

HAM

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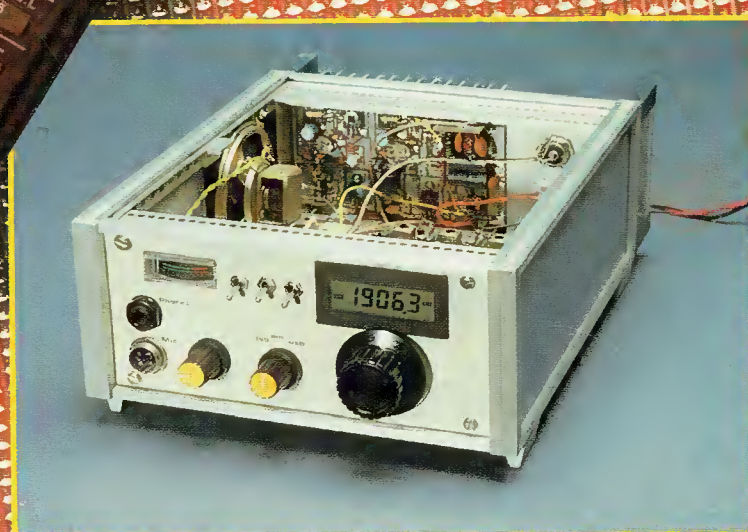
READ RADIO

TODAY

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BUILD OUR TOP BAND
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PROJECT

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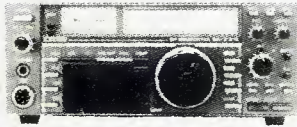


ALINCO ALR-22 2M MOBILE ▲ DATONG HF TO 2M CONVERTER
▲ SONY PRO-80 SCANNER ● WE VISIT MOROKULIEN...WHERE?

For Tomorrow's Radio Technology TODAY

BASE STATIONS

(Good news for FT 767 owners)



ICOM IC735

IMPROVED YAESU FT767 RWC/MK2 HF-UHF BASE STATION

We are pleased to announce that we have now improved the synthesizer (see reviews) leading to better dynamic range by up to 20dB which now puts this transceiver in a class of its own! This modification is only available from RWC and is fitted FREE to all New units sold by us, or we will modify any existing unit for £59.00 inc. return carriage.

FT767 MK2/RWC COMPLETE TOP CLASS BASE STATION (EX. VHF-UHF)	£1499.00
FT757 MK1/RWC WITH RWC TUNING MODIFICATION	£789.00
FT757 MK2 NEW IMPROVED HF TRANSCIVER	£895.00
FT726R MULTIMODE BASE STATION WITH 2MTRS. (SPECIAL PRICE)	£879.00
ICOM IC735 SUPER MINI HF ALL BAND TRANSCIVER	£892.50
ICOM IC275E 2MTR 25W BASE STATION, C/W AC PSU	£949.00
ICOM IC275H 2MTR 100W VERSION OF ABOVE LESS PSU	£949.00

FT767GX
RWC Mk II



NEW

HANDHELDS

* = Extended RX coverage available, call for details.

YAESU FT272R 2.5W (5W) DUAL BANDER C/W CHRGR	£395.00
*YAESU FT23R/FNB10 2.5W (5W) 2MTRS C/W CHRGR	£249.00
*YAESU FT73R/FNB10 2.5W (5W) 70CM CHRGR	£259.00
YAESU FT209R/FNB3 3.7W 2MTRS C/W CHRGR/CASE	£199.00
ICOM IC02E QUALITY 2.5W (5W) BP3 C/W CHRGR	£225.00
*ICOM MICRO 2E MINI 2.5W 2MTR C/W CHRGR	£195.00
C1E1600 (VY SIM. IC2E) 2.5W 2MTR C/W CHRGR	£165.00
KENPRO KT400EE 2.5W 70CM C/W CHRGR	£199.00
*KENPRO KT220EE 2.5W (5W) 2MTR LCD C/W CHRGR	£199.00
KENWOOD/TRIO TH21E 2W 2MTRS. (WHILE STOCKS LAST)	£139.00

PORTABLES

FT690R/MK2 2.5W MULTIMODE, JOIN IN THE FUN!	£399.00
FT690R/MK2 AS ABOVE C/W NICADS AND CHARGER	£425.00
FT290R/MK2 2.5W MULTIMODE, IMPROVED RECEIVER	£395.00
FT290R/MK2 AS ABOVE C/W NICADS AND CHARGER	£429.00
FT290R/MK1 2MTR MULTIMODE SPECIAL PRICE	£319.00

MOBILES

*YAESU FT211E 4.5W 2MTR NEW SUPER MOBILE FREE	£299.00
SUN 5/8 MOBILE ANTENNA C/W SO239 G/MOUNT	
*ICOM IC28E 25W SUPER MINI MOBILE FREE SUN	
5/8 SO239 GUTTERMOUNT ASSY+EXT LOUDSPEAKER	£359.00

NEW LICENCES CALL FOR SPECIAL DEALS

INSURED P&P
£10



NEW

SCANNERS

YAESU FRG9600/RWC

The Best Modified Scanners



FRG 9600

We supply the Yaesu FRG 9600 modified receiver to Government departments and professional users. We offer more options and facilities than any other company. We transform the basic unit by improving sensitivity and adding extra bands. No other scanner has this many options and modes available. Call now for much more information. Overseas dealer required for our kit.

Modified Yaesu receivers, NOBODY can tune 'em like WE can!	£465.00
YAESU FRG9600 RWC/MK1 60-905MHZ IMPROVED RECEIVER	£495.00
YAESU FRG9600 RWC/MK2 60-950MHZ N CONNECTOR	£857.00
YAESU FRG9600 RWC/MK3 100KHZ-950MHZ MULTIMODE	£595.00

NEW YAESU FRG9600 RWC/MK5 100KHZ-950MHZ ACTIVE F/END **£625.00 NEW**

YAESU FRG9600 MK3/AH7000/GSRV/PAAC AC PSU, COMPLETE	£699.00
100KHZ-950MHZ ALL BAND, ALL MODE RECEIVING STATION	£699.00
ICOM ICR7000 25-2GHZ ALL MODE SUPER RECEIVER	£945.00
ICOM ICR7000/AH7000 ABOVE WITH MATCHING DISCONE	£219.00
UNIDEN-BEARCAT UBC100XL SUPER H-HELD C/W NCDS PSU	£199.00
UNIDEN-BEARCAT UBC175XL SUPER DESK-TOP C/W PSU	£245.00
REGENCY HX850 HANDHELD AM/FM MINI LBA/IR/VHF/UHF	£399.00
REGENCY MX7000, SAME COVERAGE, SAME MAKE AS ACR2002	£139.00
FDK AIR BAND HANDHELD THUMBWHEEL MINI C/W NCDS PSU	£139.00
FDK AS ABOVE COVERAGE 140-173.000KHZ FM BANDS	£139.00
MANY MORE MAKES AND MODELS IN STOCK, PLEASE CALL FOR DETAILS.	
INSURED P&P £10 ON SCANNERS.	

SHORT WAVE RECEIVERS

YAESU FRG8800 SHORT WAVE ALL MODE 100KHZ-30MHZ	£572.50
YAESU FRG8800/FRV6800 AS ABOVE WITH VHF CONVERTER	£669.00
ICOM ICR71 100KHZ-30MHZ A TOP CLASS RECEIVER	£738.00

NEW PRODUCTS

INTERNATIONAL MODEL 877R AIR-BAND RECEIVERS

This new tuneable receiver covers 52-174 Mhz as well as CB in three bands and is a cost-effective alternative to handheld scanners. The receiver is fitted with a Helical antenna and has good performance for a radio with this coverage. It is ideal for monitoring Air Band, the two-metre and PMR/Marine bands as well as Band 2 FM Broadcast. A squelch control is also provided. Two versions are currently available.

Model 877R, for use with Dry cells.	£39.50
Model 877R, c/w nicads and charger.	£49.50

DEALERS CALL FOR TRADE PRICES P&P £2.50

See it at Leicester, Stand 36



INTRODUCTORY OFFER

NEW

RAYCOM PRODUCTS

NEW ICOM TYPE COMPATIBLE NICAD PACKS, EMPTY CELL CASES AND DESK TOP CHARGER

A new range of professional Heavy Duty long life nicad packs, imported from the USA, available exclusively at RWC.

10AF 10V 800 mAH LONG LIFE, ICOM EQUIV BP5/8	£55.00
12AF 12V 600 mAH LONG LIFE, ICOM EQUIV BP7	£52.50

(Both above units for use in ICOM BC30/60 OR RAYCOM NC580)

MT1 EMPTY Cell case for self assembly of up to 10x Nicads for a cost effective replacement for packs such as BP3 etc. there is ample room for a DC jack, c/w instructions £8.50. **AA NICADS** tagged 1.2V 500mA Nicad cells for above £1.60. **NC580 Desk-Top charger** for all Icom type Nicads above 400mA, two charging positions 50mA & 80mA 14hr charge £39.50 Trade and Dealer enquiries welcome. Call for more details.

P&P £2.50 per order



NEW

ANTENNAS & ACCESSORIES

ICOM AH7000 SUPER DISCONE 25-1300MHZ INC POST	£79.00
NEW RAYCOM AIR BAND DISCONE 118-170 MHZ 6 ELEMENTS	£12.50
RAYCOM DISCONE 60-600 MHZ 8 ELEMENTS SO239 SOCKET	£27.50
SUN MOBILE 5/8 SO239 C/W SO239 MOULDED LEAD/G/MOUNT	£22.50
G5RV 1/2 SIZE HF MULTIBAND HF ANTENNA (INC POST)	£15.00
G5RV FULL SIZE MULTIBAND HF ANTENNA (INC POST)	£17.50
G5KW/W3DZZ 7.1MHZ TRAP DIPOLE ASSY, SO239/COAX FED	£23.50
G5KW/W3DZZ 7.1MHZ MULTIBAND AS ABOVE, BALANCED FED	£22.50
G5KW/W3DZZ 7.1MHZ 2X TRAPS, FOR SELF ASSY. ANT	£9.95

Hundreds of other types of base and mobile antennas in stock

JAYBEAM, TONNA, MET, SUN, HOXIN, POPULAR MODELS IN STOCK.

Appointed dealer for MSJ. Butternut Products.

MOD KITS

RWC MOD KITS, ANNOUNCEMENT

We apologize to customers waiting for various mod kits, supplies of crystals and components are inconsistent and demand for kits varies, so there is occasionally a delay before we can send your kit of parts, please be patient, Rome was NOT built in a DAY! Kits still available. SANYO LC7137 SYNTHESIZER CB-10MTRS, LCL/DNT CB-10MTRS, FT757GX MK1 FAST TUNING MOD, STORNO CQM713 PMR-2MTR KIT, PYE A200 E-BAND 50MHZ KIT, call for technical details, prices and delivery.

WANTED DEAD OR ALIVE

Your used equipment. We also offer a very comprehensive range of guaranteed used equipment, eg. Amateur band transceivers, SW receivers, scanning receivers, PMR and accessories. As far as we are aware we are the only company in the UK to offer a bi-weekly computerized used equipment list and special offers list.

Send a large SAE for copies. ALL USED EQUIPMENT CARRIES 3 MONTH WARRANTY

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★ WE WILL MATCH OR IMPROVE ANY GENUINE ADVERTISED PRICE ★



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TODAY

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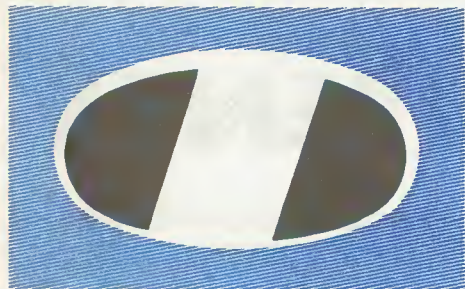
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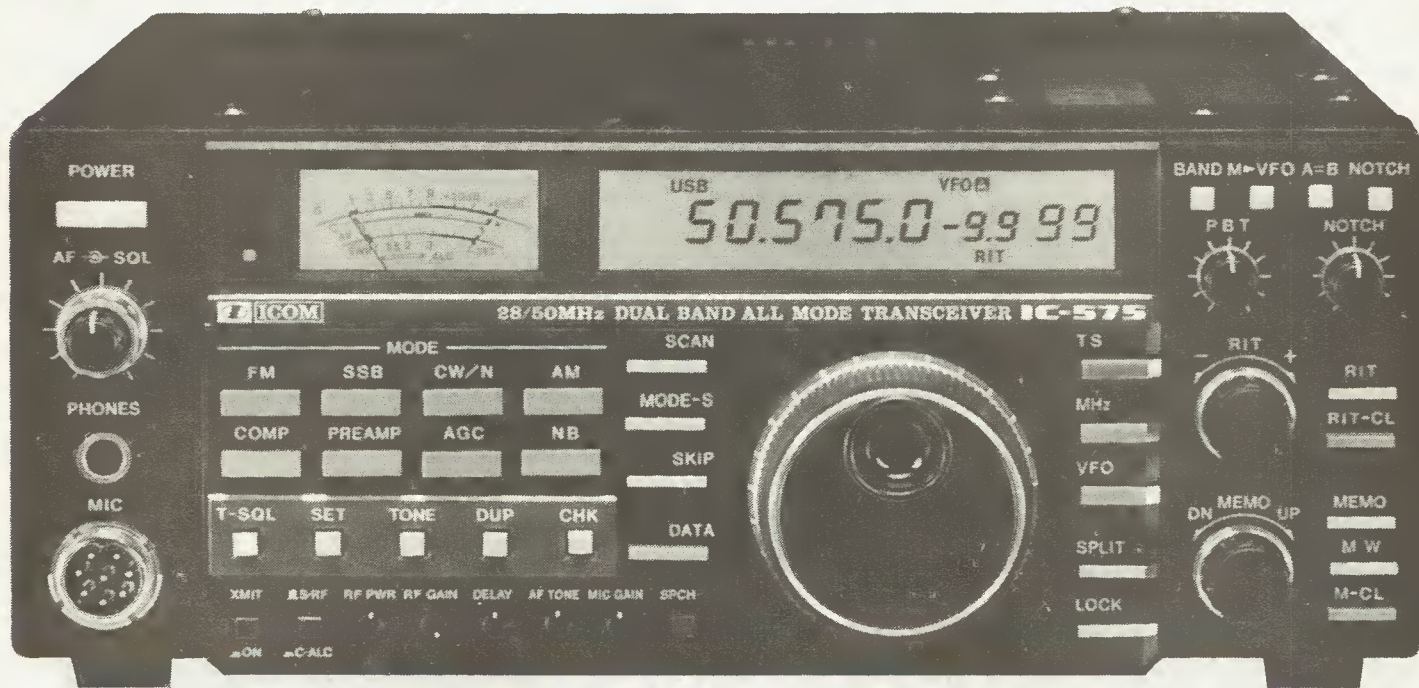
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ICOM

Communications



IC-575, 28/50Mhz Dual band multimode base station.

The ICOM IC-575 base station was developed to meet the demand for advanced communications for the recently acquired 6m band. Similar in appearance to the IC-275/475 2m and 70cm base stations, the beauty of this new transceiver from ICOM is that it gives you the best of both worlds, 6 & 10m in one compact unit. The IC-575 covers 28-30Mhz and 50-54Mhz. 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.



You can get what you want just by picking up the telephone. Our mail order department offers you free same day despatch whenever possible, instant credit, interest free H.P., Barclaycard and Access facility, 24 hour answerphone service.

Datapost



TOP HF



IC-761, HF Transceiver with general coverage receiver

The new ICOM IC-761 H.F. Transceiver has many features making it probably the best top of the line Amateur transceiver available today. This all mode transceiver features an internal aerial tuning unit and A.C. power supply. The A.T.U. boasts a 3 second band selection and tune up with a VSWR matching of less than 1.3:1. For the serious operator the 100kHz-30MHz general coverage receiver and 105dB dynamic range make it ideal for DX chasing. Frequency selection is by the main VFO or via the front panel direct access keypad.

And for when reception is difficult, pass band tuning, I.F. shift, notch filter, noise blanker, pre-amp and attenuator should enable you to copy even those weak DX stations whether amateur or broadcast.

The C.W. operator will appreciate the electronic keyer, 500Hz filter and full break in (40wpm) other filter options are available. The IC-CR64 high stability crystal is standard as is the CI-V communications interface for computer control. Twin VFO's and split mode for cross band contacts the IC-761 features program scanning, memory scan and mode select scan and the 32 memories can store frequency and mode.

The transceivers operating system is held permanently in ROM and is not dependant upon the lithium battery. The cell is used for memory back up only. A new style meter gives P.O., A.L.C., IC, VC, COMP and SWR readings. Optional accessories include the IC-SP20 external loudspeaker with audio filter selections, FL101 250Hz CW filter, FL102 6kHz A.M. filter and the EX 310 voice synthesizer. The SM8 & SM10 desk microphones are also suitable for this equipment.

Telephone us free-of-charge on:

HELPLINE 0800-521145.

— Mon-Fri 09 00-13 00 and 1400-17 30 —

This is strictly a helpline for obtaining information about or ordering ICOM equipment! We regret this service cannot be used by dealers or for repair enquiries and parts orders. Thank-you

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South Midlands C

SCHOOL CLOSE, CHANDLERS FORD IND. EST., EASTLEIGH

★ UNREPEATABLE ★
BARGAIN OFFER

FT726R (2) £699 inc VAT



The world's best known VHF/UHF/satellite multimode base station is still making its mark with dedicated VHF DX'ers.

You choose the plug-in RF Modules for the bands you want to use. Up to three bands can be installed at once for cross-band operation or pushbutton band selection, and RF Modules can be easily changed for even further expansion at a later date. The 70cm modules include GaAs FET receiver preamplifiers.

Sideband selectable SSB, FM and CW are all included, with dual synthesized VFOs tuning 20Hz/step, plus an independent FM channel tuning knob with standard channel steps of your area. All repeater operating functions are provided, including reverse shift and programmable odd split memory. A speech processor is included for SSB, and for CW, an optional 600Hz narrow filter is available for selectable CW narrow operation. An excellent IF shift system is provided, plus Yaesu's super IF width system; first time ever in a VHF/UHF transceiver!

All memories store mode (as well as band, of course), and can be scanned for busy or clear, pause or stop - even when on a different bands. Programmable limited band scan between memories, and priority channel checking functions are also included. Every conceivable memory/VFO data exchange function is provided, and all memories plus the VFOs are backed up by a lithium battery.

With the optional plug-in satellite IF unit installed, full duplex cross-band capability is provided, with independent tuning, mode selection and indicators, and meter functions for transmit and receive. With just this rig and good antennas you have the finest amateur satellite earth station available.

430/726 70 cms UNIT	£199	SAT/726 SAT UNIT	£59
50/726 6m UNIT	£249	21/24/28 HF UNIT	£269

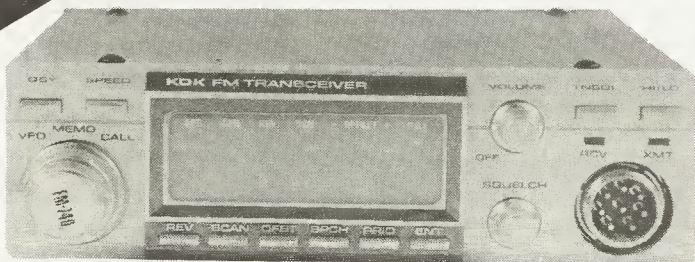
★ The FT726R 2m base station, at only £699, is £240 cheaper than its nearest rival. Add 70cms at £199, you now have 2m & 70cms capability for less than the oppositions 2m bases. ★

WITH 12 MONTH WARRANTY & FREE FINANCE AVAILABLE.

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BARGAIN OFFER



2M & 70CMS
MOBILES
NOW ONLY
£199 inc VAT



- ★ Programmable step sizes (2.5KHz to 40KHz)
- ★ Priority function monitors call channel
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- ★ Full repeater splits with reverse facility
- ★ Programmable band scan limits
- ★ Lithium back up for memory & CPU

- ★ 2m or 70cms COMPACT MOBILES (FM ONLY)
- ★ 25/5W O/P on 2m or 10/1W O/P on 70cms
- ★ 16 Programmable Memories plus Call
- ★ 4 Scanning Modes Skip, Carries, Auto & Delay
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THE BRAINS AND THE BRAWN.



THE BRAINS OF THE OPERATION: THE FT-767GX

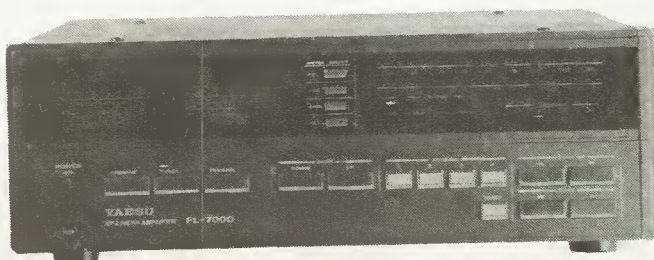
Features include 160 to 10 metre transmit, including WARC bands. Optional plug-in modules for 6-metre, 2-metre and 70-cm operation. Receiver coverage from 100KHz to 30MHz. AM, FM, SSB, CW, AFSK modes built in. Ten memories that store frequency, mode. Dual VFOs with one-touch split frequency capability. Digital SWR meter. Digital RF power meter. Built-in RF preamplifier. Adjustable drive level from 0 to 100 watts.

Up to 30 minutes continuous transmit (100% duty cycle). Quick turnaround time from TX to RX for AMTOR, Packet, and QSK CW. AGC slow/medium/fast/off selection.

THE MUSCLE TO GET YOU OUT: THE FL-7000.

This solid state amplifier covers 160 to 15 metres, and includes a built-in power supply, automatic tuner and lots of powerful operating features.

There's a fast turnaround time for break-in (QSK) CW, HF, packet, radio, and AMTOR. Only 70 watts excitation for full output, and 1200 watts PEP input power. Automation antenna matching sensor turns off amplifier and rematches tuner circuitry if SWR rises above 2:1. Hands-free automatic band change when used with FT-767GX, FT-757GX or FT-980. Connection to up to four antennas, including automatic selection via optional unit.



FT767GX RRP £1550 inc VAT

FL7000 RRP £1600 inc VAT

A SELECTION FROM OUR CATALOGUE

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KR250	Bell type twist switch control	£78.00
AR40	Bell type turn push rod	£125.00
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AR50	Bell type 5 position pre-select	£149.00
CD45	Bell type meter readout	£219.00
KR600RC	Bell type 350 deg. round meter	£219.00
HDR300	Bell type digital readout	£699.00
KR800SDX	Bell type 450 deg. variable speed	£325.00
KR1000SDX	Bell type 450 deg. variable speed	£368.00
KR2000RC	Bell type heavy duty round meter	£445.00
KR200	Bell type meter control +/- 90 deg.	£445.00
KR400	Bell type meter control +/- 180 deg.	£139.00
KR500	Elevation meter calib. +/- 90 deg.	£149.95
KR500B	Heavy duty version of KR500	£259.95
KR5400	Azimuth/elevation dual control	£279.00
KR5400A	Azimuth/elevation computer control	£339.00
KR5600	Azimuth/elevation heavy duty	£369.00
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ROTATOR HARDWARE

50425	Ubolts clamps AR22/AR40 std.	£10.18
50463	Ubolts clamps CD45 etc. heavy duty	£16.68
KS050	Rotary bearing 1 1/2" mast	£19.95
KS065	Rotary bearing 2" mast	£29.95
KC038	Rotary bearing form KR400/KR600	£16.95

ROTATOR CONTROL CABLE

RC5W	5way for KR400RC etc.	per mtr. £0.48
RC6W	6way for KR250/400/500 etc.	per mtr. £0.66
RC8W	8way for CD45/KR2000RC etc.	per mtr. £0.72

Carriage on rotator cable £1.90 up to 20 metres, over 20 metres £2.65.

VHF/UHF MOBILE ANTENNAS

HAND PORTABLE ANTENNAS

6P2T/PL	6 section telescopic with PL259	£6.33
6P2T/BNC	6 section telescopic with BNC	£7.94
T144H	Tele. 2 metre 1/2 Wave with BNC	£13.50
2H/PL	Helical for 2 metres with PL259	£6.33
2H/BNC	Helical for 2 metres with BNC	£7.94
HS430	70cm 1/2 Wave with BNC	£9.75
HS430S	70cm 5/8 Wave with BNC	£9.75

MOBILE WHIPS

370F	70Mhz 3/8 Wave 5.3ft.	£18.54
20W	144Mhz 1/4 Wave 1.6ft.	£3.15
2VF	144Mhz 1/2 Wave foldover 3.5ft.	£16.13@
78F	144Mhz 7/8 Wave foldover 5.7ft.	£21.15
78B	144Mhz 7/8 Wave ball adjust 5.6ft.	£18.64
78SF	144Mhz 7/8 Wave short whip 4.7ft.	£21.15
88F	144Mhz 8/8 Wave 6.5ft.	£24.10
258	432Mhz 2x5/8 Wave foldover 3.1ft.	£29.37
268E	432Mhz 2 section colinear 6db	£32.80
358	432Mhz 3x5/8 foldover 4.7ft.	£33.73
70N2DX	144/432Mhz 6/8+3x5/8 Wave	£37.75

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SMCGCCA	Gutter clip c/w 4m cable + PL259	£14.25
SMCSOCA	Cable ass. S0239 4M cable PL259	£6.90
SMCSOCAL	Cable ass. S0239 6M cable PL259	£7.20
SMCTMCAS	Trunk mount c/w 6M cable PL259	£12.25
HDTMCA	Heavy duty truck mount c/w 5M cable	£16.65
SOMM	Mag Base c/w 4m cable PL259	£12.75
SMCSOWM	Adj. angle wing mount base	£6.00
SMCGCD	Gutter clip adjust angle for SOCA	£6.45
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LR2/2M	Vertical omnidirectional	£28.18
LW8/2M	5 Element Yagi 7.8dbd	£17.31
LW8/2M	8 Element Yagi 9.5dbd	£21.85
LW10/2M	10 Element Yagi 10.5dbd	£28.23
LW16/2M	16 Element Yagi 13.4dbd	£42.44
PBM10/2N	10 Element Parabeam 11.7dbd	£55.20
PBM14/2M	14 Element Parabeam 13.7dbd	£68.08
Q4/2M	4 Element Quad 9.9dbd	£35.31
O6/2M	6 Element Quad 10.9dbd	£46.28
D5/2M	5 over 5 slot fed Yagi 10.0dbd	£30.82
D8/2M	8 over 8 slot fed Yagi 11.1dbd	£42.38
5XY/2M	5 Element crossed Yagi 7.8dbd	£33.41
8XY/2M	8 Element crossed Yagi 9.5dbd	£43.01
10XY/2M	10 Element crossed Yagi 10.8dbd	£53.95
PMH2/C	2 Way harness circ. polarisation	£12.82
PMH2/2M	2 Way harness for 2 Metres	£14.15
PMH4/2M	4 Way harness for 2 Metres	£35.25

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GDX1	Discone 80-480Mhz low VSWR	5.75
GDX2	Discone 50-480Mhz low VSWR	£69.65
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GP144W	2 Metre colinear 2x5/8 6.4db	£42.00
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GP2M	2 Metre ground plain 100 Watt	£23.65
GP432X	70Cms colinear 3x5/8 6.8db	£47.50
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Yaesu FT757GXII	969.00	(-)
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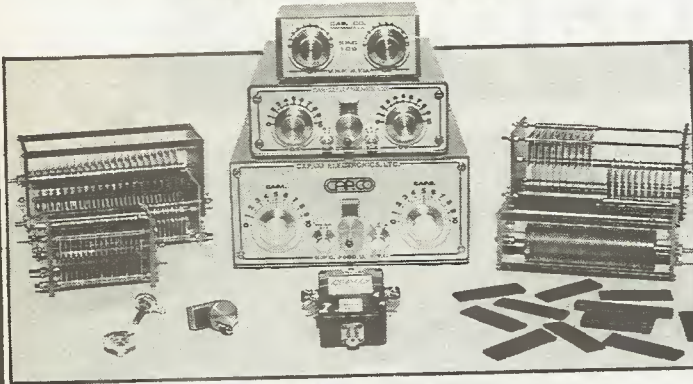
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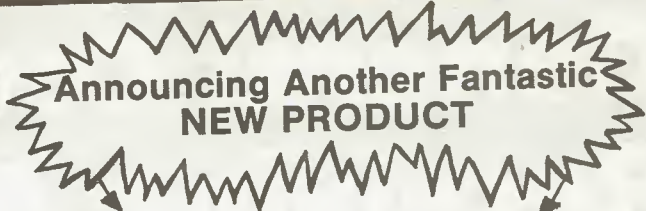
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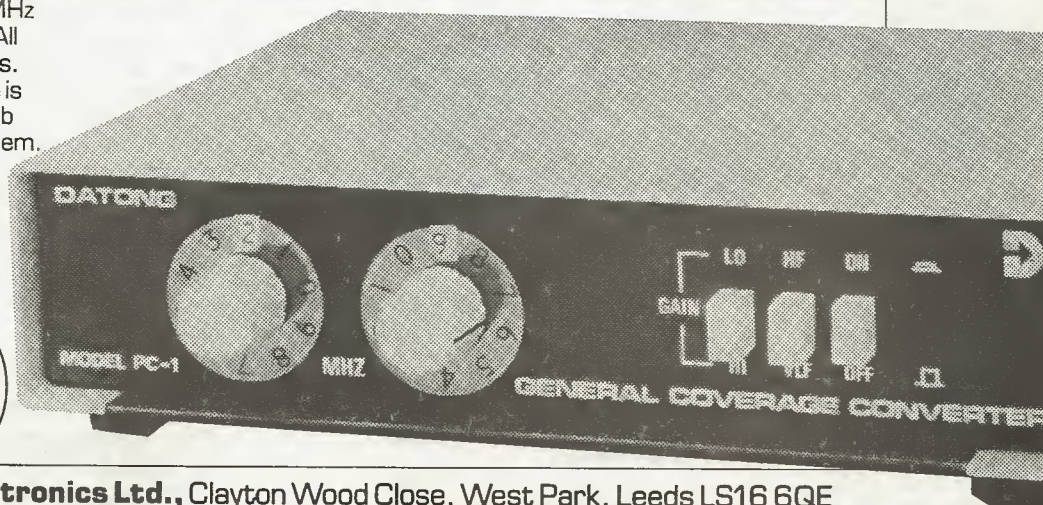
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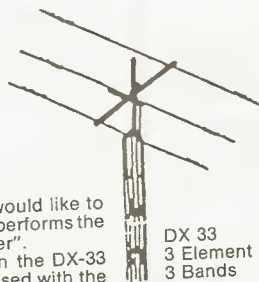
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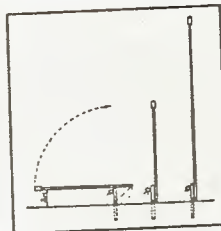
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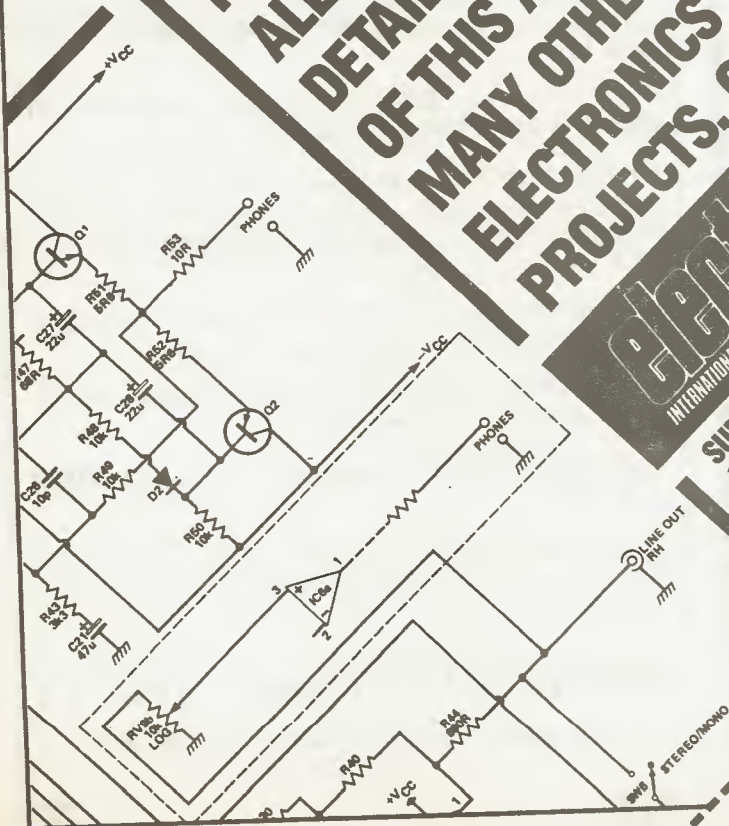
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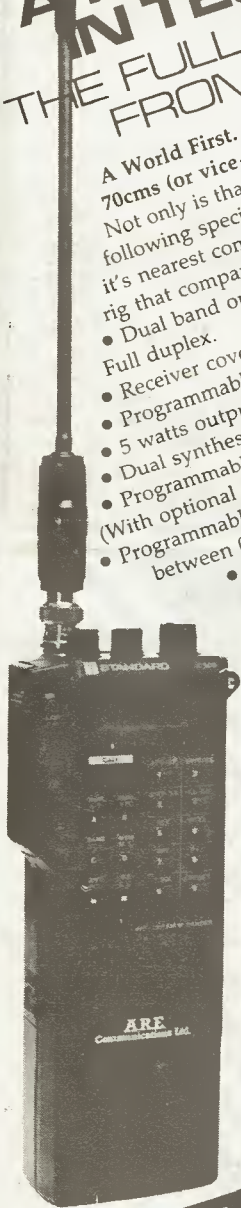
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TX-3 RTTY/CW/ASCII TRANSCEIVE

The high performance, low cost system

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For **VIC20** we have our RTTY/CW transceiver program. Tape £20.

