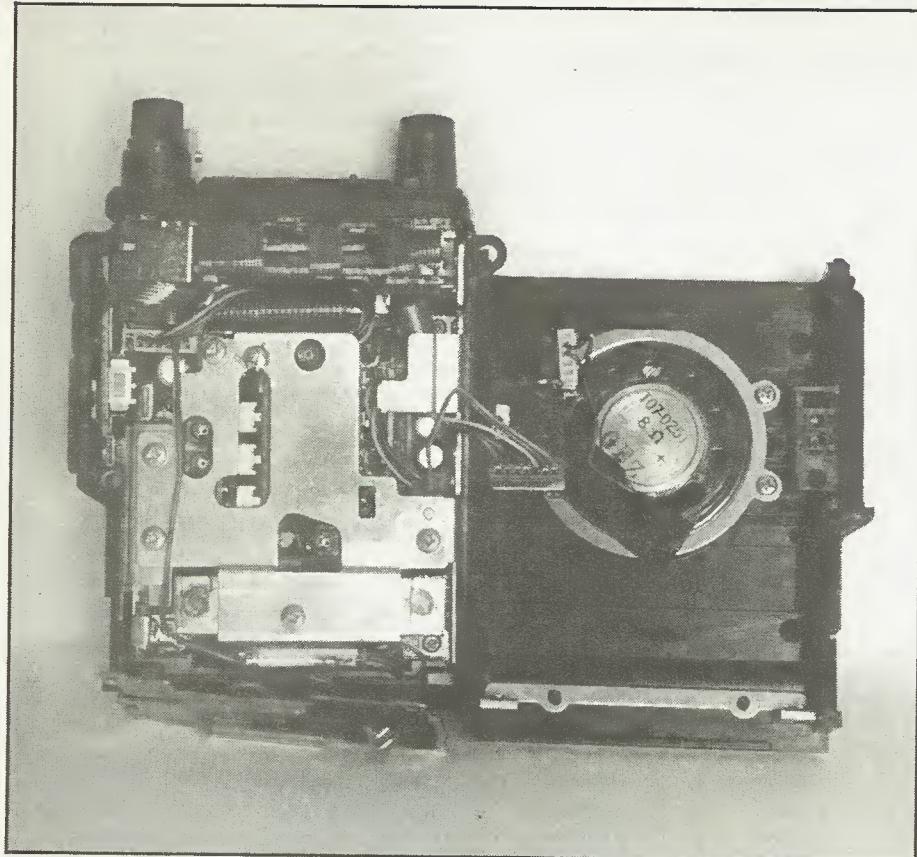
A three-piece moulded black plastic case houses the internal circuitry and opening the set up revealed all this to be extremely well screened. The use of several PCB circuit 'blocks' rather than large board construction suggests that fault finding and repair may be limited to individual board replacement, a sign of the times perhaps!

The usual dual conversion superheterodyne is used on receive, with IFs of 16.9MHz and 455kHz. Out of band selectively is achieved with a two-stage elliptic low pass filter common to transmit and receive at the aerial connection point, followed by a bandpass filter preceding the RF amplifier and three varicap tuned bandpass stages following it. A standard PLL synthesiser generates the first local oscillator, feeding the mixer to generate the 16.9MHz first IF, where a pair of monolithic dual crystal filters provide the main part of the adjacent channel selectivity. Further conversion to 455kHz follows using a TK10487M subsystem IC, and a CFUM455E ceramic filter provides further selectivity.

On transmit a separate VCO (directly modulated by processed transmit audio) is amplified and fed to an M57796MA power module, low power being achieved by varying the preceding driver supply voltage. There is no RF detection circuitry, power regulation being performed instead by sensing the current drawn by the PA. A multi-legged uPD75108 microprocessor commands the set's many functions, including tone generation on key depressions and the transmitted toneburst.

### Laboratory Tests

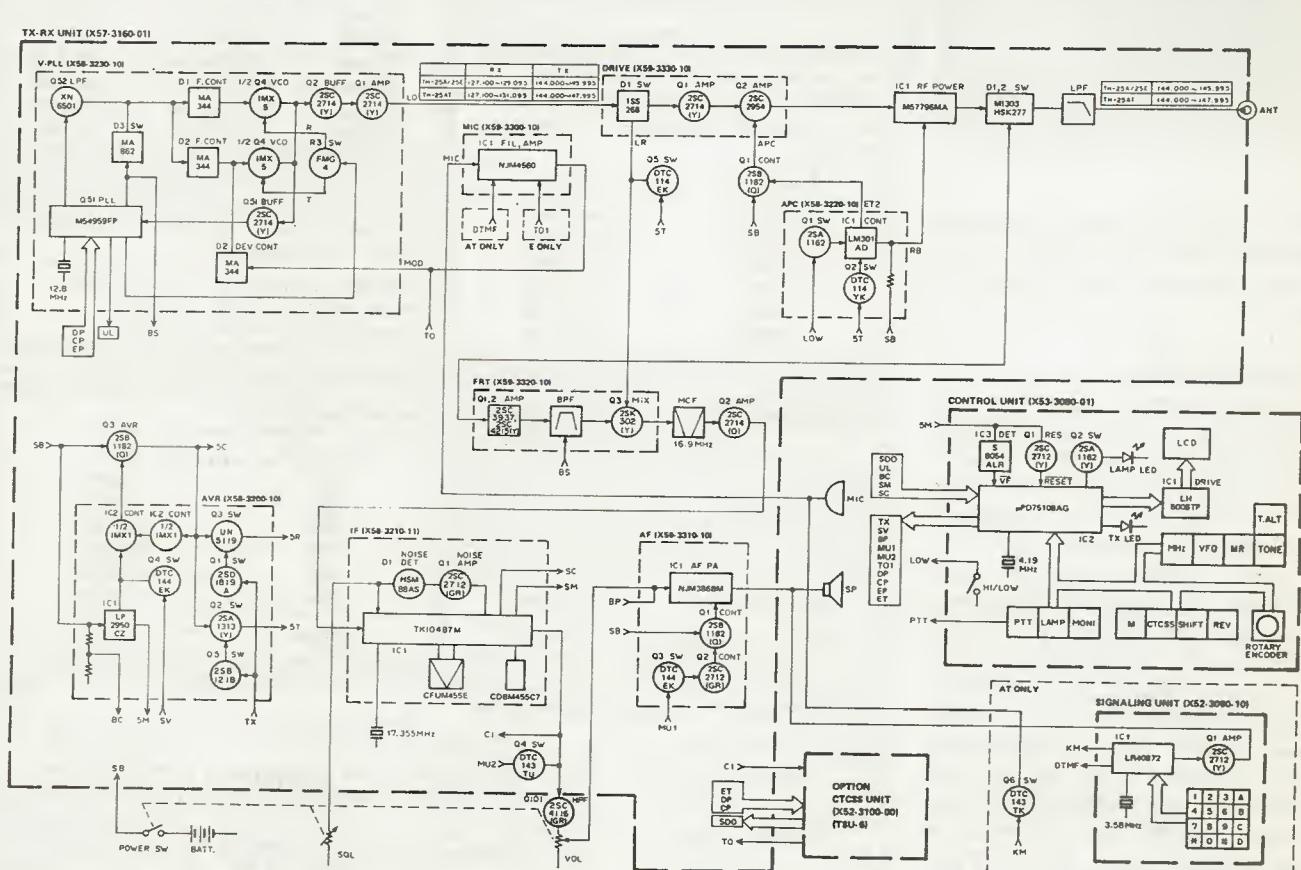
The measured receive sensitivity shows the set to be very good indeed, in fact it is far more sensitive than many mobile and base stations that I have come across. Surprisingly the strong signal per-



Rear view of the set.

formance doesn't seem to have suffered from this, being what I would have expected from a set designed for use primarily with higher gain aerials. The measured audio output power confirmed what I had found in practice and this didn't improve with increased supply voltages. The adjacent channel selectivity was very good for a portable, and a reasonable degree of rejection of  $\pm 12.5\text{kHz}$  spaced signals was also found making it usable in congested areas providing all the other stations keep their deviation down! The S-meter gave a better than normal dynamic range than I would have expected, some portable sets being virtually useless in this respect.

On transmit a reasonably clean output was provided with no discernible spuri apart from harmonics, normally I would have expected to find the odd 'nasty' coming out at a crystal related offset from the carrier but no so, all the internal screening must be doing its stuff. The current consumption on high power transmit was quite



Internal view, showing the well screened internal circuitry.



## LABORATORY RESULTS

### Receiver

Sensitivity Input level required to give 12dB SINAD

Freq	Level
144MHz	0.126uV pd
145MHz	0.123uV pd
146MHz	0.129uV pd

#### Squelch Sensitvity

Threshold	0.049uV pd	<2dB SINAD
Maximum	0.138uV pd	16dB SINAD

Adjacent Channel Selectivity Measured as increase in level of interfering signal, modulated with 400Hz at 1.5kHz deviation, above 12dB SINAD ref. level to cause 6dB degradation in 12dB on-channel signal

Spacing	Level
+12.5kHz	36.5dB
-12.5kHz	37.0dB
+25kHz	74.5dB
-25kHz	73.5dB

Blocking Increase over 12dB SINAD level of interfering signal modulated with 400Hz at 1.5kHz deviation to cause 6dB degradation in 12dB SINAD on-channel signal

Spacing	Level
+100kHz	84.0dB
-100kHz	85.0dB
+1MHz	93.0dB
-1MHz	94.0dB
+10MHz	101.0dB
-10MHz	103.0dB

Intermodulation Rejection Increase over 12dB SINAD level of two interfering signals giving indentical 12dB SINAD on-channel 3rd order intermodulation product

Spacing	Level
25/50kHz	65.5dB
50/100kHz	65.5dB

Maximum Audio Output Measured at 1kHz on the onset of clipping

Load	Output (RMS)
3ohm	230mW
8ohm	175mW
15ohm	110mW

Image Rejection Increase in level of signal at first IF image frequency over level of on-channel signal to give indentical 12dB SINAD signals 59.5dB

#### S-Meter Linearity

Indication	Sig. Level	Rel. Level
2 segs	0.248uV pd	0dB Ref
4 segs	0.457uV pd	+5.3dB
6 segs	0.923uV pd	+11.4dB
8 segs	1.71uV pd	+16.8dB
10 segs	2.47uV pd	+20.0dB
12 segs	5.17uV pd	+26.4dB

#### Current Consumption

Standby, Economiser 12mA average  
Receive, Mid Volume 97mA  
Receive, Max Volume 161mA

### Transmitter

Peak Deviation 4.76kHz

Frequency Accuracy -160Hz

#### Harmonics/Spurii

Harmonic	Level
2nd	-76dBc
3rd	-72dBc
4th	-84dBc
5th	-93dBc
6th	-84dBc
7th	<-100dBc

#### Spurii

<-100dBc

#### TX Power and Current Consumption

Freq MHz	Power	7.2V Supply	9.0V Supply	12.0V Supply
144MHz	High Low	2.57W/745mA 370mW/355mA	3.70W/920mA 418mW/370mA	5.16W/980mA 472mW/385mA
145MHz	High Low	2.30W/740mA 365mW/355mA	3.64W/910mA 417mW/370mA	5.15W/970mA 478mW/390mA
146MHz	High Low	2.30W/740mA 365mW/350mA	3.61W/905mA 422mW/370mA	5.09W/965mA 473mW/390mA

good, this coupled with the receive economiser facility confirms that your Ni-Cads should last out nicely in use.

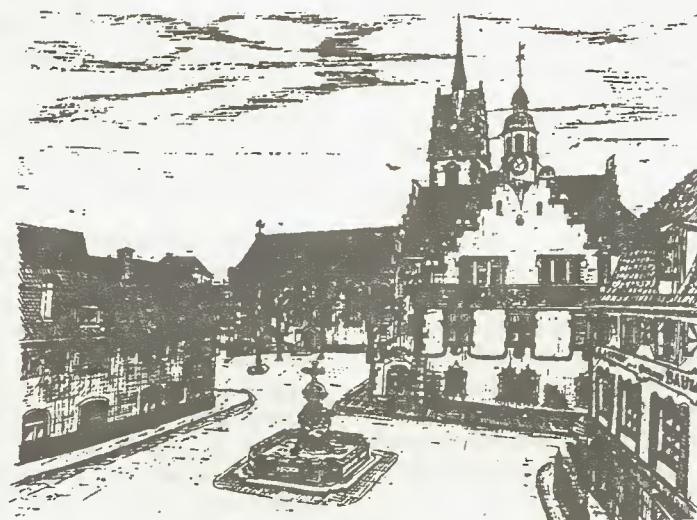
### Conclusions

The set is small, quite versatile, and offers an impressive technical performance. The excellent receive sensitivity coupled with the better than normal overall transmit efficiency found should make it a little more usable in the odd 'dead spot' that we portable operators sometimes find ourselves in when trying to have a QSO! The available audio output could be a limiting factor if you tend to operate in noisy surroundings, so an earphone would be useful here. Apart from the small buttons I had no other real grumbles with the set, in fact some of the facilities such as the 'Tone Alert' were surprisingly useful.

My thanks go to Lowe Electronics for the loan of the review set.

# The 5% Column

## YL-Treffen



## hamradio 87 Friedrichshafen

*Angelika Voss, G5CCI, looks forward to this year's Friedrichshafen Rally and gives a few hints for YL awards and how to get them*

Spring and summer are traditionally the seasons for radio rallies, and as every year, BYLARA will be putting in an appearance at a number of events — including the RSGB's 75th Anniversary Convention in July, where, besides having a stand, we shall also be holding our Annual General Meeting. Other rallies at which BYLARA hopes to be represented include Swindon (22nd May), Ipswich (29th May), Elvaston Castle (12th June), Longleat (26th June), Colchester (24th July), Scarborough (31st July), Woburn (14th August) and the Scottish Convention on 17th September.

Stands are usually put on by local members, who are given a free hand in the way they lay out their display, and this means that there is often a considerable amount of variation from one rally to the next,

with some people going for BYLARA's old frilly feminine image and surrounding themselves with pink ribbons and balloons, while

Mary G6BID and Kay GM6KAY are shown here running the BYLARA stand at the '87 NEC.



others go for a more down-to-earth approach by displaying copies of YL awards and magazine clippings about various YL activities. As well as introducing BYLARA to the outside world, these stands also serve as a meeting place for members, and some rally organisers now try to take account of this by providing us with extra space and additional chairs to enable people to sit down and have a natter.

### Friedrichshafen

This year's Friedrichshafen Convention takes place from June 17th to 19th, and if you happen to be in central Europe around that time then this event is well worth a visit. Not only is it Europe's largest radio convention (about three times the size of the RSGB's Birmingham event), but it is also host to Europe's largest gathering of YLs. As well as a semi-formal YL meeting held on the second day of the convention, there is a YL stand/lounge area next to the main entrance, where visiting YLs (and their families!) may sit down in comfortable armchairs and enjoy a cup of coffee, a cold drink or a slice of home-made German cake — all provided free of charge, though donations are always welcome, and money boxes are provided for the purpose. The lounge area has proved to be a popular meeting place and is usually crowded, with lively discussions going on, often in three or four

different languages.