RX-4 RTTY/CW/SSTV/AMTOR RECEIVE

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TIFI 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 £15 (assembled PCB + Cables, Connectors) or ready-made £25, boxed with all connections. Extra MIC leads for extra rigs £3 each. State rig(s).

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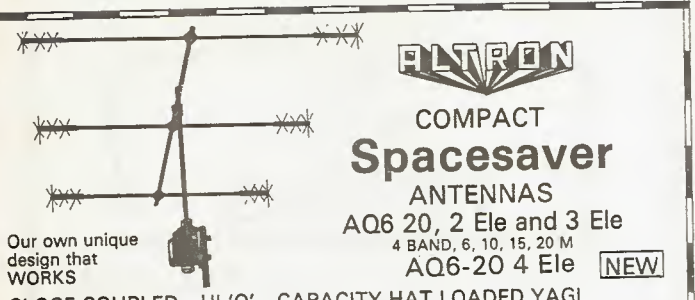
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As reviewed by
G4HCL in HRT
APR 87

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Forward Gain Dbd	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
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VSWR (typical)	1.1:1	1.1:1	1.1:1
Weight	7.5lb	12lb	16lb
Wind load	2ft ² 0.18M ²	3ft ² 0.27M ²	4FT ² 0.37m ²
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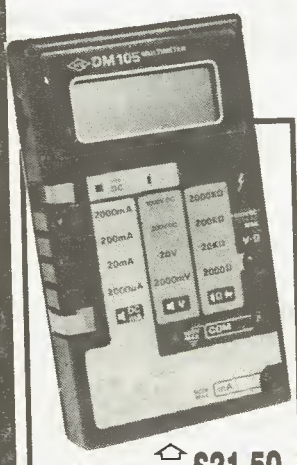
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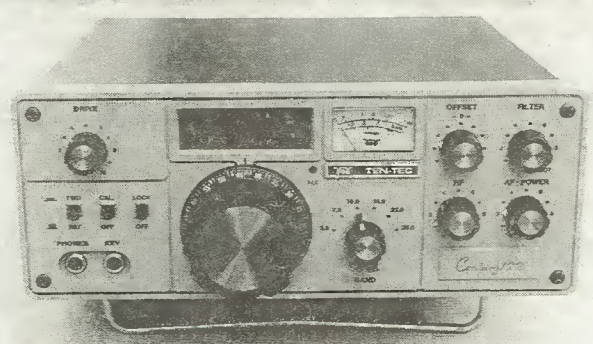
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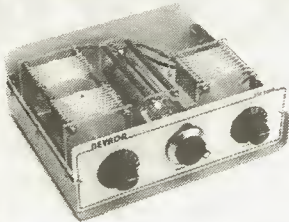


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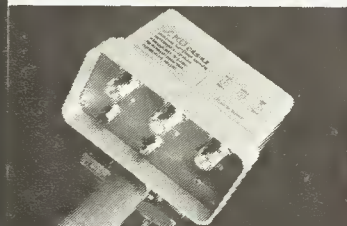


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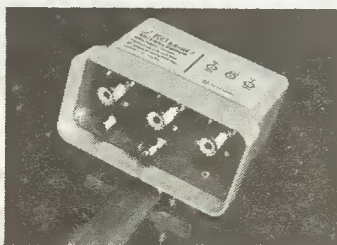
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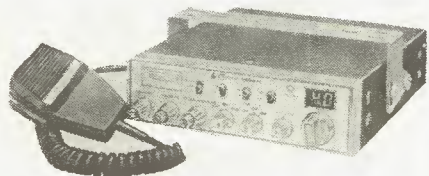
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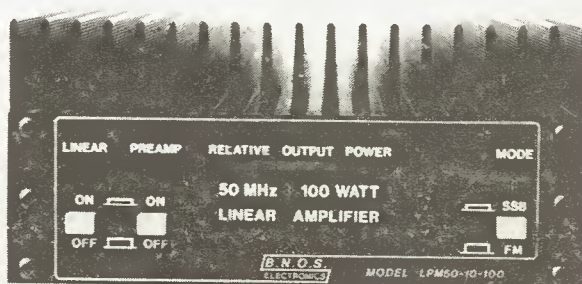
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With the recent surge in interest in the lower VHF bands the average amateur is looking around for new equipment on these bands. In what promises to be the ultimate partnership BNOS have teamed up with Cue Dee of Sweden to offer the highest quality equipment available anywhere.

BNOS, of course, have always offered a five year guarantee on all our linear amplifiers and the 4m/6m range is no exception. The compact LP models for 6 metres incorporate many of our popular features which offer peace of mind to the user. The LPM models for both bands contain all of our user friendly additions including the power meter and our famous overdrive protection circuits.



	LP50-3-50	LP50-10-50	LPM50-10-100	LPM70-10-100
Frequency Range	50-54MHz	50-54MHz	50-54MHz	70-72MHz
Class of Operation	AB1	AB1	AB1	AB1
Minimum input power	500mW	500mW	500mW	500mW
Maximum input power	5W	15W	15W	15W
Recommended input power	3W	10W	10W	10W
Output impedance	50 ohms	50 ohms	50 ohms	50 ohms
Output Power	50W	50W	100W	100W
Power Requirements	13-8V 6A	13-8V 6A	13-8V 12A	13-8V 12A
Pre-Amp gain (typical)	12dB	12dB	12dB	12dB
Noise Figure (Better than)	1.5dB	1.5dB	1.0dB	1.0dB

As is usual with BNOS products the specifications mean what they say. Power is quoted in RMS and harmonic outputs are kept incredibly low.

Many black boxes produce terrible second and third harmonics and at six metres these harmonics are even more troublesome. The second harmonic of 50 MHz is slap bang in the middle of the broadcast FM band. BNOS's range of low pass filters are designed to remove harmonic problems without cutting out the DX too. Fit a BNOS filter and the

next time there's a stateside opening on 6, you can rest assured that the bloke next door can still listen to "The Archers".

Cue Dee are the Aerial world's BNOS. They also can offer a five year guarantee on their products because of the superior construction of their antennae. The aerials are made from the finest Aluminium and tested to Sweden's stringent national regulations.

The Cue Dee Duo is a combined yagi with 5 elements on 4 metres and 6 on 6 metres. The Duo incorporates a factory

Model	Band MHz	Insertion Loss dB	Harmonic 2nd	Rejection 3rd	Non Harmonic Rejection	Power Handling	Connectors
F50-L/U	50	Better than 0.5	50dB	75dB	75dB	250W	UHF
F70-L/U	70	Better than 0.5	50dB	75dB	75dB	250W	UHF
F144-L/U	144	Better than 0.5	50dB	75dB	75dB	250W	UHF
F144-L/N	144	Better than 0.5	50dB	75dB	75dB	250W	N
F432-L/N	432	Better than 0.5	50dB	75dB	75dB	250W	N

Note: Rejection Figures are typical and w.r.t. the wanted signal

6 metre Amps

LP50-3-50 Linear/Preamp	175.00
LP50-10-55 Linear/Preamp	175.00
LPM50-10-100 Linear/Preamp	235.00

Filters

F50-L/U	29.95
F70-L/U	29.95
F144-L/U	29.95
F144-L/N	35.35
F432-L/N	35.35

4 metre Amps

LPM70-10-100 Linear/Preamp	235.00
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CUE DEE Duo Antenna 5 elle on 4m & 6 elle on 6m 6dBd on both bands 129.95



B.N.O.S.
ELECTRONICS

Mill Lane, Stebbing, Dunmow, Essex, CM6 3SL.
Tel: 0371-86681
Tix: 817763 BNOS G

adjusted gamma match so you don't have to mess about tuning up like with other aerials. The boom is strong 28mm tube with a 1.5mm wall. Each element is a big strong 12mm diameter yet the overall effect of tubular section materials is to reduce wind loading by up to 66% over square-section aerials. With a 5 year guarantee, 6db gain over a dipole on each band and a preset gamma match the Cue Dee Duo - like all Cue Dee Aerials - is a fit and forget product. BNOS and Cue Dee - The Ultimate Partnership.

LETTERS

Letter of the month

Dear HRT, It seems that RSGB has decided to use 70.4875 for a packet link frequency, in violation of their bandplan which allocates upwards of 70.425 to FM simplex *only*. (RAYNET 'reserve' 70.350/375/400).

In real terms, with 25kHz spec gear this means 3 channels (70.425/450/475), with 70.260 for mobile use and the presence of a digipeater 12.5kHz above the top channel will effectively reduce this to 2. Four meters is not the barren wasteland it seems. In the Dudley area alone, significant numbers have managed to get hold of 12.5kHz gear and most frequencies, including 70.4875, are in regular use.

What I find totally unacceptable is the fact that this 'rule-change' has been 'sneaked through' without reference to the membership and has only been written up in the data bulletins. Not in the general pages of RadCom. There is a perfectly good all-mode section of 4 metres so why do RSGB choose not to use it?

I have been a member of RSGB for 17 years, as I regard it essential to have a voice in the corridors of power. Realising the shambles which would ensue if the RSGB, for all its faults, ceased to exist I have resisted the temptation to resign over this deviousness... so far!
D J Reynolds, G3ZPF

What — no fishphone!

Dear HRT, I studied with interest Paul Hollands feature (HRT June 87) and Lt Cdr DSE Howes subsequent reply (Oct 87) with regard to events which occurred off the West Coast on 10th September 1984 at 1335 pm.

I was the amateur who received the distress call during a lunch break and immediately contacted the coastguard service via an emergency 999 call whereupon I acted as intermediary between the coastguard rescue service and Paul and Dave — the two amateurs in distress off the coast of Arran. In the event the incident ended on a happy note much to everyone's delight, especially Paul and Dave, and I headed back to work with thoughts of Tony Hancock competing for attention with the

various dual carriageway signs.

On a more serious note I was rather surprised to learn from the authorities that there is no legal requirement to have marine VHF equipment installed in seagoing craft, surely this situation is not only absurd but tantamount to serious neglect in maritime regulations. The DTI are a responsible and very necessary government body and must retrieve this oversight at the earliest opportunity.

Steve Adams GM4PGL

You may be interested to know that it isn't just private boats which can be non-radio; I was staggered to learn recently that it is still legal for light aircraft to fly with no radio facilities on board. Obviously, multi-channel radio for these applications isn't cheap — but it certainly seems to be high time that at least one or two channel sets are made compulsory.

More on class B bands

Dear HRT, Perhaps M. Allen G4XMH should step out of the trees for a while and re-examine his viewpoint.

I do not know the original reason for the instigation of a 'B' licence, however it is regarded that it covers VHF and above; if he does know anything about radio theory (I for one was required to learn a certain amount prior to the RAE) he would know that the VHF spectrum runs from 30MHz-300MHz, perhaps a justification in itself for allocation of 50MHz to 'B' licencees? Far from being a 'smack in the mouth' for 'A' licencees, surely it is a tribute to the general operating expertise of the 'B's'? It does seem to me that a great number of 'A' licencees only looked on the morse test as an obstacle to be surmounted before being unleashed upon an unsuspecting world, promptly discarding their keys in favour of wielding a microphone and a Megawatt linear like the fourth horseman!

I shall, when work and time allow, take the morse test to enable me to use what I consider to be a challenging and rewarding mode of operation. In the meantime I should like to broaden my horizons by talking to as many of my fellow amateurs as possible, on as many bands as

possible; not narrow my viewpoint by restricting the hobby to a minority — after all, my opinion may be wrong!

Regarding 10 metres, why *not* give access to the 'B's'? After all, is it not better that we all use it, rather than lose it due to the present inactivity?

D J Butcher G1UBO

And more . . .

Dear HRT, I feel I must comment on the letter from M Allen (Oct 87 HRT) concerning 'B' licencees having access to 70 & 50MHz.

I have been licensed since 1981 and I am always on the lookout for DX on 2m and 70cm, when I have the gear. I live, and always have done, in flats. Never having a garden never having any room to put up any HF antennas in order to warrant me obtaining an 'A' licence, I was very pleased to hear that 'B' licencees were granted access to 50MHz.

Having listened to 50MHz prior to 'B' licensee access, and hearing not a lot, I can only say that activity by 'A' and 'B' licencees will only do good for the band (as was shown some years ago on Two).

As for Ten, yes please, after all quite a few countries allow their equivalent 'B' licencees to use this band, the activity it would create would be very healthy (converted CB rigs are not expensive) and a ten metre dipole would fit my balcony.

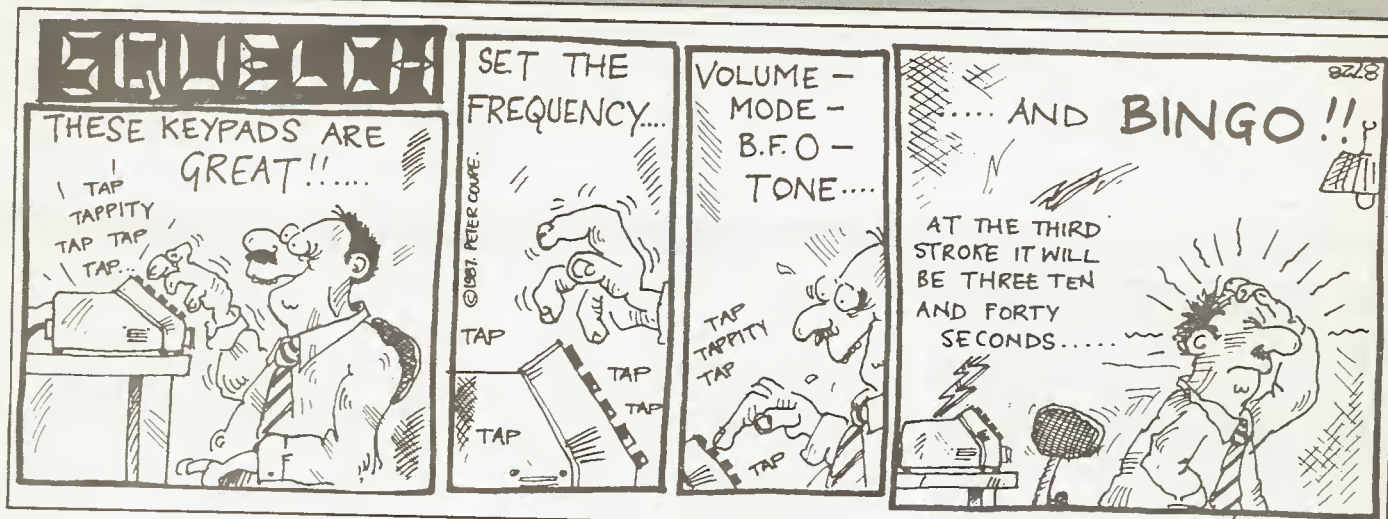
Come on G4XMH, we don't all have real estate.

C Stangroom G6CRX

And yet more!

Dear HRT, For 2 years we have waited for the allocation of 50MHz to those of us who do not have the desire to take a morse test and work the HF bands. Now this has been granted (along with 70MHz), why do some of those people who have got the superior skill and intelligence to pass the morse test start to moan about the allocation.

We do not believe that there is such a thing as Class A & B licencees; merely those who want to use HF have to take the morse test as required by Article 32 of the ITU. The licence is after all, the same with this exception. We have an HF receiver



here but after having listened to the standard of operating on most HF bands it stays firmly tuned to World Service!

You have gathered from this letter that we find the sentiments of G4XMH and others deplorable. Finally, how many of these self-appointed super operators use completely homebrew equipment on 50 and 70MHz? Not many we suspect!
Julian & Hazel Tether G6LOH & G1NOD and the G7ABI Contest Group

Bandhogs revisited

Dear HRT, Re: J Moss's comments on bandhogs (Aug 87). What Mr Moss said was true, there is so much satisfaction in making a rare DX QSO using limited power and the joy of knowing the contact was made under the greatest of difficulty where patience, politeness and common sense paid dividends.

Radio operators of this calibre are a rare commodity, it's so easy to work rare DX with high gain beams, 3kW linears etc. Mr Moss hold your head high, it will be a great privilege to hold a QSO with a common sense operator.

S G Braid, Holyhead

Sorry Standard

Dear HRT, I wish to apologise most sincerely to the company 'Communique', importers of Standard radio equipment. Due to a misunderstanding between people, once Communique became aware of my problem they pulled out all the stops, repaired the C58 and once again it is back in my possession after nine complete months. Any other name mentioned in my original letter, the thoughts still stand.

Thank you HRT for bringing this long drawn out saga to a satisfactory close.

H Fennah GW4FLZ

No 'B's for Ten

Dear HRT, I was so pleased to read in the September edition of 'HRT' the letter from your correspondent, A L Dick, GM6KKP, stating that he does not oppose the use of morse nor the testing of those who wish to use it.

I trust, however, that he will understand, that I would most strongly oppose the granting of facilities at or below 30MHz to holders of Class B licences.
G P Lovelock G3III

The Early Days

Dear HRT, This month's issue of 'The Early Days' brought back fond memories of my ham days 1937-39, 1946-48, when pressure of building up my radio business and DXing till 3 am did not mix. My station G8AU was first licenced at 226 St Helens Road, Hastings, when in 1939 we moved to 12 Springfield Road, St Leonards, and the closedown for the duration — my last QSO was with a Polish station as Poland was being invaded!

Horror of horrors, in 1942 Hitler destroyed my receiver and gear not impounded by the GPO (and my old friend Fred Roberts the GPO Radio Officer) and I lost all my precious QSL cards etc from all over the world.

I worked G8AU on 14MHz and 28MHz mostly, whilst my great friend Roy Southland G5RO was a 160 and

5 metre man. My TX was a crystal oscillator 6H6 into a doubler 6L6 into two 807s, grid voltage 200V and 1000V on the anodes. A great time was had by all!

How nice to see the TX so similar to mine on p19 complete with 807s and a 6L6. Zep or Windom antennas were the order of the day and I worked nearly all (not quite all) continents and many countries on a 33' Windom.

I hope to get G8AU back on 28MHz soon with a 'modified' 148GTLDX, cannot at the moment afford any other bands!

Donald Jackson G8AU

Going by the book

Dear HRT, Re: your letter of the month in the Oct 87 issue, and comments passed by M Allen G4XMH on Class B licensees being allowed to use 50MHz. What with the RSGB being run down with letters relating to same, what on earth is the matter with the G4 licensees, are they jealous or do not want progress. Before the G4 gentlemen start abusing the mere Class B licensees they should get themselves some education on how to operate on 2m, a CQ call was answered on S20 and the G4 station replied 'take it up to 145.800 old man', the book states 145.200 and 145.800 are RAYNET frequencies, wonder what the answer to that question will be.
F Richards GW1LLN

£10 FOR THE LETTER OF THE MONTH

You've got a gripe about the bandplans, or you're sick of being wiped out by next doors microwave. Or maybe you've been bowled over by the excellent service from your local radio shop.

Whatever you've got to say about amateur radio say it here in the letters column and you could win yourself £10 for writing the letter of the month.

Send your epistles to: Letters Column, Ham Radio Today, ASP Ltd, 1 Golden Square, London W1R 3AB.

80m

Direct Conversion Receiver ~ Part 2

All of the components mount on the non-track side of the PCB and are inserted into the board as far as they will go. Resistors lie flat against the PCB surface and are all on 10mm spacing between lead. Similarly, capacitors are inserted through their mounting holes as far as they will go leaving minimal lead lengths above the board.

The four transistors should be inserted so that about 3mm of the leads are above the PCB — don't put them in so that all the excess lead length is above the PCB. One, it looks ugly and two, you will have stability problems.

The only components to keep an eye on are the polystyrene capacitors and electrolytics. The former can be soldered in as with any other component but *don't* touch the actual plastic body with the iron — it will melt and short out internally. If this happens throw it away and get another one. The electrolytics are polarised (that is, they are fussy about which way round a DC voltage is applied to them). One end is marked with a '+' sign to indicate the positive voltage end, or sometimes the negative end is marked instead. Whichever, make sure that when you put it in, the positive end coincides with the hole on the layout marked with a '+' sign.

A similar condition exists with the three diodes in that there is a correct way round for each. A black band shown on the layout corresponds with a black band on one end of the diode. In the case of the two Schottky diodes, these may have a blue/grey band at the appropriate end rather than black. Take care when bending the leads as the glass bodies are fragile.

Go directly to 80 metres, with part two of this constructional project from Cirkit.

Before starting construction, check that you have all the components necessary and that the PCB doesn't have any whiskers or solder bridges left on it from manufacture. Remove any with a sharp tool or scribe.

1. Insert one of the 1mm diameter PCB connection pins into each of the holes marked with solid black circle. These are used to solder the various connecting wires to later. The pins are inserted from the under (track) side of the board and pushed in until the small head is against the PCB track. Use a blunt nosed tool to get them right home before soldering. There are 15 in total.

2. Insert and solder C8, 9, 10, 11 & 12. From now on, cut off all excess lead lengths under the board as you go along.

3. Insert L2 and L3 into the PCB until the bases are resting against the upper surface, then solder all pins and the two tags on the cans on the underside.

4. Insert and solder RFC1, then all the fixed value resistors. Double check the resistor values as you go along.

5. Insert and solder the following ceramic capacitors: C28, C7, C13, C18, C16, C26, C19, C22, C6, C27 and C5.

6. Insert and solder C17 (220uF/16V axial) — note the polarity.

7. Likewise, place C14, 15, 23, 24,

25, 20 & 21 with polarities correct. All these capacitors sit with the bases of the cans against the PCB upper surface.

8. Insert and solder the four polystyrene capacitors C1, 2, 3 & 4. Don't melt the bodies! Ignore any red marking at one of these particular capacitors — it is not a polarity marking.

9. Insert and solder D1, 2 & 3. Make sure that the banded ends are in the right places and take care when bending the leads.

10. Insert and solder Q1, 2, 3 & 4. Make sure that the flat side of the packages coincide with the flat side on the layout. Push the packages into the holes until about 3-4mm of lead shows above the PCB before soldering.

11. Insert and solder L1 and RV1.

12. Insert and solder IC1, making sure that the pin 1 identifier is in the correct position, or that the notch is at the right end of the package.

The only remaining operation is to wind the transformer. Follow these directions and you won't (hopefully) have any problems.

1. Take a 35mm length of 0.2mm diameter enamelled copper wire and put one end through one of the holes in the ferrite block until about 15mm protrudes from the other end. Take the other end of the wire and thread it back down the other hole. You should now have a loop of wire running up one hole and back down the other, with both wires hanging out the same end of the ferrite block. This is one turn. Now, using the longer wire, continue threading through the holes in the block in the same direction until you have 8 turns through (8 in total). This completes the primary winding. Trim the

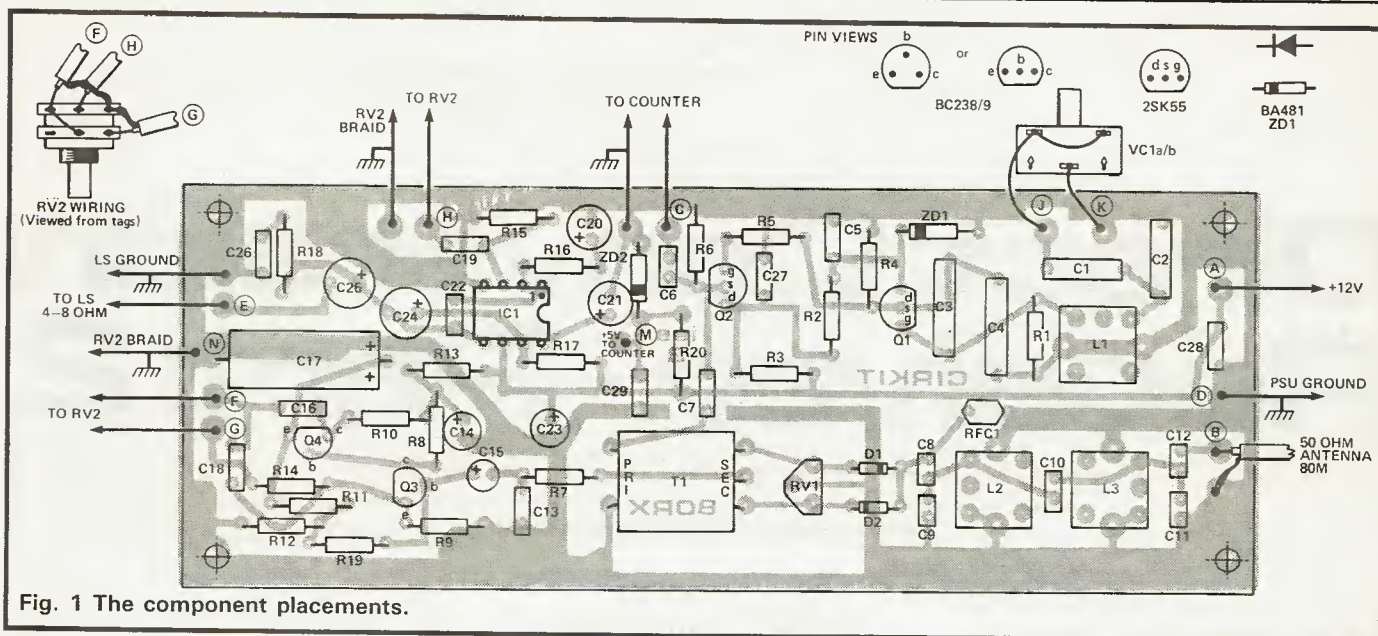


Fig. 1 The component placements.

protruding wires to about 10mm.

- Turn the block round so that you can start winding the secondary through the holes, but this time commencing from the other end. Wind on 8 turns, starting with a piece of wire 70cm long. **Don't** cut off the excess length yet from the winding just made. You should now have a pair of wires protruding from each end of the ferrite block, with the pair you have just wound comprising one half of the centre tapped primary. To make the centre tap, start to thread the longer lead still protruding from the transformer through the other hole as though you were starting another turn until you have a loop about 10mm out from the core. Twist this loop together neatly (this is the centre tap), then carry on winding another 8 turns. **Don't** change direction with the winding during this process!
- Trim all wires to about 10mm in length, then strip off the insulation on each of the five ends using a sharp knife to within about 3mm of the core.
- Thread the wires through the appropriate holes in the board (three at the secondary end) and then solder in place making sure that the core is resting against the PCB surface. It will help prevent microphony and the possibility of the core wires fracturing if you drip candle wax all over this transformer assembly to fix it in place on the PCB (you can use Araldite, but do it when you have checked the board out in case you have to rewind the transformer for any reason). Neither the

wax nor the Araldite will affect the circuit performance.

This completes the assembly of the PCB. It may now be tested and aligned.

Before switching the power on, you can connect an antenna to the receiver (pin B). As mentioned earlier, the best results will be obtained with a well matched 50 ohm impedance, either a dipole, G5RV or a long wire type used with a matching unit.

Having connected everything up, turn the volume control to minimum (fully anticlockwise), set preset RV1 to mid travel, adjust the cores of the three transformers level with the top of the cans and apply power. The current consumption should be somewhere under 60mA. If all is well, turn up the volume control and you should hear some hiss from the speaker showing that the audio stages are working. Applying a finger to the base of Q3 should induce a lot of hum. If you don't get anything at all, check the connections to RV2 first, then that the speaker is connected properly. If a finger or metal tool on pin 3 of IC1 brings up hum, then the fault must lie between Q3 and the volume control. The voltage checks shown on the circuit may help to locate a fault.

Once the audio stages are working, try tuning the capacitor around and with luck you should hear a signal somewhere. Temporarily adjust the cores of L2 and L3 for maximum strength. You now have to find the bottom of the 80M

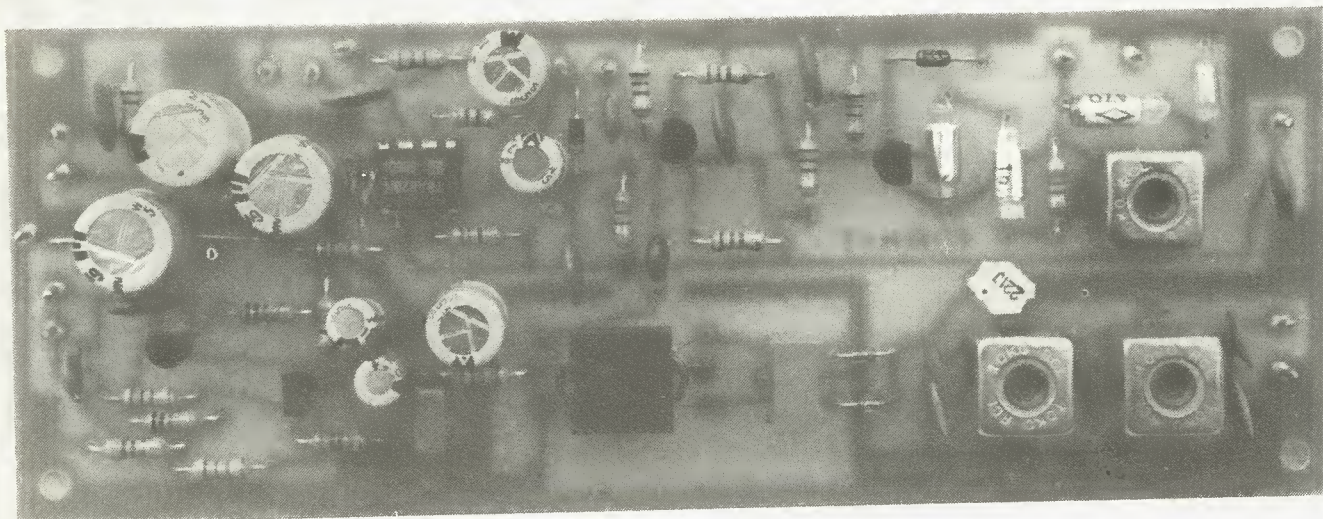
amateur band. If you have a frequency counter, then all you need to do is to attach it pin C and adjust the core of L1 so that the frequency is 3.490MHz with the capacitor vanes fully meshed (fully anticlockwise). Then peak L2/3 on a signal at mid-band.

In the absence of a counter, set the capacitor fully anticlockwise and adjust L1 slowly until you come across amateur CW signals — these will lie (most probably) between 3.5 and 3.6MHz. Using these as a guide it should be possible to estimate where the band starts. Alternatively, you could of course use a signal generator or crystal calibrator as a marker generator to aid getting the frequency correct. Once you have the bottom of the band set correctly, the top will take care of itself, the bandspread being preset by the values of C1 and C2. Again, L2/3 should be peaked on a signal at mid-band.

The balance control RV1, will probably be fairly accurately set if left at mid travel. If you experience direct breakthrough of broadcast signals on 80M, adjusting the setting of RV1 carefully should eliminate them depending on how strong the interfering signal is. This is most likely to happen with an untuned long wire type of antenna.

Finishing Touches

Once all is working, the receiver can be built into a case, preferably of metal rather than plastic. The tuning capacitor will be a lot easier to set accurately if a slow motion drive is



The assembled board — note particularly the transformer winding.

attached to the spindle, either once of the 6:1 epicyclic types or the dual speed 30/6:1 versions, although the latter is more difficult to obtain. Some sort of 'L' shaped bracket will be needed for this assembly.

For calibration, a dial on which the frequencies can be marked is needed and can easily be attached to the slow motion drive.

Testing

Firstly, you will need to wire up the volume control (RV2). Referring to the drawing, screened audio cable is used for three connections between the control and the PCB, with all the earth braids twisted and commoned at the control end to provide electrical screening of the three wires carrying audio frequencies. At the control end, the twisted braids are soldered to the tag shown. Lead H has its braid soldered at the PCB end to the adjacent earth pin, while the braids of leads F and G are twisted and soldered to pin D. Use three lengths of screened wire about 12cm long for the connections, stripping off 10mm of the insulation at each end before twisting the earth screen into a pigtail. Then strip off 5mm of the insulation on the inner core of the cable.

Don't forget to link two of the tags shown on the control together with a short piece of wire. If wired as shown, the control operates in the conventional manner with clockwise rotation increasing the volume. Having connected up RV2, use another length of screened wire to

connect up a four or eight ohm speaker to tags E and D (braid to D).

The variable capacitor should be connected up next. The two tags at the front (spindle end) should be linked together with a short piece of wire to gang the two rotor halves of the capacitor together. Then, using a stiff piece of wire, connect these linked tags to pin J. The longer stator tag on the same side but at the back connects to pin K (they can be reversed without affecting anything).

Next you will require a power supply for the receiver. This should be capable of supplying between 12 and 14V DC at currents up to a couple of hundred milliamps (on audio peaks). It is important that the DC supply is well smoothed and does not contain any large superimposed AC component. If this precaution is not observed, you will end up with a lot of hum which will be impossible to eradicate, amplified up by the high gain audio stages. Note also that pin D *must* be used for connection of the negative side of the supply, the positive connection going to pin A. As an alternative to a mains derived power supply, a car battery can be used if available.

When first switching power to a new circuit, it is a wise precaution to use some means of current limiting in case of any shorts on the board which haven't yet been spotted. If the PSU you use has this feature, then set it to 100mA before switching on. In any case, use a multimeter on a suitable current range in series with the positive

supply so that you can observe the current taken by the circuit on switch on. If it is far too high, switch off at once and investigate before proceeding any further.

Alternatively, a digital frequency counter module (type PCIM 177) is obtainable which will give a direct readout to 100Hz of the operating frequency, although its use does add a lot to the cost (you *would* be able to use it in other projects later though). If this is used, then connect together the pads on it marked S3, S4, AM/FM and VDD using short lengths of insulated wire. Connect VDD to the +5V supply pin (M) on the receiver PCB using a length of insulated wire. Then, using a short length of miniature coaxial cable, use the centre conductor for the connection between the counter output on the receiver PCB (pin C) and the module input (INPUT), and the braid for the earth connection from VSS on the module to the earth pin adjacent to pin C.

This receiver should provide you with many hours of enjoyment on the 80M band. Happy listening!

A complete kit of parts for this project (excluding case and speaker) is available from Cirkit Holdings, Park Lane, Broxbourne, Herts, EN10 7NQ for £15.90 inc VAT. Stock No 41-03414. The optional multi-pole audio filter is also available from the same address for £18.25 inc VAT; Stock No 41-02900.

RADIO TODAY

HF Convention '87

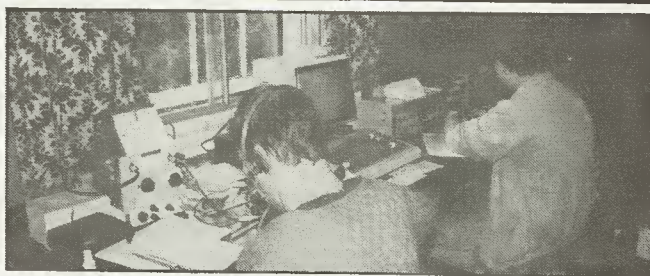
Both the venue and the weather were just the same as last year on 27th September for the '87 HF convention, so as a result a good time was had by all at the Belfry Hotel just south of Oxford. The £3 entry fee gave access to the usual lecture series which ran throughout the day, covering topics as varied as 'Special Forces Signals', 'Measurements in the shack' and Dxpedition slide shows from the Peter the 1st Island and Market Reef excursions.

One item which was noticeable for its absence on the programme this year was the open forum or questions and answers sessions which provided for an entertaining and lively debate in 1986. One visitor commented that perhaps it had got *too* lively last year — hence its demise, but hopefully this is not the case as this would surely add fuel to the fire of those who criticise the RSGB for lack of accountability.

In other parts of the hotel the RSGB bookstand seemed to be doing a respectable trade — both in John Devolderes new book on LF DXing and especially in copies of last years 1987 American Radio Relay League Handbook, an excellent tome of over two inches thick covering virtually everything an amateur would want to know, and then some!



The Belfry Hotel, Oxford. Venue for the RSGB HF Convention



Special event stations GB2CAR and GB2HF in full swing

A number of the RSGB committees were represented, including the EMC stands which featured amongst its exhibits a reprint of one of HRT's articles on radio interference suppression techniques. The propagation studies group and planning panel also put in an appearance whilst for those who were very much into the CW end of the HF operation there were two opportunities to prove their signal-winkling abilities, with a taped 'CW pile-up' in one room and the Dr DX computer simulation of CW contest working in another.

Talk-in was on S22 as usual and everybody had a fairly easy time of it — even the Deputy Editor didn't get lost for once, although it must be said that you can see the venue from junction 5 of the M40, nevertheless it was nice to check that we did have the right motorway! HF special event stations GB2CAR and GB2HF were sharing the ops room with the talk-in station and were making good use of a quite respectable selection of aerials including beams and wire set-ups; in the photo you can see Chris Norton G0AZV operating 'CAR and on his right Dale Kipping G0ACL trying to get a bit of action on 14MHz.

All in all a pleasant and informative day at an easily accessible site offering plenty of room and refreshment facilities without becoming embroiled in the usual scrum. But don't forget to buy your lunch tickets before 12 otherwise you'll have to raid a burger bar on the way home!

New Club for Sudbury

Radio amateurs and SWLs living in the Sudbury area will be pleased to hear that a new radio club — the Sudbury and

District Radio Amateurs has now been established, to be known as SAnDRA.

A short note from club secretary Colin Muddimer GIGPD tells us that SAnDRA is alive and well with the first

three meetings being well attended. Colin also mentions that all are welcome at the regular meetings which are held at 8 pm on the first Tuesday of every month at The Saracens Head, Newton

Green, Sudbury. Good luck with the club SAnDRA. We think we may have an idea why the turn out is so good! Colin can also be contacted by phone on Sudbury (0787) 77004.

New 2m to 6m Transverter from Howes

Howes Communications has just announced the addition of a new 2 to 6 metre transverter to their product range.

The new Howes HC266 is a ready built unit which features a 10W RF output and an

A/LC controlled power input level which allows the transverter to still develop full power with input levels varying from 1 to 5 Watts of drive, or optionally over a 5 to 10W range. The unit also features SWR and reverse polarity protection circuits and transmitter spurious outputs of better than 85dB for 2nd harmonic and

local oscillator levels — better than 60dB for all other spurious products.

Covering from 50 to 52MHz with a frequency translation accuracy of better than 1kHz the unit is multi-mode and offers both PTT and RF sensing VOX for transmitter control. The HC266 is supplied in a dark grey case with

white screen printed control labelling, an operator's handbook which includes block and schematic diagrams and costs £179.90 inc VAT.

Further details on the HC266 can be obtained from: C M Howes Communications, Eydon, Daventry, Northants, NN11 6PT or Tel: (0327) 60178.

Rathlin Island Line-up

The Ballymena Radio Club set out once again on their annual pilgrimage this August to commemorate the work done by Marconi for Lloyds of London 89 years ago. Special event stations GB3MKB, located on Rathlin Island activated square IO65VH, WAB square D15 and WAB squares D14 and D05 were also worked using the club call of GI3FFF/P. Operation was on both HF and



The Ballymena Mob! Back row from left: Jonathan '1XIB, Bill '1YDX, Bert '3RNY, Graham BRS7781, Hugh '1RBN, Owen '1XND, Aubrey '4TOR, Albert '4CRL, Billy '4KUM, Graham '4SFZ and Isaac '4POV. Front row: David '1KLH, Stan '4VJC, Tommy '4VJZ and Bertie '4DCC.

VHF with ATV activity on 70cm, although club secretary Jeffrey Clarke GI4HCN wasn't

able to join in the fun through illness. Looking on the bright side though, at least he avoided

being in the police line-up of dubious characters shown here!

G-Whip Changes

We've heard from G-Whip Products following our review of the G-Whip multiband (HRT June 1987) and they say that they're acting on our few criticisms of this antenna to make it even better value for money.

In particular, the aluminium bracket for the SO-239

feeder socket is to be replaced with a plastic moulding to secure the wire better and provide water-proofing, and the problem of the centre-resonant frequency on 14MHz being shifted by rain droplets has been reduced by altering the L=C ratio for the loading coil, the 20m band being the worst offender in this respect.

The letter goes on to say

that the possibility of a larger version, to improve coverage of 80m and possibly even allow top-band working, is being actively looked into. Also, it is suggested that in very exposed locations, the top telescopic mast can be lowered by a few inches to improve physical stability without degrading performance. Incidentally, there have been good

reports of stations using this antenna at roof height with random radials.

Finally could readers note that the new telephone number for G-Whip Products is 0745-2004 (9am to 4.30pm); their former number is now a private line, so please don't use it. G-Whip Products, 4 Bryn Coed, St Asaph, Clwyd, Wales.

Public Domain Takes To The Air

PD SIG, the public domain software interest group, in May this year started their first 2m packet radio BBS system on 144.650MHz. The system is run from the home of Rod Smith, the group's software librarian, in Crowborough, East Sussex. The system provides the usual mailbox facilities and message for-

warding, however the emphasis is to be on providing software for downloading.

The system consists of a PC clone with 20Mbyte Winchester, an MFJ 1270 TNC and the RF side consists of an FT280 into a vertical colinear 12m above ground. The site is 700ft ASL and coverage seems very good, direct contacts as far north as Watford and South into France have been logged. Currently the system is oper-

ating under Rod's call sign G4DQY, but a GB call is being applied for. PD SIG counts itself as one of the major sources of public domain type software for CP/M and MSDOS, and its library of over 2000 disks is probably the largest in Europe.

The growing use of computers in the radio hobby and the need for cheap specialised software for these applications is making PD SIG very

popular with the ham radio community. (Copies of library disks are available to members for around £2.00. PD SIG also has a number of telephone BBS systems where software can be downloaded if you have a suitable modem.

For further information send a stamped, self-addressed envelope to: Rod Smith, G4DQY, Winscombe House, Beacon Road, Crowborough, East Sussex TN6 1UL.

Come On Down — to Brixham

Data communications has become incredibly popular over the past few years, yet surprisingly there haven't been many events which reflect this trend. Well they don't hang about in South Devon. Last year saw the first specialised computer and radio show which we've heard of at HRT — and it was such a success that 'Computercations 87' is now upon us.

So if you are into radio or computing or even a combin-

ation of both then this show must certainly be worth a look. Opening from 10 am to 6 pm on Sunday, 1st November at the Brixham Community College, Higher Ranscombe Road, Brixham. Admission is only 50p for adults and 25p for children, senior citizens and UB40s. There are refreshments available on site and the show features professional, business and home computer hardware and software, Ham and CB radio gear, video equipment and a bring & buy sale.

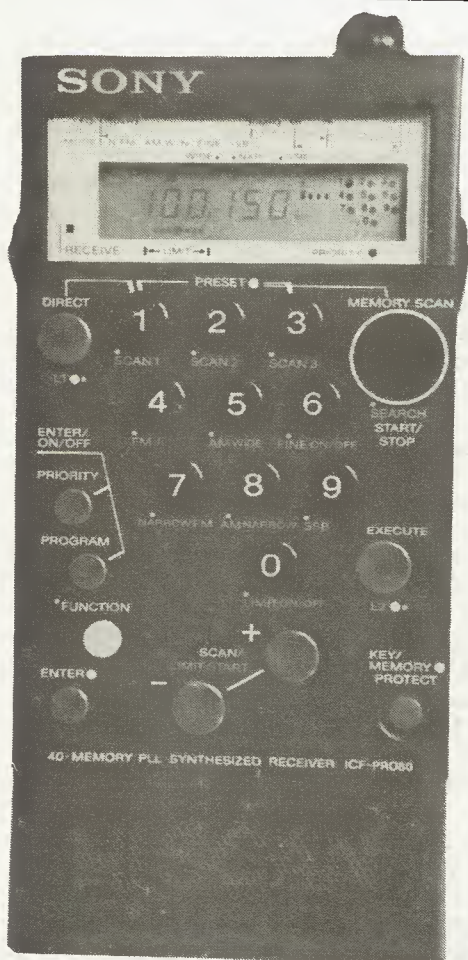
There will be talk-in facilities on S22 and a special event station GB4CPU will be on air throughout the show. During the day there will also be demonstrations of satellite communications using weather sat and UOSAT systems, with a variety of ham demos including packet radio, AmTOR, RTTY, ATV and satellite TV.

For further information contact: Ian Chipperfield, 9 Sun Valley Close, Brixham. Tel: (08045) 59224 or Jeffery Birks, 46 Eden Park, Brixham. Tel: (08045) 7014.

Computercations '87
THE WATTSVILLE 1 PRINCIPAL COMPUTER AND RADIO SHOW
Organised by
Today's Computer Association
and the South Devon Radio Club
COME AND SEE THE LATEST IN COMPUTERS,
SATELLITE AND TV TECH.
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SUNDAY 1st NOVEMBER
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BRIXHAM COMMUNITY COLLEGE
Higher Ranscombe Road, Brixham
TALKIN 10.30
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DEMONSTRATIONS ON:
SATELLITE COMMUNICATIONS, SATELLITE TV
AMTOR, RTTY, PACKET RADIO, ATV, UOSAT
FOR MORE INFORMATION CONTACT Ian Chipperfield, 9 Sun Valley Close, Brixham, Devon, TN6 1UL
or Jeffery Birks, 46 Eden Park, Brixham, Devon, TN6 1UL

We couldn't resist showing the Computercations '87 poster, all produced on a home micro

SONY PRO-80 SCANNER



the lowest converter frequency of 115.15MHz. So what of the radio itself?

Getting acquainted

With so many more features packed into what is essentially still a scanner sized box you would expect the new rig to appeal to any shortwave enthusiast, however the initial enthusiasm may wane and even turn into angry frustration when actually trying to learn how to use this complicated and awkwardly designed piece of gear.

There are several ways of tuning in your stations, the first, *Direct Tuning*, is easy to operate even though it takes a sequence of seven moves to input the frequency of your desired station. When correctly done, after pressing the EXECUTE button, you will be rewarded with a beep sound, but if you input a wrong frequency you are 'honked' at and a 'Try Again' indication blinks at you. In the early learning stages of operating this radio a harmless and mindless diversion can be to play with the noises as a displacement for your aggression! Although direct tuning with its 'Direct + frequency + Execute' entry system is fairly

SCAN + button moves the set up frequency and SCAN - moves it down. In fact the only difference between the modes is that whilst scan tuning relies on the auto-squelch facility, manual tuning also allows one frequency step at a time, because the squelch has to be set to minimum.

A further option is to set the squelch control to a level determined by the operator (squelch control being in the manual 'up' position) so that only stations above this signal strength open the squelch. Essentially, manual tuning is for use when you don't know the frequency of the

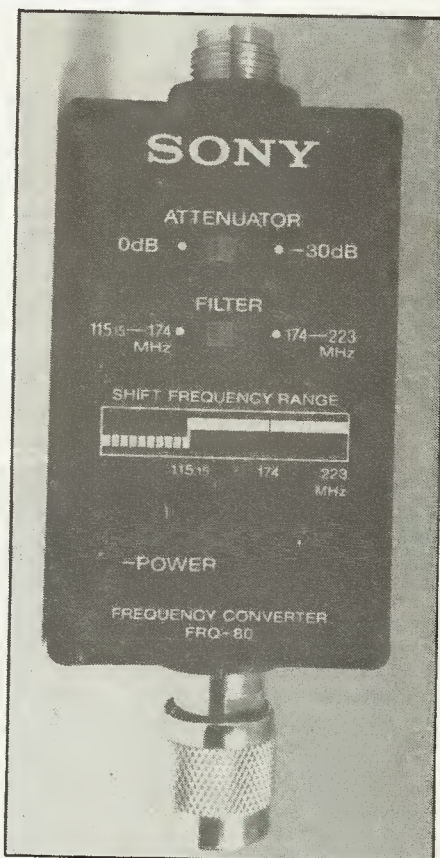
It looks like an Air-7, it works like an Air-7 — but it does a whole lot more. K Berkeley Henderson assesses the latest Sony handy receiver.

At first glance the new Sony PRO-80 is outwardly very similar to the Air-7 (reviewed in HRT Sept 87) but packs in many new features including almost continuous coverage from 150kHz through to 223MHz plus a choice of modes including narrow band FM, wide band FM, AM and SSB. The standard set covers only up to 108MHz, with the extra coverage being provided by an add-on converter supplied with the set, leaving a gap between 108MHz and

easy to remember it is the variety of entry systems which can be baffling.

Having obtained the required frequency, it is possible to make use of another tuning system which is *Scan tuning*. Here the squelch control can either be set to 'automatic' by pressing the knob down; whereby only stations above a pre-set signal strength will lift the squelch, or so called *Manual tuning* can be chosen.

In either case pressing the



The 115 to 223MHz converter. Its two internal AA cells add to the top-heavy effect on the rig — good level of internal screening though.



Spot the difference! Externally, the Pro-80 (left) bears a remarkable resemblance to the more basic Air-7.

station which you want to tune in, or when you want more precise tuning after scan tuning.

More on scan tuning

Scan tuning is a very useful function but complicated in the extreme since there are three scan modes, all of which are simple enough to set but confusing to remember as the scan mode indicators

tend to resemble a bad dose of morse. The operation consists of five steps, including the depression of the SQUELCH button onto AUTO, the selection of the scan mode and the use of the SCAN +/- buttons. When a station is received, the RECEIVE indicator lights up and the set then operates according to the scan mode which you have selected.

Scan One mode stops scanning

when the first station is received and allows it to be heard continuously. *Scan Two* mode receives the station for two seconds before scanning resumes, and *Scan Three* mode receives the station until its signal stops, then resumes scanning again.

Limited Scan Tuning allows you to define an upper and lower limit in frequencies for scanning and involves a myriad of finger manoeuvres and a bountiful abundance of 'beeps' to confirm each stage of the operation. After selecting the scan mode you then keep FUNCTION pressed and press button 1, 2 or 3, following this you direct tune your lower limit frequency, keep ENTER pressed and press DIRECT. To tune in the upper limit frequency, you use another method, namely after tuning in the frequency you again keep ENTER pressed but then press the EXECUTE button. You then use SCAN +/- in the normal way to scan between the chosen limits.

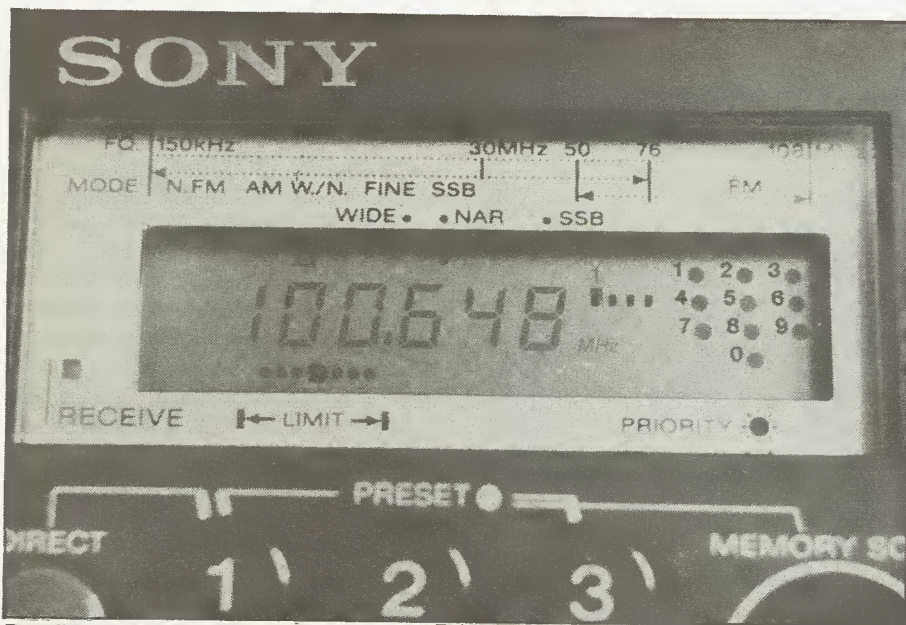
Priority Tuning is an interesting addition to the receiver which enables you to check a station which you have designated as a priority. The receiver automatically tunes into the station every three seconds to check whether there is a signal or not. If one is picked up, the priority station overrides all others and is tuned in continuously. Not only do we have our auditory confirmation but in addition to the word 'priority' appearing on the display, we also have a 'blinking' number on the memory section.

Thanks for the memories

If you thought that the tuning options stopped there you'd be wrong! Like the AIR-7 the PRO-80 offers a forty station memory, having the ability to store ten stations on each of four separate 'pages', page selection being made by means of a rotary switch on top of the set. You can tune in a station by any mode and simply by pressing the ENTER



The Pro-80 top panel controls.



Detail of the liquid crystal display.

button and one of the number buttons simultaneously, you have stored your station, again a 'beep' sounds and the LCD confirms which memory page and on which button it is stored. Memory search is another operation which enables you to check the stations on one memory page whilst you are still listening to a station. The information on the stored stations is displayed in sequence.

Memory Protection is another handy function which prevents the accidental erasure of the memory pages. Keeping the ENTER button pressed, you also press MEMORY PROTECT and in addition to the now familiar 'beep' sound, a small key appears on the LCD as a further indication that your memory is protected. Memory scan tuning is a fairly easy operation, although the LCD looks like a numbers game as the frequencies flash past!

Get converted

Perhaps the clumsiest part in the design of the PRO80 is the converter which allows reception of air band, public service band, and TV VHF channels by shifting the frequency coverage of the receiver by 115MHz. After inserting 2 AA batteries into the converter itself, making it a bit top heavy for the receiver of course, you then attach the telescopic antenna to the converter and the converter to the antenna connector. Then comes the most awkward and quite unbelievable part of the operation — the removal of the

battery case from the battery compartment in order to set the frequency display switch underneath the battery to SHIFT.

Having done this you then replace the battery case and have to go through four separate stages to program the set for a 115MHz offset on the display. This does give the advantage of having the correct frequency shown on the LCD — but if you're the sort of operator who likes to jump from VHF to HF and back again the system is what computer

hacks would call 'user hostile'.

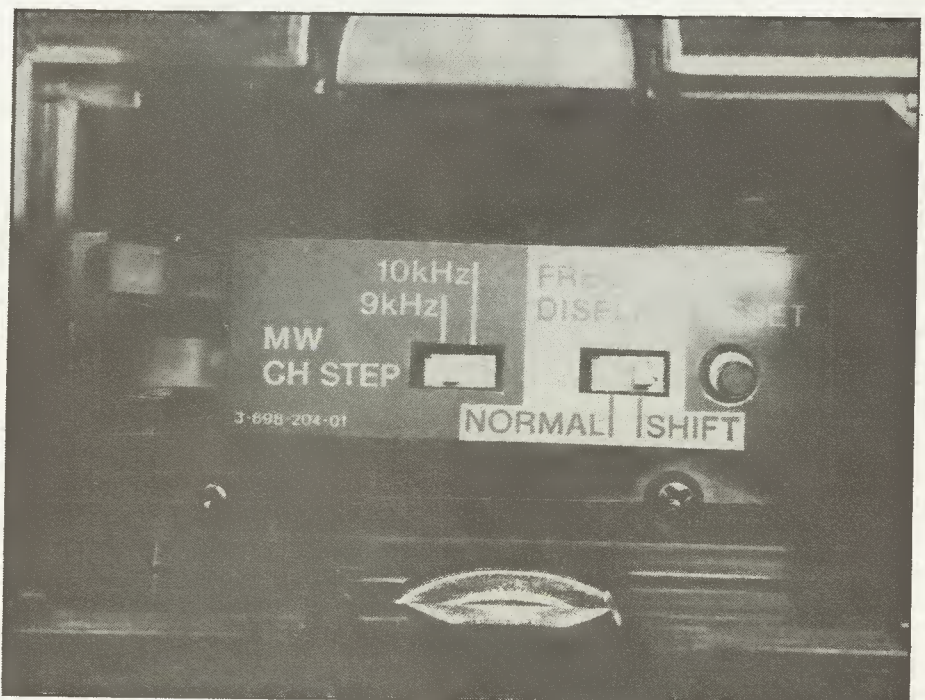
Tuning involves setting the ATTENUATOR selector on the converter to 0dB and then setting the FILTER selector (also on the converter) according to the frequency of the station which you want. Tuning can then be done in any of the ways already detailed, and should there be interference from an adjacent station, you can set the attenuator to -30dB to improve reception.

Feeling Fine

To select the detection mode is again a fairly simple task but one would do well to make up a card of the buttons to be pressed and the relevant detection mode because there are five to be memorized in all; for example, to receive FM broadcasts you have to press FUNCTION and button 4. Fine Tuning of an AM station is the AM WIDE or AM NARROW detection mode is executed in a similar way, with the FUNCTION key being pressed then button 6. 'Fine' will appear on the LCD and a 'beep' will sound, enabling you to use the FINE/SSB control on the top panel for better reception. It should be noted that the fine tuning range is approximately +/- 3.5kHz.

In use

Regular readers of HRT's scan-



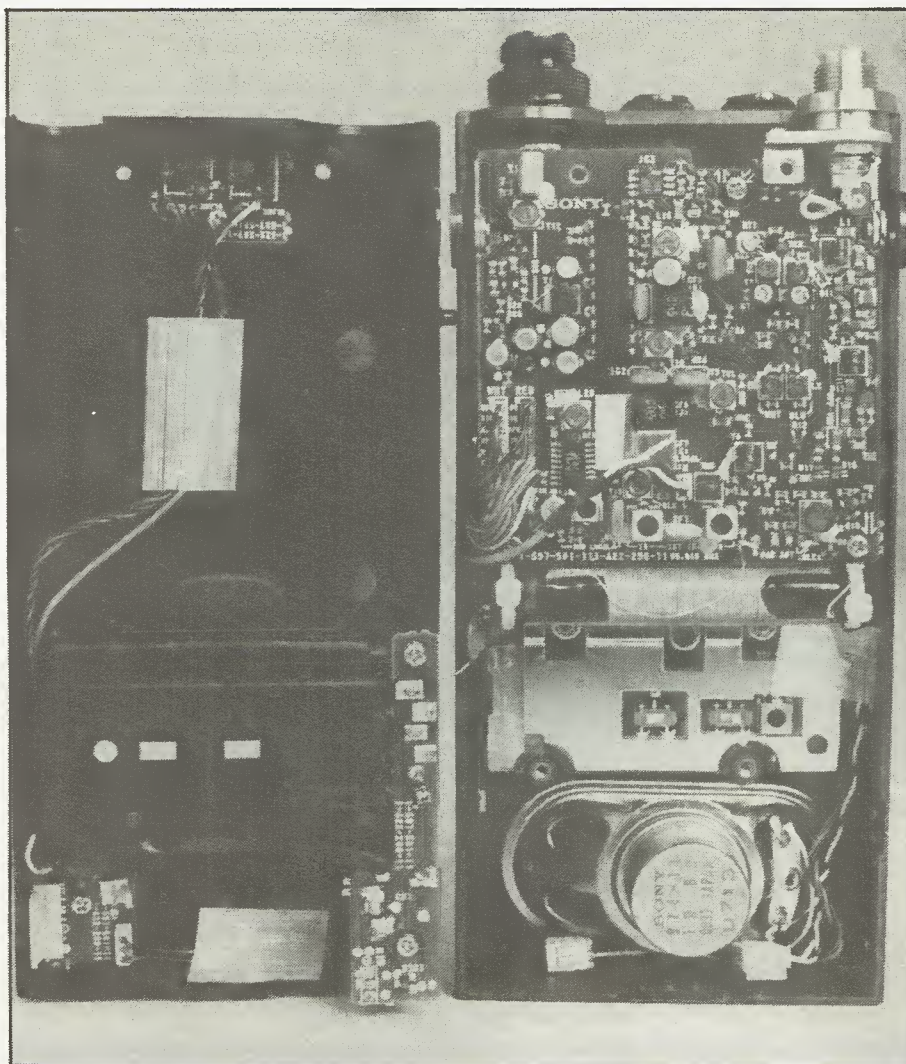
Buried away in the depths of the battery compartment are the MW channel step (l) and reset (r) switches together with the display shift switch for use with the converter.

ner reviews will realise that, unless you take out a mortgage to buy a professional radio, compromises have to be made in terms of design and performance. AM and FM broadcast performance was quite acceptable, although a tendency to overloading was noted on wide band FM when close to the transmitter site. Medium wave reception was acceptable whilst not being in the 'communications receiver' performance bracket — and Long wave coverage was broadly similar.

For most people however the attraction of this set would be the ability to listen to both shortwave and public service transmissions all in the one box, so I will deal first with the HF coverage. SSB facilities are becoming increasingly necessary for even the most casual SWL, more international broadcasters are following the lead of stations such as Radio Sweden with SSB outlets and in this respect the set coped quite well in its sideband mode. On the amateur bands, where stations operate a good deal closer together, the selectivity left something to be desired when compared to a purpose built communications receiver but for general shortwave reception and occasional forays into ham bands performance was adequate.

It was also noticed that when tuned to one of the international frequency standards in SSB mode, there was a tendency to drift — but as there was no S meter fitted to the radio it wasn't clear whether this was due to local oscillator pulling or just simple thermal wanderings. As far as short wave is concerned the radio is much more suited to the casual listener rather than the ardent DX chaser.

Public service coverage, apart from the ludicrous antics needed to get the frequency offset right, was quite acceptable. Sensitivity was on a par with a run of the mill handheld on 2 metres, although again there was a tendency toward overloading which could be reduced by means of the attenuator on the converter. There seemed to be few problems with breakthrough from other bands, mainly due to the well screened inner case which housed the converter; although the whole unit was awkward and unstable due to the top heavy effect of the whip, converter and its batteries. Overall the public service performance was acceptable



Inside the Pro-80, neat design and miniature components help pack more features into the box.

without being exceptional for a hand held scanner.

There is plenty of versatility in terms of power sources for the main set, with the options of four AA batteries, a rechargeable battery pack, mains unit or a car battery. A disadvantage is the erasure of all memory if the battery pack is out for more than three minutes, which immediately becomes a problem for physically disabled shortwave listeners such as those with arthritic complaints.

The antenna provided with the receiver is a telescopic aerial with a TNC screw connector but an adaptor is also supplied for connecting a BNC connector. This antenna provides for reception of SW/VHF/FM reception, ie. 1,605-108MHz. For LW and MW reception (150-1,602kHz), there is a built-in ferrite bar, therefore you rotate the receiver for optimum re-

ception. Another good feature is the KEY PROTECTION which is to avoid the accidental operation of the buttons — you've guessed it, the radio beeps at you when it becomes protected and another little key appears, this time on the bottom left of your display.

To complete the package you are given a carry case which completely protects your receiver and even enables you to use the buttons when covered, a nicely designed earplug and a hefty tome of operating instructions which varies from being clear and lucid to unimaginably complicated. The radio looks quite good, sounds quite good, and at £329 inc VAT is quite good value for money — but it may take you some time to get to grips with it!

My thanks go to Sony UK Ltd who supplied the review unit.

DATONG PC-1

Short Wave Converter



If you're already kitted up for two metres, moving to HF can work out pricey. One answer is to go for a VHF receive converter before taking the plunge. Ken Michaelson, G3RDG, looks at the Datong PC-1 short-wave converter.

The Datong PC-1 isn't a clone computer, but a converter unit. It allows you to use a VHF receiver (or the receive section of a VHF transceiver) to cover from below 50kHz to 30MHz in thirty bands of 1MHz each. So, using the 5MHz setting, for instance, an incoming signal at 5.455MHz could pop up at 144.455MHz on the VHF rig.

No modifications are required to the receiver used, so the PC-1 represents a cheap way for a class 'B' licensee to sample the delights of HF. It also represents a way of getting the facilities one has come to expect of synthesized VHF rigs without the 2nd mortgage type HF prices.

How It Works

The frequency range is selected by two rotary switches, the first deciding the tens of MHz, the other units of MHz. Besides the on/off switch, there are two other controls on the front panel: the HF/VLF selector, which is used on the 0 MHz

band to select a special filter for below 550kHz or a HF filter for above 500kHz (the PC-1 obviously doesn't 'know' what frequency the receiver is tuned to); and a hi/lo gain switch, which is in fact an attenuation control.

The internals of the PC-1 are very straightforward. The input goes first to a filter block; there are seven band-pass filters in this block, the signal route being decided by the reception band selected, after which the signal is then passed on to a mixer stage. The other input to the mixer is from the local oscillator, which uses LSI techniques to derive all thirty of the required frequencies from a single crystal-controlled source; the frequency of which is selected according to the desired reception band. Finally the output from the mixer, which is now at VHF, is passed through a 144-145MHz band-pass filter.

All this filtering has the effect of reducing the signal level by 3dB (manufacturer's figure), but the

sensitivity of most two metre receivers (or transceivers) will be more than adequate to cope with HF operation.

In Use

The PC-1 gave a good account of itself, and particularly impressive was the lack of any perceptible increase in noise level between using an Icom R71E receiver on its own and with the converter. So far as the PC-1 is concerned, the manufacturer states that an input voltage of less than 0.4uV will give 10dB S+N/N at 29MHz and that the sensitivity is substantially constant from 50kHz to 30MHz. Not having the test gear to check absolutely the veracity of this claim, I can only say that as a user these figures are apparently accurate.

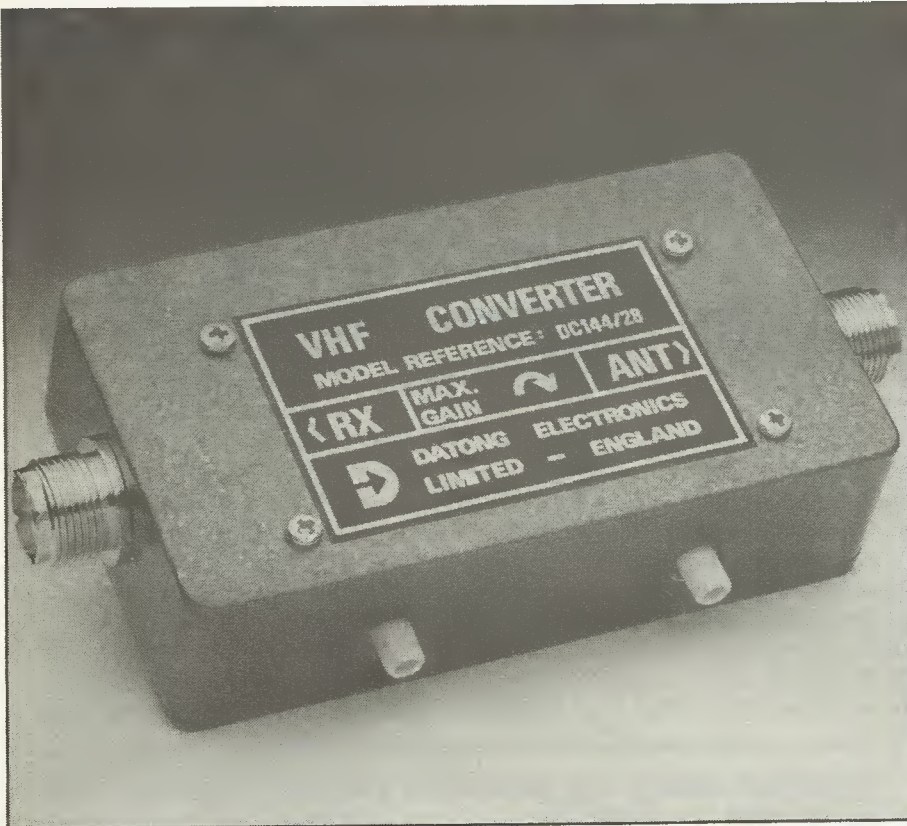
To show the sensitivity and stability of the PC-1 (and, incidentally, also of the DC144/28) part of a German news bulletin is shown here. This was transmitted on 140.3kHz in ASCII at a speed of 200 baud. My apologies to German readers for the Gothic letters!

For all the signals I received, I used my normal 80 metre dipole — even for VLF. Formerly, I have had to use a frame antenna to get any decent signals on VLF, so I was very impressed by the efficiency of the PC-1.