On the second day of the convention (ie. Saturday) visiting YLs are treated to a traditional German "Kaffeeklatsch" or coffee-and-cake party. This is held in one of the lecture rooms, which, although it holds about two hundred people, has often been so crowded that late arrivals have not found anywhere to sit! Each YL is given a little souvenir to take home (usually something like a glass or a small vase) and visitors from outside Germany are asked onto the stage to introduce themselves and make a short speech — an ordeal which is rewarded with another little gift. At the end of the "introduction parade" a special prize is given to the person who has travelled the longest way to attend — last year, the prize went to a lady from Israel, though the meeting has been attended by YLs from as far afield as India, Japan and Brazil.

British visitors to Friedrichshafen have often commented on how nice it would be if we could have a similar meeting at the RSGB Convention, but unfortunately the facilities just aren't there! Amazingly, the stand and meeting at Friedrichshafen are the work of just one person — Zita Kühnle, DL4GA. Plans are now under way to have some kind of a meeting/ mini convention to celebrate BYLARA's 10th birthday in 1989 — watch this space for further details!

### More Awards

In the last '5% Column' I mentioned a special award created for 1988, the YL Year 1988 Award. This seems to have got off to a really good start, with YLs all over Europe making a special point to be active so that everybody can work their eight or eleven contacts every month. As a reminder, the award is worked by contacting either eleven YL stations during each of eight months, or eight YL stations during each of eleven months. Although it is now too late to start working for the award on the eleven months basis, there is still time to work eleven YLs during each of the next eight months. Good hunting!

Two more awards have now been created for working YL stations during this magic year of 1988. The first of these, known as the 8-8-88 award, is sponsored by



Over the water in Southern Germany, Zita, DL4GA addresses the Friedrichshafen YL meeting.

the Dutch YL Club (DLYC), and the rules are slightly complicated though it seems to be basically a case of working either eight YLs from eight Dutch provinces, or working eight YLs from eight DXCC countries, or working a specified number of DLYC members which varies according to where the applicant lives. Extra points are awarded for contacts made on August 8th (ie. 8-8-88). (*Shame we haven't got an 88 metre band!* ... Ed.)

The other award is the YL-88 Certificate, sponsored by the Japan Ladies Radio Society (JLRS). This award is obtained by working YL stations between March 3rd (3-3-88) and August 8th (8-8-88), and applicants must work either eighty-eight stations on HF or thirty three stations on VHF (including 50 MHz). The contacts must include at least two members of the JLRS — though these do not have to be resident in Japan! Like all YL clubs, JLRS has a number of associate members in other countries, including some in the UK, Holland and Germany — so it should be possible to obtain the VHF award without investing in a holiday in Japan!

Full details of all three awards (and other YL awards) are available

Gunilla, SM5CXC; Raija, SMOHNV and Helen I1KAX (left to right) were conferred in front of the QSL card display.



from me — but please remember, as always, to enclose a stamped addressed envelope.

### The Numbers Game

Some readers may have started to wonder about the special significance of the number 33 — which not only features in the Japanese award, but is also frequently heard during QSOs between YLs. Most people are familiar with seventy three (best wishes) and eighty eight (love and kisses), and even the German fifty five (good luck) is fairly well-known (especially after the adverse publicity it had some years ago when someone claimed it really meant "Heil Hitler"!). 33 is a greeting exchange only between women, and its official definition according to a group of American YLs who "invented" it back in the 1930s is "love sealed with friendship between one YL and another". This could perhaps be translated into something like "sisterly greetings" in 1980s — speak.

### Finding YLs

One problem many people have experienced in trying to work for YL Awards is that YLs are usually very difficult to find on the bands — it may not be all that unusual to hear

female voices on the bands, but for some reason it seems to be very rare that one hears a YL called CQ except during YL contests!

One way of working for YL Awards is to check into YL nets — except that some awards don't allow net contacts, and, sadly, some nets don't welcome strangers! Another possibility is to be active during YL contests — but if nets and contests don't appeal to you, and you don't have the patience to scan the bands for the one YL that might be calling CQ or be about to finish a QSO with someone else, then there is one more option open to you: Listen round the bands on the 6th of every month!

### YL Activity Day

It was realised, several years ago, that something ought to be done to encourage YLs to be active outside the confines of YL contests and nets, and, at the suggestion of Diana G4EZA, it was decided to promote the 6th of every month as "YL Activity Day" — ie. one day every month on which YLs should

try to make a point of being active. The idea was given wide publicity in the various YL magazines during 1979, and at first it seemed to catch on very well. However, as is often the case with things like nets and activity periods, support gradually started to wane, and the last few years have probably seen very little activity in Europe or America on the 6th of the month — though we understand that YL Activity Day is still very well supported "down under". There seems to have been a bit of a revival in recent months, however, following renewed publicity in the BYLARA Newsletter, and we hope that this upward trend will continue.

To make things easier for those scanning the bands, YLs are advised to call on (or around) designed spot frequencies, and to put out initial calls on the hour. The spot frequencies are 14.288, 21.188, 21.388, 28.588 and 26.688 MHz.

### Contests

At time of writing, I have not been advised of any contests taking

place in the next few months. The Canadian YL Club usually have a contest in May, but I have not yet received any details of this. Anyone who would like details nearer the time is welcome to contact me at the usual address.

Looking further ahead, there is usually a number of contests taking place in September. These include the American YLs' "Howdy Days", usually at the beginning of the month, and the Japanese and Italian YL Contests which both take place on the last week-end of September, overlapping by several hours ... which, although it tends to cause some confusion ("which contest are you in?") does, nevertheless, give contestants the benefit of extra activity during those hours that both contests are on. More details of these and other contests will be included in the next edition of the '5% Column'.

As always, your news and views are very welcome (in fact it would be nice to hear from a few more people this time!). My address is: PO Box 49, Manningtree, Essex CO11 2SZ.

**BINDERS**  
FOR YOUR VALUABLE COLLECTION  
OF HAM RADIO TODAY  
**MAGAZINES**  
• SMART • EASY TO USE • TOP QUALITY  
To ASP Readers Services, PO Box 35,  
Wolsey House, Wolsey Road, Hemel  
Hempstead, Herts HP2 4SS (0442-41221)

Please supply ..... Ham Radio Today Binders  
@ £5.95 inc. P&P

Total £ ..... (Please make cheques payable to ASP Ltd.)

Years Required — 198.....198.....198.....198.....

Name .....  
Address .....

Please allow 21 days for delivery

Access VISA

£5.95  
inc.  
P&P

### MAIL ORDER ADVERTISING

#### British Code of Advertising Practice

Advertisements in this publication are required to conform to the British Code of Advertising Practice. In respect of mail order advertisements where money is paid in advance, the code requires advertisers to fulfil orders within 28 days, unless a longer delivery period is stated. Where goods are returned undamaged within seven days, the purchaser's money must be refunded. Please retain proof of postage/despatch, as this may be needed.

#### Mail Order Protection Scheme

If you order goods from Mail Order advertisements in this magazine and pay by post in advance of delivery, Argus Specialist Publications Ltd will consider you for compensation if the Advertiser should become insolvent or bankrupt, provided:

- (1) You have not received the goods or had your money returned; and
- (2) You write to the Publisher of this publication, summarising the situation not earlier than 28 days from the day you sent your order and not later than two months from that day.

Please do not wait until the last moment to inform us. When you write, we will tell you how to make your claim and what evidence of payment is required.

We guarantee to meet claims from readers made in accordance with the above procedure as soon as possible after the Advertiser has been declared bankrupt or insolvent (up to a limit of £2,000 per annum for any one Advertiser so affected and up to £6,000 per annum in respect of all insolvent Advertisers). Claims may be paid for higher amounts, or when the above procedure has not been complied with, at the discretion of this publication but we do not guarantee to do so in view of the need to set some limit to this commitment and to learn quickly of readers' difficulties).

This guarantee covers only advance payment sent in direct response to an advertisement in this magazine (not, for example, payment made in response to catalogues etc., received as a result of answering such advertisements). Classified advertisements are excluded.

## It's easy to complain about advertisements. But which ones?

Every week millions of advertisements appear in print, on posters or in the cinema. Most of them comply with the rules contained in the British Code of Advertising Practice.

But some of them break the rules and warrant your complaints.

If you're not sure about which ones they are, however, drop us a line and we'll send you an abridged copy of the Advertising Code. Then, if an advertisement bothers you, you'll be justified in bothering us.

The Advertising Standards Authority.  
If an advertisement is wrong, we're here to put it right.  
ASA Ltd, Dept 2 Brook House, Torrington Place, London WC1E 7HN

This space is donated in the interests of high standards of advertising.

please mention HRT when replying to advertisements.

# RADIO Tomorrow

## 1 May RSGB Convention, Sandown Park

Scottish RAYNET Promotional Meeting at the Freedom Inn, Aviemore Centre, Aviemore. Opens at 10am through till 5.30pm with a series of talks and discussions by the various emergency services. For details contact: Scottish Zone Rep. Eric Garrington GM3RFA on Fort William 3833 or your nearest Scottish RAYNET Controller.

## 2 May Dartmoor RC: Annual Mobile Rally at the Town Hall, Princetown, Devon. 10.30am through till 5.00pm. Usual traders, display stands for RAYNET and local repeater groups, bring & buy, refreshments and ample parking. There will be a small entrance fee and talk-in will be on S22. Sutton & Cheam RS: Natter night in the Downs Bar, Downs Lawn Tennis Club, Holland Avenue, Cheam.

Todmorden DARS: Natter night. 8pm. Queen Hotel, Todmorden. Welwyn-Hatfield ARC: Talk by Cirkit. Lemsford Village Hall, Brocket Road, Lemsford.

## 3 May Fylde ARS: Equipment Sale at The Kite Club, Blackpool Airport.

Stevenage ARS: Construction evening (HF ATU & Noise Bridge)

Rugby ATS: Natter night. 7.30pm Cricket Pavilion, BTI Radio station, 'B' building entrance, A5 Trunk road, Hillmorton

## 4 May Chestnut DARC: Natter evening. Church Room, Church Lane, Wormley, Nr. Cheshunt, Herts. 8pm.

Wirral DARC: 'Treasure Hunt' at the Irby Cricket Club, Irby Mill Road, Irby. 8.00pm start.

S Bristol ARC: DX TV demonstration by Ron Gardner at Whitchurch Folk House, East Dundry Road, Whitchurch, Bristol.

Crawley ARC: Junk Sale at TS Cossack, London Road, Crawley. Starts at 7.00pm, adm. 10p

Wirral ARS: Talk 'Orbital Predictions for Satellites' by G3VQT at Ivy Farm, Arrow Pard Road, Wirral. Details from: G3VEB on 051 638 1346

## 5 May Bredhurst RTS: Construction & natter night.

Horsham ARC: Talk 'ITV Presentation' by G3GOP. Guide Hall, Denne Rd, Horsham.

North Wakefield RC: Talk 'The police' by PC Workman Details — Steve Thompson, G4RCH. Leeds 536633.

Yeovil ARC: Talk 'Is SWR harmful?' by G3GC at 7.30pm, Recreation Centre, Chilton Grove, Yeovil.

Mid Sussex ARS: Informal evening at Marle Place Adult Education Centre, Leylands Rd., Burgess Hill. Starts at 7.45pm.

E Kent RS: HF Antenna Symposium — problems solved at Parkside Lodge, Kings Road, Herne Bay Salop ARS: Natter night.

Ponterfact DARS: Final preparations for the Five Towns Half Marathon at the Carleton Community

Centre, Carleton Road, Ponterfact at 8.00pm

Dunstable Downs RC: Committee Meeting at Room 3, Chews House, High Street South, Dunstable, Beds. 8pm. Details from Tony on (0582) 508259.

## 6 May Loughton DARS: Planning for Aylmers Farm Field Weekend. Loughton Hall, Rectory Lane, Loughton, Essex.

Coventry ARS: Night on the air & morse tuition. 8.00pm. Baden Powell House, 121 St. Nicholas St, Radford, Coventry.

Harrow RS: Activity night at the Roxteth Room, Harrow Arts Centre, High Road, Harrow Weald from 8pm

Vale of Evesham RAC: Visit to Pebble Mill.

Blackwood ARS: Natter Night

## 8 May Drayton Manor Rally

Yeovil ARC: 1988 Yeovil QRP Convention, opens 9am at Preston School, Preston, Yeovil. Lectures by G3MYM & G4GAI, 1930's style QRP rigs using special call GB2LOW, component stands & homebrew equipment displays. Refreshments & natter area

Talk-in on S22 from 9.30am.

Dunstable Downs RC: DF Hunt starting at Room 3, Chews House, High Street South, Dunstable. Beds. 8pm. Details from Tony on (0582) 508259

## 9 May Atherstone ARC: DTI rig testing service. Held at the Physics Laboratory, Atherstone Upper School, Long Street, Atherstone.

Stourbridge ARS: Formal meeting, talk & slides on early amateur radio by Bill, G3CAQ.

## 10 May Delyn RC: Treasure hunt. 8pm Daniel Owen Centre, Mold, Clwyd.

Malvern Hills RAC: Visit by new RSGB RLO.

Reading DARC: Talk 'Satellite Reception' by Dave Bryant at the White House, Emmer Green, Reading. Details on (0734) 774042.

Dorking DRS: Talk 'SWR — does it matter?' by Tony G4XYC

Rugby ATS: Talk by Ian Hopwood, GOEDT. 7.30pm. Cricket Pavilion, BTI Radio station, 'B' building entrance, A5 Trunk road, Hillmorton

## 11 May Willenhall DARS: Natter night. Cross Keys Inn, Ashmore Lake Rd, Willenhall, W. Midlands. Info Dave Jackson, GOEGG (0902) 734475

Cheshunt DARC: Talk. 'QRP' by G4VBN. Church Room, Church Lane, Wormley, Nr. Cheshunt, Herts, 8pm.

Fareham DARC: Talk 'Mystery of microwaves' by Bob G8VOI. 7.30pm. Portchester Community Centre, Westlands Grove, Portchester, Hants.

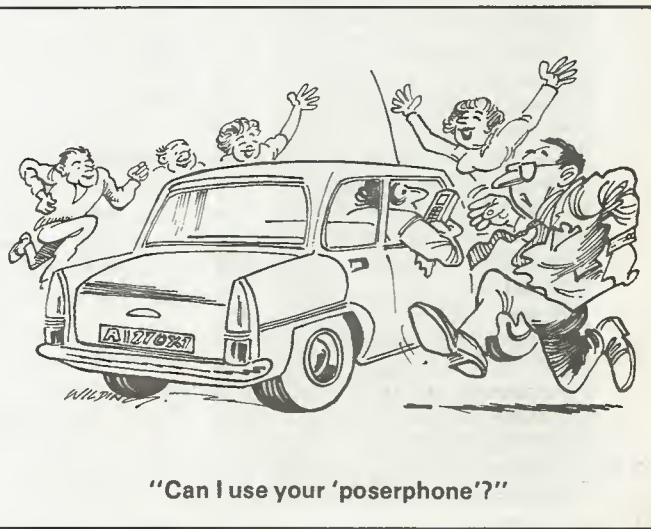
Wirral DARC: Quiz night vs Wirral ARS at the Irby Cricket Club, Irby Mill Road, Irby. 8.00pm start.