The same capability of producing signals without any discernable background noise was displayed throughout the 30MHz tuning range. Only two significant spurious signals were found, one at 10.24MHz which failed to move the S-meter and the other at 20.48MHz, which gave an S5 reading. All other spurious were at the threshold of audibility.

Some Details

The PC-1 is built in a smart silver anodised aluminium case, with black front and rear panels, measuring 184mm(W) x 153mm(D) x 54mm(H) (7.2 x 6 x 2.1 inches). The knobs and



The DC144/28 VHF converter

switches add 17mm (0.7 inches) to the depth and the unit weighs 1kg.

Power requirements are 10 to 13 volts at 140mA, but the manufactu-

rer says the PC-1 will withstand up to 20 volts for short periods. For sustained operation at above 13 volts, a dropper resistor should be

inserted in series with the supply rail, and an appropriate formula is given for this. The supply does not need to be regulated or even particularly well smoothed; the instructions suggest that a suitable supply may be obtained from the receiver's accessory socket.

One thing I did not like was the use of a 3.5mm 'earplug' type socket for the power supply input. The problem is that if the plug is pulled out or inserted with the power on, the power source will suffer a momentary short circuit, which could cause quite a lot of grief, not to mention blown fuses, receiver memory resets and so on...

My advice would be to use a separate power supply which has short-circuit protection.

The DC 144/28

This two metre converter was loaned to me as an extra to use with a 28MHz receiver; it is made on a plated-through glass fibre PCB and is contained in a standard diecast box which measures 113 x 62 x 31mm. The input and output connectors are SO239 and the input for the power plug is a 3.5mm socket. It is fitted with input and output attenuators to match into any receiver, which is a very good point, particularly for use with the PC-1. It has a noise figure (as quoted by the manufacturers) of better than 3dB with both gain controls at maximum. I would think that this is due to the fact that the DC144/28 uses a very low noise input MOSFET (A 3SK88) and a JFET post mixer amplifier. The input and output impedance is 50 ohms and the unit requires 10-14 volts DC at 100mA. It weighs 250gms.

Conclusion

I was very impressed with both these modules, and can only say that for those of you who want to receive signals transmitted on the HF bands and balk at the cost of a good and therefore expensive receiver, the PC-1 and the DC144/28 if needed, could be the solution.

The price of the DC144/28 2 metre converter is £39.67 and that of the PC-1 £137.42, both prices being inclusive of VAT and delivery.

Thanks are due to Datong Electronics Ltd of Leeds, for the loan of the review units.

DN R

bsi182 4 kna'188 vvvvb kna 417

p1/B/Papst: Gerechte Ausländergesetze

023/Vat

Papst fordert gerechte Ausländergesetzgebung
Belirnden dürfen Einwanderer nicht diskriminieren

Vatikanstadt, 3. September (KNA) Papst Johannes Paul II. hat auf die Regierungen in aller Welt appelliert, jede Diskriminierung der ausländischen Arbeitnehmer zu vermeiden. In einer am Donnerstag, 3. September, im Vatikan veröffentlichten Botschaft zum Welttag der Emigranten fordert der Papst die Behörden auf, in ihrer Gesetzgebung die Rechte der Einwanderer zu berücksichtigen. Die katholische Laien müssen nach dem Willen des Papstes den Behörden ihrer Länder gerechte Lösungen bezüglich Wohnungen, Arbeitsplätzen und sozialer Sicherheit für die Auswanderer vorschlagen.

Johannes Paul II. betont in seiner Botschaft, daß die Kirche keine Gelegenheit ungenutzt lasse, um an das moralische Gewissen der Behörden zu appellieren, das Los der Auswanderer zu erleichtern. Der diesjährige Welttag der Emigranten steht unter dem Thema: "Die katholischen Laien und die Emigranten." In seiner Botschaft warnt der Papst die reichen Länder davor, Desinteresse für das Auswanderungsproblem zu zeigen, die Grenzen zu schließen oder die Gesetze zu verschärfen. Dies würde unweigerlich zu einer weiteren Vertiefung des Abgrundes zwischen den armen und reichen Ländern führen. Aufgabe der katholischen Laien sei es, in einer Situation der Diaspora und wachsenden Unglaubens den oft entwurzelten Ausländerfamilien bei der Bewahrung und Weitergabe des Glaubens an ihre Kinder zu helfen.

kna fw

031702 sep 87

Printout of a German news bulletin service

STANDARD C500 TWINBANDER REVIEW



Dual band mobile sets are readily available in a compact size, but this is not always the case with portables. There are three manufacturers of 2m/70cm dual band portables at the present time, the latest product to hit the market being the C500 from Standard. Only two C500s

avoided and sanctuary can be sought in the wide open spaces of 70cm if 2m gets too much for you! So, what of the rig itself?

Features

Rigs are getting smaller all the time, but when I opened the C500's

Standard enters the two-band portable market with the C-500. Capable of cross-band full duplex, Chris Lorek, G4HCL, tries out the latest pocket simulcaster.

were in the country at the time of writing, but the HRT heavy mob, sorry, review team managed to extract a review sample to test for our readers. When this appears in print at the Leicester Exhibition, dealers stocks should be plentiful, and no doubt many happy amateurs will be returning home with a new toy to play with!

Dual Band Advantages

With the growing number of 70cm repeaters in the UK at the moment, designated 'community' boxes covering a small, localized area, many amateurs are getting on this band as well as 2m. This is often to escape the 'ratrace' on 2m in many areas, where 'new pastures' allow an unhurried QSO with local amateurs whilst commuting, walking the dog, or waiting in a DX pile up!

Rather than carry both 2m and 70cm sets around, a choice has to be made between them and the generally lower level of activity on 70cm often leads to 2m being chosen. With a dual-bander such heart rending decisions can be

packing box I was pleasantly surprised with it's smart presentation as well as it's small size and weight. The set is smaller than many single-band sets, measuring 182mm(H) x 58mm(W) x 39mm(D) including the battery case and knobs but excluding the PTT bar, this increasing the width to 68mm. Coverage is from 144 to 146MHz, and 430MHz to 440MHz, with selectable tuning steps of 5kHz, 10kHz, 12.5kHz, 25kHz, and 50kHz. The review sample was supplied with a battery case to fit six AA size cells, giving 1.5W transmitter output power when fitted with nicads and slightly more if dry cells are used due to their higher voltage. Optional nicad packs are also available, giving either 2.5W or 5W transmit output power dependent upon type.

Dual VFOs

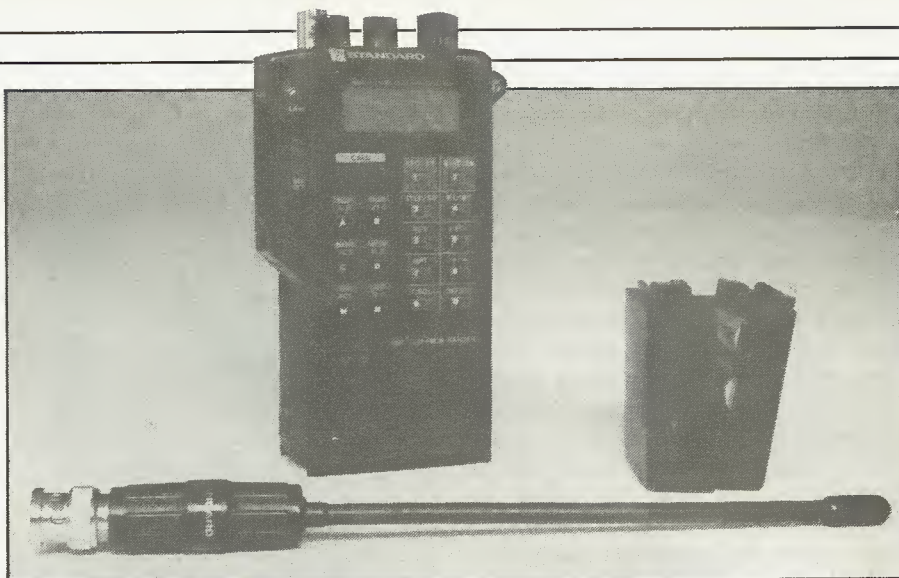
Two digital VFOs are fitted, with frequencies controlled either by direct key entry or by stepping using the top mounted rotary tuning knob. On the top panel also are rotary controls for on/off/volume and squelch, two push buttons control-

ling high/low TX output power and a switchable receive attenuator, jack sockets for external speaker/mic, and a BNC socket to allow connection of an external aerial as well as securing the supplied dual band portable whip. The majority of the set's other functions are controlled by the front panel buttons, in conjunction with a 'Function' bar mounted above the PTT key. The rotary squelch control is complemented by a 'Sql Off' bar on the PTT extension, this raising the squelch momentarily when pressed.

Each VFO range may store a different repeater offset as well as up to ten memory channels and a user-programmed 'Call' channel. In turn, each memory channel may store frequency, + or - repeater TX offset, and sub-audible tone squelch frequency if optionally fitted. Each VFO range may be programmed for a given offset and direction, variable from zero to the limit of the set's band coverage, once selected by the 'RPT' button, toggling between + and - is also possible without re-programming. Momentary repeater input frequency checking is possible by using the 'Rev' button. Although not fitted to the early review sample, I'm informed that a 1750Hz toneburst will normally be enabled by a press of the PTT followed by the 'Function' bar for repeater access. Cross-band full duplex, that is simultaneous transmit and receive operation, is possible between VFO A and VFO B, by enabling the 'Dup' function, further presses of the 'A.B.' button followed by a number key, further single-key presses then selecting the numbered memory channel for the selected range. The main tuning knob may also be used for memory channel selection, this stepping through all 20 channels.

Scanning

Scanning of either 'A' or 'B' range memory channels for activity is initiated by a press of the 'M.S.' button, the scan halting for about 5 seconds on a busy channel before resuming. Likewise the VFOs may also be scanned in the programmed frequency steps, a press of the 'S.C.' button giving a 1MHz scan coverage, alternatively pre-programmed band-scan limits may be entered if required. A dual watch ('priority channel') facility is also available, this



The C500, showing the battery pack (right) holding six AA cells and the combined 2m/70cm aerial in the foreground.

briefly samples a given frequency every few seconds whilst monitoring or scanning away on other frequencies, the set locking onto the 'Priority' channel while it contains activity.

A battery economizer ('Save') facility may be enabled in receive mode, this switches the receiver on for a fraction of a second every half second or so until the squelch raises. This may also be used in scanning mode, the scan rate slowing down due to the sampling rate. The frequency keys may be locked if required to prevent accidental frequency shift in use, likewise the TX PTT may also be disabled if required. The usual 'bleep' sounds on each key depression, a longer, lower frequency bleep indicating an incorrect entry, these may also be disabled if required.

An LCD panel shows the operational frequency in large digits, together with indications of the other selected functions such as

memory mode, VFO A/B, offset, PTT lock and so on. Along the bottom, a bargraph indicator shows relative receive signal strength and transmit power output, and a small 'B' indicator displays to warn if your batteries are about to breathe their last. The display may be backlit by a press of the 'Lamp' button mounted on the PTT bar.

In Use

I found the set very easy to hold, fitting very nicely into the palm of my hand, which is very important when you consider that at £420 a time it would be a rather unwise move to drop it! The supplied wrist strap gives an added measure of security, but the set was light enough to fit into my inside jacket pocket most of the time without becoming an incumbrance.

It took me a short while to get used to operating the set's many functions, however once learned I



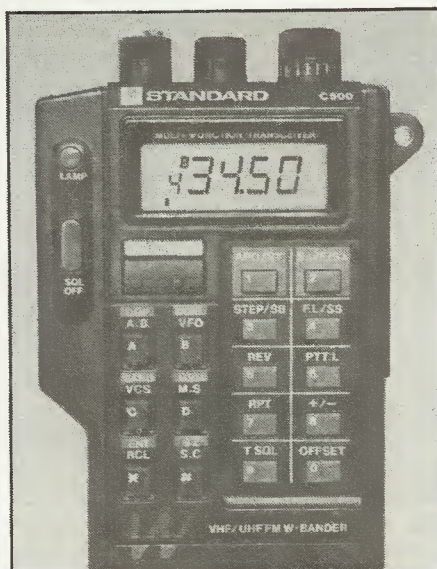
Top panel controls

found it very easy to control. The function bar mounted on the PTT extension, always within reach without letting go of the set, was to be found far more useful than the usual keypad button, however in normal use this was not usually needed. I found that I invariably used the set in memory mode while portable, using the tuning knob rather than the one-touch keys to select channels. This allowed me to quickly check all the programmed memories rather than just either batch of 10 each time, as was the case in memory recall or scan modes. I found that, although the memories would store offset and direction, it was not possible to mix 600kHz and 1.6MHz offsets in the same memory range apart from Channel 1 in each case. I didn't find this too much of a problem, as I stored the area 2m repeater in Channel 1 and other local simplex and 70cm repeater channels in the remaining 9 channels. Alternatively, one could always use Range A for 2m and Range B for 70cm, but this may limit some user's requirements.

Signal Handling

Received audio reports were very good as long as I stayed around 8cm away from the microphone, but surprisingly the mic picked up little background noise. On receive, I found the available audio just about sufficient when walking around very noisy environments, turning the volume control to absolute maximum introduced rather a large amount of distortion. I took the set to a local rally to see how it would perform with all the other 2m and 70cm signals in close proximity, including of course the adjacent talk-in station. The simple answer was, very well indeed, I experienced no desensitisation problems at all. Comparing this to one or two other portables in a similar 'real' test, the C500 stood up extremely well. I must say that on walking around the rally carrying the set I felt rather conspicuous, as several eyebrows were raised with resultant enquires as to who was selling them!

The supplied whip aerial is not the usual helical, but instead functions as a quarter wave on 70cm and a shortened, base loaded whip on 2m. In portable tests using distant signals, I found the aerial to be quite efficient, more so than I would have



Detail of the keypad and display area

expected on 2m due to its reduced length. Replacing it with a standard Japanese 2m helical whip showed little difference in my radiated signal. I found the battery life very good, I could use the set in continuous QSOs using low TX power for several hours, and full day's use could easily be obtained using the set mainly in receive mode with the occasional chat on high power.

Insides

The set is constructed using a die-cast alloy chassis with a plastic front panel, this giving good mechanical strength as well as a heat dissipation area for the transmitter power amplifier. The controls and keypad appear to be sealed against dust and water, a rubber cover also sealing the external speaker and mic connectors, showing that the set should survive being used during the odd downpour. Internally, three printed circuit boards are used, with wired interconnections between them. Virtually all components are surface mounted 'chips', so the service engineers will be reaching for their magnifying glasses again.

Separate PIN diode attenuators, front ends, mixers, and synthesiser -tuned voltage controlled oscillators are used on receive for each band, the resultant first IF signals at 55.05MHz being switched into a common IF crystal filter and amplifier stages. Downconversion to 455kHz and subsequent processing takes place in the usual TK10420 IC, and a BA546 audio power amp IC drives the internal speaker.

On transmit, the separate final TX frequency voltage controlled oscillator is directly modulated with processed microphone audio, the signal being amplified and then passed to a block PA module on each band. Separate MB87006 synthesisers are used for each band, rather than a single IC, hence allowing for the full duplex facility. A uPD7514 micro controls the operating functions of the set, it is interesting to note that diode links are used with this to control the frequency coverage of the set, allowing 130-170MHz to be covered for the more nosey amongst us!

Laboratory Tests

The receiver sensitivity was very good on 2m and fairly reasonable on 70cm — the less sensitive 70cm side being offset by the excellent strong signal handling performance measured on this band, yet this was still good on 2m, confirming the on-air test results. Of special note is the low current drain on receive, this being further improved by the economizer operation.

On transmit the frequency accuracy was excellent for a portable, the harmonic purity likewise, however I did notice a band of low-level spurious, at 2.1fMHz spacings, around the 2m signal. The transmit deviation was unfortunately over the top on both bands, this shouldn't cause too many problems but I would be tempted to delve inside the set to reduce the 2m deviation at least.

Conclusions

The set is very small considering its capabilities, its technical performance very good. Its many features such as dual band scanning, coupled with full cross band duplex operation when required, lends the set to a variety of uses apart from just being used as a walk around portable or as a second set. I enjoyed using it very much indeed, the ability to be 'in' on the activity on both bands is certainly a very useful feature, especially so when you consider the set is around the same size and weight as many single-band sets. Pity it's not the same price, but you can't have everything! I was sorry to see it go.

My thanks go to A.R.E. Communications Ltd. for the loan of the review set.

LABORATORY RESULTS — STANDARD C500 RECEIVER

Sensitivity: RF input level giving 12dB SINAD		
Attenuator	145MHz	435MHz
Out	0.149uV pd	0.261uV pd
In	1.40uV pd	3.66uV pd

Squelch Sensitivity		
Setting	145MHz	435MHz
Threshold	0.070uV (3.0dB SINAD)	0.064uV pd (1.5dB SINAD)
Maximum	0.359uV pd (31dB SINAD)	0.385uV pd (19dB SINAD)

Receive Current Consumption (mA)		
Conditions	145MHz	435MHz
No signal, 'save' on	9	10
No signal, 'save' off	27.5	32.5
RX, mid volume	64	71
RX, max volume	120	130

Intermodulation Rejection: Increase in level over 12dB SINAD level of two interfering signals giving identical 12dB SINAD on-channel 3rd order intermodulation product.		
Spacing	145MHz	435MHz
25/50kHz	62.5dB	69.5dB
50/100kHz	61.5	68.5

Strength Meter Indication				
Reading	145MHz		435MHz	
S1	1.08uV pd	-16.7dB	1.07uV pd	-16.8dB
S3	2.60	-9.1	2.76	-8.6
S5	4.12	-5.1	4.18	-5.0
S7	5.68	-2.3	5.77	-2.2
S9	7.41	0dB ref	7.41	0dB ref
S9 +	8.80	+1.5	8.83	+1.5

Adjacent Channel Selectivity: Measured as increase in level of interfering signal, modulated with 400Hz at 30% system deviation, above 12dB SINAD ref. level to cause 6dB degradation of 12dB SINAD on-channel signal.

Spacing	145MHz	435MHz
+12.5kHz	32.0dB	22.5dB
-12.5kHz	28.5	32.5
+25kHz	65.0	58.5
-25kHz	65.0	60.0

Maximum Audio Output: Measured at 1kHz on the onset of clipping, into an 8 ohm load

145MHz	435MHz
195mW	196mW

Blocking: Increase over 12dB SINAD level of signal 1MHz away to cause 6dB degradation in 12dB SINAD on-channel signal

Spacing	145MHz	435MHz
+1MHz	92.0dB	95.0dB
-1MHz	93.0dB	95.0dB

Image Rejection: Increase in level of signal 110.1MHz removed to give identical 12dB SINAD signals.

145MHz	435MHz
89.9dB	60.1dB

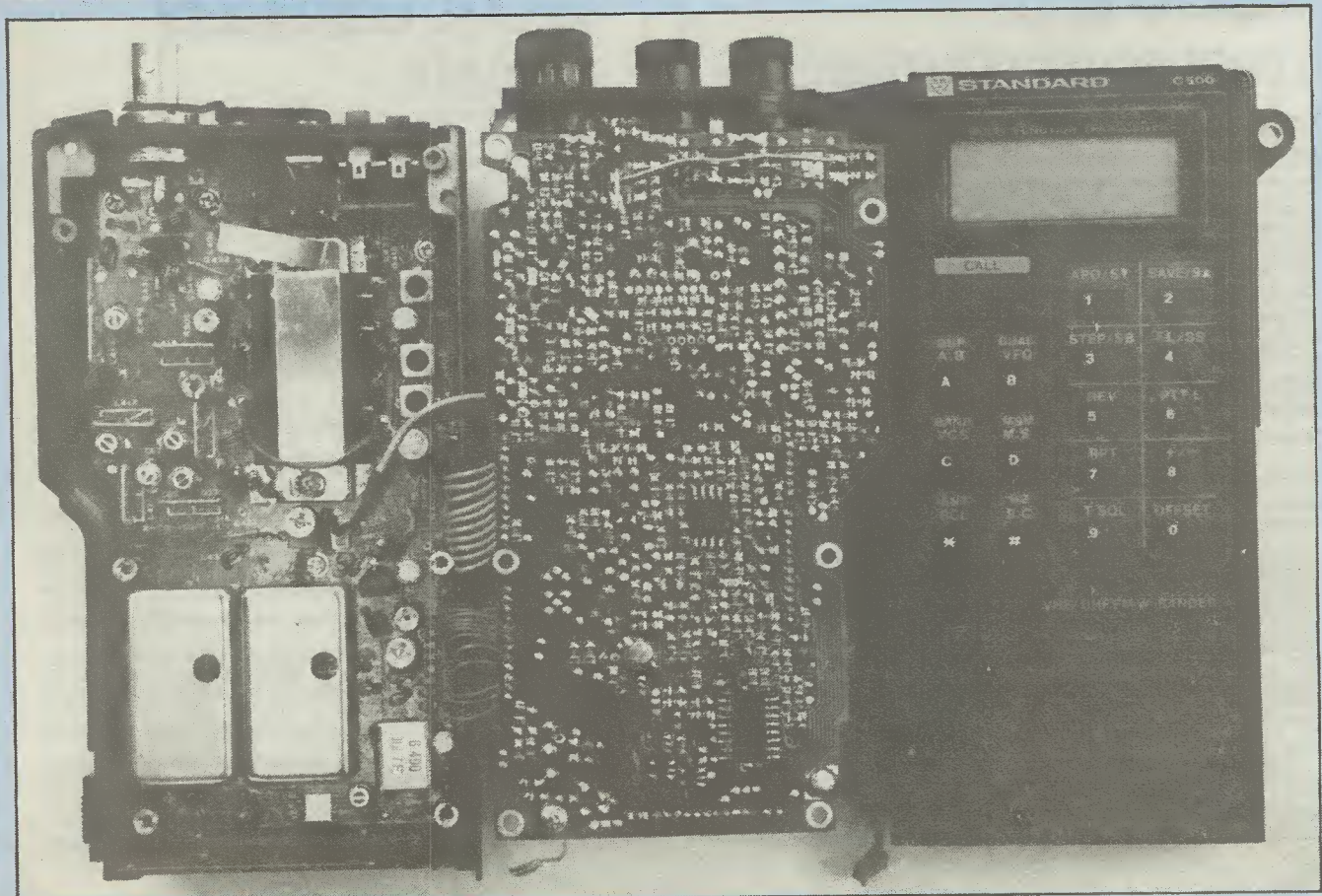
TRANSMITTER

TX Power and Current Consumption		
Power	145MHz	435MHz
Low	280mW/155mA	300mW/195mA
High	1.55W/630mA	1.65W/760mA

	145MHz	435MHz
Peak Deviation	5.38kHz	5.80kHz
Frequency Accuracy	-90Hz	Within 20Hz

Harmonics/Spurii		
Harmonics	145MHz	435MHz
2nd	-88dBc	-80dBc
3rd	-85	< -90
4th	-88	< -90
5th	-87	< -90

All other harmonic outputs less than -90dBc
VHF close-in spurii -86dBc average



Interleaved PCB construction of the C500

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packet radio from Kantronics.

KPCS...This KANTRONICS designed AX25 version 2 TNC features a built-in VHF and HF modem, full duplex operation and multiple connect facilities. The serial RS 232 port, combined with the enhanced generic command structure allows operation with any computer.

KPCS £165.00 inc vat, carriage £7.00

KPC4...A KPC4 is your gateway into packet flexibility. Having two packet ports, digipeating on each port and gateway between ports, the KPC4 lets you bridge two frequencies on one band or operate cross band. The KPC4 also includes the PERSONAL PACKET MAILBOX feature.

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KAM...Combine VHF packet, HF packet, CW, RTTY, ASCII and AMTOR in one unit.

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1300HC frequency counter.

Small enough to fit into a shirt pocket, the 1300HC frequency counter brings easy and accurate frequency measurement well within everyone's reach.

The 1300HC uses a full 8 digit display, and measures to 1300 MHz, thus being ideal for amateur as well as all mobile radio bands including cellular.

The unit contains its own rechargeable NiCad battery pack which is charged from an external supply. The frequency counter can also be powered from any 9 to 12 volt dc supply, which charges the batteries as well.

The 1300HC has excellent sensitivity, and when used with the optional telescope whip, easily measures transmitter frequencies of mobile or handheld transceivers, even low powered "bug" devices. When used in conjunction with a simple "dip oscillator", the 1300HC makes checking tuned circuit or aerial resonance an easy task.

The high performance of the 1300HC frequency counter makes it an indispensable tool for every amateur, engineer or technician. Its small size makes it suitable for either shack or "on the move" use.

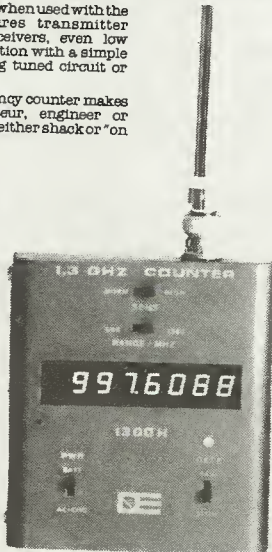
SPECIFICATION

Range 1-1300 MHz
Resolution 100Hz at 2.5 sec gate
1 kHz at 250 ms gate
Display 8 digit 0.3" LED
MHz decimal point
Leading zero blanking
Gate times Fast: 250 ms
Slow: 2.5 s
Sensitivity
(typical) 1-10 Mhz.....10 - 150 mV rms
10-1000 Mhz.....3 - 50 mV rms
1 - 1.3 GHz.....10 - 150 mV rms
Accuracy
(typical) +/- 1ppm, +/- 1 count LSD
Aging 0.1 ppm/month (typical)
Gate indication Red LED during sampling
Input connector B.N.C.
Input power 9 - 12 Vdc at 150 mA
Power connector Concentric, Centre pos.
Case Brushed anodised aluminium
Size 3.9H x 3.5W x 1D (inches)
Weight 255 g
Power supply Internal NiCad pack
(supplied) or external dc source (option)

1300HC Handheld frequency counter
..... £155.00 inc vat, carriage £2.00

OPTIONS

PS12 AC mains power supply
..... £8.50 inc vat, carriage £2.00
BC6 Telescopic whip



..... £7.45 inc vat, carriage £0.50
CC12 Padded carrying case
..... £9.90 inc vat, carriage £1.00

HOKUSHIN aerials.

BASE STATION AERIALS

HSVK5...50 to 10 metres vertical, includes radials £218.00 inc vat, carriage £7.00

HF5R...Radial kit for use with HF5 when mounted on chimney or gable end..... £54.81 inc vat, carriage £7.00

GFV5...Two metre base station colinear, 6.5 dB gain, 3.1 metres high inc vat, carriage £7.00..... £54.92

GFV23...as above but 3 section colinear, 7.8 dB gain, 4.45 metres high inc vat, carriage £7.00..... £51.97

GFV7...Seventy centimetre triple 5/8 base station colinear, 6.8 dB gain inc vat, carriage £7.00..... £45.59

GFV720...Dual band (144/430 MHz) base station aerial. £45.68 inc vat, carriage £7.00.

MOBILE AERIALS

2E...Two metres 5/8 whip, 3.4 dB gain, foldover base £14.55 inc vat, carriage £2.00.

2NE...Two metres 7/8 whip, 4.5 dB gain, foldover base £24.23 inc vat, carriage £2.00.

OSCAR430...Seventy centimetre triple 5/8 whip, 6.3 dB gain inc vat, carriage £2.00..... £27.72

OSCAR720...Dual band (144/430 MHz) whip ... £24.59 inc vat, carriage £2.00.

HS770...144/430 MHz diplexer for use with OSCAR720. £18.02 inc vat, carriage £1.50.

GSS...Gutter mount (requires RG4M cable assembly). £6.26 inc vat, carriage £1.25.

RG4M...Cable assembly for GSS base, complete with SO239 and PL259 plug..... £6.26 inc vat, carriage £1.00.

12B...Car wing mount with SO239 top and bottom £5.73 inc vat, carriage £1.00.

HSTMB...Car boot mount including cable and PL259 £15.42 inc vat, carriage £1.50.

MAR00S...High quality mag mount with cable and strong protective cover to prevent paintwork damage.. £22.90 inc vat, carriage £2.00.

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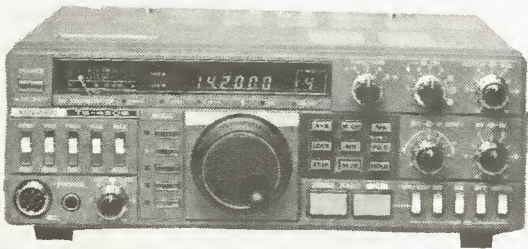
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the TS711E and TS811E PERFECT BASE STATIONS!



The **KENWOOD TS711E two metre base station** is perfection epitomised, receiver sensitivity and the ability to reject unwanted adjacent signals is outstanding. For the serious operator, any other transceiver is unacceptable.

Similar in specification and appearance to the TS711E but operating on seventy centimetres is the **KENWOOD TS811E**. When used along side the TS711E, the TS811E completes the ideal equipment line-up and provides the best possible access to the satellites for the VHF/UHF enthusiast.

The **TS711E (TS811E)** covers the two metre (seventy centimetre) band from 144 to 146 MHz (430 to 440 MHz). Operating modes are USB, LSB, CW and FM. When switched to the "auto" position the transceiver correctly selects mode according to frequency, a great advantage for the blind operator. Simple up/down frequency shift is provided on the front panels and also on the microphones.

Power output on all modes is 25 watts. For QRP operation the output can be reduced using a front panel control.

The **TS711E (TS811E)** has **IF shift**, an essential feature when the band is crowded during a contest. To help work DX, speech processing is also available.

The transceiver has two separate VFO's and forty memory channels. Each memory stores frequency, operating mode, whether simplex or repeater shift and if the 1750 Hz tone burst is on or off. The VFO can be either free running as for SSB or CW operation or electrically switched to a "click" stop for FM where it changes frequency in 12.5 or 5 kHz steps. Frequencies stored in memory can be readily transferred to either VFO A or B. Depending on how VFO was set when the information was put into memory i.e. click stop or free running VFO, the rig is set the same when memory information is transferred. It is therefore possible to have SSB frequencies transferred with a free running VFO and FM channels with click stop. A great aid to operating! The second VFO can also be quickly put on the same frequency as the one currently being used, ideal when checking the position of a strong adjacent signal whilst remaining on your operating frequency.

Frequency scan on VFO can either be between or outside user set limits. On memory the transceiver can either scan the entire memory content or be instructed to look at those frequencies of a particular mode. The TS711E (TS811E) has a timed hold on an occupied channel.

Both priority channel and immediate recall of your local net frequency are possible with the TS711E (TS811E).

For those with failing sight or a blind operator the TS711E (TS811E) is a dream come true; not only is the operating mode identified by the appropriate CW letter sent in tone (F for FM, U for USB etc.) but when fitted with the VSI optional board, a digitally encoded girl's voice will announce both frequency and, where applicable, whether the rig is switched to repeater shift.

DCS (digital code squelch) is also fitted to the TS711E (TS811E).

TS711E	£940.00 inc VAT	Carriage £7.00
TS811E	£1094.00 inc VAT	Carriage £7.00
VSI	£32.62 inc VAT	Carriage £7.00

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TOP BAND SSB TRANSCEIVER



Reach for your soldering iron, pardn'r, the Kanga Gang just rode into town with a Top Band rig for the ranch. At 15W max on SSB, and with the option of CW, it should set them herds a hummin...

The original idea of this set was to take the place of the now ageing 'Whitfield' transceiver for 160 and 80 metres (Short Wave Magazine, April to August '83). This was still functioning well but was rather large and the bug had bitten to make our shacks fully home brewed again. The set is designed for SSB or CW for the 160 metre band, to be portable and reasonably compact. This last demand is not usually governed by the electronic design of the piece of equipment but by the front panel layout, and the 'Whitfield' is an excellent example of this!

The Design

Fig. 1. gives the block diagram of the set and Figs 2 to 9 the circuit diagrams of the various sections.

In Fig. 2, the aerial signal is filtered by the bandpass circuit of T1 and T2. IC1 is the RF preamp, but, using the two small relays RLA 2 and 3, it can be bypassed to improve the large signal handling capability, for when the set is used at night or with a large, high-gain antenna. If this facility is not required, the relays can be replaced by two links permanently keeping the preamp in circuit.

The mixer, IC2, is an SBL1 device, chosen not so much for its characteristics but for the ease of switching the transmit/receive path which it allows, but more of that later. A certain amount of trade-off has been accepted in the termination of the mixer, but in use this does not seem to have made much difference to the handling of the set on the main aerial.

IF Stages

The IF signal from the mixer is fed via a matching transformer to the SSB filter, FL1. This device has been introduced only recently, and is being marketed by ILP Ltd. It is a mechanical filter of very small size with an extremely good shape factor of just over 2:1. This, coupled with the selectivity of the two IF transformers used in the receive section of the IF strip, brings the overall shape factor below 2:1, a very acceptable level. For reception on AM this filter is too narrow and two relays are used to change to a six pole ceramic ladder filter of 8 kHz bandwidth, FL2.

The output from the filters is then amplified by the IF strip, Fig. 3. This consists of three stages using dual-gate MOSFETs. Only two are used in the SSB receive path as the signal has then reached a high enough level to drive the balanced demodulator, of Fig. 4. The third stage of IF amplification, Q8/T10 in Fig. 3, is used to increase the level of the signal to drive the AGC detector. This detector is also used to develop the audio for use on AM. The resulting AGC voltage is used to control the three IF stages by changing the gate 2 voltages.

AM & SSB Operation

The AM or SSB audio is selected by the mode switch and then fed to the volume control prior to driving the audio output device, IC7. For this stage we use a ULN2283 integrated circuit; this is a very versatile device and will deliver a watt of audio into an 8 ohm speaker.