S Bristol ARC: Club project construction evening at Whitchurch Folk House, East Dundry Road, Whitchurch, Bristol.

- Farnborough DRS: Open evening at the Railway Enthusiasts Club, 103 Hawley Lane, Farnborough at 7.30pm. Details from Tim on Camberley 29321
- 12 May** Bredhurst RTS: Junk Sale. North Wakefield RC: On the air. G4NOK. Details — Steve Thompson, G4RCH. Leeds 536633.
- Edgware DRS: Talk 'Navigation by Satellite' by P Machin of HSDE Ltd, at Watling Community Centre, 145 Orange Hill Road, Burnt Oak, Edgware.
- Mid Sussex ARS: Construction contest at Marle Place Adult Education Centre, Leylands Rd., Burgess Hill. Starts 7.45pm.
- Ponterfract DARS: Committee meeting at Carleton Community Centre, Carleton Road, Pontefract at 8.00pm
- Salop ARS: DF Hunt second qualifier. Southgate ARC: Talk 'History of Valves, Part 3' by Stan Woods.
- Yeovil ARC: Talk 'Is SWR Harmful?' by G3GC at The Recreation Centre, Grove, Yeovil.
- 13 May** Loughton DARS: Field Weekend at Aylmers Farm up to 15th.
- Harrow RS: Talk 'Access Control using LF Transponders' at Roxteth Room, Harrow Arts Centre, High Road, Harrow Weald from 8pm.
- Itchen Valley RC: Nattery night
- Wimbledon DARS: Talk 'Allard Motor Cars' by David Kinsella at St Andrews Church Hall, Herbert Road, Wimbledon. Details from David G4RBQ on (07373) 51559.
- Blackwood ARS: 'Fastest constructor in the west' competition
- Dunstable Downs RC: Junk sale at Room 3 Chews House, High Street South, Dunstable, Beds. 8pm. Details from Tony on (0582) 508259
- 15 May** Mid Sussex ARS: Sunday foxhunt at Marle Place Adult Education Centre, Leylands Rd., Burgess Hill. Starts at 7.45pm.
- Newport ARS: Grand Surplus Equipment/June Sale at Brynglass House, Newport, Gwent. Junk and Flea market stalls, auction from 12 till 3pm, snacks and refreshments available, talk-in by GW1NRS on S22. All proceeds used to fund the amateur radio display at the Royal Welsh National Eisteddfod. Details from Bob GW4IED on (0633) 280958.
- Pontefract Dars: RAYNET exercise for the Five Towns Half Marathon
- Mid-Ulster ARC: Parkanaur Ralley. Noon at The Silverwood Hotel, Lurgan Co. Armagh. Entrance £1. Trade stands, bring & buy, RSGB bookstall, QSL bureau. Talk in on S22, FM 145.550. Further details from Sam White, GI1BIW on (07622) 22855
- Proceeds from this rally will go to Stanley Eakins Memorial Fund.
- 16 May** Burnham Beeches RC: Computer night. 8pm Haymill Youth & Community Centre, Burnham Lane, Slough.
- Stourbridge ARS: Informal meeting
- Todmorden DARS: Talk by Crime Prevention officer. 8pm. Queen Hotel, Todmorden.
- Welwyn-Hatfield ARC: HF Field day preparation.
- Knightsfield Scout HQ, opposite Ingles, Welwyn Garden City
- 17 May** Wakefield DRS: Junk Sale.
- Midland ARS: Junk sale & Natter night.
- Fylde ARS: Informal meeting at The Kite Club,
- Blackpool Airport.
- Rugby ATS: Preparation for special event at Rugby Hobbies Festival. Details from G8TWH QTHR 7.30pm. Cricket Pavilion. BTI Radio station, 'B' building entrance, A5 Trunk Road, Hillmorton.
- 18 May** Cheshunt DARC: Natter evening. Church Room, Church Lane, Wormley, Nr. Cheshunt, Herts. 8pm.
- Lough Erne ARC: Talk 'Can you read a map'. 8pm. Railway Hotel, Enniskellen, Co. Fermanagh.
- S Bristol ARC: 20m activity evening at Whitchurch Folk House, East Dundry Road, Whitchurch, Bristol.
- Wirral ARS: Portable activity meeting at Ivy Farm, Arrowe Park Rd, Wirral. Details from: G3VEB on 051 638 1346.
- 19 May** North Wakefield RC: Visit to Jorvik Viking Centre, coach (total cost £5) Details — Steve Thompson, G4RCH Leeds 535533.
- Barry College of Further Education RS: Video 'JARL DX-Pedition to China'.
- Mid Sussex ARS: Night on the air at Marle Place Adult Education Centre, Leylands Rd., Burgess Hill. Starts at 7.45pm.
- E Kent ARS: Operating evening at the radio shack, former coastguard look-out at Bishopstone.
- Salop ARS: Talk 'Contest working' by Ron Stone G3YDX.
- Ponterfract DARS: Talk 'Converting CBs' by Bill G4ZVB at the Carleton Community Centre, Pontefract at 8.00pm
- Yeovil ARC: Talk 'The Absorption Wave Meter' by G3MYM at The Recreation Centre, Chilton Grove, Yeovil.
- 20 May** Sutton & Cheam RS: AGM at Downs Lawn Tennis Club, Holland Avenue, Cheam.
- Loughton DARS: Informal evening. Loughton Hall, Rectory Lane, Loughton, Essex.
- Coventry ARS: Night on the air & morse tuition. 8.00pm. Baden Powell House, 121 St. Nicholas St, Radford, Coventry.
- Swindon DARC: Radio, Electronics and Hobbies Fair at the Science Museum, Wroughton, Swindon, Wilts. Opens at 10am, Wroughton Airfield, 5 miles South of Swindon. The large museum collection of aircraft, fire engines, and hovercraft will be the back-drop to traders and exhibitors stands in several heated and well-lit hangers.
- Edgware DRS: Straight Key Evening, organised by G3SJE at Walting Community Centre. 145 Orange Hill Road, Burnt Oak, Edgware
- Dunstable Downs RC: Visit to Fire Station starting at Room 3, Chews House, High Street South, Dunstable, Beds. 8pm. Details from Tony on (0582) 508259.
- 21 May** Thornbury DARC: World of Amateur Radio Exhibition at the URC Church Hall, Rock Street, Thornbury. Nr. Bristol.
- The purpose of the exhibition is to present the world of Amateur Radio to the public as a hi-tech hobby - displays will feature SWLing, Computers, Amateur TV and Microwaves. School visits are welcome and details can be obtained from J Jones G8AZT on Thornbury 416381.
- 23 May** Atherstone ARC: DF Hunt No. I. Starting from the Physics Laboratory, Atherstone Upper School, Long Street, Atherstone.
- 24 May** Delyn RC: Talk on RADAR. 8pm Daniel Owen Centre, Mold, Clwyd.

- Reading DARC: Talk '25cm TV repeater GB3HV' by Gary Shipton G4CRJ at the White Horse, Emmer Green, Reading. Details from Mike on (0734) 774042
- Dorking DRS: 4m Activity Night with G3CZU/P Stevenage ARS: Committee meeting
- Rugby ATS: Hobbies Festival de-brief. 7.30pm. Cricket Pavilion, BTI Radio station, 'B' building entrance, A5 Trunk road, Hillmorton
- Verulam ARC: Talk 'Packet Radio networking in the UK' by M. Dennison, G3XDV. RAF Association HQ. New Kent Rd, off Marlborough Road, St. Albans
- Farnborough DRS: HF Field Day review & morsé at the Railway Enthusiasts Club, 103 Hawley Lane, Farnborough at 7.30pm Details from Tim on Camberley 29321
- 25 May** Cheshunt DARC: Portable on Baas Hill. Fareham DARC: Talk by Len G6NS. 7.30pm. Portchester Community Centre, Westlands Grove, Portchester, Hants.
- Wirral DARC: Talk — by 'Mr X' at the Irby Cricket Club, Irby Mill Road, Irby. 8.00pm start.
- S Bristol ARC: Microwave activity evening at Whitchurch Folk House, East Dundry Road, Whitchurch, Bristol.
- 26 May** North Wakefield RC: Monthly meeting. Details — Steve Thompson, G4RCH. Leeds 536633.
- Mid Sussex ARS: Talk 'Contest Operating' by Al Slater G3FBX at Marle Place Adult Education Centre, Leylands Rd., Burgess Hill. Starts at 7.45pm.
- Salop ARS: HF night on the air
- Edgware DRS: National Field Day briefing and Construction Contest at Walting Community Centre, 145 Orange Hill Road, Burnt Oak, Edgware.
- Pontefract DARS: Talk 'Direction Finding' by Niall G4ISU and Reg G4KMW at the Carleton Community Centre, Carleton Road, Pontefract at 8.00pm
- Southgate ARC: Informal meeting
- Yeovil ARC: Natter night. 7.30pm. The Recreation Centre, Chilton Grove, Yeovil.
- 27 May** Itchen Valley RC: Talk 'QSL Bureau and Awards' by G2VF
- Wimbledon DARS: Construction Contest for G3PGA Trophy at St Andrews Church Hall, Herbert Road, Wimbledon. Details from David G4RBQ on (07373) 51559
- 29 May** Plymouth Radio Club Mobile Rally at Plymstock School, Church Road, Plymstock. Opens at 10am. Large free car park, refreshments, raffle, trade stands & demos. Talk in on S22. Further details from Joe GIRXR on (0752) 662511.
- Burnham Beeches RC: Thames TV Special event station, GBOTT Haymill Youth & Community Centre, Burnham Lane, Slough. (Aslo 30th May)
- East Suffolk Wireless Revival at the Civil Service Sportsground, Straight Road, Bucklesham, Ipswich. Featuring traders, RSGB bookstall, aerial testing range, packet radio demo, bring & buy, car boot sale, rig clinic, CW pile-up competition, vintage radio display.
- Admission £1 (including car parking) refreshments, talk-in on S22, GB3PO and GB3IH. Further details from Jack G4IFF on (0473) 464067.
- 30 May** Sutton & Cheam RS: Cheam & Worcester Park Fete Special event station.
- 31 May** Rugby ATS: 2m DF Hunt. 7.30pm Cricket Pavilion, BTI Radio station, 'B' building entrance, A5 Trunk road, Hillmorton.
- 1 Jun** Cheshunt DARC: NFD preparation. Church Room, Church Lane, Wormley, Nr. Cheshunt, Herts. 8pm
- Wirral DARC: Practice DF Hunt, meet at the Irby Cricket Club, Irby Mill Road, Irby. 8.00pm start
- Wirral ARS: Surplus sale at Ivy Farm, Arrowe Park Rd, Wirral. Details from: G3VEB on 051 638 1346
- S Bristol ARC: Bristol Rally 1988 — Briefing at the Whitchurch Folk House, East Dundry Road, Whitchurch, Bristol. Details from Len, G4RZY on Whitchurch 834282
- 2 Jun** North Wakefield RC: Bar-B-Q. Details Steve Thompson, G4RCH. Leeds 536633
- Horsham ARC: Talk 'Independent TV' by Robin Powell G3OGP. Guide Hall, Denne Road, Horsham.
- Mid Sussex ARS: Anniversary evening at Jack & Jill Windmills, Clayton.
- Meirion ARS: Talk 'Software & Computers' by GW3RRI at the Dolgellau Hall, 8pm
- Pontefract DARS: Talk by RAYNET County Controller Colin Thomas G3PSM at the Carleton Community Centre, Carleton Road, Pontefract at 8.00pm
- Salop ARS: Junk Sale
- Yeovil ARC: Junk Sale at The Recreation Centre, Chilton Grove, Yeovil
- 3 Jun** Loughton DARS: HF DF Hunt. 7.30pm start for 7.45pm first call. Freq. 1910kHz. Loughton Hall, Rectory Lane, Loughton, Essex.
- 4/5 Jun** National Field Day Contest
- Stevenage ARS: HF Field Day
- Welwyn-Hatfield ARC: VHF Field Day
- 5 Jun** Bolton ARC: Rally. Deane Sports Complex, New York, Bolton, Greater Manchester
- Spalding DARS: Rally. 10am onwards at Springfield Gardens, Spalding, Lincs. Details from Terry, G4TWR on (0775) 2940
- 6 Jun** Stourbridge ARS: Informal meeting
- Todmorden DARS: Talk, 'Clandestine Radio' by Gordon Adams, G3LEQ. 8pm. Queen Hotel, Todmorden.
- Welwyn-Hatfield ARC: Summer social barbecue plus model aircraft display. (Provisional cost £2.50) Lemsford Village Hall, Brocket Road, Lemsford
- 7 Jun** Flyde ARS: Talk 'Aerials for Confined Spaces' by H Fenton G8GG at The Kite Club, Blackpool Airport.
- Stevenage ARS: Talk & Demonstration. "Shefford" 2m TCVR by members of Shefford club
- Rugby ATS: Test gear night. 7.30pm. Cricket Pavilion, BTI Radio station, 'B' building entrance, A5 Trunk Road, Hillmorton
- 8 Jun** Cheshunt DARC: Natter evening. Church Room, Church Lane, Wormley, Nr. Cheshunt, Herts. 8pm.
- Fareham DARC: Talk 'Solving breakthrough' by Alan, G1WZZ. 7.30pm. Portchester Community Centre, Westlands Grove, Portchester, Hants
- Wirral DARC: Club 10th Anniversary with Special Event Stations at the Irby Cricket Club, Irby Mill Road, Irby. 8.00pm start
- S Bristol ARC: Packet Radio Evening at the Whitchurch Folk House, East Dundry Road, Whitchurch, Bristol. Details from Len. G4RZY on Whitchurch 834282
- Farnborough DRS: Quiz evening at the Railway Enthusiasts Club, 103 Hawley Lane, Farnborough at 7.30pm. Details from Tim on Camberley 29321
- 9 Jun** North Wakefield RC: On the air. G4NOK Details -