The carrier insertion oscillator (Fig. 5) needs little description because it is quite straightforward in design. There are in fact two oscillators, built round Q12 and Q13. The frequency controlling elements are ceramic resonators, X1 and X2. These have two advantages over crystals, they are far cheaper and it is possible to 'pull' them to a much greater degree, making setting up of the unit easier. However, the main

disadvantage is that their long-term stability is far below that of crystals, though this is not an insurmountable problem in a 'home brew' design, it just means you have to realign the oscillators periodically. One oscillator is set to the appropriate frequency for the lower sideband and the other for the upper. The oscillator to be used is selected by SW1c, which switches the power to one or the other. The output from the selected oscillator is buffered by Q14.

Transmitter

The transmitter section (Fig. 6) is fairly straight forward and without any frills. ALC is not included but instead the maximum drive level set to a point just below flat-topping. This does mean that the same microphone has to be used at all times, but removes the problems that can occur in getting the ALC to work properly. Provision is made for ALC to be fitted retrospectively by our using a dual gate MOSFET in the signal path (second gate can be used for control).

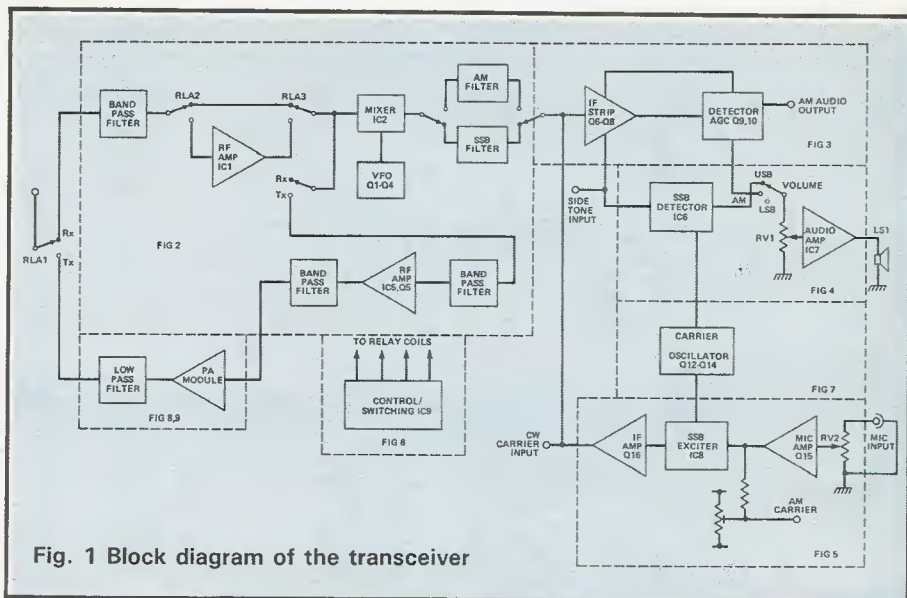


Fig. 1 Block diagram of the transceiver

In the original design, the microphone signal was amplified using an SL630 or SL1630 device; however due to a large number of drop-outs in the last batch of 'seconds' we bought (only in the SL630s) this was scrapped and replaced by a very simple single

transistor stage, Q15. The gain required is very low as the maximum signal needed to drive the SL640 is 1 volt P/P; the microphone input level is adjustable from a control on the front panel.

The amplified signal is fed to IC8, an SL640 or SL1640, to mix

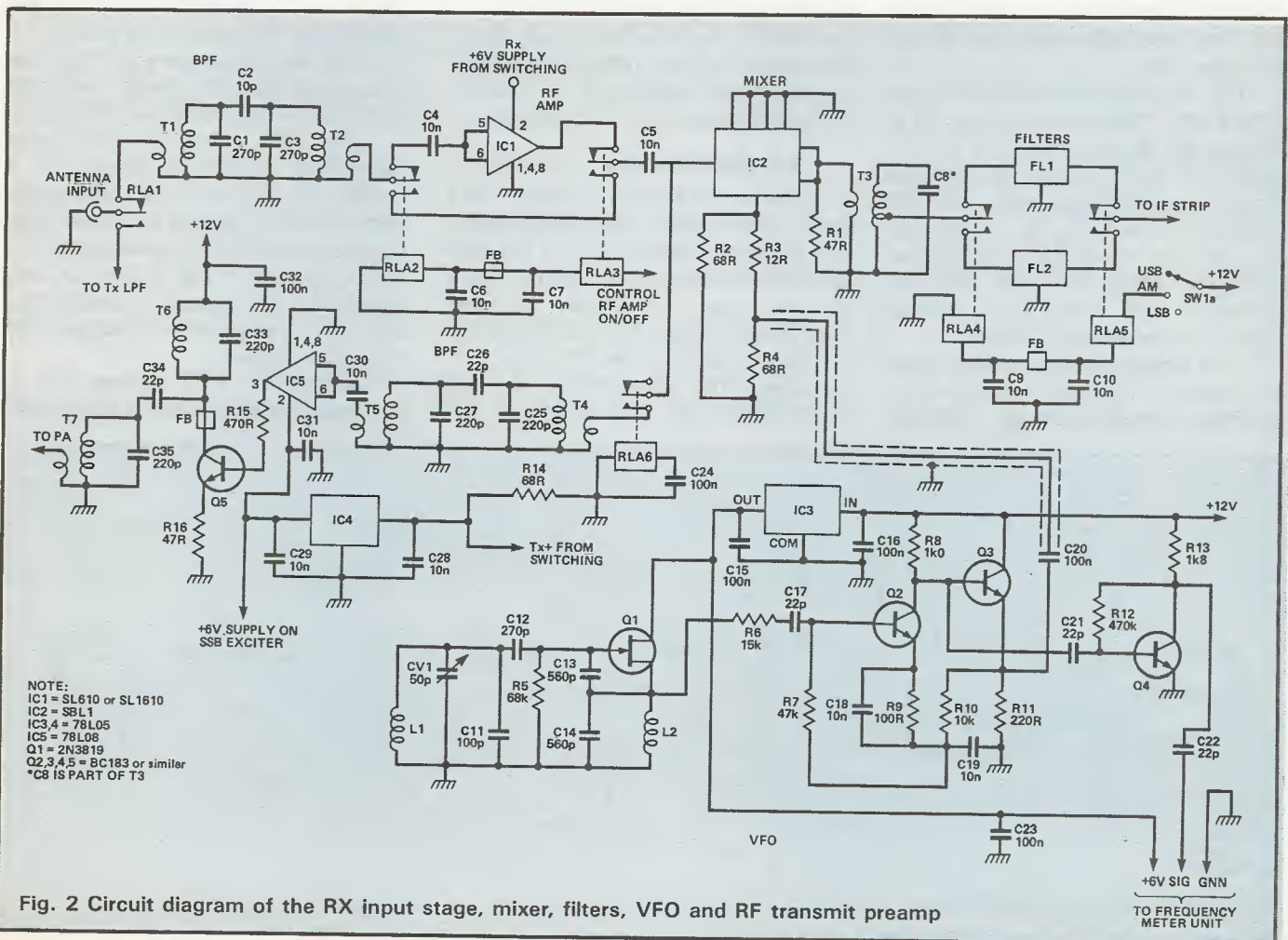


Fig. 2 Circuit diagram of the RX input stage, mixer, filters, VFO and RF transmit preamp

NOTE:
 IC1 = SL610 or SL1610
 IC2 = SB11
 IC3,4 = 78L05
 IC5 = 78L08
 Q1 = 2N3819
 Q2,3,4,5 = BC183 or similar
 *C8 IS PART OF T3

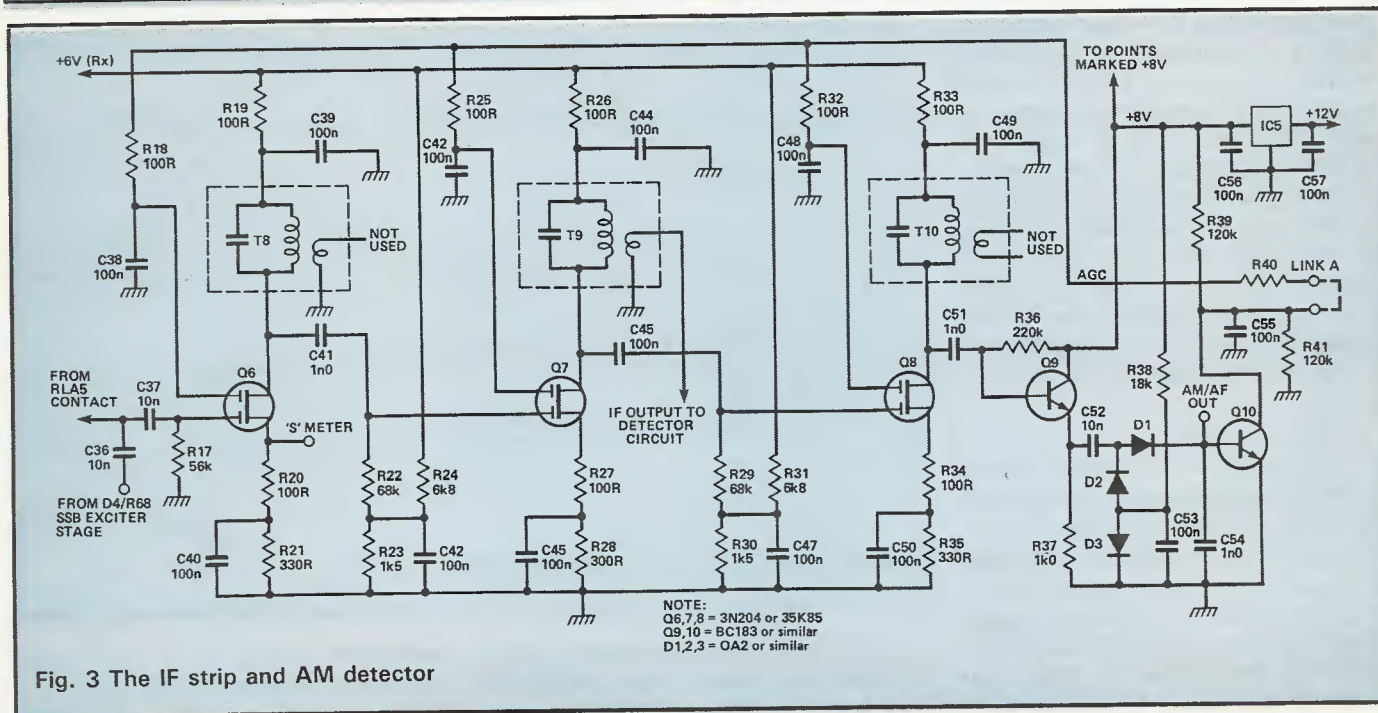


Fig. 3 The IF strip and AM detector

with the signal from the carrier insertion oscillator. The resulting double sideband reduced carrier output is fed to dual gate MOSFET amplifier stage, Q16, and then into the SSB filter via a diode switch, — but more of that later when we consider CW.

It is at this point where the use of the SBL1 Mixer IC (see Fig. 2) is of great advantage. Because it is bilateral, it can be used to mix the input received signal with the VFO to produce the IF signal, or, without switching, it will mix the SSB signal from the filter with the VFO to produce the transmitter output signal on the required band.

The signal path then splits again and the transmit signal is fed into a bandpass tuned circuit and then into

IC5, an SL610 or SL1610, for further amplification to make up for the loss in the filter and mixer stages. Unfortunately the SL610 cannot drive a tuned circuit directly so a transistor, Q5, is used as an interface to drive a second bandpass filter. The output of this filter is clean and of sufficient amplitude to drive a Cirkit PA module to full output.

TX PA Control

To control the PA module using solid state switching we have carried out a minor modification to the bias line. This is done by lifting links 3 and 4 from the +ve supply rail (see Fig. 7) and using the resulting lack of bias to turn off the PA and driver stages. The pre-driver is left conducting all the time as the

dissipation is low enough not to cause any problem. The current requirement of the bias line is in excess of 100mA and so we have included a bird's-nested emitter follower (Q17 in Fig. 7) to reduce the loading on the switching circuit.

It is also necessary to filter the output of the PA board and the circuit and values are given in Fig. 8.

The TR (transmit/receive) switching system is based on a design of Ian, G3RVM, which he constructed to enable his Yaesu gear to work QSK. We have adapted this circuit, shown in Fig. 9, for our own needs in many pieces of equipment and have never been disappointed with the results.

When the PTT button line is pressed, taking the input to ground,

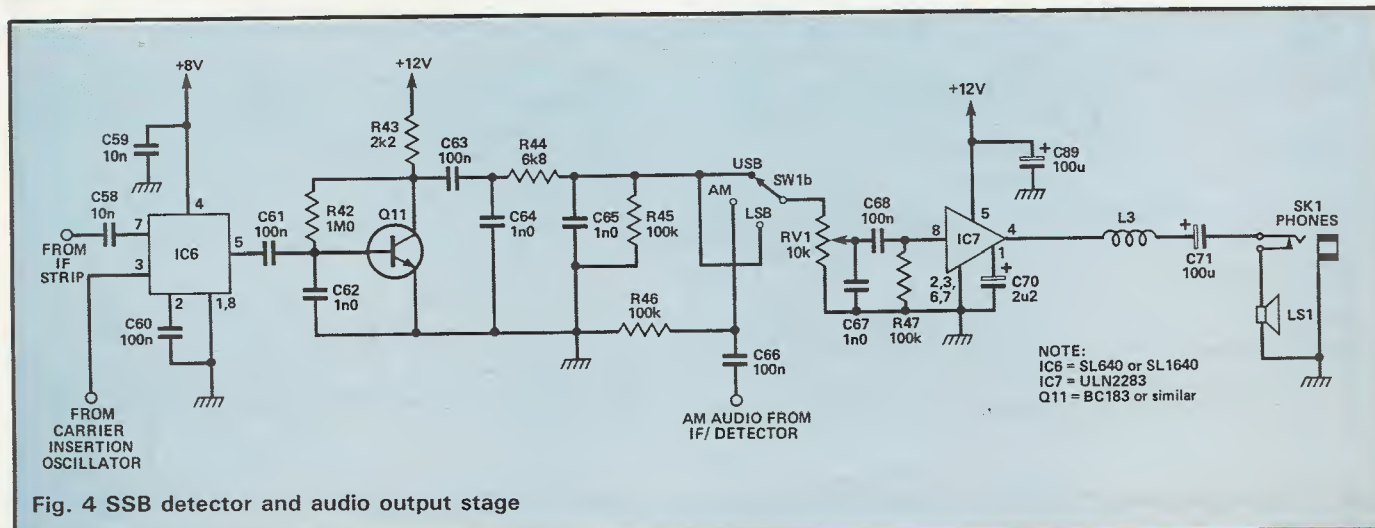
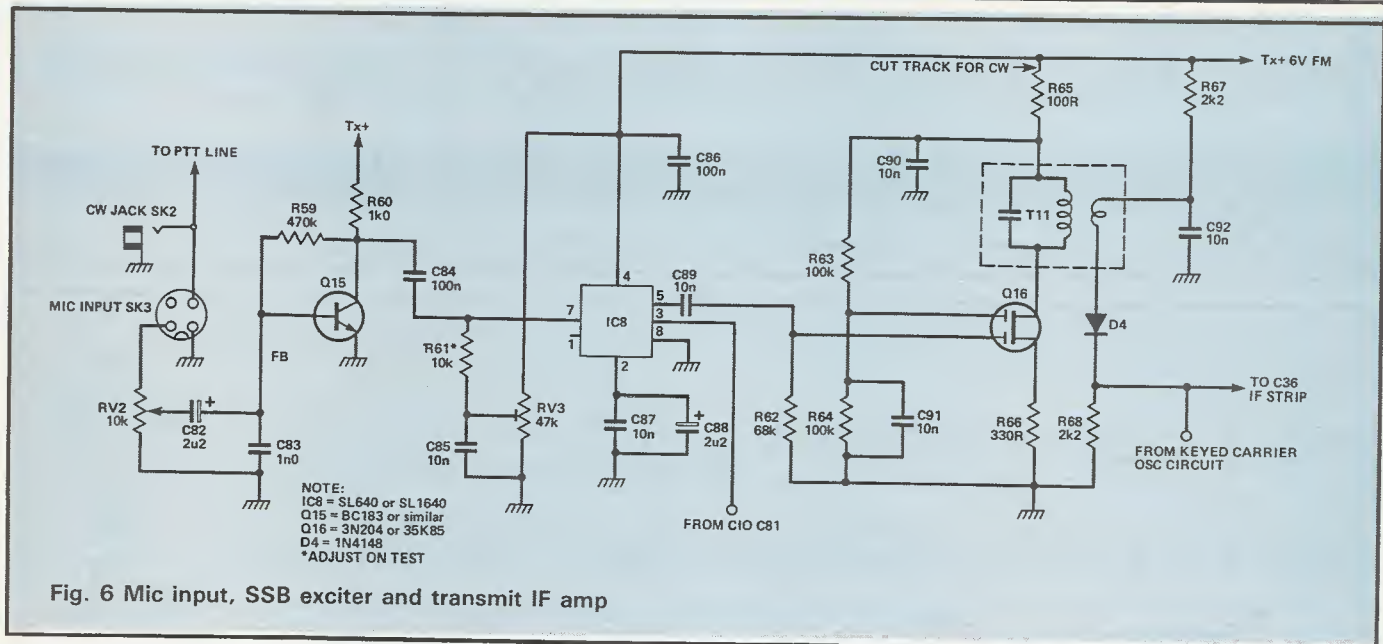
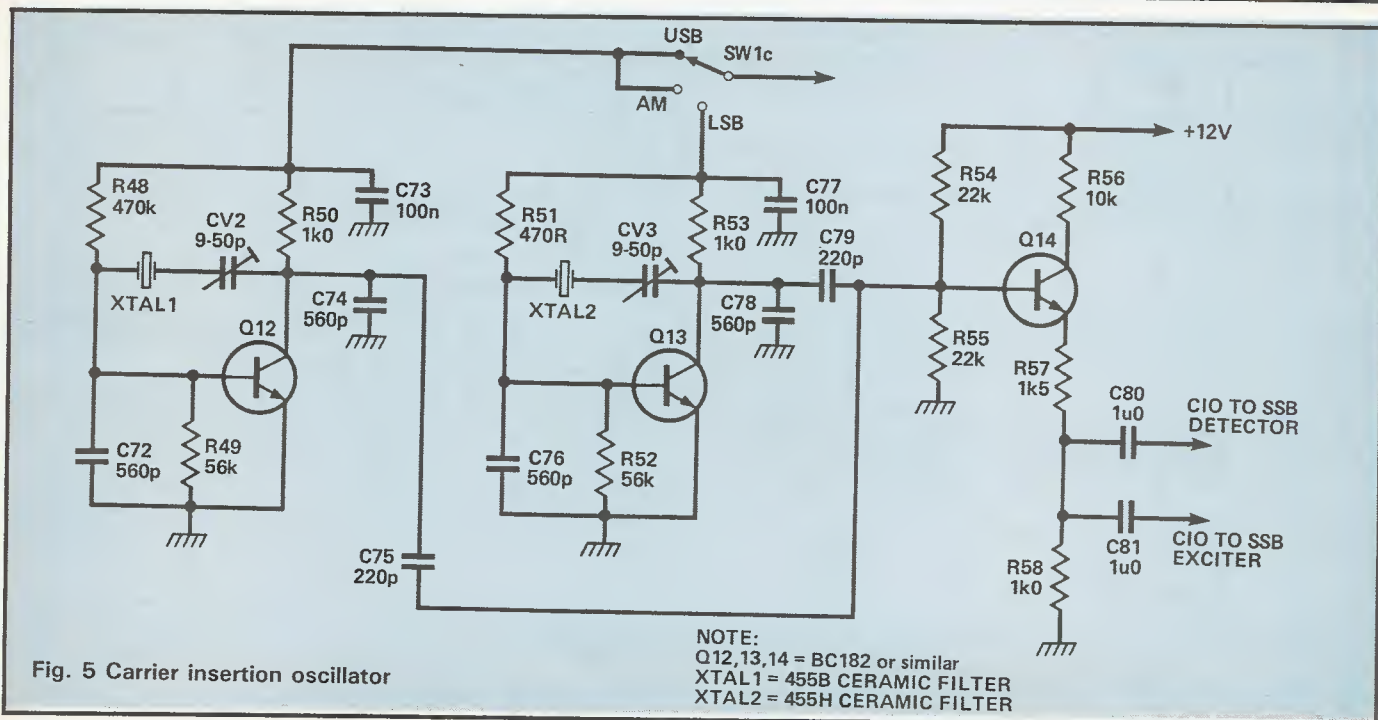


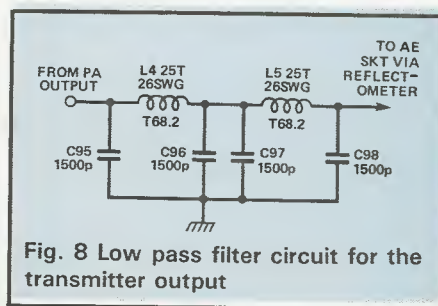
Fig. 4 SSB detector and audio output stage



IC9a pin 2 goes from low to high and C100 charges up via R70, also D5 conducts causing IC9e pin 13 to go low and so pin 12 goes high. This turns on Q19 which energises the aerial relay, RLA1, taking the aerial off the receiver and connecting it to the output of the low-pass filter. While this has been happening C100 reaches a potential which will change the state of IC9b and pin 6 will go low so discharging C101 via R71. The potential on pin 3 will reduce and after a finite time IC9c will change state and pin 4 will go high. This whole action will take between 10 and 15 milliseconds.

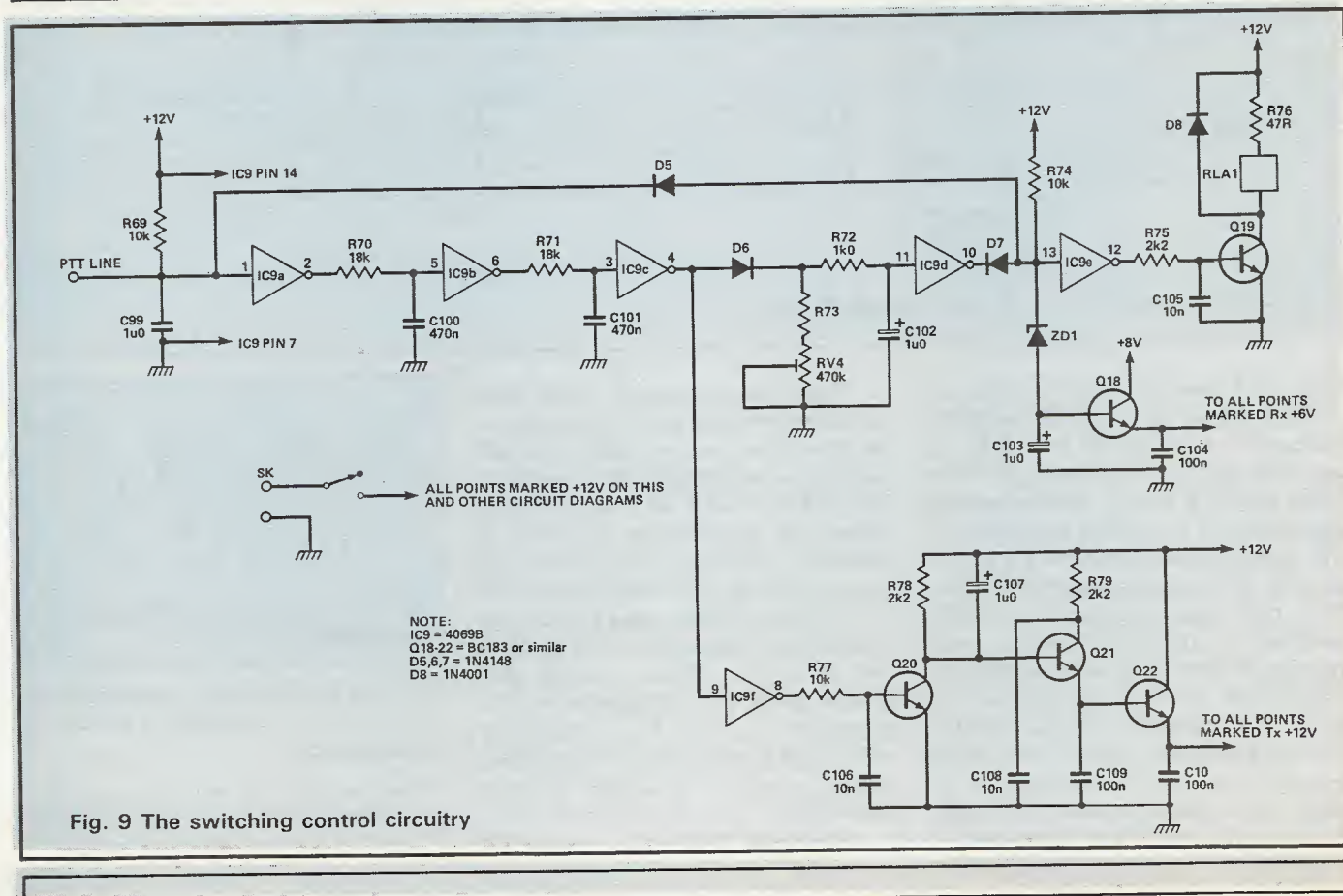
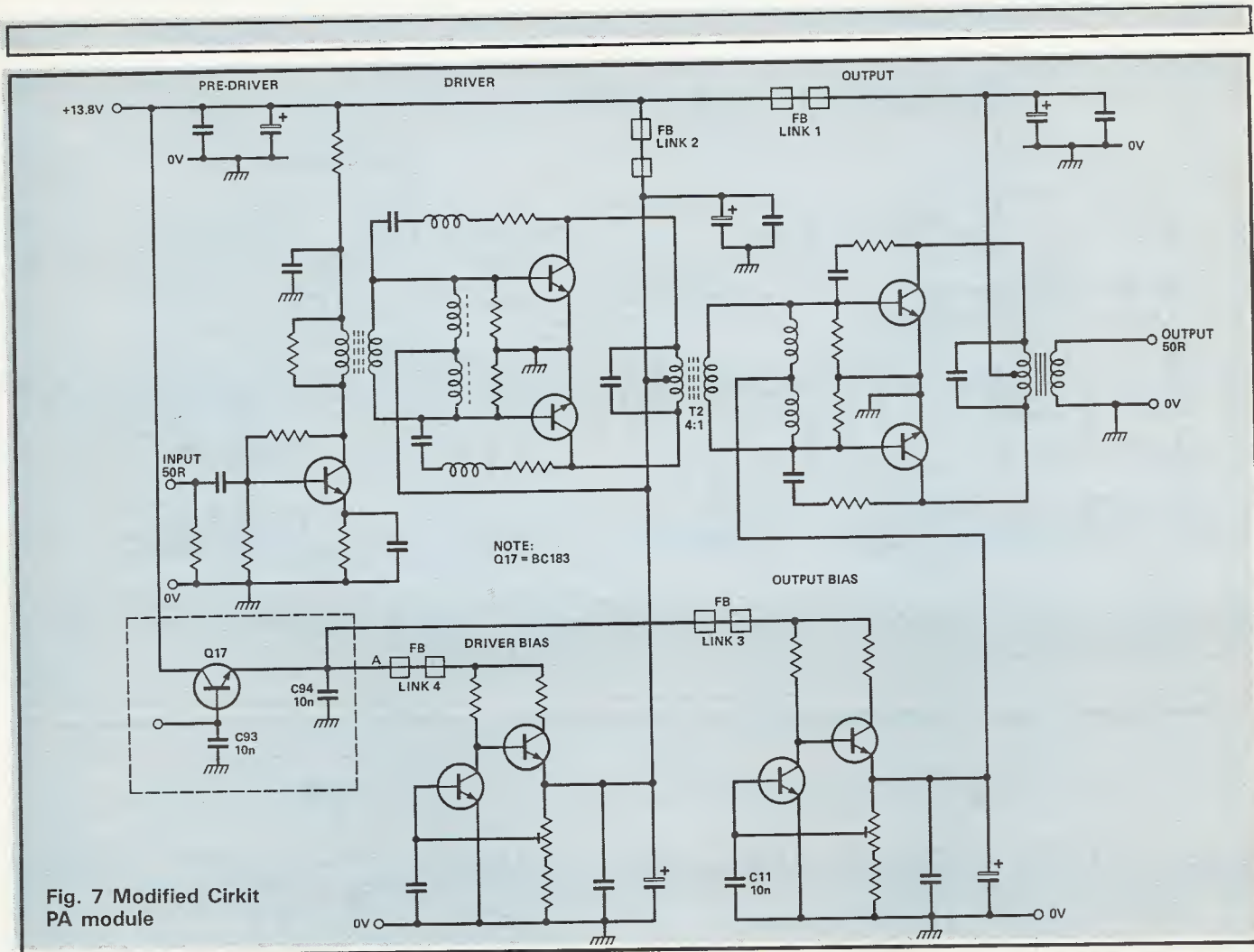
Two things happen now: IC9f will change state and the output on pin 8 will go low; secondly D6 will conduct and charge C102 via R72. This will turn on IC9d and pin 10 will reduce to zero. When the PTT is released the aerial relay, RLA1, will hold on due to pin 10 being low and this will remain low until the charge in C102 has discharged via R72, R73 and RV4. The charge cannot discharge back into IC9c due to the presence of D6. RV4 therefore adjusts the 'hang' time from a few milliseconds to upwards of one second.

However the keyed output on



IC9f pin 8 follows the 'keyed output' on IC9a pin 1 delayed by about 15 milliseconds.

Next month we will be covering the construction and alignment of the Top Band transceiver project.



RADIO Tomorrow

- 1 Nov** Camarthen ARS Rally, Leisure Centre, Johnstown. Details from GW3GUE on (026783) 460.
- 2 Nov** Stourbridge DARS: Night on the air. Welwyn/Hatfield ARC: Construction competition. Todmorden DARS: 'Bash the Committee' — air your views. Southdown ARS: Construction evening. Felixstowe DARS: Night on the air. Hambleton DARS: Talk 'Log checking with a computer program' by Pieter Smit. Sutton & Cheam RS: Natter night.
- 3 Nov** Rugby ATS: Fireworks & barbecue. Dartford Heath DFC: Pre hunt meeting, Horse & Groom. Loughborough ARC: Night on the air. Fylde ARS: Equipment sale. Wakefield DRS: Pea & pie supper. Chester DRS: Committee meeting.
- 4 Nov** SE Kent YMCA ARC: Natter night. Fareham DARC: Talk 'Amateur radio in the Royal Navy' by G3JFF. Willenhall DARS: Talk 'Microwaves' by D Acrill GODJA. S Bristol ARC: Talk 'CW operating'. Chesham DARS: Natter night.
- 5 Nov** Mid Sussex ARS: Fireworks on the air. Bredhurst RTS: Construction & natter night. Yeovil ARC: Talk 'Simple HF aerials' by G3GC. Salop ARS: Talk 'Model steam engines' by GOEBD. E Kent RS: Talk 'Kanga amateur radio kits' by Dick Pascoe GOBPS & Ian Keyser G3ROO.
- 6 Nov** Mansfield ARS: RSGB Video. Loughton DARS: Film show.
- 7 Nov** **OK DX Contest (also 8th)** BARTG: AGM at The Churchill Room, London House, Meckleburgh Square, London. **North Devon Radio Rally, Bradworthy Memorial Hall. Details from G8MXI, QTHR.** **North Wales Radio Rally, Abercônwy Conference Centre, Llandudno. Details from Derek Watts on (0492) 530041. Also on 8th.**
- 8 Nov** Dartford Heath DFC: Club hunt, 2.30 pm, Dartford Heath.
- 9 Nov** Sheffield ARC: Junk sale & sausage spectacular. Atherstone ARC: RSGB film.
- 10 Nov** Keighley ARS: Informal meeting. Dorking DRS: Informal meeting. Loughborough ARC: Film show. Biggin Hill ARC: Surplus equipment sale. Delyn RC: Informal meeting. Verulam ARC: Activity evening. Rugby ATS: Slide & talk by Mr Powers of the IBA. Chester DRS: Talk 'The TR940S' by Dave G4JMF.
- 11 Nov** Trowbridge DARC: Natter night. Bath DARC: Microwaves. Wirral DARC: Chairmans night. SE Kent YMCA ARC: 2m fox hunt. Lothians RS: Junk sale. S Bristol ARC: CW activity evening. Chesham DARS: Talk & demo 'High power linear amps'. Farnborough DRS: AGM.
- 12 Nov** North Wakefield RC: Night on the air. Mid Sussex ARS: Talk 'Remote imaging' by Des Watson G3YXO. Bredhurst RTS: Talk 'AX25' by Chas G4VVSZ. Salop ARC: Talk 'Field strength & power density' by G3MYM. Southgate ARC: Construction competition. Edgware DRS: Film evening.
- 13 Nov** Wimbledon DARS: Activity evening. Itchen Valley RC: Talk 'Getting started on 50MHz' by G Sanderson G2DBT. Dunstable Downs RC: RAE opening evening.
- 15 Nov** **Bridgend DARC: Bridgend Rally at the Bridgend Recreation Centre, Angle Street, Bridgend, Mid Glamorgan. Doors open 11.00 am (10.30 am for disabled visitors). Free parking, bring & buy, morse test. Talk in on S22. Further details from Dave, GW1OUP, on (0656) 723508.**
- 16 Nov** Stourbridge ARS: Annual surplus sale. Todmorden DARS: Natter night. Felixstowe DARS: Social evening.
- 17 Nov** Midland ARS: Home Construction Competition. Mansfield ARS: Talk 'The grid dip oscillator' by Keith G4AAH. Loughborough ARC: Annual dinner. Wakefield DRS: Talk by G1LTU. Fylde ARS: Informal meeting. Chester DRS: Talk 'Clandestine radio — part 2' by Gordon Adams G3LEQ.
- 18 Nov** Hastings ERC: Talk 'The Phillips compact disk'. SE Kent YMCA ARC: Natter night. S Bristol ARC: ATV activity evening. Chesham DARS: AGM.
- 19 Nov** Mid Sussex ARS: Night on the air. Bredhurst RTS: The G4EGH Ingenuity Trophy. Salop ARS: Talk 'The lead mines of SW Shropshire' by G4ZZP. E Kent RS: Natter night. Yeovil ARC: Talk 'RTTY — part 2' by G8AWB.
- 20 Nov** Sutton & Cheam RS: Talk 'BBC external services'. Loughton DARS: Informal evening.
- 22 Nov** Wakefield DRS: Visit to Jodrell Bank. **W Manchester RC Winter Rally, Pembroke Halls, Walkden. Details from G1IOO on (0204) 24104.**
- 23 Nov** Atherstone ARC: AGM.
- 24 Nov** Loughborough ARC: Construction night. Wakefield DRS: Novelty project judging.

- Delyn RC: Informal meeting.
Verulam ARC: Talk 'Advanced receiver technology' by Robin Hewes G3TDR.
Rugby ATS: 144MHz AFS Contest planning.
- 25 Nov** Trowbridge DARC: Visit by Region 17 Rep.
Bath DARC: Open night.
SE Kent YMCA ARC: Club project discussion.
Lothians RS: Talk 'Propagation with an HF bias' by T Main GM4DCL.
S Bristol ARC: Discussion — events for 1988.
Chesham DARS: Talk 'The history of stereo' by Tony G4BPC.
Farnborough DRS: Chairmans evening.
- 26 Nov** Keighley ARS: Film show.
North Wakefield RC: Monthly meeting.
Mid Sussex ARS: Talk 'Air navigation in World War 2' by Len GOAPZ.
Bredhurst RTS: Talk 'Regenerative Receivers' by Stan White G4EGH.
Salop ARS: HF night on the air.
Yeovil ARC: Natter night.
Southgate ARC: Informal evening.
Edgware DRS: Talk 'SWR topics'.
- 27 Nov** Wimbledon DARS: Mini lecture.
Itchen Valley RC: Talk 'Radio' by Len G6NZ.
- 30 Nov** Felixstowe DARS: Social evening.
- 1 Dec** Loughborough ARC: Night on the air.
Wakefield DRS: Night on the air.
Fylde ARS: Construction competition.
Chester DRS: Committee meeting.
- 2 Dec** Fareham DARC: Talk 'Bobbins, baluns and beads' by G3CCB.
S Bristol ARC: Test equipment rally.
Chesham DARS: Natter night.
- 3 Dec** Mid Sussex ARS: Night on the air.
Bredhurst RTS: Construction & natter night.
Salop ARS: Talk 'Drug abuse' by Community Police Officers.
E Kent RS: Annual cheese & wine party.
Yeovil ARC: Talk 'VHF propagation & choosing a site' by G3GC.
- 4 Dec** Mansfield ARS: Christmas party.
Loughton DARS: Night on the air — 6m.
- 5 Dec** RSGB AGM.
- 6 Dec** 144MHz fixed & AFS contest.
Verulam ARC Christmas Rally, St Albans City Hall. Details from G4JKS on (0727) 59318.
- 7 Dec** Stourbridge DARS: Night on the air.
Welwyn/Hatfield ARC: AGM.
Todmorden DARS: George Dobbs Annual Xmas Lecture.
- 8 Dec** Keighley ARS: Informal meeting.
Midland ARS: Christmas Party.
Dorking DRS: Informal meeting.
Dartford Heath DFC: Pre hunt meeting, Horse & Groom.
Loughborough ARC: Film show.
Biggin Hill ARC: Tape & slide show and Christmas celebration.
Bury RS: AGM.
Delyn RC: Informal meeting.
- 9 Dec** Chiltern ARC: Christmas party.
Trowbridge DARC: Natter night.
Bath DARC: Christmas party.
SE Kent YMCA ARC: Talk 'How to work meteor scatter' by Ken Willis G8VR.
S Bristol ARC: Discussion — club project.
Chesham DARS: Talk 'Technical topics'.
Farnborough DRS: Christmas social evening.
- 10 Dec** Mid Sussex ARS: Club Christmas Dinner.
Bredhurst RTS: Talk 'Building GB3KN'



- Edgware DRS: Annual junk sale.
Salop ARS: Natter night.
- 11 Dec** Wimbledon DARS: Social evening.
Itchen Valley RC: Christmas party.
Dunstable Downs RC: Christmas TV show via GB3TV.
- 13 Dec** Dartford Heath DFC: Club hunt, 2.30 pm, Dartford Heath.
- 14 Dec** Leeds DARS Christmas Rally, Pudsey Civic Centre. Details from G4WYD on (0274) 658039.
Sheffield ARC: Pea & Pie supper.
Felixstowe DARS: Christmas drinks, Grosvenor Hotel, Felixstowe.
Atherstone ARC: Talk 'Central Electricity Generating Board' by R Hammond.
- 15 Dec** Dartford Heath DFC: EGM.
Mansfield ARS: Talk 'The oscilloscope' by Mike G8GNN.
Loughborough ARC: Construction night.
Fylde ARS: Hot Pot supper at club.
Rugby ATS: Annual Christmas Dinner.
Chester DRS: Construction contest.
- 16 Dec** Hastings ERC: Christmas social.
SE Kent YMCA ARC: Christmas social.
Fareham DARC: Talk 'Taking the morse test' by G3TZL.
Chesham DARS: General meeting.
- 17 Dec** North Wakefield RC: Christmas dinner.
Bredhurst RTS: Construction & natter night.
Salop ARS: Christmas social.
E Kent RS: Natter night.
- 18 Dec** Sutton & Cheam RS: Christmas get together.
Loughton DARS: Christmas dinner.
Dunstable Downs RC: Members Christmas Party.
- 21 Dec** Stourbridge DARS: Main meeting.
Todmorden DARS: Natter night
- 22 Dec** Rugby ATS: Mince pie evening.
Loughborough ARC: Christmas drink in The Black Swan.
Wakefield DRS: Christmas social.
Delyn RC: Informal meeting.
Chester DRS: Christmas meeting.
- 23 Dec** Trowbridge DARC: Christmas Party.
Chesham DARS: Drinks & sandwiches. at the Queens Head.
- 29 Dec** Chester DRS: Drink & waffle.

Will club secretaries please note that the deadline for the February 1988 segment of *Radio Tomorrow*, (covering radio activities from 1st January to 1st March) is 18th November.

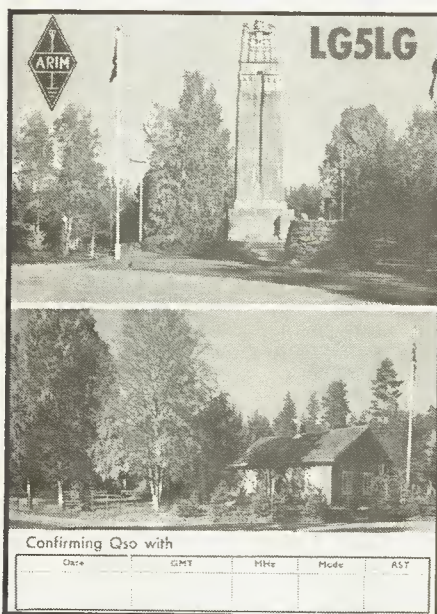
CONTACTS

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 Aberporth ARC GWODPR 023987 274
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 Amateur Radio & CC Trevor 04895 81032
 AMRAC Phil, G6DLJ 0703 847754
 Armagh & Dungannon DARC J. A. Murphy 0861 522153
 Atherstone ARC Roy 0203 393518
 Axe Vale ARC Bob 02974 5282
 Ayr ARG GM3THI 0292 42313
 Barking RES R. Woodberry 01 594 4009
 Barry College RS John 065679 710
 Basingstoke ARC Dave 07356 5185
 Bath DARC G4UMN 0373 63939
 Biggin Hill ARC G3UMI 01 462 2689
 Borehamwood Elstree ARS Tony 01 207 3809
 Braintree ARS Pub Sec 0376 28714
 Bredhurst RTS Kelvin GOAMZ 0634 376991
 Bridgend DARC Dave 0656 723508
 Brighton DARS Peter 0273 607737
 Binstead ARS Douglas 0893 67665
 Bristol ARC G4YOC 0272 4116
 Bristol (Shirehampton) ARC Ron Ford 0272 770504
 Burnham Beeches RC G6EIL 0628 25720
 BT (Reading) ARC G4MUT 0734 693766
 Bury RS Allan 0204 706191
 Cambridge DARC D. Wilcox 0954 50597
 Chesham DARS Liz, GOETU 09278 3911
 Cheshunt DARC G4VMR/G4VSL 092084 250
 Chester DRS Dave, G8ZRE 0244 336639
 Chichester DARC C. Bryan 0243 789587
 Clacton ARS Reg 0255 430466
 Chiltern ARC Ron, G3NCL 0494 712020
 Clifton ARS RA Hinton 01 301 1864
 Conwy Valley ARC GW4KGI 0745 823674
 Coulsdon ATS Alan 01 684 0610
 Coventry ARS Bill, G3UOL 0203 414684
 Crawley ARC Jack 0293 28612
 Darenth Valley RC Sec 0322 63368
 Dartford Heath DFC Pete 0322 844467
 Delyn RC Sec 0244 819618
 Denby Dale DARC G3SDY 0484 602905
 Derwentside ARC G1AAJ 0207 520477
 Donegal ARC EI3BOB 074 57155
 Dorking DRS John 0306 77236
 Droitwich DARC G4HFP 0299 33818
 Dudley ARC John 0384 278300
 Dunfermline RS GM0DYD 0383 413440
 Dunstable Downs RC Phill Morris 0582 607623
 Eastbourne EARC G1BRC 0323 29913
 East Kent ARS Stuart 0227 68913
 East Lancashire ARC Stuart 0254 887385
 Edgware DRS G4IUZ 0707 65707
 Exeter ARS Roger Tipper 0392 68065
 Fareham DARC Alan, G3CCB 0329 288139
 Farnborough DRS Mr Taylor 0252 837581
 Felixstowe DARS G4YQC 0473 642595
 Fishguard DARS Bernard 0348 872671
 Fylde ARS F. Whitehead 0253 737680
 Galashiels DARS GM3DAR 0896 56027
 Glossop DARG G4GNQ QTHR
 Gt. Lumley ARES G4MSF 091 4693955
 Gt. Peterborough ARC Stan 0733 69822
 Halifax DARS D. Moss 0422 202306
 Harpenden ARC G1BJC 05827 2455
 Harrow RS Tony 01 861 0419
 Hastings ERC Dave Shirley 0424 420608
 Haverhill DARS Rob Proctor 0787 281359
 Havering DARC G0BOI 04024 41532
 Hillingdon ARC Howard, G6SII 01 561 2917
 Hornsea ARC Richard 0401 62498
 Horsham ARC Paul, G4YFY 0403 87 404
 Inverness ARC Brian 0463 242463
 Itchen Valley RC G1IPQ 0703 736784
 Keighley ARS G1IGH 0274 496222
 Kidderminster DARS Tony 0562 751584
 Kingston DARS G3ODH Epsom 26005

Lagan Valley ARS Jim, G14TCS 0846 682474
 Leeds DARS G1EBS 0274 665355
 Leighton Linlade RC Pete Brazier 052 523 270
 Lincoln SWC Pam, G4STO 0427 788356
 Lothians RS Robin 0506 890177
 Louth DARC G1IZB 047286 595
 Loughborough ARC Philip 0509 412043
 Lough Erne ARC Bill 0365 24905
 Loughton DARC G4FKI 0525 714591
 Macclesfield DRS G1NUS 0625 24534
 Maidenhead DARC Colin 0628 25443
 Maidstone YMCA ARS GOBUW 0622 30544
 Maltby ARS Keith, G1PQW 0709 814135
 Medway ARTS Tony 0634 578647
 Midland ARS G8BHE 021 422 9787
 Mid Sussex ARS G0GMC 07918 2937
 Mid Ulster ARC Sam 076 22 22855
 Mid Warwickshire ARS G4TIL 092 681 4765
 Milton Keynes DARS Mike, QOERE 0234 750629
 Morecambe Bay ARS G4ZJL 0524 52042
 N. Bristol ARC Alan Booth 0272 690404
 N. Cornwall RS J. West 0288 4916
 N. Staffs ARS G6MLI 0782 332657
 N. Wakefield RC Steve 0532 536633
 Newbury DARS G3VOW 0635 43048
 Newport ARS GW6ZUQ 02912 6867
 Norfolk ARC Andy Norwich 610874
 Oswestry DARC Brian 0691 831023
 Peterborough RES Peter G4PNW QTHR
 Plymouth ARC G4SCA 0752 337980
 Pontefract DARS Colin, G0AAO 0977 43101
 Poole ARS G0EQV 0202 674802
 Preston ARS George 0772 718175
 Reading DARC Steve, G4YFB 0734 867820
 Rhyl DARC GW1PLI 097 888 621
 Rugby ATS Kevin, G8TWH QTHR
 Salisbury RES Neil 0980 22809
 Salop ARS Simon, G0E1Y 0743 67799
 Sheffield ARC John 0742 581766
 Sheffield DARS Alan, G4PSO 0462 57946
 S. Bristol ARS Len Baker 0272 834282
 S. Cheshire Chris 07816 73185
 S. Lakeland ARS G4VKE 0229 65359
 S. Manchester RC Dave Holland 061 973 1837
 S. Tyneside ARS G4XWR 091 543955
 S. E. Kent (YMCA) ARC John 0304 211638
 Southdown ARS P. Henly 0323 763123
 Southampton: See Waterside.
 Southgate ARC Dave, G4YLL 0992 30051
 Spen Valley ARS G4MLW 0924 409739
 Stevenage DARS G6EDA 0438 724991
 Stockton DARS John Walker 0642 582578
 Stockport RS Mel 061 224 7880
 Stourbridge DARS G3ZOM 0384 288900
 Stowmarket DARS M. Goodrum 0449 676288
 St Helens DARC A. Riley 051 430 9227
 Surrey RCC John 01 657 0454
 Sutton & Cheam RS John, G0BWV QTHR
 Swale ARC B. Hancock 0795 873147
 Taunton DARC Peter 0823 75973
 Telford DARS Tom Crosbie 0952 597506
 Three Counties ARC Keith, G0BTU 0730 66489
 Tiverton SWRC Alan 0392 881569
 Todmorden DARS G1GZB 070 681 7572
 Trowbridge DARC Ian 0380 830383
 V of Evesham ARC Paul 0386 831508
 V White Horse ARS I White 0235 31559
 Verulam ARC Gerry 0727 52003
 WACRAL G4NPM 0795 873147
 Wakefield DRS G4VRY 0532 820198
 Warrington ARC Paul, G0CBN 0925 814005
 Waterside SWC Bernie Lyford 0703 893937
 Welland Valley ARS J. Day 0858 32109
 Welwyn & Hatfield ARC Kevin, G4WLG 0707 335162
 West Kent ARS B. Guinnessy 0892 32877
 Westmorland RS G. Chapman 0539 28491
 White Rose ARS G4ATZ 0937 842790
 Wigston ARC G6HAJ Leicester 403105
 Willenhall ARS Dave, G0EGG 0902 734475
 Wimbledon DARS George 01 540 2180
 Winchester ARC Gordon 0703 772191
 Wirral DARC Peter 051 677 7376
 Wolverhampton ARS Keith 0902 24870
 Worcester DARC D. Batchelor 0905 641733
 Worksop ARS G4ZUN 0909 486614
 Wythall RC G1MEE 0546 824705
 Yeovil ARC David, G1MNM 0935 79804
 308 ARC (Surbiton) Bob 01 391 0788

MOROKULIEN - WHERE?



The LG5LG QSL card (the SJ9WL card is identical, other than the call-sign).

It is a well-known fact that the Scandinavian countries are not cheap places to stay. A typical hotel room in Sweden is about £60 per night and a glass of beer over £3. And Norway is even worse — the Norwegians frequently cross the border into Sweden to buy their booze, because they consider it to be cheap! So the idea of a cheap amateur radio holiday combined with beautiful Scandinavian lake-land scenery sounds like a contradiction in terms.

Special offer!

So, how about hiring a whole house, complete with HF and VHF transceivers, a 60 foot mast, beam antennas and two unique prefixes, all for £10 a night, no matter how many people you want to cram in? Sounds too good to be true? No, it *is* true, the place is called Morokulien, it is located right on the Norwegian-Swedish border near the town of Charlottenberg, and I went there for a weekend at the end of August last year.

How to book

Any radio amateur can book the house and it is not even necessary to have Swedish or Norwegian reciprocal licences, a photo-copy of a British licence is perfectly adequate. However, because the place is such good value it is naturally very popular, especially with LA and SM amateurs, who often book it several months in advance.

To book Morokulien, write to the genial host, Mr Einar Jansson, SM41M, Gardesgatan 5, S-670 50 Charlottenberg, Sweden, enclosing a self-addressed envelope and at least one IRC for his reply. If possible book several weeks or months in advance and try to give one or two alternative dates in case your preferred date is already booked. If you do try to book at short notice, why not give Einar a phone call? (he speaks excellent English). His number, from the UK, is 010-46-571-20093.

The house is then a few hundred yards further along, on the right hand side (if you are coming from Sweden) and can't be missed on account of the 60 foot mast! If you don't have a car, the closest railway station is at Charlottenberg, from where it is possible to get a taxi for the four or five kilometres to Morokulien.

Your 'hotel'

When you arrive at Morokulien you will find a house with a large living-cum-dining room comfortably furnished with two sofas, pine wood tables and chairs, a black and white television set and a handsome Scandinavian wrought iron wood-burning stove for heating the house during the winter months, when the snow lies several feet thick in this part of the world. The walls are covered with DXCC certificates and other awards and pennants from various international societies, including the

Just try booking this place through your local travel agent! Steve Telenius-Lowe, G4JVG, heads north in the name of DXing and ends up in Sweden — or is it Norway!

Getting there

The easiest way to get to Morokulien is with your own car. It is on the road number 61 between Eda in Sweden and Magnor in Norway. When you arrive at the border, stop at the customs house (*Tull*) and show the customs officer your amateur radio licence. He checks your callsign against the booking list and will hand you the key to the Morokulien house upon receipt of the necessary amount of Kronor (100 Swedish or Norwegian Kronor per night, except in the height of the summer season or during Scandinavian holidays, when it is 150 Kronor).

RSGB. Just off the lounge is the shack, which leads to the combined kitchen and bedroom. There is an electric cooker and a selection of pans, crockery and cutlery, so it is possible to be entirely self-catering here. You should, however, bring your own bed linen or sleeping bags, and towels, but just about everything else imaginable is provided.

There are two double bunk beds in the bedroom and the sofas in the lounge convert into double beds as well, so it is possible to sleep a total of eight people in reasonable comfort — providing they are all quite friendly with each other! Einar tells me, though, that the record is 26



The Morokulien house, complete with 2m and HF beams, and 40/80m dipoles.

Scouts during 'Jamboree on the Air' one year!

Local attractions

Apart from the radio station, the area called Morokulien contains a small cafe and shop, tourist information, a petrol station, a camping site and log cabins for hire to those who are not radio amateurs. There is also an eighteen metre high granite peace monument, erected in 1914 to commemorate one hundred years of peace between Sweden and Norway, and this is now one of the border markers.

Interestingly, the border between the two countries runs right through the house in which the amateur radio station is situated, and this must have given the authorities something to think about when issuing a callsign for the place! In the event two callsigns were issued, one with a Norwegian and one with a Swedish prefix. Today, these calls are

LG5LG and SJ9WL, and both callsigns can be used from the same station, although not at the same time of course. Separate log books are provided for the operator to use, with a note to only use one log book at a time.

'Hotel' facilities

The shack is well-equipped, with an Icom IC-720A transceiver for the short wave bands, and an Icom IC-251E multi-mode transceiver for 2 metres. There is also RTTY terminal unit and printer, bug key and a choice of standard 'hand-pumps'. The antennas provided are a TH6Dxx 6 element beam for 10, 15 and 20 metres on top of the mast and above this is a ten element crossed beam for 144 MHz. The mast also supports a 40 metre sloping dipole plus 80 and 40 metre dipoles on the same feeder, but there are no antennas at present for either 160 metres or any of the new WARC

bands.

The station gets out extremely well on the higher frequency bands but less so on 40 and 80 metres: the combined 40/80 dipole on the same feeder possessed a high SWR and did not seem to radiate very well — nevertheless it was still possible to work back to England on 80 metres SSB during the late evening. On 20 metres, it was easy to work South Americans in the morning, Japanese and other Far Eastern stations in the afternoon, and Africans in the early evening. By way of example the best DX worked on 20 metres SSB whilst I was there included JT1BU, VQ9GB, 5X5MB, 5Z40T, 9M2BB and 9M6AE.

Creating pile-ups

It was also easy to generate a pile-up at any time on 20 metres, with prefix-chasers anxious to contact the LG5 or SJ9 prefixes, both of which are unique to Morokulien. Conditions were very poor on 10 and 15 metres when I was there, so I did not use those bands: nor did I use the 2 metre equipment, though with a ten element beam more than 60 feet high, there is no reason to think that results there would not be equally as good.

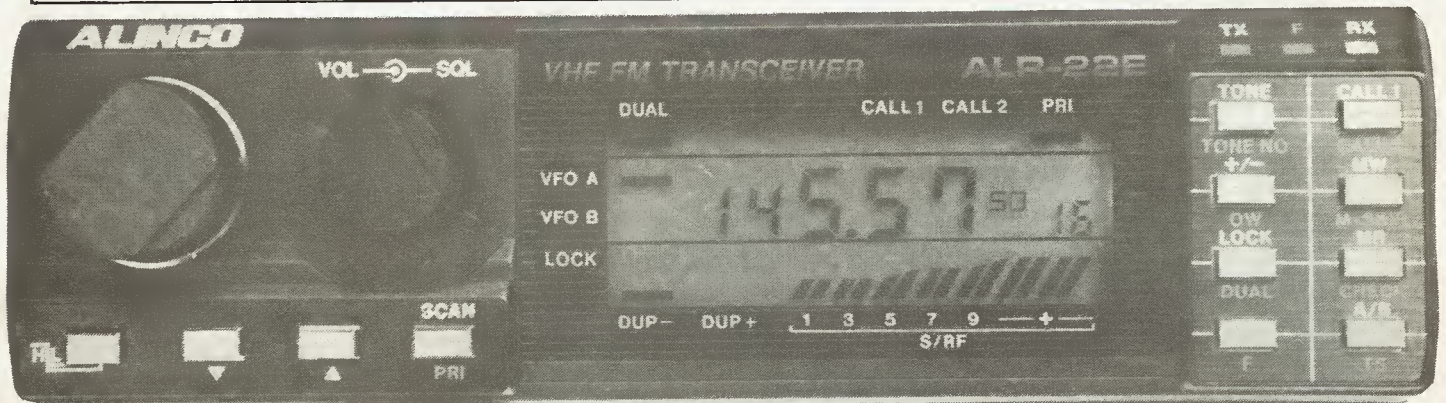
So, next time you are in Scandinavia, instead of paying outrageous hotel bills, stay a few days at Morokulien, and be a DX station for a change!



Morokulien in winter — you are advised to visit in summer unless cross-country ski-ing is another hobby!

ALINCO ALR-22E

REVIEW



Alinco have been producing amateur radio gear in Japan for some time now, but their sets are still relatively unknown amongst UK radio amateurs. With so many 2m mobiles now

size as well as the operating frequency and selected repeater shift.

Frequency control is performed by using either the main rotary tuning knob or up/down buttons

A DUAL function is also available, allowing Rx operation on one VFO frequency and Tx on the other VFO. Reverse repeater checking is available by a two-button push and a CALL button keys the transmitter whilst sending a 1750Hz tone for repeater access.

Memories

Twenty-one memory channels are available, each storing the operating frequency and any programmed offset. Access to these is by a press of the MR button, the facia-mounted up/down buttons then controlling memory channel selection. Although not mentioned in the user manual supplied, operating the rotary tuning knob or the microphone-mounted up/down buttons places the set into VFO mode, allow-

As two metre mobiles shrink in size, could the market share of the big three diminish too? A new name to the UK, Alinco, certainly could find some room over here, as Chris Lorek, G4HCL, discovers.

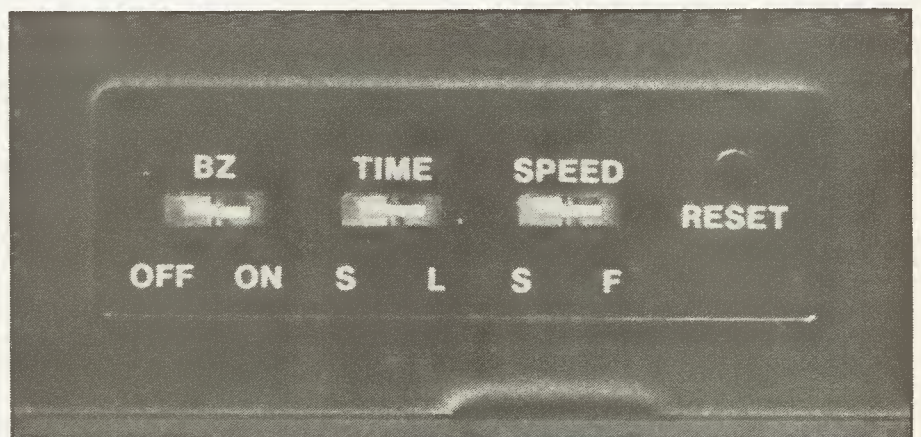
on the market, the purchaser faces a bewildering choice. We've featured the latest offerings from the 'big three' Japanese manufacturers in the last few issues so let's see what Alinco are offering.

Features

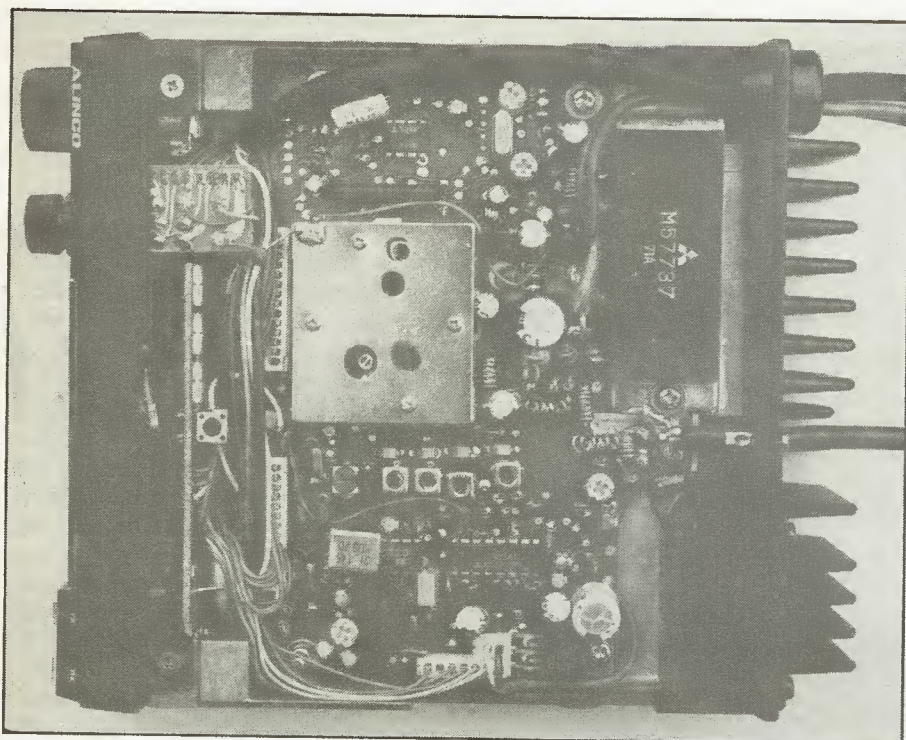
The set is, not surprisingly, tiny and measures 140mm(W) x 40mm(H) x 164mm(D), this allows it to fit in the smallest of car dashboards. All connectors are moulded onto flying leads emanating from the rear of the set. This allows great flexibility in the set's mounting position and also removes any nasty eye-poking projections from the car's facia.

The set covers 144-146MHz in 12.5 and 25kHz steps, with a selectable transmitter output powers of 5W or 25W (a higher power version, the ALR-22H, offers 45W maximum). Two VFOs are fitted which independently store channel step

fitted to the fist microphone, further up/down buttons on the set's facia give a 1MHz shift with each depression. A standard 600kHz Tx offset is provided for repeater operation, and this may be reprogrammed to give non-standard shifts if required (within the frequency coverage limitations of the set).



Details of the top panel switches



Internal top view of the Alinco

ing you to QSY from any selected memory channel. Quick access to memory channels 1 and 2 is provided by the CALL button.

Scanning of selected memory channels is initiated by a press of the facia-mounted scan button, the set halting on the first busy channel found, and resuming either immediately or four seconds after the squelch closes, this being selectable from a small top-mounted slide switch. An adjacent switch alters the scan rate to either four or 20 channels per second. The scan is cancelled by a further press of the SCAN button.

A further search facility is available in VFO mode, the scan function in this case searching in the programmed VFO steps between the frequencies programmed in memory channels 20 and 21. A 'priority' check facility samples a pre-programmed channel for one second every six for activity, this continuing until the 'VFO A/B' button is pressed. A selectable LOCK function may be used to protect against accidental frequency shifts.

Each button press is accompanied by a beep from the set's speaker, varying in sympathy with the volume control setting this beep may be disabled by a small slider switch if required. Dual concentric rotary controls are fitted for power on/off/volume and squelch. A back-

lit LCD shows the operating frequency, selected memory channels, bar-type markers for VFO, duplex, dual, call channels and priority watch operations, and a graphical S/R/F output indicator.

A small internal speaker is fitted to the underside lid, and the rear of the case houses a 3.5mm socket to enable an external speaker to be used. The set weighs 1.2kg, and comes supplied with a mobile mounting bracket and fixing hardware, a fist microphone, a DC power lead fused in each lead with spare fuses provided, an external speaker plug, and a user manual giving operating instructions and part of the circuit diagram.

Impressions

Alinco appear to be keeping up with the trend for very small mobile sets, its small size and smart, hi-tech appearance undoubtedly being strong selling points. I'm pleased to see the use of flying leads at the rear of the set. It never fails to amaze me that, while car designers spend so much time making their modern dashboards safe, radio users mount their sets with projecting mic plugs right in the middle, which limits the view of the controls as well as being a danger in its own right.

The supplied mounting bracket is a 'quick release' type, which allows easy removal of the transceiver

rather without the need for several minutes with a screwdriver to get the set out; this may be either an advantage or disadvantage to you.

I've heard several tales of thieves simply hacksawing a section of dashboard out to steal the radio, the moral being take it with you if you want to keep it!

The operating booklet provided is sadly lacking in the simple internal adjustment positions, such as peak deviation and mic gain, and does not even mention (never mind show the position of) the back-up battery that will need replacing after a period of use. This appears to be in keeping with the trend of some manufacturers to treat licenced purchasers as black box appliance operators; however, a technical workshop manual for the set should become available in due course.

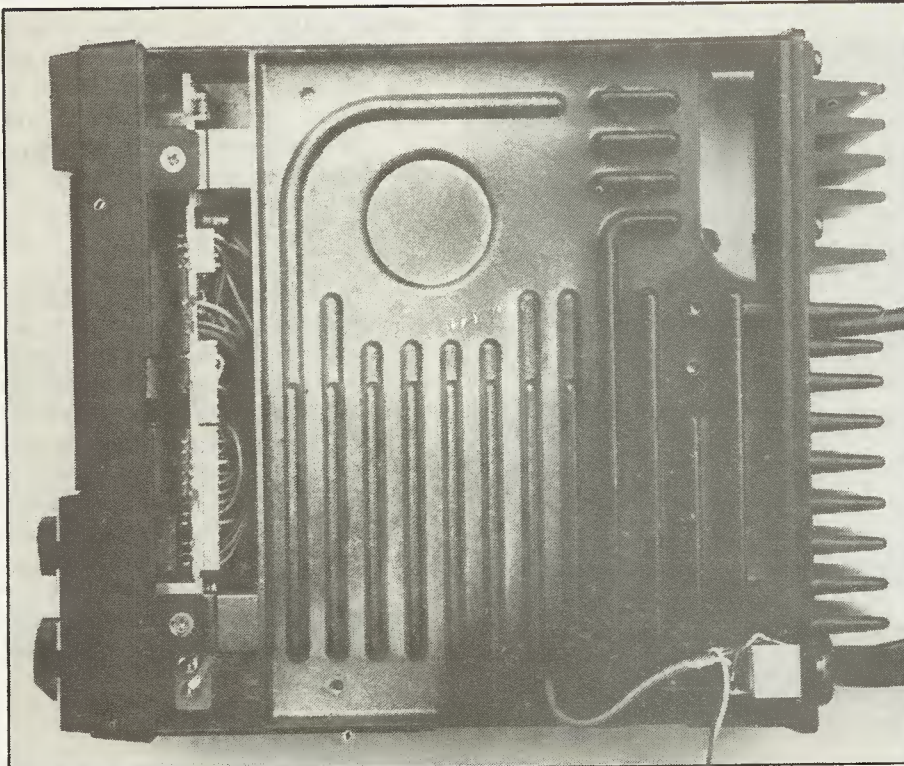
Technicalities

Opening the set shows remarkable similarities in construction techniques with other Japanese amateur sets; as with cars I believe soon only the maker's badge will be a guide as to who it comes from! A solid die-cast chassis is used to contain the single 'motherboard' housing the analogue RF circuitry, two sub-boards housing the digital circuitry being mounted onto the front panel (the elusive back-up battery is sandwiched in between!).

Chip components are mounted on the underside of the PCBs, with coils, filters, and other discrete components fitted to the topside. Inside the case, there is a clearly evident space for a cooling fan, combined with airflow ducts in the chassis showing the same mechanics are also used for a higher power version.

The block diagram shows that a standard arrangement is used for the receive side, a 3SK129 FET being used in the front end and with a single-gate 2SK192 mixer converting down to the 21.6MHz first IF. The usual TK10240 FM IF sub-system IC (the manufacturer of these must be making a fortune!) is used to perform further amplification, mixing, squelch detection and FM discrimination, a uPC2002 block audio amplifier IC boosting the recovered audio to loudspeaker level.