	Steve Thompson, G4RCH. Leeds 536633 Mid Sussex ARS: Informal evening at Marle Place Adult Education Centre, Leylands Rd., Burgess Hill. Starts at 7.45pm. Edgware DRS: Talk 'Digital Transmission for Amateurs — What does the future hold?' by E Kessler at Walting Community Centre, 145 Orange Hill Road, Burnt Oak, Edgware Pontefract DARS: Committee meeting at the Carleton Community Centre, Carleton Road, Pontefract at 8.00 pm Salop ARS: Natter night	<b>22 Jun</b> Cheshunt DARC: Natter evening. Church Room, Church Lane, Wormley, Nr. Cheshunt, Herts. 8pm Wirral DARC: Bar-B-Que at Heswall Shore Farnborough DRS: VHF Field Day review at the Railway Enthusiasts Club, 103 Hawley Lane, Farnborough at 7.30pm. Details from Tim on . Camberley 29321
<b>10 Jun</b>	Itchen Valley RC: Surplus equipment sale Wimbledon DARS: Talk 'Nuclear Magnetic Resonance in Medicine' by Dr J Griffiths at St Andrews Church Hall, Herbert Road, Wimbledon. Details from David G4RBA on (07373) 51559	<b>23 Jun</b> North Wakefield RC: Natter night. Details — Steve Thompson, G4RCH. Leeds 536633 Mid Sussex ARS: Informal evening at Marle Place Adult Education Centre, Leylands Rd., Burgess Hill. Starts at 7.45pm Edgware DRS: Antenna Surgery — or How to Cut Your Wire Antennas by G4GYS at Watling Community Centre, 145 Orange Hill Road, Burnt Oak, Edgware. Pontefract DARS: Annual Open HF Hunt starting at the Carleton Community Centre, Carleton Road, Pontefract at 8.00pm Salop ARS: Natter night
<b>12 Jun</b>	Mid Lanark RS: Open Day. Bring & Buy, trade stands, demos of packet radio, RTTY, annual award of EH1 trophy, refreshments. Talk-in on S22. Venue — Community Centre, Newarthill, by Motherwell <b>Elvaston Castle Mobile Radio Rally</b>	<b>24 Jun</b> Itchen Valley RC: RSGB video tapes — 'Amateur Radio's Newest Frontier WSLF Space Shuttle' 'New World of Amateur Radio ARRL' Wimbledon DARS: Club Bazaar at St Andrews Church Hall, Herbert Road, Wimbledon. Details from David G4RBQ on (07373) 51559 Stevenage ARS: Committee meeting
<b>14 Jun</b>	Malvern Hills RAC: Constructional competition, venue is the Red Lion, St. Annes Road Malvern Dorking & DRS: Talk, 'Operating techniques' by Lawrence G4PNA Rugby ATS: 2m DF. 7.30pm. Cricket Pavilion. BTI Radio station, 'B' building entrance, A5 Trunk road, Hillmorton	<b>25 Jun</b> Meirion ARS: Special Event Station GBOTPR at Barmouth for the 'The Peaks' sailing, climbing & running race from Wales to Scotland. Operating HF and VHF from 10am to 10pm <b>26 Jun</b> Longleat Mobile Radio Rally
<b>15 June</b>	Cheshunt DARC: British Telecom. Church Room, Church Lane, Wormley, Nr. Cheshunt, Herts. 8pm. Wirral ARS: DF Hunt starting at Ivy Farm, Arrowe Park Rd, Wirral. Details from: G3VEB on 051 638 1346 S Bristol ARC: Computer Activity Evening at the Whitchurch Folk House, East Dundry Road, Whitchurch, Bristol. Details from Len G4RZY on Whitchurch 834282.	<b>27 Jun</b> Atherstone ARC: Club night on the air. Held at the Physics Laboratory, Atherstone Upper School, Long Street, Atherstone <b>28 Jun</b> VHF National Field Day Rugby ATS: Mid-summer barbecue. 7.30pm. Cricket Pavilion, BTI Radio station, 'B' building entrance, A5 Trunk road, Hillmorton
<b>16 Jun</b>	North Wakefield RC: Trip on the 'Water Prince Floating Restaurant'. Details — Steve Thompson, G4RCH. Leeds 536633 Barry College of Further Education RS: Video 'SWL's in the early days of radio' Mid Sussex ARS: Bring & Buy Tabletop sale. Tickets £1 in advance, £1.50 on the night, at Marle Place Adult Education Centre, Leylands Rd., Burgess Hill. Starts at 7.45pm. Pontefract DARS: Talk 'CW Keys and Keying' by Dave G4OSY at the Carleton Community Centre, Carleton Road, Pontefract at 8.00pm Salop ARS: RSGB Talk & presentation by GW4FRX	<b>29 Jun</b> Wirral DARC: Eileen Medley DF Cup, meet at the Irby Cricket Club. Irby Mill Road, Irby. 8.00pm start <b>30 Jun</b> North Wakefield RC: Monthly meeting. Details — Steve Thompson, G4RCH. Leeds 536633 Mid Sussex ARS: Informal evening at Marle Place Adult Education Centre, Leylands Rd., Burgess Hill Starts at 7.45pm Pontefract DARS: Night on the air at the Carleton Community Centre, Carleton Road, Pontefract at 8.00pm Salop ARS: HF special event on air.
<b>17 Jun</b>	Sutton & Cheam RS: Inter-club quiz. CATS vs Sutton & Cheam RS at St Swithins Church Hall, Grovelands Road, Purley	
<b>18 Jun</b>	S Bristol ARC: Club Open Day, Special call GB2WFH, at the Whitchurch Folk House, East Dundry Road, Whitchurch, Bristol. Details from Len, G4RZY	
<b>20 Jun</b>	Stourbridge ARS: Infor meeting Todmorden DARS: Natter night. 8pm. Queens Hotel, Todmorden Welwyn-Hatfield ARC; VHF Field Day preparation Knightsfield Scout HQ opposite Ingles, Welwyn Garden City	
<b>21 Jun</b>	Midland ARS: Treasure Hunt Fylde ARS: Informal meeting at The Kite Club Blackpool Airport Rugby ATS: Talk, 'QRP kits' by C.M. Howes Communications 7.30pm. Cricket Pavilion, BTI Radio station, 'B' building entrance, A5 Trunk Road, Hillmorton	



# User Review

## Black Jaguar Scanner



Scanners have come a long way since the early days of narrow coverage receivers with wandering VCOs boxed in gruesome fake wood finished cabinets. These days the buyer can reasonably expect to purchase a receiver with wide and

offered by the set. The manual does mention that most units will exceed the minimum specifications, although this is likely to be affected by factors such as the adjustment of the PLL circuitry at the factory and the state of charge of the internal

*Another handy scanner hits the streets in the shape of the Black Jaguar. K B Henderson tries it out and assesses how it measures up against the competition*

stable band coverage, logical and easy to use controls which does not need a golf trolley to carry it around. The latest of the hand-scanners to enter this increasingly competitive marketplace is the 'Black Jaguar BJ200' imported by Nevada Ltd. of Portsmouth.

### Overview

The 'Black Jaguar' is a VHF/UHF scanner in the same vein as the Sony Air-7 offering coverage of 26-29.99MHz in 5kHz steps, 60-88MHz in 5kHz steps, 115-178MHz in 5kHz steps, 210-260MHz in 10 or 12.5kHz steps, 410-520MHz in either 10 or 12.5kHz steps and offering the choice of either AM or narrow band FM demodulation.

The radio also offers what nowadays constitutes the obligatory memory facilities — in this case providing sixteen channels, each being able to store the frequency, mode (AM or NBFM) and operator preferences such as a time delay and channel lock-out when in scanning mode. Although, the frequency coverage already mentioned is quoted both in the manual and on the specification plate on the rear of the unit, it was found that in practice the receiver would operate over a considerably greater range. The review sample was able to tune 17.200-29.995MHz, 49.300-99.995MHz, 105-185.700MHz, 200-325MHz and 350-580MHz for each of the 'guaranteed' bands

Ni-Cad battery pack.

### Tuning

Frequency selection is achieved by simply typing in the required digits and mode for AM or NBFM and pressing the ENT button, where-upon the information will be stored in the current memory channel. If a short time delay of two seconds is required for the particular channel when the radio is scanning, this can be selected just before the ENT keystroke stores the information in memory by pressing the button marked DELAY — a letter 'D' will appear on the LCD readout to confirm all the channel information. Should an 'impossible' frequency be programmed or the operator omit the decimal point in the frequency keystroke stage, the word 'Error' will appear on the display next to the channel number concerned.

This same message was found to appear when the radio was operating at the edge of its coverage, sometimes the same frequency would be accepted part of the time and sometimes the 'Error' message would appear, suggesting the PLL out of lock output also drives the 'Error' flag on the display. It should be noted that the 'Black Jaguar's' wider coverage (mentioned earlier) relates to frequencies which the unit was found to consistently cover without the 'Error' flag appearing.



Top panel detail — the push-on push-off power button can be knocked 'on' by mistake.

### Scanning Facilities

The scanning system is quite straightforward in that all the channels are scanned in turn until a carrier of sufficient strength is detected which opens the squelch line on the radio. The system is able to scan any mix of AM and NBFM channels by virtue of the fact that both modes have a squelch facility. The level at which the squelch opens can be set by the user so it is possible to 'ignore' very faint transmissions if required, or alternatively a factory preset level can be chosen by turning the squelch control until a click is heard. In practice this 'auto-squelch' facility seemed more than adequate for day to day use and would probably be used by most people except for those days when everything is so quiet that you wonder if the radio is working — backing off the control to get a comforting hiss can be very reassuring at times!

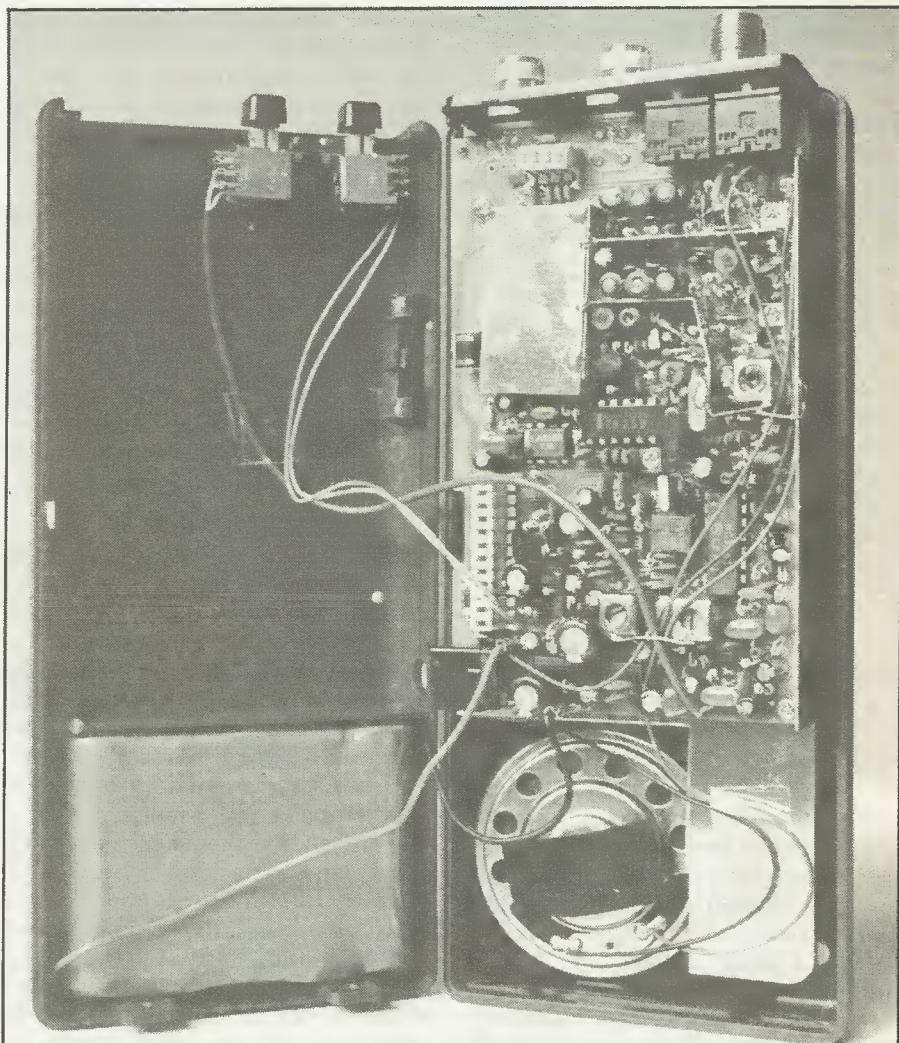
The scan is started by pressing the 'SCAN' button and the sixteen channels are spun through at the rate of ten channels per second whilst a 'SCAN' annunciator appears on the LCD to show what is going on. When a signal is encountered which is strong enough to open the squelch, the scan stops for as long as the carrier is present, so if local repeaters or beacons are programmed into memory this can cause a problem. The solution is to use the 'lock-out' facility which causes the radio to ignore that particular channel until such time as the 'lock-out' is cancelled. When in operation a letter 'L' will appear on the LCD.

The reverse problem can be that a signal is located and only lasts for a short while, perhaps two stations are working simplex and one is a

little slow on the PTT. The radio detects a drop in carrier and carries on scanning, leaving the other half of the QSO high and dry! There is a solution to this situation too in the shape of the delay feature, when in operation this makes the radio wait for a couple of seconds after the carrier drops before it recommences scanning operations. Both

the lock-out and delay facilities are programmable on a channel by channel basis to suit the prevailing method of operation on the frequency concerned.

Only the channel numbers appear on the display during scanning — together with the delay, lock-out and mode flags. The similarly priced Sony 'Air-7' also shows the frequency whilst scanning but this feature makes very little difference as human beings simply aren't designed to read information at that sort of rate. As soon as a signal is detected, the full frequency details appear on the LCD and of course the audio output switches on; should you wish to stay tuned to the channel regardless of whether it is intermittently active this can be achieved by pressing the 'MANUAL' button which cancels the scanning process. Scanning can be started again at any time by pressing the 'SCAN' button once more.



The nice outside finish is continued on the inside — note the Nicad power pack on the bottom left.

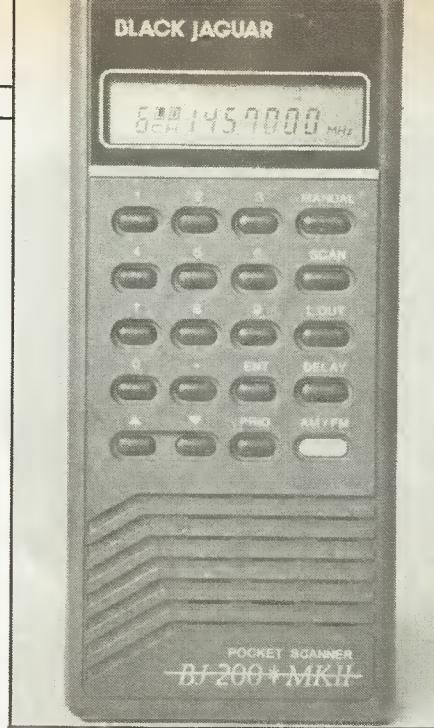
## Special Features

The 'Priority' function is a special feature which allows one particular 'favourite frequency' to be sampled every two seconds, regardless of whether the radio is currently scanning or set to a specific frequency. For example you may wish to monitor a RAYNET frequency for activity but still want to listen to the local club net; the RAYNET frequency would be programmed into channel 1 and this would be sampled automatically for any signs of activity, as soon as a signal appears on channel 1 the radio immediately locks onto it for the duration of the message. Once the signal drops the radio then returns to what it was doing previously, here again the user may program a delay into channel 1 if required and the LCD provides a 'Priority' flag to act as a memory jogger.

So far it will be clear that the BJ200 can work as a sixteen channel scanner, but of course sixteen channels are not an awful lot of use when the user wishes to scan an entire band — keying in every frequency on 2m could take a while! The solution is provided by the radio's 'SEARCH' function which allows whole blocks of spectrum to be searched at one time. The only restriction placed upon this function is that the block to be searched must lie solely within one of the five bands mentioned earlier, it is not possible to search across two bands. It was here that I decided to throw the manual away as the explanation of how to set it up was total gibberish — here's how it really works!

## Search Function

The search function works by entering a channel number, then the required upper frequency limit followed by a press of the 'Down arrow' key. The frequency step which will be used in the search mode is decided at this point according to the last few digits of the upper frequency limit, if the 3rd and 4th decimal places are zeroes then 10kHz steps will be used — if not then 12.5kHz steps are implemented. All that is required to complete the search command is to key in the lower frequency limit and press the 'Up arrow' key. A SEARCH flag appears on the LCD and the



The Jaguar's slim, pocketable lines results in an attractive radio.

search begins.

When a signal is detected the radio will display the frequency and the audio will be heard, but in order to halt the search the user must either open up the squelch or press the delay function key. Should the frequency be one which you wish to put into memory, then this can be done in the usual way simply by pressing the 'Enter' key. As soon as the search limit is reached the radio 'folds over' and begins the process all over again. Note that the lock-out function cannot be used to avoid busy but unwanted frequencies which fall inside the search range, but the delay button can be used generically ie. a delay can be introduced to all frequencies in the search block.

## General Design

The receiver is reasonably small, compact and has a quality feel to it, being finished in a grey vinyl plastic. There is no keyboard disable function fitted which could prevent inadvertent keystrokes, although the lozenge shaped keys are countersunk into the front panel thus affording some protection. The leatherette case provided has a clear, flexible plastic panel which allows operation with the case still fitted. One criticism is that the set could be accidentally switched on if the radio was left in a briefcase, the on-off switch is in the form of a push button which is easily depressed by passing flotsam and there is nothing more frustrating than a dead radio.

On this same point I also have my reservations about the choice of an internal inaccessible Ni-Cad pack. At first glance this may seem to be a good idea but it is very difficult to judge the exact state of charge of a set of Ni-Cads and with the varied patterns of use which most scanners get I would prefer accessible batteries which can be changed if they expire at a critical moment. The cells used in the 'Jaguar' are standard 'AA' cells so it would not be difficult to carry a set of spares if only there was some way of getting them into the radio! My final criticism of the power supply side of things lies with the plug-in wall charger, it simply does not fit UK sockets, including a variety of shaver sockets which I tried and I would think that it was only reasonable that users could be provided with a proper charger. In the end I settled for a rather dubious arrangement consisting of a four-way trailing socket and a little help from gravity.

## Summing Up

The 'Black Jaguar BJ200' is a pleasant radio to use, certainly more pocketable than, for example, the Sony 'Air-7' and it also offers a scan facility which is absent from some of the economy scanners. It is nicely made both inside and out and offers a performance which is par for the course, although perhaps a little more audio output would be nice.

What tends to let it down in my opinion are the peripheral aspects, a dial light which is not particularly effective and an integral Ni-Cad pack which my personal preference says is not a good idea — potential buyers must decide that for themselves of course.

The radio will be compared with the Sony 'Air 7', both in terms of price and performance and whilst the 'Jaguar' is undoubtedly a more elegant looking piece of equipment than the brick-shaped Sony, looks aren't everything. Ultimately two factors will decide the outcome: frequency coverage — the Sony 'Air-7' gives medium wave and broadcast FM coverage but not the upper frequencies of the 'Jaguar' — and power pack options which I have already mentioned.

*My thanks go to Nevada Ltd of Portsmouth for providing the review unit.*

# Who was EDWIN ARMSTRONG



EDWIN H. ARMSTRONG  
1890 - 1954

Not all the great inventors in the field of radio and electronics are as well known as Marconi, Wheatstone, or Faraday. Some people have contributed as much, but their names are not nearly as well known. One such person is Edwin Armstrong, an American who gave us three major contributions during his life. He was the

***Inventor of regenerative feedback and the superhet, Edwin Armstrong was one of the truly innovative early radio pioneers***

first person to use regeneration in a wireless to increase its sensitivity, he gave us the superhet principle which is almost universally used in radios today — and finally he was the father of frequency modulation.

Even though he was a millionaire and made three major discoveries his name is known by comparatively few. His life story is interesting, being one of success which ended in tragedy.

## Early Years

Armstrong was born on the 18th of December 1890 in a prosperous area of Manhattan. He was christened Edwin Howard and brought up in a devoutly religious family. His father, also born in the same area, was a publisher, whilst his mother had been a school teacher. From his early years Armstrong showed a keen interest in science, and in particular with mechanical devices.

At the age of fourteen Armstrong started to become interested in wireless — at about the time that Marconi had conducted his first transatlantic tests and introduced the first regular services between Europe and the USA. Reading about these exploits had captivated the mind of the young Armstrong, and he decided to start building some of his own equipment. He quickly became so absorbed in this new found hobby that he had little time for anything else. In fact the only other interest he had was tennis, and this he inherited from his father with whom he used to play.

In his academic studies Armstrong devoted his time whenever he could to studies associated with wireless. As a result when he graduated from high school he entered the Engineering School at Columbia University where he quickly became known for his active mind and keen interest in wireless.

## The First Invention

It was in 1912 whilst Armstrong was studying in his first year at Columbia that he produced his first invention. He came upon it because he was investigating various methods of improving wireless reception.

At this time the Audion or triode valve which had been invented in 1906 by Lee de Forest was not fully understood. In fact, knowledge about its operation was so limited that for several years after its invention it was only used as a detector, and by 1912 it was only just beginning to be used as an amplifier. Armstrong made an extensive study of the valve and this enabled him to devise a circuit which gave him regenerative feedback by adjusting the circuit to a point where it was just on the point of oscillation. This gave a vast increase in sensitivity and selectivity over anything else which was available at the time.

The effect of this invention was tremendous. It enabled wireless sets to achieve a much better performance when people were struggling to obtain even mediocre levels of sensitivity and selectivity. Finally at the beginning of 1913 he applied for a patent

for his new idea. This led to Lee de Forest opening a series of law suits which extended over many years. They were finally settled in favour of de Forest because the judges could not fully understand the concepts involved. In spite of this the scientific community still agreed with and supported Armstrong.

Whilst it is clear that Armstrong gave us the regenerative receiver, it is not clear who invented regeneration and was the first person to be able to make a valve oscillate. Strangely four people, namely Armstrong, Rizs, Meissner and Franklin all discovered the phenomenon within a couple of months of each other.

### Discovery of the Superhet

Having finished his studies at Columbia, Armstrong took a post as an instructor in the University. This did not last long because the First World War started and soon he found himself in the US Army Signal Corps, travelling to laboratories which had been set up in Paris. Here Armstrong was to invent the superhet and build the first working prototype.

At this time many people were involved in research into methods of improving reception. One of the first was Captain J.H. Round of the British Army. It was Round who took the first step in the invention of the superhet by building a receiver which he called the Autodyne. Effectively this was only a direct conversion receiver, but it demonstrated that signals could be converted from one frequency to another by the addition of a local oscillator. The next step was taken by a French engineer named Lucien Levy. He was investigating methods of reducing static and he developed a circuit which actually used the superheterodyne principle. However, he did not employ any amplification at the intermediate frequency stage and therefore it was not a complete superhet.

It was left to Armstrong to finish the development of the complete superhet. He did it whilst he was investigating methods of increasing the amplification of receivers. This was of vital interest because at this time valves could only give comparatively small amounts of amplification at 'high' frequencies ie. in excess of about 200kHz! In order to overcome this problem he converted signals from their original frequency down to a lower one where the signal could be amplified and filtered more effectively. After this the signal was converted to audio by using a second heterodyne stage. This was effectively a beat frequency oscillator, and it was used because most of the signals being transmitted were in morse.

The development of the idea continued at a tremendous rate and an experimental receiver was constructed. For its time it was remarkably complicated, consisting of eight valves — first detector, oscillator, three stages of intermediate frequency amplification, second detector oscillator and finally two stages of audio amplification.

Having reached this stage in its development, work on the superhet had to be cut back as the war had ended and the Armistice had been signed. On returning to America Armstrong filed his patent for the receiver on 30th December 1918. Although Armstrong was definitely leading the field in the development of the

superhet other people had been working on the idea on the German side. W Schottky, a part manager of the Siemens Laboratories, had also filed a patent on the same idea six months before Armstrong. Nevertheless Armstrong was undoubtedly the first person to construct a superhet, and so the recognition of him as being its inventor is only just.

### After the War

Armstrong returned from the war and took up a post again at Columbia University. Whilst there, he took the opportunity to sell the rights to several of his circuits to some large companies. This was very much a part-time activity because he never expected the royalties to be very large.

Initially the idea of the superhet did not catch on. The circuits required more valves than a compatible tuned radio frequency (TRF) receiver, and odd though it may sound in these congested days, the added selectivity was not needed. In fact in the early 1920's wireless sets had to use as few valves as possible. This was because of the extra components which were required and the fact that each valve filament consumed about one amp which had to be supplied from an accumulator. This meant that the superhet was too expensive and not commercially viable.

However, things soon changed. In the early 1920's the number of broadcasting stations rose very rapidly and the old TRF sets were unable to cope. On top of this a 'dull emitter' valve had been developed and it only required about a quarter of the filament current. This gave the superhet the opportunity it needed. As a result a large number of superhets were built, bringing in considerable earnings and soon Armstrong found himself a millionaire.

Typical of many pioneers, Armstrong was not particularly seeking money, he still retained his interest in radio and kept his post at Columbia, he continued with his teaching and used much of his own money to finance research into further ways of reducing static and interference from radio reception.

### Spanning the Atlantic

It may seem that Armstrong did not have much contact with amateur radio. However, this is not true as he took part in some early transatlantic tests on the short wave bands in the winter of 1921 and 1922. Although the transatlantic had been spanned many years before using very high powered stations on the long wave band, it had not been done using relatively low powered stations on wavelengths shorter than 200 metres.

The first tests took place in the winter of 1920 and 1921. However, they were a complete failure because not even one transatlantic signal was heard. The Americans concluded that this failure was as a direct result of the power receiving equipment being used by British amateurs. Accordingly Paul Godley 2ZE, a well known amateur, was sent over from the States with equipment more suited to receiving weak transatlantic signals. This consisted of a highly sensitive regenerative receiver together with an Armstrong superhet. Godley set up his station in Middlesex, but he quickly found that the levels of interference were too

high. As a result of this he moved up to a small place near Glasgow called Ardrossan. Here he managed to set up his station with quite an impressive aerial.

Using this equipment Godley was able to identify the first transatlantic signal on short waves, that of 1BCG. This was a station set up specially for the occasion by six people, including Armstrong himself. This event has been commemorated by a stone which was laid in 1950 on the approximate site of the original station in America.

### Frequency Modulation

Armstrong seems to have started his work on FM in about 1933. By this time the boom in wireless was well under way in the USA, as well as in Europe. This resulted in a large proportion of households which owned their own wireless sets, many of which would have been superhet designs. Armstrong took a new look at FM and instead of reducing the bandwidth he turned the thinking of the time on its head by *increasing* the bandwidth. In order to demonstrate its effectiveness he built a wide band transmitter and receiver system in 1935. In tests which he carried out he was able to convincingly show that this new system was capable of giving signal to noise ratios that were far better than any AM system could hope to offer.

In order to utilise his new discovery Armstrong tried to sell the idea to commercial companies. However, they did not want it and so Armstrong had to go it alone. The first step was to set up his own

broadcast station. This was completed at a cost of \$30,000 and started broadcasting on 110MHz in 1939. The cost of this venture proved to be well justified as a few stations which were troubled by poor reception applied for licences. Once the first few stations had been set up others soon followed and the use of FM started to rise very rapidly. Unfortunately this growth was halted with the entry of America into the Second World War.

### Last Years

After the war the use of FM began to grow again and with it came all the legal battles over royalties which he had known several years before. Armstrong fought hard to receive reasonable levels of royalties, but the law suits took years to progress through the courts. All these battles took their toll on Armstrong. He became increasingly ill, and finally in 1954, aged 63 he took his own life to release himself from the interminable rounds of legal battles. Eventually the final case was settled in 1967, thirteen years after Armstrong's death.

### Reflection

Armstrong gave a tremendous amount to the radio industry. His invention of the regenerative receiver, the superhet and FM became the foundation for countless other inventions. Although he was honoured by the Union Internationale des Telecommunications (ITU) it seems a sad reflection on the radio industry that he was pressurised to the extent he took his own life.

## ADVERTISERS' INDEX

Allweld Engineering .....	9
ARE Communications .....	BC
Bredhurst Electronics .....	8
Cirkit Distribution .....	9
Capco .....	IBC
ERA Communications .....	27
Garex Electronics .....	11
Icom U.K. Ltd. ....	4, 5
ICS .....	10
KW Communications .....	9
Lowe Electronics .....	28, 33
McKnight Crystals .....	27
Nevada Communications .....	11
RAS Nottingham .....	27
Raycom .....	IFC
South Midlands Communications .....	6, 7
Spectrum Communications .....	IBC
SMJ .....	9
Technical Software .....	8

# Free Readers Ads!

## FOR SALE

**BBC Master** as new £250, two VX540 Modems (Thorn EMI) £15 each or £25 both. Or swap lot for FRG9600 (or similar) or FT290MK Two (or similar). Phone Paul G7ALW on 01-572-7217 after 6.30pm please.

**YAESU** converter FRV7700D. Covers two and four metre Ham Bands and Air Band, £30. Revcone Disccone Antenna £18. All in good condition and postage paid. Moore, 76 High Street, Ide, Exeter, Devon EX2 9RW.

**FOR SALE** Kenwood Trio R2000 HF receiver as new original packign and manual £375. Phone Southend 201615.

**FT290R** original. Mobile mount carry case MM linear nicads, mike, head set, light-weight as new with boxes, manual, swap for 9130 in good condition. Phone Doncaster 0302 531927 (G1IND). Also PRO2002 scanner VHF/UHF exchange for Dragon Computer disc drive and interface.

**YAESU FT107M H.F. inc.** supply, narrow AM/FM filters, memory unit, immaculate £500. Trio MC60 base mic £45. Yaesu FTV transverter module for 2m £ offers. Wanted: base station power/ SWR meter for 70cms may P/Ex above. Tel: Alan 0933 318493.

**50MHz Transverter** with 10w amp WPO design also 5 ele tonna for 50MHz £60 o.n.o. Phone Paul 0920 871639 anytime.

**IC4E** Icom 70cm handheld for sale, complete with case, spare battery pack, DC adaptor and speaker-mike. All as new condition, £180 o.n.o. Phone Simon on Leighton Buzzard (0525) 375959 evenings/weekends.