On transmit, the processed microphone audio directly modulates the final frequency voltage control-



Underside of the rig, showing the cooling fins and location for the fan fitted to high power versions

led oscillator to produce direct FM. A crystal controlled 1750Hz toneburst is injected at this point as required, the mic derived audio being muted by a transistor switch while the toneburst is being transmitted.

The modulated VCO signal is amplified and fed to a block M57737 PA module to generate the 25W power level, a PIN diode switch and twin pi-section low pass filter follow. A uPD2834 synthesiser coupled with

a uPD571 dual-modulus prescaler controls the VCO frequency, serially controlled from an MB88543 microprocessor with its associated I/O interfaces and battery-backed RAM.

In Use

Finding a suitable mounting location in my car was very easy due to the set's compact dimensions, it would be possible in many instances to place the set up at virtually eye level to minimise the amount of diversion of attention required to operate the set whilst on the move. The large frequency readout was very handy in this respect, but when viewed from below (if the set was mounted above head height in a commercial vehicle say) the display becomes blank due to the viewing angle, so lorry drivers beware! The facia buttons, although small, had a positive tactile feel and were hence very easy to use by touch alone after I had familiarised myself with their positions.

I started programming up the 21 memories with 2m repeater and simplex channels, using call channels 1, and 2 as S20 and the local 2m 'box' for quick selection. By programming band scanning limits into channels 20 and 21 — locking these out of memory scan mode, I found I could

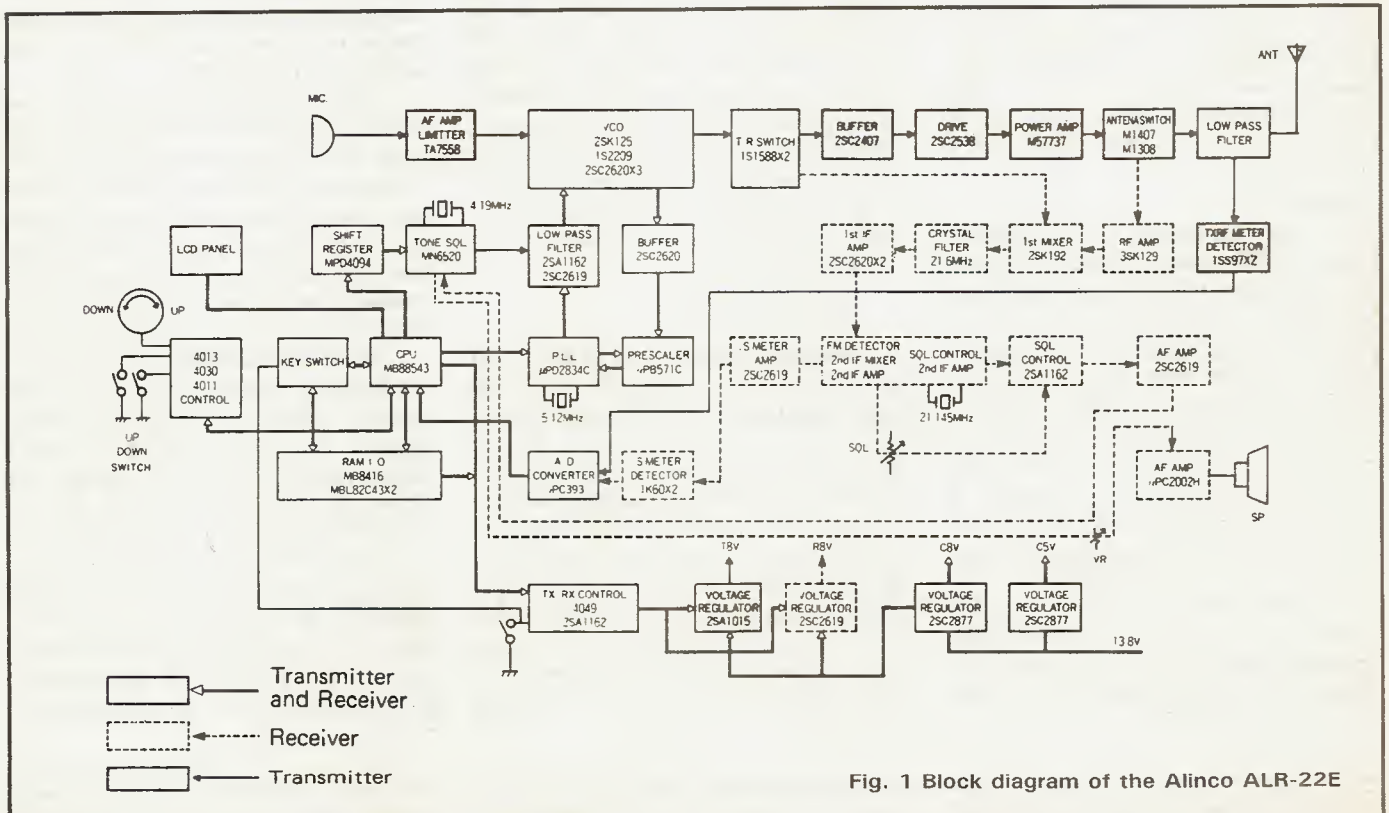


Fig. 1 Block diagram of the Alinco ALR-22E

Laboratory Results

Receiver

Sensitivity: Input level required for 12dB SINAD

144MHz	0.161uV PD
145MHz	0.172uV PD
146MHz	0.174uV PD

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

3ohm load	2.55W RMS
8ohm load	1.55W RMS
15ohm load	0.91W RMS

Squelch Sensitivity

Threshold
Maximum

0.147uV PD (10.5dB SINAD)
0.779uV PD (28dB SINAD)

Adjacent Channel Selectivity: Measured as increase in level of interfering signal, modulated with 400Hz at 30% system deviation, above 12dB SINAD ref. level to cause 6dB degradation of 12dB SINAD on-channel signal

+ 12.5kHz	30.0dB
- 12.5kHz	42.0dB
+ 25kHz	66.5dB
- 25kHz	67.5dB

Image Rejection: (Increase in level of signal at -43.2MHz to give identical 12dB SINAD signals: 76.5dB)

S-Meter Linearity

S1	1.20uV PD	- 6.2dB
S3	1.36uV PD	- 5.1dB
S5	1.68uV PD	- 3.3dB
S7	2.16uV PD	- 1.1dB
S9	2.45uV PD	0dB ref
S9 +	2.98uV PD	+ 1.7dB
S9 + +	3.75uV PD	+ 3.7dB

Blocking: Increase over 12dB SINAD levels of signal 1MHz away to cause 6dB degradation in 12dB SINAD on-channel signal

+ 100kHz	83.0dB
- 100kHz	84.0dB
+ 1MHz	102dB
- 1MHz	101dB
+ 10MHz	108dB
- 10MHz	109dB

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

25/50kHz spacing	63.5dB
50/100kHz spacing	63.5dB

Transmitter

Tx Power and Current Consumption

Frequency	10.8V Supply	13.8V Supply	15.6V Supply
144MHz	21.8W/4.25A	27.4W/4.90A	27.9W/3.95A
145MHz	21.7W/4.15A	27.4W/4.80A	28.0W/3.90A
146MHz	21.2W/4.05A	27.3W/4.80A	28.0W/3.85A

Low power in all cases measured at 6.7W

Peak Deviation 4.97kHz

Toneburst Deviation 3.70kHz

Harmonics/Spurii

2nd Harmonic	- 82dBc
3rd Harmonic	- 74dBc
4th Harmonic	- 83dBc
5th Harmonic	- 88dBc
6th Harmonic	- 88dBc

All other harmonics less than - 90dBc

Frequency Accuracy

- 300Hz at switch-on

merrily search over the top MHz section of FM activity whilst driving, returning to memory mode for normal operating.

At first I found it rather annoying that I could not initiate scan mode by keeping one of the mic up/down buttons pressed for a second or two, but I soon realised that the possibility of instant QSY from a selected memory frequency by this operation proved rather more useful! This saved me having to constantly

switch between VFOs or repeater shifts to get from one part of the band to another, glancing at the display each time to see where I was after each operation (sorry officer, I was looking at my radio instead of the pedestrian crossing).

There was ample receive audio, even from the small speaker, although this tended to be rather topky, and I never found I had to place the volume control further than its mid position. Audio reports re-

ceived on my transmissions were generally favourable from amateurs who didn't know my voice, those who did found it rather 'nasal' though, as if I were speaking with a blocked up nose, accompanied with rather more vehicle noise than normally occurs in the background of my transmissions.

In use the set got fairly warm, due to heat dissipation limitations from its small size, but never reached what I would call hot. It would be important to ensure a well-ventilated mounting position, rather than positioning the set inside a glove compartment or enclosed car radio aperture.

When operating the set using a repeater 80km away (GB3PI) at the same as passing the site of another in use (GB3PE), I found no receiver desensitisation problems at all on the Alinco. Likewise when tuning around in a mobile rally car park, 20m from the talk-in station, no reception problems were encountered, which also left me suitably impressed.

Laboratory Results

The measured receiver sensitivity was quite reasonable, and the good strong signal blocking performance verified the on-air results. In other respects also, the receiver performed quite well, the only thing I could find to complain about was the limited S-meter range, which in fairness appears to be a failing on many other FM-only sets.

The transmitter output power was well regulated at just over the 25W mark, and the transmit deviation was accurately set at 5kHz. The harmonics were well suppressed, and I could find no spurii above -90dB.

Conclusions

This is a very neat and smart looking set, coupled with quite a reasonable technical performance for its current price of £269. The ample number of memory channels could allow safer mobile operation purely by use of the mic up/down buttons, and its small size should allow unobtrusive fitting into the car, possibly even on top of the dashboard hence needing less eye travel distance from the road ahead.

My thanks go to A. Kelly Communications for the loan of the review equipment.

METREWAVE

Printers and publishers view the approach of Christmas with foreboding. They know that every year it will tear several days, maybe even a week or more, from their production schedules. Likewise, contributors must turn in their offerings several weeks earlier than they normally would do. In the case of a yearly conspectus like this one, its writer must hope that in a metrewave context no

In his customary look back over the dying year Jack Hum, G5UM, reminds us of some milestones (and a few millstones!) which marked the passage of 1987.

Significant Event or world shattering occurrence will pop up in the last few weeks of 1987 to render his material dated before it gets into print.

Certainly looking through a glass darkly over those last few weeks ahead nothing appears on the horizon remotely to compare with the two Significant Events which hit 1987 earlier in its passage. One of them was indeed a Big Bang; the other was rather more subtle.

Big Bang

The Big Bang first: this was the release of two new metrewave bands to the generality of British hams. Throughout the early months of 1987 there had been constant rumours that the 50MHz band was to be opened to Class B operators. Well, after all, it was a VHF band and Class B people are by definition VHF types, so why shouldn't they have it? Thus went the thinking, and it seemed to make a lot of sense.

On June 1 they got it — and they got something else, too, a veritable bonus far beyond their wildest hopes: they got 70MHz as well. Very few people expected that this would happen. As readers will recall from the piece printed here in September, 'Four' is a rather specialised band peculiar to the British and hedged about with certain restrictions. To be granted it in, as it were, the same breath as 50MHz was to many hams a sign that the Licensing Authority was taking a much more liberal attitude to the Amateur Service in the UK. It also showed how important was the need to have a strong national society able to talk with the Licensing Authority on its own terms and to wrest substantial concessions from it — like 'Six' and 'Four' for all.

Nature's Voice

Almost as if to celebrate this Big Bang, the forces of Nature staged a 'spectacular' in the several weeks following the granting of the band on June 1, providing such phenomenal conditions of propagation

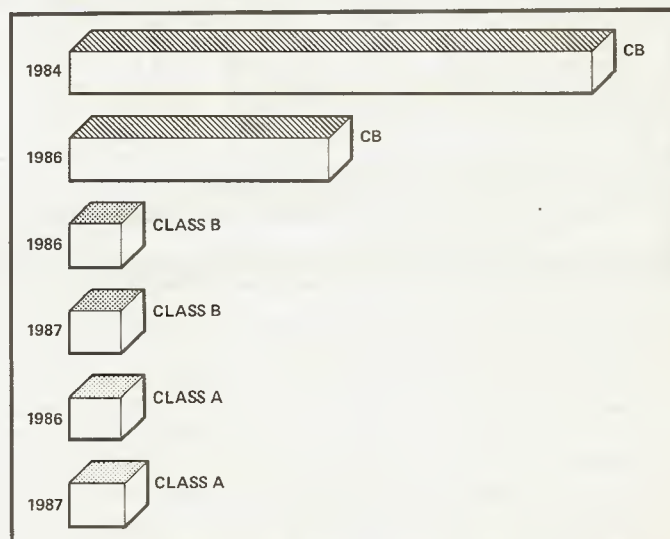
on 'Six' that it was possible to hear Stateside stations on nothing more than a dipole in the roofspace — and even to work them if you had the patience to queue yourself in the pile-up.

Strangely, there had been another manifestation of Nature sixteen months earlier, when Six was made available to all Class A people: right on the opening date of February 1st 1986, a gigantic aurora occurred that would have produced Europe-wide contacts had there been anyone there to talk to, which there wasn't. Even so UK-wide contacts were enjoyed by the Class A operators swarming on to the band in February, 1986, convinced of the belief that 'If Six is like this then I'm with it for keeps'. The Class B chums who swarmed on to it on June 1, 1987, felt the same: working Yanks was something quite outside their experience.

Sadly, manifestations of Nature don't last long, though be assured there will be more of them in the coming years as the sunspot cycle improves. Soon, it was borne in on many operators that Six was beginning to conform with that definition of war: '80 per cent boredom, 10 per cent great excitement and 10 per cent sheer terror'. Presumably where Six was concerned, the terror would be caused by failure to work that Canadian after a three hour wait when all about you were doing so!

Making the Choice

Here we have one of the Subtle Occurrences hinted at above, and it is this: For most of the time the 50MHz band functions as a VHF band, not a DX one — and for most of the time it is sadly underpopulated. As one aficionado put it: 'There are lots of



The bar chart shows how the dramatic drop in CB licences in the UK has not resulted in the expected rise in Class B ham licences, which have remained static over the period. Class A licences marginally exceeded them in 1987 for the first time in many years.

8 METREWAVE RESOLUTIONS FOR '88

1. I will make my contacts meaningful and cliché free.
2. I will never hog a 2 metre repeater, remembering a queue may be waiting to use it.
3. If I haven't got myself organised for 70cm I will make this a top priority for 1988 to give me time to enjoy more relaxed QSOs — and more repeaters at my bleep finger.
4. If I haven't got myself organised for 6 metres or 4 metres I will attempt to have a go after I have re-read the many HRT articles giving advice about them.
5. When 'going QSY' I will do so on to one of the less popular SU or S channels.
6. I will try to make myself proficient at the Morse code to help me wrinkle out weak stations not workable by any other mode. . . but — —
7. Having 'got the morse' I will keep in practice so I don't lose it.
8. Heeding the remarks about the anti-social nature of omni-aerials, I will either build or buy small beams for the metrewave bands I used to give me the same effect as buying a linear but at a quarter of the cost.

licensed listeners who can't be bothered to press the transmit switch'.

Probably for this reason many Class B people have opted to major on Four rather than Six — though everyone knows that there are two other reasons for this, first, that quantities of redundant PMR equipment are around, adaptable for Four by a bit of tweaking, and secondly that a 4 metre aerial fits more snugly into domestic environments than a 6 metre one.

Result: a great increase in FM activity on Four, not solely by the newcome Class B friends but also by many Class As, impressed by their example. Indeed, on some evenings the congestion on 70.26MHz FM has been so exuberant as to persuade operators to go out and get themselves a 70.45MHz alternative next day.

Those 'snugly fitting' 4 metre aerials have brought a new dimension to the band in more than one sense. Most of these aerials are vertically polarised, and of course the increasing number of mobiles on Four use the same polarisation. In 1987 those diehards who had been on the band for a long time they found they needed to supplement their long established horizontal Yagis with an antenna that would 'talk vertically'.

No mobiles on Six has meant that antennas on the band are exclusively horizontal. They had to be, anyway, by regulation. This has brought the concept of 'horizontal FM' (a misnomer if ever there was one) to 50MHz after its many years of success on the 144MHz band. Accepting the argument above that there must be more occupancy of Six for more of that time — and to use it as a VHF band and not as a DX one — means that many more local nets need to be established. Several were, in 1987, much to the enjoyment of their participants. That bonus of an extra megahertz which extended the width of Six to

two megahertz as from June 1 provides room for all who wish to use the F3E mode. And already a 6 metre bandplan is under discussion to place DX in the lower meg and 'local' broadly in the upper meg — and, to the relief of many, no provision for repeaters!

Our Rate of Increase

Now to another of those Subtle Occurrences that became quietly evident during 1987, meaning the slower rate of increase of British ham licences. This phenomenon might be difficult to accept by readers ready to point to the fact that there are now about 60,000 of us in these islands. Yet the writing was clearly on the wall as early as April of 1987, when the number of Class A licences extant exceeded Class B, which had not happened for several years. At that time there were 30,242 Class A and 27,166 Class B. Several sociological theories may be put to account for this significant change in the pattern of UK licensing. Here are two of them — and you may decide that the second of them is not sociological but economic:

The build-up of Class B licences over the last several years was caused largely by the influx of CB operators keen to extend their horizons. But the number of CB licences, too, has been showing an even more dramatic fall than Class B licences. From 1984 to 1986 the CB tally dropped by 50 per cent from 280,000 to 140,000 in two years. Take a guess and assume that 5 per cent of CB people go on to become hams, and you can readily deduce that *their* numbers have been halved. From 1986 to 1987 the increase in Class B licences remained static at that 27,000+ figure. Not only were fewer CB people coming in to the hobby, but lots of ham people were letting their licences lapse.

No wonder there were rumours abroad in the supply industry that sales of transceivers were beginning to fall off. But that was not all: which brings us to the economic aspect of the situation. Sales of Japanese transceivers have been falling off not just because the number of licences was, but because they had become too expensive. Much was made during 1987 about persuading more young people to take up ham radio, a laudable thought but somewhat out of this world when the prices of the transceivers which the young wanted to purchase to get on Two were quite unrealistic.

Many British licensees harbour the wish that the Japanese transceiver industry would rethink its design policy, cease introducing advance technology for technology's sake, and come up with simple-to-operate 2 metre rigs devoid of the bells and whistles that simply serve to enhance selling prices. Maybe 1988 will show that the industry has heeded the economic warning bells which in 1987 sounded with increasing strength, and will be persuaded to market designs which are affordable by the many — and the young.

What You Say and How You Say It

All those Citizens' Band operators and young people keen to dip a tentative toe into amateur radio's enticing pool may decide that this is not for

them after they have listened a while to some of the nonsense they hear talked, noticeably on Two (though it is said that they run on a bit on Eighty!).

But many times it has been remarked that amateur QSOs are short on content but long on wind. No wonder that intending newcomers find their interest declining after they have listened a while to the clichés of electronic conversation that dominate all too many a QSO. Their enthusiasm may well be rekindled when they are reminded that on the ham bands you are allowed to talk about anything under the sun that is at once relevant and decent and which you would talk about in genial mixed company (and in such company you would not be too dogmatic in airing your views). There's much more to ham radio communication than "The rig here is . . ." or "See you further down the log."

'Short on content' no longer when you learn to make your QSOs as near face-to-face as you can. It's not difficult to achieve during simplex contacts: it's dead easy in duplex ones, probably the most civilised and rewarding mode of amateur communication there is (so long as you observe the protocol of announcing yourself frequently and not holding a channel too long, lest this becomes vexatious to others listening on it or wanting to use it). More real conversation, then: a thought for 1988.

Duplex operation suggests voice communication. But need it? You can do it almost as effectively on

the key in the A1A mode if you know how — but that's a big subject to be aired here when there's more time and space.

'Short in content . . .' Never let this observation be attached to *your* callsign!

But there is another side to this picture, namely those QSOs which offer no time to sit and chat and exchange no more than signal strengths — all over in about 15 seconds. Meteor scatter is an example. So are the minimal QSOs you hear on Six when it is open. In each of these cases the 'Everest Syndrome' prevails — people attempt MS 'because it's there', and the same with those minimal QSOs on Six when it opens up for a while and pretends it is not a VHF band. Both MS and VHF DX in all its forms add to the sum of human knowledge about electronic propagation because so many observers are active at the relevant times, even though their communication content remains virtually nil.

On To '88'

One of the more facetious ham radio abbreviations is "88", meaning "Love and kisses". Occasions for using it are rare. Yet you might think it has some relevance to the coming year of '88 — and although you would hardly expect it to be translated literally it might apply if you vary it slightly to read 'Sweetness and Light'. The UK amateur movement could do with a lot more of *that* in 1988!

ATTENTION ALL WRITERS . . .

*...or just readers who sometimes think
"I could write that!"*

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HOMEBREW ATU

Right then, you've got your shiny HF wonderbox, with matching trapped HF vertical, but what happens now? Has the magic gone out of DX chasing with too many lost stations? Your thoughts may stray to putting up a better aerial system, or maybe your existing aerial's SWR rises towards the band edges and your solid output power dwindles to miserable proportions as a result. In either case you need an aerial tuning unit. But have you seen the price of decent imported ones lately? Here's a project virtually anyone can get going very easily, resulting in a useful end product that will last them for years to come.

Why use an ATU?

Basically, aerials may exhibit a complex impedance comprised of both resistive and reactive components. The ideal aerial would appear as a 50 ohm resistive load, but this is often not the case as the inductive or capacitive component present alters the overall impedance seen and the resistive part is often nowhere near 50 ohms. An ATU is simply an impedance transformer, of both magnitude and phase which makes the impedance at the end of the feeder look like 50 ohms, and hence nicely matches the transmitter.

There are several ATU configurations, all of which have their merits and demerits, some of the popular types include the PI match, the series-parallel circuit (SPC), and the well publicised 'ultimate transmatch'; the configurations of these are shown in Figs. 1, 2, and 3 respectively. These are all suitable for unbalanced loads, ie. an end-fed wire or a coax-fed vertical or gamma-matched dipole. If you use a balanced aerial fed with 200 or 300 ohm open-wire feeder, you will suffer rather less feeder loss in most cases, but a 4:1 balun (balanced-to-unbalanced

A simple project, but one that could make a great difference to your station's performance on the HF bands.

transformer) is required at the shack end. If your aerial requires an ATU, rather than place the balun between the feeder and ATU, hence mismatching the balun, a more sensible approach could be to construct a balanced ATU as shown in Fig. 4

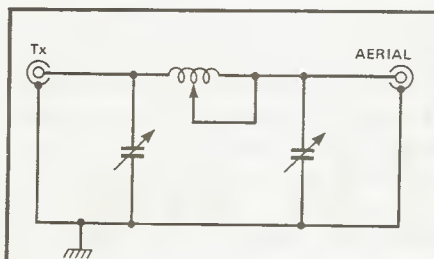


Fig. 1 Pi match circuit.

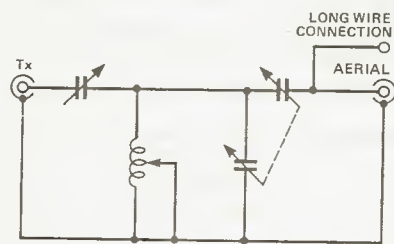


Fig. 2 SPC circuit.

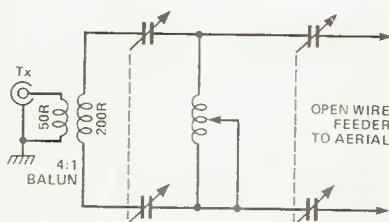


Fig. 4 A balanced ATU.

and used that to tune the system to resonance. In this case, the balun would be presented with a 200 ohm balanced impedance, transforming nicely to 50 ohm to be fed to the transmitter.

Added Bonuses

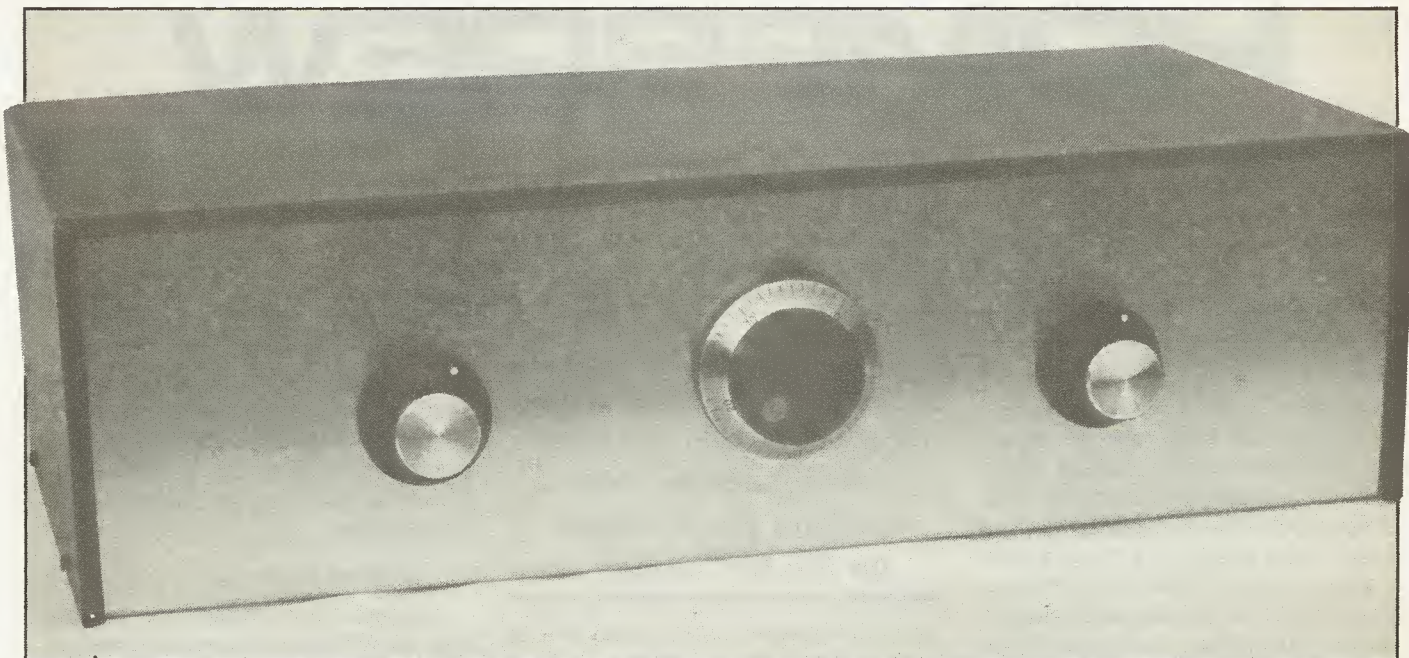
Apart from impedance matching, an ATU does have other advantages. As it normally acts as a highly selective tuned circuit, it also functions as an RF filter passing only the band of frequencies in use. Many solid state receivers suffer from front end overload caused by strong out of band signals and as today's sets use switched, broadband filters covering several megahertz, the ATU makes up for the lack of preselection, giving a better receiving set-up.

The ATU will also act as a transmitter harmonic filter, which is very important considering the current official attitudes to amateur TVI and the like, remember for instance that the third harmonic of 10m falls right in Broadcast Band II. Today's synthesised HF rigs also put out many mixing products due to all the internally generated signals and again one will often find wideband circuits employed which nicely amplify all this, even at the PA!

Components

If your interests are purely QRP, then wide spaced variable capacitors and large high-Q inductors are certainly not necessary. However if you're building this project to keep in use whatever your station capabilities become, then you'll need to find something beefy! Surplus ex-military gear is often a hiding place for nice silver plated roller coaster variable inductance coils, with sometimes even the odd high power variable capacitor or two thrown in.

The values of the components you need depends on the impedance of your antenna, which could be



The World's most beautiful ATU?

anything. In practice, I have found that capacitors covering 10-20pF up to 200pF or slightly over and an inductor of 20 to 30uH makes it possible to match almost anything over the HF bands. You might be lucky and get away with 100pF, but 200pF will virtually guarantee a sufficient range. Obviously, the higher the maximum capacitance and inductance, the lower the frequency you can tune a really awkward load. Very conveniently, these values are just what you tend to find in ex-military gear.

This gear is now getting fairly rare and even when you can find it, the asking price sometimes makes one think twice before taking a risk. No doubt with this in mind, more

than one UK manufacturer has decided to produce HF tuning components to fill the gap in the market, hence components for homebrew construction are certainly readily available 'off the shelf'. For this project, the Nevada TC500 dual 13-250pF and TC250 single 13-250pF capacitors and the Nevada RC26 26uH roller coaster and matching turns counter were used.

The 'ultimate transmatch' configuration was employed to give continuous coverage from 160m to 10m at power levels certainly up to and probably exceeding the UK limit of 400W PEP. The SPC configuration could also be used, although in this case I would recommend reduction drives to be used on the capacitors

as the tuning of these is rather more critical.

Construction

If you're wondering whether to make an ATU yourself, I can assure you that the majority of the work is purely mechanical in nature. If you're building your own enclosure, you'll need the requisite sheet bending tools, however there is a large selection of ready-made enclosures on the market, from firms such as West Hyde, Radiospares, Cirkit, and Maplin.

I simply nipped down to my local electronics shop and bought one which fitted the bill nicely for just over £10, but each amateur will have their own preferences I'm sure. You'll then need to drill out the required holes, so a hand or electric drill is required, although a suitable size of chassis punch will give a tidier finish. For those who tend to ignore the advice of 'measure twice, drill once', a small round file can also come in very useful. If you're using the Nevada components, a smart purpose-made box is also available for those who don't trust their skills or can't stand the sight of blood!

Start by marking out the front panel for drilling, either by using the dimensions shown in Fig. 5 or from those measured from your particular tuning components if different. Drill your pilot holes first, if you don't have a chassis punch then you'll also need to drill a circle of small diameter

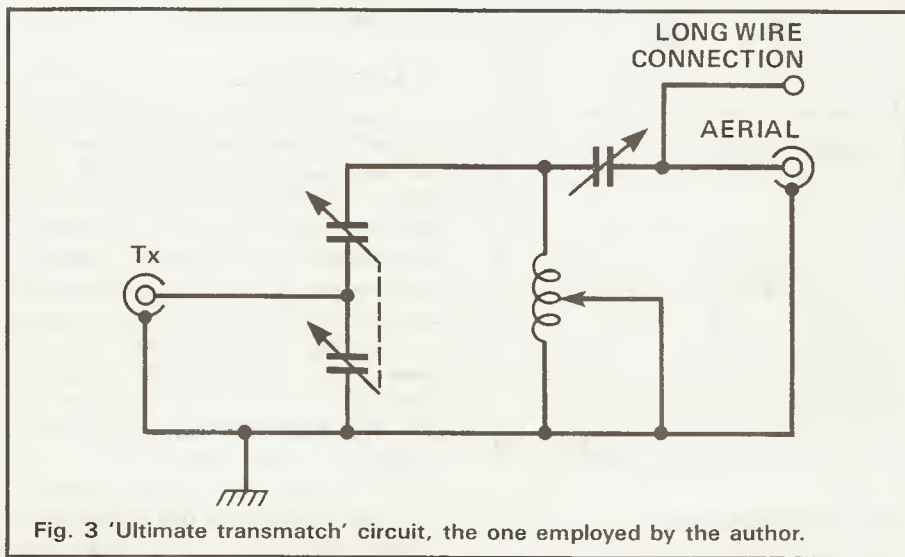


Fig. 3 'Ultimate transmatch' circuit, the one employed by the author.

holes for the coil turns counter. Open up the tuning capacitor spindle holes, either with a punch, reamer, or round file, to allow for plenty of mechanical and electrical clearance.

Now carefully remove the circlip and washer on the turns counter, and remove the dial with its spindle and gear from the plastic skirt. Using the skirt as a marker, drill four further attachment holes in the required positions, de-burr them and fix the skirt using the screws supplied. Now you can re-assemble the dial and circlip, which nicely cover the fixing screws to provide a neat finish. Using the roller coaster and capacitors in your desired mounting positions, mark out the positions of the two fixing holes for each on the bottom of the case and then drill holes to suit. Then do likewise with your coax sockets, earth and long-wire screw connectors (if used) on the rear of the case.

You can now begin assembly, make sure you mount the variable capacitors with their stator vanes (the non-rotating parts) uppermost, this keeps the stray capacitances to earth at a minimum. I would recommend using flattened coax outer braid as a good, low impedance earth connection between components, but when using an aluminium enclosure make sure you use solder tags for connections rather than trying to bolt the copper braid to it directly, as electrolytic corrosion could otherwise occur. The insulated

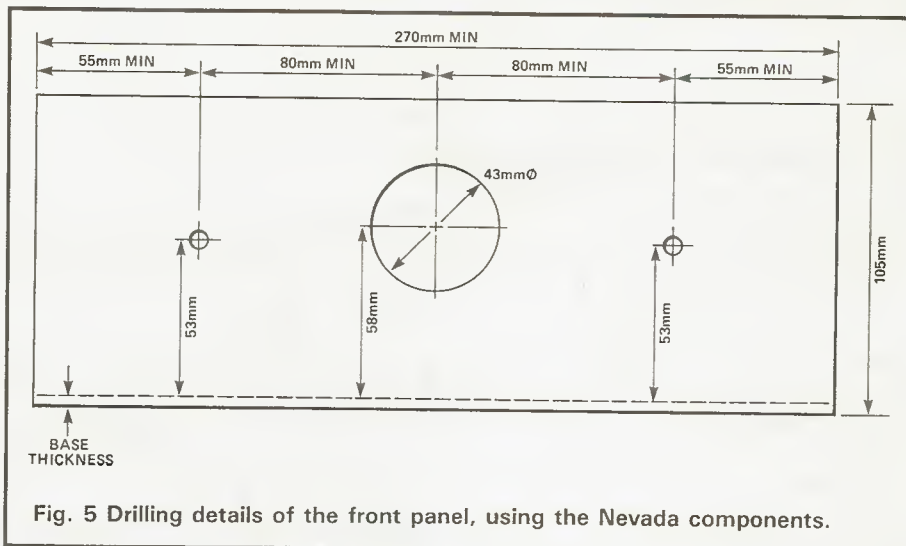


Fig. 5 Drilling details of the front panel, using the Nevada components.

coax inner you now have spare may be used for the 'hot' interconnections, to provide good insulation against the high RF voltages found in some mismatches.