**DELTA 1** 934MHz Cybernet rig with Cresbyte preamp £280. BNOS 2m linear amp L144-10-100, £120. Ring Mike 0799-27155.

**YAESU** counter YC500E top

model mint, manual, boxed, £225.00. Reg 0904 (York) 768545.

**APPLE-2E** enhanced, twin drives, 1200 kilobyte RAM, extended 80 column card and parallel, serial and RGB interfaces, £545, could separate. Other items including mouse and publications. Also Stradcom plug-in modem for IBM/Comptables, £95. Contact Mike (0383) 416688, evenings.

**PYE** marine band receiver, Canadian model very good condition, working, requires Xtal's. Spectrum +3 joystick would like to exchange above items for anything radio related. Telephone 0266 45527.

**FOR SALE** FDK 750E 2 mtr multimode transceiver twin CFO's 1-10 watts, recently all realigned, now surplus £190. RN Electronics 6 mtr. Transverter 1-3w Drive 25 watts out 2mtr if only 6 months old, £125. Tel: 0343 820955 GM4YWQ.

**TRIO** valve receiver. Model 9R59 with external speaker and manual. Full working order and in excellent condition. £80 o.n.o. Ring Haywards Heath 0444 459438 ask for Trev.

**AOR2002** Scanner 25MHz) 550MHz 800MHz - 1300MHz £310 boxed. Comax Telereader CD670 LCD display brand new boxed virtually unused cost £327 sell for £275. Folkestone 58685.

**PRO32** 200 channel programmable hand-held scanner VHF Hi/Lo 68-88MHz 108-136MHz (AM) 138-144MHz 144-148MHz (Ham) 148-174MHz 380-450MHz, 450-470MHz 470-512MHz access to 22,684 different frequencies priority function two scan and search speeds. Mint condition £150, complete with flexible antenna. Tel: Maz on 01-399-1768 Kingston, Surrey.

**TRIO SSB/CW** 2m rig model TR7010 10w good condition £85. Homebrew VFO available £25. AEA CW?RTTY ASCII Reader also improve

your sending, £80. Tower very heavy 20/15ft two section free standing £35. Telephone 0705 371183 Fareham.

**STANDARD C58** 2 metre multimode mobile/portable scanning mike, nicads £250 o.v.n.o. Phone G3GZH (Ron) 0582 873267 (Dunstable).

**BRAND NEW** Yaesu 727 hand held two metre and 70cm transceiver with heavy power pack, £295. Bass charger all SC, new £50. 70cm antenna, eight over eight, £5. Also 6 metre beam £15. Phone evenings 0277 823434 Brentwood, Essex.

**YAESU FT726R** 70/2/SAT excellent condition, 6 months old, superb multimode base station £750. May take 2m mobile in p/ex. G8EKZ. Tel: (Bristol) 0272 793296.

**DATONG MK** morse keyboard, mint £60.00 o.n.o. "Howes" built boards in case Tx, Rx, Sidetone for 40m, £40.00 o.n.o. Also Tx and VFO both 40m £10.00 and £8.00 Trio/Kenwood TS440S HF trans mint, £790 o.n.o. Tel: (0305) 813202.

**FOR SALE** Pye Europa 3-ch. RB4 SU8 SU16 approx 5 watts £60 including postage. Pye, PF1 (RB4) Tx/Rx 5 Tx 5 Rx batteries £20 including postage all in very good condition Europa has built in pre-amp and tone-burst. G6TFC QTHR. Telephone 0204 (Bolton) 651183.

**SPECTRUM** plus 3 unwanted birthday gift so W.H.Y. would like to exchange for radio equipment AM interested in 70cms 2m HF. Tel: 0266 45527.

**ICOM IC-R71E** receiver as new with FM and speech boards fitted, £520 o.n.o. Also 24 amp DRAE, PSU also as new £75. Phone 0582 699573 at Dunstable, Beds.

**MEON** 50MHz transverter needs alignment, £50. Maplin TU1000 RTTY unit needs setting up £60. Speaker case large 11" x 8" x 6" fitted two speakers £11. KR 500 elevation rotor slight casing crack, new operation

OK £90 o.v.n.o. Collect carriage extra. G8SBU Des 0395-265059.

**PYE** valve transceiver QRP Xtal/Mo control 1.6/10MHz Fone/CW ATU 12v DC HS/Mic £70. Mullard QOV06-40 in holder/case with vari-caps components 2 x 20 watts twin anode dissipation for frequencies up to 500MHz. Ideal for VHF linear full valve data £25. Telephone 0773 810010.

**SSB** (German) LMS24 24cms (1268-1270MHz) oscillator/mixer unit for Oscar Phase III model uplink 2 metre I.F. 500mW out. Super condition £125. Trio 751E 2 metre multimode as new, boxed, all accessories £485. Phone Paul G4XHF (0293) 515201 (QTHR).

**DATONG PC1** HF Adaptor, new boxed, 2 metres to HF £80.00. Collins 70EI needs attention £75.00. Marconi Salvor emergency set built in key Tx £50.00 Becker 2182 Rx £30.00. Marconi Alert 500kc/s Distress Rx £30.00. Atlanta handbook £11.00. Ten Tec Mic Model 700, new £15.00. K.W. Vespa handbook £8.00. Ediswan Power Unit Type R1095 £20.00. Signal Corps Power unit Type 5003A £20.00.

**TRIO TS520S**, £350. AT230, £130. R2000 with VHF converter £400. FRG965, £400. Microwave Modules MMT 70/28 70MHz Transverter, £50. MM4001 RTTY Transceiver, £100. G4CXA QTHR. Tel: 061-223-7716.

**BARGAINS** Jaybeam 88 ELE Multibeam 70cms £25. Hansen FS-210 Automatic SWR/Power meter 1.8-150MHz £49. MBA-RO CW/RTTY/Ascii Reader with 32 character scrolling display £139. Ferguson 3V20A Colour Video Camera x 6 zoom, Macro £199. Sony 2" b/w Television pocket size £79. Tel: 01-845 4008.

**ICOM IC1050** 10 metre FM Tx/Rx complete with mic £30. Vic 20 computer with data recorder, plug in 3K RAM, video modulator and power, supply. Manual plus

extras £30. G4ANW. Phone 0730 61859.

**YAESU FT-1** all options fitted £110.00. Latest Kenwood portable TH205E with extras £165.00. ATV Transceiver £75.00. Commodore 64 plus 1541 Disk Drive plus MPS-803 Printer plus Software £275.00. PK232-6 plus Software for CBM-64, leads etc. £300.00. Phone Rotherham (0709) 554665.

**IC251E** in excellent condition fitted Mutek board and complete with all documentation, also SM2 desk mike, £425 o.n.o. Phone 0905 620041 or write G6JNS QTHR.

**REALISTIC SX190** short wave receiver, very good condition, VSB, LSB, AM, 10 bands. handbook, circuit diagram £65. Phone Geoff, Norwich 406331.

**SWIFT Hip 4** regulated power supply outputs 6, 7.5, 9, 12v DC 1 amp, 2 amp surge new in box, never used £12.00. Swift 500mA regulated power supply outputs 6, 7.5, 9v DC small plug type £5.00. Swift FM wireless intercom FMX3 3 channel, ch-1 150KHz, ch-2 170KHz, ch-3 190KHz £25.00 the pair, again all new in boxes. Phone 041 445 2155.

**SPECTRUM** Tape Rx-4 receiver RTTY etc. Scarab Nite-2 Filt/amp built by Scarab £35. 20 copies HRT, 50 copies Practical Wireless, offers. Tel: 06267 79994. Teignmouth.

**FOR SALE BBC-B** with monitor DFS 80T single drive, Siskin TNC 220 (with Power Supply - not cased). Maplin TU1000 RTTY terminal. All leads except to radios, most software. Can be seen working. Full documentation. £250 the lot. G3MTD QTHR. 0271 816539.

**FRG** for sale; good condition, general coverage Rx to 30MHz. Include battery holder, mains lead and digital frequency readout MOD. Phone (0225) 65131 (Bath) evenings after 6.30pm.

**NPR 934** hand held, 2 nicads & charger, key pad ext. £400. Phone 05436 - 75746.

**FOR SALE** Trio R1000 gen. cov. receiver and HS5 headphones 12v DC option fitted v.g.c. £250. Mr. Savage, 12 The Row, Scottow, Norwich,

Norfolk NR10 5DR.

**FOR SALE** Trio TR9130 2m multimode complete with mobile bracket leads and service manual v.g.c. £335. Also Altron 3 ELE 4 band AQ6-20 beam tuned for CW end of bands so can be moved up to desired frequency, only 6 months old, excellent condition £95. Tel: 0623 513575.

**SHURE 201** mike for KW2000B also Voltage regulator VR/130/30 for KW2000B. Price £7.50. GQ0DLA. Tel: 0443 436655.

**FT101E** £350. FT220 2M base multimode £150. Sony ICF-7600D £110. All excellent condition, complete and boxed. BC221M, charts, PSU £15. Original manuals for Eddystone 770R, 940, £5 each. ARB8D £10. G2AQJ QTHR 0722 25929.

**MICROWAVE** Modules 100w 10w in 2m linear amp plus Mutek 2m RF switched pre-amp £90 will split. G4VXU QTHR. Tel: 0462 53097.

**FOR SALE** Parabeam 14 ELE 2mtrs £35. Parabeam 24 ELE 70cms £35. Kenpro elevator £70. Microwave Module 70cms lin. 10W in - 100W out £100. NAG144XL Model 2200 fitted 4CX350A 250W out SSB nom. £300. Yaesu FT757GX HF Transceiver FP757HD power supply. FT757 auto ATU £800. Phone Alan 061-437 4514 evenings and weekends. Manchester.

**CP/M80** Iotec computer, twin D.S.D.D., metal cased smart. Bios listing etc. serial and parallel ports. 80 col. monitor, software, circuit diags. good hacking machine £250.00. J. Yeandle, 5 Brookhill Grove, Leeds, W. Yorks. LS17 9QF. Tel: 0532 687368.

**SALE** FT290R 2 metre multimode carry case nicads plus charger, excellent condition £220 or exchange for good HF receiver, also Himound Paddle £15. Navy straight key £5. TS530 manual £2. Phone Jeff 0484 645923.

**SONY CRF-320** professional receiver, 32 bands, digital 1.6-30MHz, sell £325 or exchange for Yaesu FRG9600 Mk3 Scanner or W.H.Y. also linear. amplifier 26-30MHz 500 watt base AC for 10 metre £100. Tel: 0952 2450 Lancs.

**FOR SALE** Yaesu FTDX401 transceiver 560W still in good condition plus microphone £160 o.n.o. Also Icom 1050 10 metre FM plus new unused Nevada 35W linear £25. Phone 0349-882941. G. Matthew, 2 Old Milnafua Road, Alness, Ross-Shire IV17 0TW.

**MARCONI** Marine Rx Dynatron Model 2235 £100.00. Cedar ATS with power supply £45.00. Philips Rx type PCR and power supply £40.00. Vespa power supply £30.00. Marconi salvor emergency Tx £40.00. Ediswan power unit type R1095 £15.00. Tel: 01-653-1391.

**SONY CRF-160** portable communications receiver, (analogue) £50. JVC Compact Disc player cost £200, sell £135. Portable Colour Television, remote controlled £85. 48K & 128K Spectrum Games 50p & £1 each. Data corder £8. Joystick £2. Vacuum Cleaner £25. Mike 01-461 5398.

**FT290R** £200. Trio QR666 gen. cov. receiver £50. Eddystone amateur bands. £45. Mizuho AXI aerial switch; KX2 antenna tuner; audio processor including matching rack £60. AR40 rotator £35. 10XY £10. 48 ELE Parabeam £10. 5 ELE Tonna £5. (All 2 mtrs.). Phone Redhill 768243.

**CB PRESIDENT AR144** 40-ch. AM - SSB transceiver, mint condition in original box, suitable for conversion to 10m, price includes postage, £40. No offers or W.H.Y. all letters answered. Mr. A. McMahon, 9 Farley Road, Stoneygate, Leicester LE2 3LD.

**DRAKE R4C** passband notch filter audio mod. fitted, good condition, £300. Slow scan monitor £35. Trio filters YG455CN £40. YG88C £28. YF88H 2.1KHz for TS820. L. Huntley, 118 Bradford Road, Trowbridge, Wilts. BA14 9AR. Phone Trowbridge 3166.

**BBC B** Issue 7 c/w 40 T.D.D. ATPL Rom/Ram board G3LIV RTTY computer interface and Rom forth Rom and manual replay Rom mono 12" monitor £300 o.n.o. Tel: 0532 778689.

**FOR SALE** Comet 2m Collinear triple 5/8 wave

antenna, never been used, still in original box, cost £66 accept £40. Phone Chris on 021-422 9506 after 6.00pm. **KENWOOD R2000**. receiver with integral VHF converter, 100KHz-30MHz, 119MHz - 180MHz, 10 memories, scanning, all modes, boxed as new £450. J.I.L. SX200N scanner, AM-FM, 26MHz - 88MHz, 118MHz-180MHz, 380MHz -514MHz, built-in Bargraph "S" meter, neat, boxed, with manuals, £150. G6BDY, QTHR Kidderminster (0562) 755501 after 6.30pm please.

**COBRA 148GTL-DX** Mark II ideal for 10m conversion, excellent condition, as new, excellent sideband audio. Telephone John 0244 311989 (Chester) £125.00 o.n.o. plus carriage.

**FOR SALE** 1 TET antenna system, 6 Element with cable £35. Plus automatic antenna rotator £30. Total £65. Please ring after 6pm.

**FOR SALE** Ranger 3500 26-30MHz never used 300W SSB 8W FM AM Tuning steps 10Hz 1KHz 10-100-1MHz. USB, LSB AM FM CW cost £450 £375. Phone 0283 221870.

**WANTED** Cobra 148GTL must be in untouched condition 0283 221870.

**FOR SALE:** FT1012D MkII fan, mike, manual FM board with spare valves Welz SP300 VSWR meter AVT 18 (10-80) antenna and parts for 1kw ATU. All in ex. cond. £550. Prefer not to split. Contact Bill GOBIK QTHR. Phone Felixstowe 282526.

**FOR SALE** Vintage brass morse key £40. New matched unused pair GJS6C £22 pair. Unused 5BM254M £6. 88MH Toroids £1 each. Dymar 882 5 channel 2 metre, portable, nicad, rubber duck, charger, £40 GW3YGM QTHR 0437 2015.

**DATONG** active receiving antenna Model AD270 as new £35. Trio R600 communication receiver 150KHz-30MHz perfect condition with instruction manual £220. Wanted small valve general coverage receiver with USB-LSB 100KHz-30MHz in good condition. Ring 0244 816435.

**MATHOS** computer 64K CP/M2.2, microsoft basic, Z80 monitor, dual 5½" discs, word processor ROM, serial/parallel I/Faces. All leads and manuals. Many programs, CP/M plus and terminal ROM available. Pristine. What offers? (Money or swap HF Rx) Joh, 01-399 1606.

**TRISTAR** 747 extensively modified, ideal for conversion £90 or swap for YORKJCB863 CB + £50 o.n.o. Many other Ham/CB items for sale. Write for details to: P. Sabin, 33 Furzehill, Sidbury, near Sidmouth, Devon EX10 ORJ.

**SHACK CLEARANCE!** Global (SWL) ATU £50. Bearcat DX1000 Communication receiver £295. Tokyo Hi-power 144MHz Linear HL160V £175. Datong Morse Tutor £40. Morse Talker MMS1 £85. Welz SP420/SWR meter £45. Welz SP122/SWR meter £60. Drae 24amp PSU £100. 726R (2m, 6m, HF) £850. Tel: 0803 882281.

**FT208R** and **FT708R** with 4 Nicad packs, NC1A charger and YM24 mic. £300. NEC 8201A portable computer, disc drive, tape recorder and technical manuals £200. Simon Hopkins S8 PXB. Tel: 0442 42277, ext. 2537.

**FOR SALE** 2m C5 Colinear antenna £60.00 plus 2M 9 ELE Tonna £15.00. Telephone 0604 811246.

**KENWOOD** TS930S 6 months old, mint condition, boxed £1200. Yaesu FT726R as new, fitted 70cms, 2 metres. Boxed £775. Tel: Stourbridge 0384 392147 anytime.

**FT77** 4F TCVR FM unit fitted 100w output never used mobile FC700 ATU £550 o.n.o. Also Spectrum 6-10 TRVR £50 o.n.o. SEM Transmatch 160/10 £75. All mint condition. M.L. Brown, Barncroft, Croft Road, East Ogwell, Devon TQ12 6BA. Newton Abbot 56159.

**STANDARD** C110E 2m FM handheld hi-power nicad, charger, manual £125 or swap for cine, photographic or darkroom equipment or portable TV Jon G1FSF QTHR (Sussex).

**RTTY** complete ready to go Commodore 64C, C2N cassette recorder, Citizen 2,

color dot matrix printer, ST5C terminal unit, Offers. Chinon Super 8 sound movie camera, with boom mike, fitted case lights and accessories, offers. Want 2 metre gear. 01-958 6887 between 10am-6pm.

**TR2300** £95. Datong ANF £45. Morse Key HK703 £15. Antenna and other books Cedar AT5 PSU £35 MML432/144R transverter £90. 12v PSU £20. Contact Thompson C3WQM 0904 793672. Buyer collects or pays carriage.

**TRIO** 9000 multi-mode boxed bracket for mobile bargain £320. Tel: 0302 859451.

**UNIDEN** CR2021 portable communications receiver. VHF and 150KHz to 30MHz shortwave. AM, FM, CW, SSB plus filters. Digital readout. Perfect condition, cost £169 accept £90. Dave G4EZP Mottram Cheshire (0457) 62799.

**FOR SALE** Belcom LS102 mobile transceiver v.g.c. SSB FM AM 27-30MHz original mike £180 o.v.n.o. Phone Northwich 0606 44670.

**FOR SALE** TS830S 2 years old £750 or exchange FT757 with power supply. Northwich 0606 44670.

#### **WANTED**

**WANTED** 5½" disk drive for Amstrad 8256. Tel: Pontypridd (0443) 403474.

**WANTED** R.109 WW2 receiver Preferably un-modified, your price paid + carriage. Tel: Peter also (19 set type) variometer A.T.U. 0642 456327 daytime only.

**WANTED** Circuit diagram for Lafayette 1200 will buy, copy or borrow. All costs gladly paid. Bryn GOHXA. Tel: 0274 605230.

**WANTED** "Racal" RA121 sideband adaptor also "Racal" ATU protection unit must be in mint condition. Reasonable price paid. I pay carriage T.P. Mc. Clelland, 25 Emmett Road, Inchicore, Dublin, Ireland.

**FT101ZD**, FM, fan, mic, WARC £515 - Shure 444 mic £28 - Wanted MC60 mic. G3VOF QTHR Tel: 040423 73366 (Essex).

**WANTED** "Yaesu" "YC601" frequency readout for 101E must be v.g.c. and working

100% fair price will be paid for same so come on, check your shelves and help me out. Tel: 07622 24855.

**WANTED** HF linear amp homebrew considered 400w + sale. TS520S 160-10 100w plus matching VFO and speaker, v.g.c. £495. Phone Southampton 421862 evenings/weekend.

**WW2 GERMAN** ex-service equipment, parts literature W.H.Y. British, T1190, WS11, WS65, WS66, AD67, 52ERT RG37 YQ WS No. 1. Cash or swap, will collect. OZ8RO Ragnar Otterstad, Vejdammen 5, DK-2840 Holte, Denmark. Tel: 010-452-801875.

**I HAVE** a Codar CR-70A SW receiver in need of repair can anyone supply a circuit diagram or give any help to repair it contact Michale Dearden on Bolton 397179 or 141 Crescent Road, Bolton BL3 2JS.

**WANTED** has anyone got any information on how to convert my Colt 485DX multi-mode 27MHz to 6m band, just passed R.A.E. and would be grateful to hear anything, will pay: Steve G7AFK. 18 Astoria Close, Allens Rough, Willenhall, W. Midlands WV12 5XD.

**WANTED** Balun (co-axial) for TET HB23M, spare nicad pack for IC2E, Hygain Balun BN86. Pair matched 6KD6's Japanese. Phone 061-437 7899, George, South Manchester.

**WANTED** Mains transformer for NEC CQ11DE transceiver, or would buy non worker for spares. Mr A. Swainsbury 01-460 4134.

**WANTED** manual for Trio 9R-59D. Photocopies accepted. Phone 0295 55488 between 5pm and 7pm ask for David.

**WANTED** HF vertical antenna also SEM HF Transmatch ATU. Tel: Jeff 0484 645923.

**WANTED** circuit (block and component layout) diagram for microwave modules 144/100LS on or three watt input. Mr. Williams, 97 Gilmorton Close, Gilmorton Estate, Leicester LE2 9GX.

**WANTED** two pocket phone 70 range serial number must have "E1" on it antenna also Pye West Minster W30AMB

and or FM model must have remote socket etc. Jason Williams, 97 Gilmorton Close, Gilmorton Estate Leicester LE2 9GX.

**WANTED** Icom PS30 power supply. Icom SP3 ext. speaker. Also Icom AH7000 Discone or Diamond D130N Discone. All must be in first class condition etc. Phone (0206) 394336 Essex after 7pm.

**WANTED** FL-110 linear for FT7 must be in perfect condition cash waiting, please Tel. 0246 36496 G4HMW.

**WANTED** FRG9600 MkII will exchange Trio R600 0.30MHz SSB/CW cash adjustment. Also CB radio, Harrier CBX £30. Bearcat 100XL VHF/UHF scanner £140. Phone 051 336 1556 evenings. (Merseyside area).

**WANTED** Eddystone 940 Rx deluxe, will exchange for Daiwa 9 Search 2m Rx with power pack, cash adjustment. Rogers, Tadley, Hants. Tel: 07356 2476.

**WANTED** HF Linear amplifier up to about 1kw for use with Icom 100 watt Tx. Call Derek 0453 843266.

**WANTED** JRD receiver model NRD505 NRD515 or NRD525. JRC transceiver JST100. Must be in first class condition. G3LPA QTHR. Tel: Kettering (0536) 760336 after 6pm.

**WANTED** FT101ZD must be very good condition, also ATU needed G.O. Just starting on H.F. Phone 0945 581555 with price GOIKO QTHR.

**WANTED** Xtals 3.502MHz to 3.520MHz 12MHz any type for 80. HCV for VHF. Sale. K.W. Vanguard G.W.O. DX40V AR88 £100. For all three AR88 is FB condition. AEX Jeffrey, 42 Dennis Road, Padstow, Cornwall PL28 8DE.

**BUG KEY** wanted. Any semi-automatic mechanical speed-key of American manufacture. Also seeking a pair of Fuller - phones and any early telegraph equipment or books. Alan Williams, G3KSU. Tel: I.O.W. (0983) 65551 after 6pm.

**WANTED** complete HF station required must be general coverage on receive (no Yaesu equipment please) and all in A1 condition. Buyer will collect. Tel: 0533 774506.

# Free Readers Ads!

**Buy, sell or exchange your gear through our free service to readers.**

1. These advertisements are offered as a free service to readers who are not engaged in buying or selling the same equipment or services on a commercial basis. Readers who are should contact our advertising department who will be pleased to help.
  2. Advertisements will be inserted as and when space becomes available.
  3. The insertion of advertisements will be on a first come, first served basis, subject to condition
  2. As a result, it will not be possible to guarantee the insertion of a particular advertisement into any particular magazine.
  4. Readers should either write out their advertisement in BLOCK CAPITALS or type it. The first word will appear in **bold**.
  5. The magazine cannot accept any responsibility for printers' errors in the advertisements. However, we will do our best to ensure that legibly written advertisements are reproduced correctly. In the event of a gross error, at the Editor's discretion, a corrected version of the advertisement will be printed (at the advertiser's request) in the earliest issue in which space is available.
  - 6 .The magazine or its publishers will not accept responsibility for the contents of the advertisements, and by acceptance of these

conditions, the advertiser undertakes to indemnify the publisher against any legal action arising out of the contents of the advertisement.

7. The magazine reserves the right to refuse to accept or to delete sections of advertisements where this is judged necessary. Illegal CB equipment is not acceptable unless specified as suitable for conversion to amateur or legal CB frequencies.
  8. Advertisements are accepted in good faith; however, the publisher cannot be held responsible for any untruths or misrepresentations in the advertisement, nor for the activities of advertisers or respondents.
  9. Advertisers must fill in their names, addresses and (if available) telephone number in the space provided, and sign the form to indicate acceptance of these conditions (forms returned without a signature will not be used).
  10. All that is to be reproduced in the advertisement should be entered into the space provided on the form printed in the magazine. A photocopy is only accepted if accompanied by the corner of this page. All advertisements must give either a telephone number or address for respondents to contact or both — these must be included in the advertisement.
  11. Advertisements must be 40 words or less in length including the address or phone number information. Telephone numbers normally count as two words, exchange or exchange code plus number.

I accept the conditions above.

**Signature** . . . . .

**Send this form to:** Free Readers Ads, Ham Radio Today,  
1 Golden Square, London W1B 3AB

**ENTER YOUR ADVERTISEMENT HERE:**

# RETAIL NETWORK

## BEDFORDSHIRE

## KENT

## MERSEYSIDE

### ELECTRO COMM NEW CB SHOP

2A Tennyson Road, Luton  
Tel: 0582 458310  
CB RADIOS ALL ACCESSORIES.  
RELIABLE SPEEDY REPAIR SERVICE.  
USED CB'S BOUGHT AND SOLD  
(Open 9-6 Tues.-Sat.) ½ mile town centre.

### ICOM (UK) LTD.

ELECTRONICS  
Unit 8, Sea Street, Herne Bay, Kent  
Tel: (0227) 369464  
Telex: 9651791 com G  
Fax: 0227 360155  
Open Mon.-Sat. 9-5.30pm.  
Lunch 1-2.

### MGR SERVICES

Wirral based communications  
ICOM - YAESU - M. MODULES - HOWES -  
CIRKIT - WOOD & DOUGLAS - PART-EX -  
AERIALS - PMR - MARINE - MET ANTENNAS -  
ALINCO - HEATHERLITE - SPECTRUM COMMS  
48 Shrewsbury Road, Oxton, Birkenhead L43 2HZ.  
Telephone: 051 653 3437  
(Callers by appointment 9am-9pm, Mon.-Sat.)

## BIRMINGHAM

### HEWARD'S HOME STORES LTD.

(Est. 1963)

822/4 Kingstanding Rd., Birmingham B44 9RT.  
Tel: 021-354 2083  
G4RJM with over 40 years in The Radio Trade  
Ham Equipment urgently wanted!  
Open: Mon-Sat 9-6

### RAYCOM COMMUNICATION SYSTEMS

International House,  
963 Wolverhampton Road, Oldbury,  
Warley, West Midlands B69 4RT.  
Tel: 021 544 6767

Opening hours 9-5.30pm Late nights Thurs.-Fri.  
Send just £1.00 (refundable against purchase)  
for latest catalogue + our exclusive products & used list.

## LANCASHIRE

G4 DXX  
VIDEO ELECTRONICS  
For ICOM, DRAY, WELLS, DAIWA  
DATONG, 934 MHz Equipment, Log-  
books, Rotators, Cable etc.  
Open 9-5pm, Closed Wednesdays.  
141 LANCASTER ROAD, MORECAMBE,  
LANCASHIRE LA4 5QJ  
PHONE (0524) 418873

## LANCASHIRE

### AMATEUR ELECTRONICS/HOLDINGS G3LLL.

YAESU, JAYBEAM, DRAE, DATONG, BLACK STAR COUNTERS,  
ETC. FT 101 EXPERTS.  
6JS6C 6KD6 12BY7A Original type approved  
valves & our own Double Balanced Mixer and  
new band WARC Kits for original FT 101 MK1-E  
SAE List. Full Yaesu range, 15 mins Junction  
31 M6. Free parking. Call and consult G3LLL  
without obligation. Holidays? Phone check  
we are open before calling.  
45 JOHNSTON STREET, BLACKBURN BB2 1EF.  
(0254) 59595. CLOSED THURSDAY.

## N. WALES

### NORTH WALES AMATEUR RADIO MART

AMATEUR RADIO — CB RADIO — MARINE  
RADIO — P.M.R.  
25 ABBEY STREET  
RHYL

Open Monday-Saturday: 11am-5.30pm  
All repairs and accessories available ex  
stock. Mail order welcome.  
Tel: 0745-51579

## BIRMINGHAM

### RAYCOM COMMUNICATION SYSTEMS

International House,  
963 Wolverhampton Road, Oldbury,  
Warley, West Midlands B69 4RT.  
Tel: 021 544 6767

Opening hours 9-5.30pm Late nights Thurs.-Fri.  
Send just £1.00 (refundable against purchase)  
for latest catalogue + our exclusive products & used list.

## LANCASHIRE

### GUILDFORD COMMUNICATIONS 34 Aldershot Rd., Guildford

Open Mon-Fri 8am-6.30pm  
Sat 8am-5.30pm  
ASDEN  
Secondhand wanted  
Barclaycard VISA  
0483-574434

## CHESTER

**FAST AND  
FRIENDLY  
SERVICE**  
PAMA HOUSE,  
443 Wilmslow Rd,  
Manchester  
M20 9AF  
061-445 8918  
061-434 5701

**WHOLESALE  
CB**  
**Pama  
& Co**

## LEICESTERSHIRE

### ELLIOTT ELECTRONICS

for the Radio Enthusiast  
26-28 BRAUNSTONE GATE,  
LEICESTER.  
TEL: 553293  
Open: Mon-Sat 9.00am to 5.30pm

## DEVON

## LONDON

### AGRIMOTORS

Merton CB & Radio Centre  
Merton Garage & Post Office, Merton,  
Nr. Oakhampton EX20 3DZ. Tel: (08053) 200  
Open 6 days 9-6. Lunch 1-2.15. Closed Thurs. 1pm.  
(Sundays by appointment)  
Specialists in 934MHz  
Supplies of all 27MHz and 934MHz equipment  
Amateur Radio Stocked.