You will find that quarter-inch spindle extensions may be required for the capacitors, and also an in-line coupler (preferably of the flexible type to prevent strain) between the plastic roller coaster spindle and the turns counter. If you're using metal spindle extensions, make sure that these are well insulated where they pass through the cabinet, and if you don't want a shocking experience use non-conducting plastic tuning knobs! Remember this also applies to the grub screws, and ensure any trim on the knobs is also insulated.

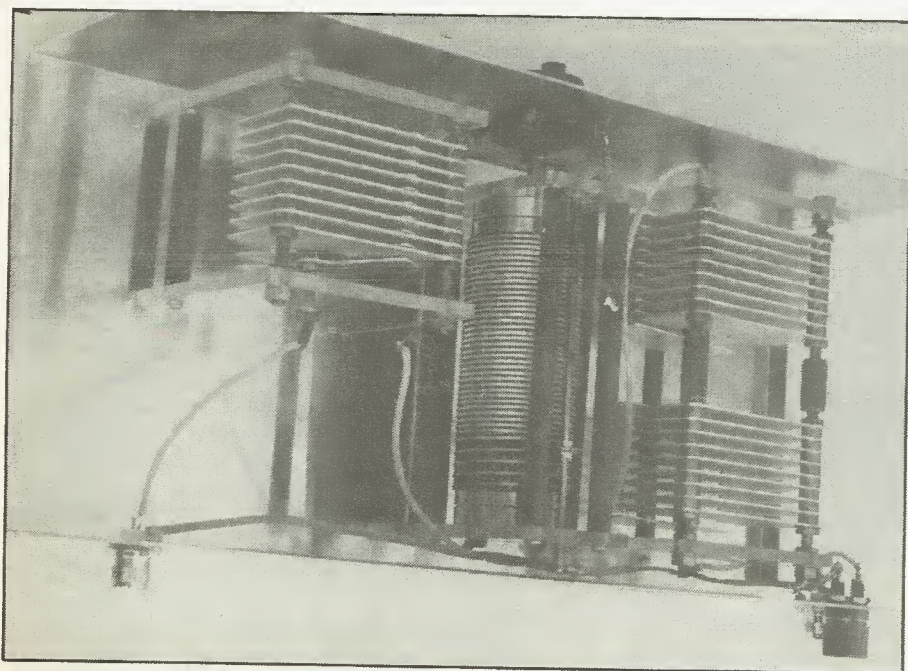
In Use

With your system connected up as shown in Fig. 3, initially set both capacitors to their fully meshed positions. Radiate a small amount of power from your transmitter, ensuring you don't cause interference to a QSO in progress, and tune the coil for a dip in the indicated SWR. Then tune both capacitors in turn for absolute minimum SWR, retuning both capacitors as required with possibly a slight adjustment on the coil if needed.

You may find that there are several capacitor positions giving a good match, the one to go for is the one with the capacitor vanes as fully meshed as possible. In use, you'll soon learn the approximate settings for your favourite frequencies, and you might find it handy to make a note of the settings for each frequency and aerial combination to aid quick tuneup.

This construction article has only covered the 'bare bones' of the ATU, the added possibilities are only limited to what the individual requires. You may find an 'In/Straight Through' switch useful to switch the ATU in and out of circuit, you may also like to include a built-in balun or SWR meter, maybe even a multi-way aerial switch. All these may of course be fitted in the future as needs arise, so make sure you leave enough space in the box and on the front panel. Good luck and happy tuning!

My thanks go to Nevada for the provision of tuning components used in this article, and to Mike Devereux for his advice on tuning unit configurations.



Internals of the ATU

WILLKOMMEN

Set in the foothills of the Odenwald, midway between the industrial areas of Darmstadt and the romantically historic city of Heidelberg lies the wine town of Weinheim.

The convention, which took place on Saturday 19th and Sunday 20th September, is held in the town's Multischule — a school that teaches both primary and secondary age children. It covers an area of around 6.25 hectares — that's roughly 250 x 250 yards to those who only speak in feet and inches.

About 50% of the convention is inside the main school and the remainder under the covered walkways that link the various buildings in the complex. To gain entrance to the inside costs DM5 (about £1.65) and for this you can go in on both days of the festival. If you only intend visiting the outside stands and the real ale and wurst tent, there is no charge.



Weinheim is noted for the biggest VHF/UHF Convention in Europe. It is also noted for its wine, beer and wurst. Julie Darby, G1CKF, tries to persuade us that she went for the former and not the latter!

more modern solid state scavengers were treated to some rare bargains in the 23cm PA block and transistor field. All this in the flea market — I couldn't wait to see what the main building housed!

The Deutsches Bundespost were in attendance with two very well equipped vans. These were the

The Convention

This year over 6500 visitors paid up to see the larger trade stands and attend one of the four lecture streams whilst another 2000 or so wandered around the covered walkways which sheltered the flea market traders from the hot Rheinland sun. The flea market stands provided a valuable indication to English visitors of the price of secondhand radios; older style Storno and boot mount Westminster's fetching the equivalent of £125, and early post-war wirelasses were marked up at between DM300 and 400. Bartering seems very popular in the flea market and if you're prepared to wait until the second day of the festival some useful bargains can be obtained.

For the valve enthusiasts there seemed to be an endless supply of 2C39a and similar bottles whilst the

2C39a and other valves were readily available in the flea market



TO WEINHEIM

equivalent of our Radio Investigation Service (R.I.S.) and provided a valuable source of information regarding TVI and RFI problems. It seems that sideband signals get into TV's on the continent just as easily as they do here!

One nice touch was the test equipment — all of which was British! — provided by the Bundespost so that the visiting amateurs could have their radios 'spec checked' for sensitivity, spurious emissions and deviation. No tuning was performed but the amateur was provided with a print out of his rigs' performance.

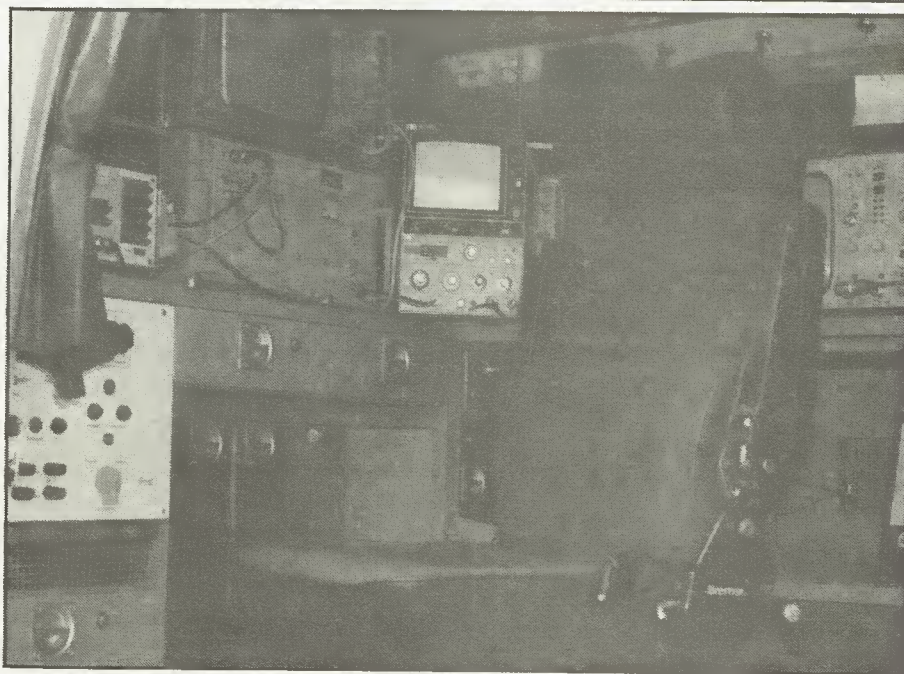
The licencing authority also had a stand where a licenced radio amateur could obtain the necessary documentation to obtain a full CEPT amateur radio licence to operate in member countries all over Europe. It would be nice to see such a system introduced here in the UK.

Variations On Antennas

Of the 95 trade stands at the rally, some 10% were antenna manufacturers giving the customers a wide choice of price, construction techniques and more importantly, quality. Jaybeam aerials were available on the UKW Technik stand (by the way, UKW means VHF); the aerials themselves looked remarkably similar to what you will see dotted around the Leicester show this year.

One entrepreneur displayed a nice variation to the standard gamma matching system used by many manufacturers. The system employed two pieces of aluminium strip side by side, the spacing of which was variable by a PVC adjustable screw. This produced an easily variable capacitor to alter the feed impedance of the antenna.

Tonna antennas had on display their latest 2300MHz yagi. It has a novel horn feed system with the elements spaced along the boom in a similar manner to their existing 23cm antenna construction. This antenna should be available in the UK during the next couple of months. Using 25 elements the antenna has a reported gain of



Inside the Detutsches Bundespost RIS van

18.2dBi and an 'E' plane beam width of ± 7.5 degrees to the 3dB points. The boom length is 1.45 metres and it only weighs one kilogramme! The bandwidth of the aerial (below a VSWR of 1.5:1.0) ranges from a little below 2290MHz to about 2340MHz, whilst still maintaining a claimed gain of over 18.0dBi.

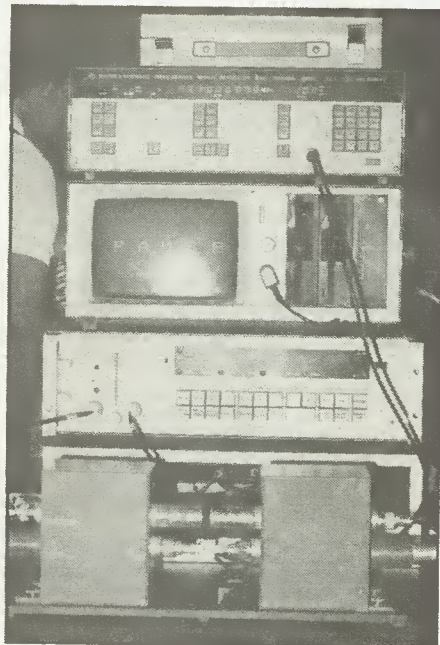
Homebrew

For the home constructor, there were ample stands to choose from. Werner Elektronik had PA transistors giving 5 watts at 4.0GHz (BLU 99), Schottky diodes HP 5082-2900, N channel GaAs MESFET (not MOS-FET) devices useful up to 2.3GHz, and some nice PA blocks for 23cm giving 20 watts output for 0.3 watts in. The only trouble being the prices asked for one of these, over £90!

The same company also had some interesting equipment for 23cm FM TV. The first unit was an adaptor for the existing Icom 23cm transceiver range. This allowed the FM transceivers to be used for FM TV transmissions and reception, priced at DM550 it seemed quite reasonable. The second item was a tuneable 23cm FM TV transmitter covering 1240 to 1290MHz (this was variable for any 50MHz seg-

ment), with full digital readout and an output of 1 watt. The companion receiver tuned from 1248 to 1300MHz and was presented in a similar attractive green case. Outputs were available for monitor, speaker or TV. The transmitter cost DM1298 and the companion receiver DM1248.

The Bundesposts all-British test equipment



Weather satellite equipment was very much on display. TGN of Pir-masens were offering converters from 1691MHz to 135MHz for around DM1095. Both Wrasse and UKW Technik offered complete systems including 10 memory storage facilities and sequenced display systems. These give results similar to those used on TV AM and Breakfast TV when the early morning weather predictions are made by the presenters.

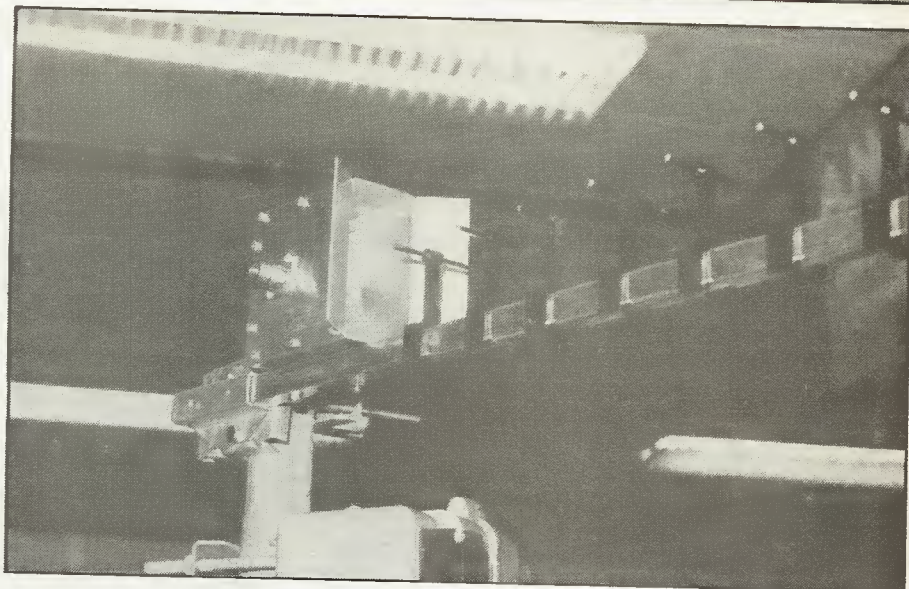
One or two companies were offering complete DBS TV systems for home use. One was priced at DM1200, very cheap, but I wonder how reliable?

Components and accessories were very popular at Weinheim with the accent being placed on 'home-brew' equipment. Having already stated that 10% of the traders were aerial suppliers of one form or another, it was pleasing to see that 16% of traders were supplying components for home construction. They all appeared to be doing brisk business. The quality of home constructed equipment on display was very high, with many people demonstrating beautifully machined microwave linear amplifiers and well constructed transceivers for 10 and 24GHz.

Black Boxes

The mainstay of the amateur trade, the infamous black box dealers numbered around 16% with Icom,

For those intent on operating from the bath, water proof bags were on sale



The new Tonna 2300MHz horn-fed yagi

Kenwood and Sommerkamp all in attendance. Some of the amateurs in the UK may be surprised to note that many of the new transceivers were sold cheaper in Weinheim than their English counterparts, whilst second-hand equipment held its price very well and was often dearer than in the UK. The only noticeable exception to this rule were the 'add on' products such as linear amplifiers which appeared to be on average 20 to 30% dearer than the equivalent in the UK.

Whilst on the subject of linear amplifiers, it was interesting to see BNOS on display and doing well. The dealers from Essex reported a suc-

cessful rally and had on display a new range of linear amplifiers for the QRP range of transceivers. Capco Electronics' ATUs were also available through their German outlet. Nice to see some British firms making an effort!

Lectures and Demo's

During the two days of the rally there were four streams of lectures and demonstrations taking place. Discussions and lectures included aerial theory and practice, varying from broadband and dual band antennas to microwave feed systems, scrambling and de-scrambling of satellite TV signals, mailboxes and Packet networks, linear amplifiers using valves and solid state devices, and last but not least the ATV demonstrations and lectures with the emphasis on 24cm FM TV.

For those amateurs interested in going to one of the German rallies next year, it's well worth the effort. Most cross Channel operators do five day excursions and you can get your car and self there and back for about £70. If you add £40 for petrol (from Dover) and £15 a night bed and breakfast, it can be an enjoyable late summer jaunt. Take a couple of friends and share the motoring costs and it could be a cheap, pleasant break.

If you would like to attend West Germany's VHF convention next year, set aside the third weekend in September and write to *Lofyer Kittwer in Der Krone 9, D6252 Heppenheim, West Germany* for further details.

Free Readers Ads!

FOR SALE. Sommerkamp SRG-8600DX communications receiver, plus HF converter, gives tuning range from 100kHz to 950MHz, as new, £350. 2 Coronation Drive, Great Cosby, Liverpool.

YAESU FT209RH with speaker mic, two FBA-5 battery packs with nicads and high capacity, FNB4 pack case, charger/service manual and other bits, £200. Datong morse tutor, £30. Ring Mark, 0753 32373, leave tel. number if I'm not in. I.W.C.U.

FT790R 70cm multimode with nicads, charger, manual, carrying case, boxed, £250. Burgess Hill 044-46-42122.

YAESU FT100 80-10 HF rig, good condition and working order, inc. new spare valves, £250 or swap R600 or 2m multimode. Tel. 0952 51670.

CONVERTERS, 2 metres to 10 metres microwave modules, MMC144/28 as new condition, £20. 70cms to 10 metres microwave modules, MMC 432/285, also good condition, £20. Archer (Tandy) six element Discone aerial, covers VHF, UHF, ideal for scanners or converters, £12. Tel. Tamworth (0827) 58004.

YAESU FT301 HF transceiver, complete with power supply and mic to match, £345 ono. Belfast area, tel. 0232 654404.

HOME/BASE portable CB/trans, hand-built by professionals, not a production model, nice job, built-in nicads and charger, carrying strap, DX, portable aerial, cost £198, will swap for good modern auto call, auto answer. Call Sid anytime, 051 334 6859.

KW107 Supamatch, rare British ATU, SWR and power meter, 100w and 1000w, 1kW load, switching for various ants, balanced and unbalanced outputs, in perfect cond. A bargain, £65. Write GODIH, 34 Warleigh Avenue, Keyham, Plymouth, Devon, PL1 1NW, price includes p&p.

FOR SALE, due to invalidity, FDK 2700 VHF all mode two metre rig plus transverters, HG220 and HG280 in die-cast box, plus home built regulated

power supply for transverters with switching from rig, £300. Phone Geoff 0603 715423 anytime.

VFO TF707DM, £85. FRG7 receiver (digital display), £125. Mizuho MX2 2m SSB, handheld, £45. Ask for Rhys (Clywd) 074571 2550.

FDK725X 144-148MHz 2m mobile, plus Heatherlite safety mic (a must nowadays!), gutter mount with $\frac{5}{8}$ x $\frac{3}{8}$ whips. Sell for £120 or consider exchange for 10 metre multimode plus linear (reason for sale). Phone 01-247 6097 daytime only, thanks.

FT707 or similar solid state HF rig, QRO, 12V operated, wanted for club use, plus ATU 3.5-30MHz. Tel. Stevenage (0438) 724991 or 350136 or 352932, write G6EDA QTHR.

ICOM 271E 2 metre multimode with Icom mains internal PSU. Also superb Mutek front end board dealer fitted. Unmarked. Total cost new over £1,000, offers over £725. Weltz SP15m + PEP mod £45. Weltz 38 HF ATU £50. Phone Chris on Ironbridge 2711.

1012D Yaesu Mk3 FM LAR ATU Welz '200' power SWR bridge 1K with PEP fitted. — Scarisbrick 880345.

FT101E £300 FT101B £220. MM4000KB RTTY receiver, £120. GW3COI Abersoch 2675.

FOR SALE, Bearcat 20/20FB VHF/VHF Scanner AM/FM model, mobile mount, manual, whip and discone aerials included. £125. Tel 0939-33638, Eric GOHRU

EDDYSTONE 770U receiver 150 to 500 MHz in 5 bands AM and FM, good working order and good condition for year, £95 ono. Tel 0329 46323, after 6 pm.

SONY ICF7600D compact shortwave receiver 153KHz - 30MHz FM 76 - 108MHz AM/FM/SSB/CW 10 memories with all manuals, accessories all boxed as new, £80. Please ring Les, Castleford, West Yorks. Tel: 516904, after 2 pm daily.

SWAP my signal R532 100 channel airband receiver for

HF receiver such as FRG-7 R600 Sony 20001/7600D or similar. My offer includes aerial PSU and some books. Call or write Mr M. Jackson, 6 Pilning Close, Peak Lane, Fareham, Hants. PO14 3BW. **TRIO** model 7930 2 meter mobile training transceiver 25 watts full scanning from mic complete with manual mobile bracket, original packing, excellent working order, anytrial. Tel. G3MLP Peterborough 0733 63851 anytime.

YAESU FP700 20 amp power supply, built in speaker, mint condition, boxed full instructions, £99. Hansen transistor tester model ZQM2 absolute mint condition full instructions boxed, £10. SEM Transmatch with easitune brand new, unused by SWL £99. Mike, York 0904 422773.

FOR SALE, Yaesu FT290R boxed. C/W Nicads, charger, carry case, strap, £250. Alinco 30w FM/SSB Linear boxed, mint, £30. Mobile whip, $\frac{7}{8}$ wave C/W gutter mount, coax. £10. Ring Gloucester 25989, Andy G4PZE.

TS430S with FM and narrow filter modifications plus AT230 aerial tuner. PS43. Power supply SP430 external speaker and MC60 Scanning desk mike. All as new. Boxed. £950 for complete station. No time wasters please. Brian G4VSK QTHR. Phone Wearside (091) 537 3966.

MICROWAVE Modules 432/144R transverter 10W output £90. Microwave modules 144/100S Linear amplifier, 10 watts in 100 out with built in pre-amp, £100. Tel. County Durham 3701429.

ALTRON 3 ELE 4 band mini beam 6m 10m 15m 20m. £70 ono. Buyer collects. Phone Peter, 0538 702208 G4YYO QTHR.

FOR SALE, Kenwood TS530S Pristine condition new valves, absolutely perfect, also three element mini beam AQ6203E 10.15.20 and 6 meters by Altron one year old, £695 can be seen working. — Phone Brian 01-515 5517 anytime. **HAM** International Jumbo,

you've read the articles, try the conversion, £125 ono. — Tel. (0509) 268020 evenings.

REGENCY HX2000 programmable hand held Scanner, twenty channels, AM/FM microprocessor controlled, little used, scan hold, priority channel, LC display, AC/DC rechargeable, including magbase aerial, charger earpiece, case, belt clip £250 secures, Tel. Woodbridge 03943 4208.

YAESU FT Newsletters, two volumes 1984/85 packed with mods, hints, fault finding tips etc. For all Yaesu rigs, £5. G. Knox, 20 Pullan Avenue, Bradford BD2 3RT. Tel. 0274 630266.

SUPER STAR 2200, converted 10 meters FM SSB AM/CW/HML HH LL £300. Rotel 240 FM converted 10 meters, £90. ZX Spectrum computer 48K boxed, £80. BRL 200 Linear, never used. £90. Ham International Concorde recently overhauled can be converted, £90. Scarab system. Never used, £50. Ferguson 3T31 cassette recorder LED level, £45. Zoom lens, £60. Mr C. T. Curtis, 554 Middle Park Avenue, Eltham, London SE9 5QS.

COMMODORE tractor printer, will swap for BBC printer, perfect, GP27 $\frac{1}{2}$ Antennae boxed sell at £50. Sigma 4 Antennae boxed, new, £60. Signal generator, £50. Scope £50. Mini beam £40. RICOH500G 35mm, 2 cases, auto tele + converter, £40 cased. Wide angle £40. Contact Bob on 01 859 2649. Will contact Chasi has no phone RAIBC/RSGB disabled. Wheelchair bound. £60. — Mr C. T. Curtis, 554 Middle Park Avenue, Eltham, London SE9 5QS.

FT101Z HF transceiver, very little used, original packing, £400. Tel. 0272 624864.

FOR SALE Sony 2001 super portable scanning receiver, vgc, £100 ono. Bearcat 2009 VHF VHF scanning receiver, mint condition, £100 ono. Wanted Sony AIR 7 Icom R7000, Yaesu 9600, AOR 2002. Tel 0283 68439.

YAESU FT757GX transceiver, £625; **FP757HD** heavy duty power supply £190; **FC757** at automatic ATU £290; Realistic Pro-32 200 channell scanner with accessories £220; **Miranda 35mm** camera with auto focus and exposure, motorised with flash, £45; computer soft/hardware for RTTY TX/RX plus TU etc. **Gordon Jackson** 01-907 2253.

BARGAIN Siemens T100 teleprinter for sale, built to last comes with tape auto repeat and complete workshop manual. What offers? **Vic Ashlee** 01 300 7183.

70CM equip **FT790R TCVR**, **FL7010 10W** Linear, both vgc, boxed with manuals case, **Nicads** charger **SMC** mobile Antenna **MET 17 - ELE** Antenna spare portable Antenna £320 ono. **G1H2S** **Melton Mowbray** 0664 64287.

FDK725X 1-30 watts 2 metre FM mobile rig, vgc, comes with **Heatherlite** safety mike, and gutter mount with 3/8 + 3/8 whips ideal mobile set up. Sell for £200 ono or consider exchange **NATO 2000**, **Cobra 148** (10 metre) with cash adjustment. **Phone** 01 247 6097 daytime.

SCANNER for sale. **PRO-31** VHF VHF hand portable scanner, £140 ono. **Ring David Newtownards** 0247 810665.

REALISTIC PRO31 **Nicads** charger, VHF Scanner £110. **Sony** air seven **Nicads** VHF scanner £170. **Icom 735 HF** general coverage **TXR** mic box £700. **Regret** no PSU all item vgc, swap both scanners for **Grundig** portable **SW** **Satelite** etc. **Write** 61 **Crystal Palace Park Road**, **SE26**.

FOR SALE, **HX 2000E** handheld, scanner, excellent condition, very sensitive or swap with cash adjustment for standard 2 metre multimode in good condition. **Phone** **Cork** 021 371613.

FOR SALE, **SX200N** Scanner **RX** VHF VHF 26-514, £165. — **A. Davies**, 42 **Everest Way**, **Hemel Hempstead**, **Herts** **HP2 4HX** **Tel** **Hemel Hempstead** 216776.

SONY 2001 portable scanning receiver, FM AM SSB vgc, £100 ono. **Realistic 2009** VHF/VHF Scanner mint condition, £100 ono. **Wanted** **Yaesu 9600**, **Icom R7000**,

AOR 2002, **Sony AIR 7**, **Tel** 0283 68439.

HW8 Heathkit QRP transceiver, good condition with PSU key phones manual, £95. **Hi-mound HK710** key marble base £18. **Buyers** collect or pay postage. **G4IMI** (**Birmingham**) 021 422 4217. **MULLARD** high speed valve tester complete with manuals and almost a thousand test cards recently serviced offers around £85 or would like to exchange or part/exchange for **W/S 22, 18, R206 R107**, etc **KE Franklin** 50 **Abingdon Street**, **Burnham on Sea** **Somerset** **TA81PJ** (0278) 784205.

FOR SALE, **Global AT1000** **Ariel** tuner, £30. **Perfect**. **SXN200** Scanner, £200. **Excellent** condition. **Buyer** collects. **Cash** only. **Tel.** **Leeds** 493094.

FOR SALE, **DR49** **Communications** **RX 150 - 30MHz** good mid-range, **RX** excellent condition, £120 ono. **Phone** 0492 68 715.

FOR SALE, **Realistic DX302** communications receiver, 10KHz 30MHz coverage, hardly used, mint condition, boxed, £185 ono. **Realistic PRO 30** scanner handheld VHF VHF air band boxed £90 ono. **R. Hodson**, 99 **Oxford Road**, **Garsington Oxford**.

GRUNDIG signal generator **A52** AM/FM with internal wobulator manual and leads, offers, books on all radio subjects by **Terman Henney** and other writers. **Radio amateur's handbook 39ED** 1962 ivgc valves all kinds some boxed **SAE** for replys. 0622 61327.

TRIO TS700S plus external **VFO** plus spk one owner from new, mint condition plus manuals, **FM/USB/LSB/AM** 20 watts output, £400. **Nottingham** 399556.

SCANNING receiver, VHF/VHF **PRO2001** with manual £120. **Amateur band HF** receiver, **SSB+AM**, **KW202** £90. with manual **Trio TS780** 2m+70cm multimode base transceiver, as new condition, £725. **Ken Greenough**, 2 **Bexley Close**, **Glossop**, **Derbyshire** **SK13 9BG**. **Phone** 04574 5468.

934 MHz fantastic bargain, **Reftec 934** with 2 x 18 element **Yagis** and phasing harness for only £199 ovno.

Ring me now and make me an offer contact **Jon** 0249 712009.

EDDYSTONE 358 receiver for sale, fully revalued covers 40 KCS to 31MHz £30. **Buyer** collects. **Wanted** circuit diagram for **Shibaden SV700** **VTR** expences paid. 0502 741283, after 6 pm.

DRAE 2 metre pre-set ATU £6. incl post include **SAE**. **Bunney**, 33 **Cherville Street**, **Romsey**, **Hants** 5051 8FB.

BBC (B) issue 7 computer, 40 track disc drive **BBC Teletext** adapter **RTTY/CW** interface and software book etc, £300. **Wakefield** 0924-825025.

LOWE SRX30 digital read out very accurate condition, excellent £100. **Grundig 1400SL** wide coverage in good condition, £60. **Skywood** solid state perfect condition, **Model CX203** offers. **A. Whitehead**, 64 **Planet House**, **Sunderland**, **T/Wear**.

SX200N VHF/UHF scanning receiver in very good condition with mains adaptor. **Unused** single serviced by **Garex**. £165. **Tel.** **Kings Lynn** (0553) 763428.

FT102 in immaculate condition, and just 3 years old, £500. **No** offers or time wasters please. **Arthur** 061 624 2808.

PYE **Westminster W15FM** VHF 6 channel complete £35. **Pye PF8** VHF pocketfones, 1 pair complete with **Nicads** and manual, £45. **Tel** 0923 241286 (evenings).

TRIO TR9000 all modes, mobile mount, handbooks, original box, £275. **MMS1** morse talker, £70. **Both** post paid please write **G8BXO John QTHR**.

COMPLETE **Yaesu HF** system, consisting of **FT707** all mode (including **FM**), **HF** transceiver, **FC707**, **ATU**, **FV707DM**, external **VFO**, **FP707** power supply, **MMB2** mobile bracket, £600 complete. **May** be interested in all mode 11m equipment with cash adjustment. **Tel.** 0274 (**Bradford**) 880895.

TRIO 2500 2 metre hand held, 2 battery packs, leather case, charger, service manual, **Trio 3500**, 70cms, hand held, 2 battery packs, leather case, speaker/mic, service manual, £16 each. **Marconi 995** AM/FM signal generator, £55.

Telephone 0222 708336.

AOR 2002 scanning receiver, VHF/UHF, little used, less than 12 months old, including free book, "VHF/UHF Guide", £380, (save up to £100). **N. Lewis** (G1VQK). **Tel.** (daytime) 0386 556105, (night) 0386 554525 (ask for Neal).

EDDYSTONE 770R, £125; **Hammerlund HQ170**, £125; **R208**, £90; **Microdot**, £150; **MSI** mobile stand and charger, £25; **SMC** monitorscope, £70 or exchange for any 70cms gear, **H.D. rotator**, **H.F. linear** or **W.H.Y. McCallum**, **G4VNG**, 0733 231639.

TR4000 2 metre, m/mode, c/w mic, m/bracket, £250. 2m linear, **MML100/S**, £100. **SEM Transmatch**, **HF**, **ATU**, £45. **MMA 28**, 28MHz, preamp, £5. **SEM HF**, auto, preamp, £5. **Yaesu** mic desk type scanning mode **MD18B**, £35. **All** items good condition. **Offers** considered. **Tel.** 0293 783556.

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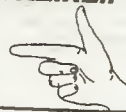
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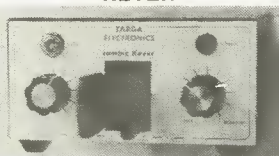
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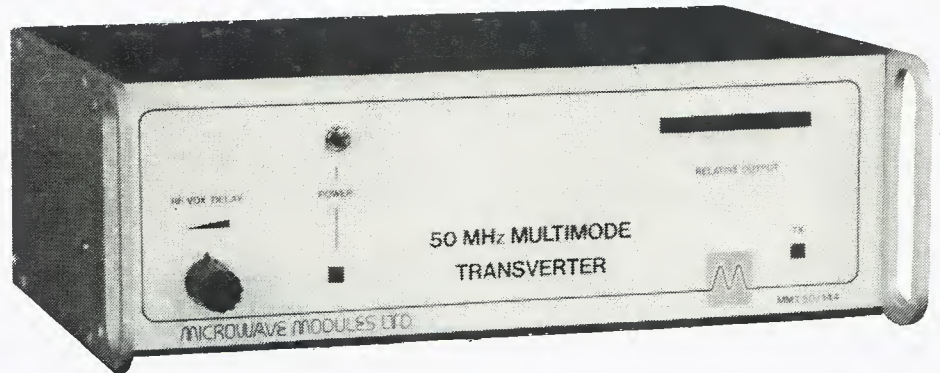
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MMT1296/144-G	23cm Linear Transverter	258.75	D
MMX1268/144	1268MHz Transmit Up-Converter	195.50	D
MMT 220/28	220MHz Transverter 15/output	139.84	B
MMT 50/144	6m Linear Transverter 20W o/p	289.80	B

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MM2001	RTTY to TV Converter	188.83	B
MM4001-KB	RTTY Transceiver with keyboard	299.00	D
MMS1	The Morsetalker	129.95	B
MMS2	Advanced Morse Trainer	168.82	B

ATV

MMC435/600	70cm ATV Converter, UHF output	35.65	A
MTV435	70cm ATV 20W Transmitter	197.80	B

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MMC432/28-S	70cm down to 10m Converter	44.85	A
MMC432/144-S	70cm down to 2m Converter	44.85	A
MMK1296/144	23cm down to 2m Converter	129.95	B
MMK1691/137.5	1690MHz WX Satellite Converter	144.90	B

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MMG144V	2m RF Switched GaAsFET Preamp	37.95	A
MMG1296	23cm GaAsFET Preamp	74.98	A
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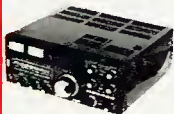
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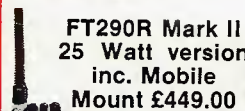
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