### ARE COMMUNICATIONS LTD.

For Yaesu Icom and Kenwood.  
Phone us for the best deals on all  
communication Equipment.  
No. 6 Royal Parade, Hanger,  
Ealing, London W5.  
Tel: 01-977 4476

## HAMPSHIRE

## MERSEYSIDE

### NEVADA Communications

Ham Radio - CB Radio - Scanning Receivers.  
Fast Mail Order Service.  
Send £2 for our bumper catalogues  
(includes £2 voucher)  
HOTLINE (0705) 662145  
189 London Road, North End, Portsmouth PO2 9AE

### ARE COMMUNICATIONS LTD.

For Yaesu Icom & Kenwood  
Phone us for the best deals on all  
amateur radio equipment.  
Tel: 09252-29881

### ALYNTRONICS

For all amateur communications equipment and  
accessories authorised dealers for  
ICOM and  
129 Chillingham Road, Heaton, Newcastle Upon  
Tyne, NE6 5XL. Tel: 091 276 1002.  
Open 10am-6pm Tues-Fri. 10am-5pm Sat.  
Access & Visa accepted

## WHOLESALE

CB radios, aerials & accessories delivered to your shop. Contact for price list.

Pama House, 433 Wilmslow Road, Manchester M20 9AF. only 3 min. from M56



OPEN EVERY DAY, SUNDAY 10-2.

## NATIONWIDE DELIVERY

DEALERS contact us today for very fast, friendly service, competitive prices, widest range & latest CB products.

Tel: 061-445-8918 061-434-5701

Fax: 061-445-0978 Tlx: 666762 PAMACOG

# RETAIL NETWORK

## SCOTLAND

### JAYCEE ELECTRONICS LTD

JOHN GM30PW  
20 Woodside Way, Glenrothes,  
Fife KY7 5DP  
TEL: 0592 756962  
Open: Tues-Sat 9-5

Quality secondhand equipment in stock. Full range of TRIO goodies. Jaybeam - Microwave Modules - LAR.



## WALES

### SMC/TMP ELECTRONICS

UNIT 27, PINFOLD WORKSHOPS,  
PINFOLD LANE, BUCKLEY, CLWYD.  
TEL: 0244 549563

FOR ALL YOUR AMATEUR EQUIPMENT  
AND ACCESSORIES.

OPEN: TUES., WED., FRI. 10am-5pm  
SATURDAY 10am-4pm. OTHER DAYS BY APPOINTMENT.



## YORKSHIRE

### ALAN HOOKER ELECTRONICS

42 Nethernall Road,  
Doncaster



Tel - 0302 25690  
Large stocks of electronic components.



# HAM RADIO TODAY CLASSIFIED

**Lineage:** 50p per word VAT inclusive (minimum 15 words) **Semi Display:** (minimum 2cms) £7.75 per single column centimetre. **Ring for information on series bookings/discounts.** All advertisements in this section must be prepaid. Advertisements are accepted subject to the terms and conditions printed on the advertisement rate card (available on request).



01-437 0699 Ext 292. Send your requirements to: Ham Radio Today Classified Department, ASP Ltd., 1 Golden Square, London W1R 3AB.

## FOR SALE

### NEIGHBOURHOOD WATCH BURGLAR ALARM D.I.Y. KIT

will offer a professional system at a DIY price

Ham mini beam 10, 15, 20 meters. Part integrated circuits, transistors, diodes, valves, resistors, etc.

Service Manual and parts for spectrum and Amstrad  
Send a 8" x 5" SAE for list.

### M.J. SEWARD (Mail Order)

St. Olafs Road, Stratton,  
Nr. Bude, Cornwall.  
Telephone: 0288 4892

SRI PAGER XTALS S20, S22, S23 £2.00 each + 20p P+P NEW REEDS 123, 136, 928Hz £3.50 each + 50p P+P XTALS 4.433, 4.9152, 5.0688, 15.00MHz £1.00 each + 20p P+P.

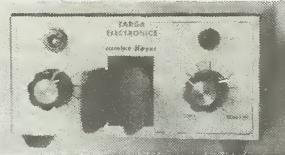
8 POLE XTAL FILTER NDK 10F 15DG 10.7MHz/15KHz BW, £9.50 + 50p P+P.  
SCANNER VOX AUTO RECORDS ON CASSETTE £5.00/£7.00 BUILT + 50p P+P.  
ELECTROKITS, 15 Kings Road,  
Sutton Coldfield, W. Mids. B73 5AB.  
Tel: 021-354-5409

## RALLY

SUSSEX MOBILE RALLY,  
Brighton Racecourse, Sunday,  
10th July, Family Fun Day starts  
10.30 (04446) 3757 evenings.

01-437 0626  
for advertising

### ELECTRONIC MORSE KEYER



Available with internal paddle (TA2) or for use with external paddle (TA6) 12v supply or 240V P.S.U. available.

\* Wide range speed control.  
\* Adjustable sidetone vol. & tone.  
TA2 - with internal paddle £49.90

TA6 - requires external paddle  
PUI1 - A.C. mains P.S.U. £7.50

All prices fully inclusive.

NO EXTRAS

TARGA ELECTRONICS  
9, Renishaw Road, Mastin Moor,  
Chesterfield, Derbyshire S43 3DW

### 10 METER ENHANCEMENT IS HERE

ALL NEW AR-3500 ALL MODE

MOBILE TRANSCEIVER - NOW

AVAILABLE IN THE UK!

MANY FEATURES INCLUDE:

DIGITAL FREQUENCY READOUT

- 28/30MC/S - AM, FM, USB,

LSB, CW - SCANNING - SPLIT

FREQUENCY OPERATION - AND

MANY MORE.

S.A.E. FOR FULL DETAILS TO:

PETE JENKINS GO ECK (HR),

43 GREEN LANES,

WEST EVELWELL, EPSOM,

SURREY KT19 9TW.

## VALVES

### Billington Valves

Valves Transistors I.C.'s.

Usually the lowest prices . . .

Rarities our speciality.

Wholesale + Export enquiries welcome.

20lb (9kg) of resistors, capacitors, potentiometers etc. etc. 1930's-1960's £10 + V.A.T. delivered.

We wish to purchase a small quantity of valve types PX4 + PX2S (or equivalents) also types KT66 KT88, we'll also buy valve collections, transistors + shop clearance.

For quotations contact: Martin Billington,  
39 Highland Road, Horsham, W. Sussex RH13 5LH.  
Phone 0403 864086.  
Fax 0403 210108. Telex 87271

## GENERAL

### USED AMATEUR EQUIPMENT BOUGHT, SOLD & EXCHANGED

S.A.E. for latest list, second hand price guide, updated monthly.

Useful guide for buying/selling £2.  
ATU mods add top band to SEM KW etc. £650.

Call Martyn G4SUI Geefor Enterprises, 112 Leeds Road, Mirfield, West Yorks.

Personal callers by arrangement.  
Tel: (0924) 495916

## ACCESSORIES

IAN FISHER Communications of Stanhope. Main distributors for 27 MHz & 934 MHz CB radios & accessories. Open Mon-Sat, 10.30-6.00pm. Sun. 2.30-4.30. CB Works, The Market Shop, Market Place, Stanhope. Tel (0388) 528464.

Phone 01-437 0626  
to find out why  
you should  
advertise  
in H.R.T.





# SPECTRUM COMMUNICATIONS

## MANUFACTURERS OF RADIO EQUIPMENT AND KITS

### A SAMPLE OF OUR RANGE OF PCB's

PRODUCT	PCB Kit	PCB Built
2m Transmitter FTX201	£43	£64.50
Receive Converters, RC2-10, RC4-10, RC6-10, RC6-2, RC4-2	£17.25	£24.50
<b>Transmit Amplifiers</b>		
TA2S1, TA4S1, TA6S1	£33.00	£40.25
TA2U2, TA4U2, TA6U2	£41.25	£52.50
<b>Receive Preamps</b>		
RP2S, RP4S, RP6S, RP10S, RP15S, RP20S	£14.75	£22.25
Transmit Buffer TB28E	£7.00	£9.50
Frequency Modulator & Demodulator FM455	£8.25	£12.25
Noise Squelch NS1000	£9.50	£14.00
Speech Processor SP444E	£15.00	£20.50
10.7MHz IF Filter Board SF10-7	£7.00	£8.00
10FM Conversion Board SC29	—	£18.50
Autotoneburst AT1750	£3.50	£5.50
Piptone PT1000S	£5.75	£8.00
Kaytone KT1000	£7.75	£11.25
And many more items including transverters and boxed kits or ready built. Send for list.		

VAT & P&P INC. PRICES

Delivery within 14 days if available.  
24 hour answering.



### FM CONVERSIONS

FOR YAESU & KENWOOD TRANSCEIVERS  
FD311X & FM2000 for FT101, 101B, 101E, 101Z,  
101ZD, 901, 902, 107, 107M, 77S, 77, 707, 200,  
250, 7B, all £71.

FD311X & FM3000 for TS120V, 120S, 130V, 130S,  
520, 520SE, 530, 830, 930, all £81.

State rig type when ordering.

### CB to 10m

CB TO 10 FM CONVERSION BOARDS - THE FIRST COMMERCIALLY AVAILABLE, suits all UK FM CB rigs to give 29.31 to 29.70MHz. Size only 63 x 40 x 13mm. Built and aligned board SC29 £18.50. Or send your rig and we'll fit it. £31.50 inc. return P&P for mobiles. £35 inc. for base rigs.

MULTIMODE CB CONVERSIONS, send your 120 channel rig and we'll convert it to give 28.01 to 29.70MHz in straight sequences without gaps. Colt 1200DX, Cobra 148, Hy Gain 5, Multimode 2, Major M360, Tristar 747 & 777, Super Star 360, Concorde, etc. £62 inc. return P&P. Jumbo or Colt Excalibur 1200, £65. 80 Channel rigs such as Stalker 9 or Major M588 are modified to give 28.31 to 29.70MHz in straight sequence without gaps, £55.00 inc. return P&P. 200 Channel in 4 bands of 50 are converted to give 28.00 to 30.00MHz or 28.00 to 29.70MHz as required. Super Hy Gain 5, Lafayette 1800, Super Star 2000, £45.00 inc. return P&P. Nato 2000 £52.50, Super Star 2000-5 x 40CH £70. Colt 1600, 4 x 40CH, £65.50.

SHOP TIMES: q 9am-1pm & 2pm-5pm TUES.-FRI.  
9am-1pm & 2pm-4pm SAT.  
CLOSED SUNDAY & MONDAY.

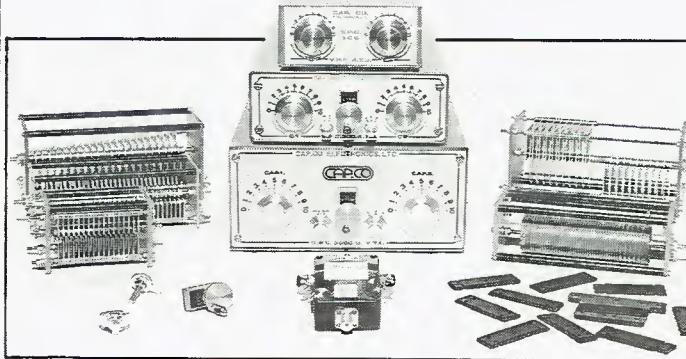
UNIT B6 MARABOUT INDUSTRIAL ESTATE, DORCHESTER, DORCHESTER, DORSET. TEL: 0305 62250



CAP CO ELECTRONICS LTD

63 Hallcroft, Birch Green  
Skelmersdale, Lancs  
WN8 6QB  
Tel: 0695 27948

Stay Tuned Forever with a CAP.CO ATU-  
Once Bought - Never Replaced



#### ANTENNA TUNING UNITS

SPC-300D 1Kw p.e.p .....	£225.00
SPC-3000D 3Kw p.e.p .....	£325.00
NEW PRODUCT - VHF A.T.U.	
SPC-100 1Kw p.e.p .....	£59.95 + £2 p&p

#### CAPACITORS

CAP-25S S GANG 250 pfd .....	£15.50
CAP-25T T GANG 250 pfd .....	£18.95
CAP-10S S GANG 500 pfd .....	£21.95
CAP-25D DIFF 500 pfd .....	£18.95

8kv 2.5mm plate spacing + 2.00 p & p

CAP-31S S GANG 250 pfd .....	£17.95
CAP-31T T GANG 250 pfd .....	£22.95
CAP-12S S GANG 1200 pfd .....	£25.95

12kv 4.5mm plate spacing + 2.50 p & p

ROLLER COASTER + 2.00 p&p .....	£22.95
28 micro henries .....	£16.50

BALUNS 4:1, 1:1 + 2.00 p&p .....	£16.50
----------------------------------	--------

Fully encapsulated .....	£5.30
--------------------------	-------

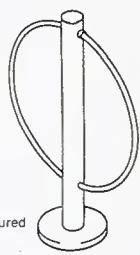
AERIAL KIT + 1.00 p&p .....	£5.30
-----------------------------	-------

Clip-on Spreaders .....	
-------------------------	--

TURNS COUNTER + 1.00 p&p .....	£22.50
--------------------------------	--------

Digital .....	
---------------	--

Receiving only  
Loop - ideal  
for S.W.L.



Manufactured  
in Great  
Britain

Our equipment is guaranteed, unique and as such protected by registered designs and copyright. Our policy is one of continual research and improvement therefore current specifications are subject to change without notice.

**ARE**  
COMMUNICATIONS

## YAESU FT980 CAT COMPUTER AIDED TRANSCEIVER

The Yaesu FT980 CAT Transceiver represents a leap forward in the amateur field, incorporating an 8-bit microprocessor (80C85) for the highest level of built-in computer control ever offered in an all-mode, all solid state H.F. Transceiver.

The transceiver's features are numerous. General Coverage receive, Multimode operation, 100W output, Keyboard entry. Built-in Power supply.

The price? a staggering £1,795 or so recommended retail prices would tell you.

We have a price that would even make Yaesu turn green. **£899.00** (That's less than it probably cost to make them!)

No catch, yes the price includes VAT and all sets are supplied brand new and boxed with 1 Year parts and labour warranty.

By the way, we only have a very limited number. But at £899, what do you expect?



## JST-125D

Now available ex-stock. **The Fabulous JST 125T transceiver.** 1.8 to 30 MHz including general coverage receiver, the JST 125T offers high performance in both operation and build quality. We are pleased to announce that the superb range of JRC equipment is now available from stock. Contact us now.

SAE for Colour us now.

**JST 125T from £1,395.00**



Opening Hours London Mon/Fri 9.30 to 5.30 Saturday by appointment.



A.R.E. Communications Limited, 6 Royal Parade,  
Hanger Lane, Ealing, London W5A 1ET, England  
Professional Tel: 01-997 4476 Fax: 01-991 2565

