

*Amateur*

# RADIO

For all two-way radio enthusiasts

**HF Antennas for small gardens**

**FT209 base station adaptor**

**Yaesu FT211 2m FM mobile reviewed**



**Test: Kenwood TR851E 70cm multimode mobile**

**MORSE REPORT**

# For Tomorrow's Radio Technology TODAY

## BASE STATIONS

**Good News for FT67 owners. Kenwood owners take note!**  
**IMPROVED YAESU FT767 RWC/MK2 HF-UHF BASE STATION**

We are pleased to announce that we have now improved the synthesiser (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 £59.50 inc. return carriage.

- FT767 MK2/RWC COMPLETE TOP CLASS BASE STATION (EX VHF-UHF) £1449.00
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- FT757 MK2 NEW IMPROVED HF TRANSCEIVER £895.00
- FT725R MULTIMODE BASE STATION WITH 2MTRS. (SPECIAL PRICE) £799.00
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- ICOM IC7000 25-2GHZ ALL MODE TRANSMITTER £949.00
- ICOM IC7000 25-2GHZ ALL MODE AC PSU £949.00
- NEW ICOM IC575 6M 10W BASE STATION, 26-56 MHZ RECEIVER TX10 AND 6M £949.00

Many more Makes and Models in stock. Please enquire.

FT767GX MK2/RWC

NEW



ICOM IC735



## HANDHELDS

NEW

- \* Extended RX coverage available - call for details
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- YAESU FT23RFNB10 2.5W (5W) 2MTRS C/W CHGR £249.00
- YAESU FT73RFNB10 2.5W (5W) 70CM CHGR £259.00
- ICOM IC02E QUALITY 2.5W (5W) BP3 C/W CHGR £225.00
- ICOM MICRO 2E MINI 2.5W 2MTR C/W CHGR £195.00
- CTE 1600 (VY 5M IC2E) 2.5W 2MTR C/W CHGR £165.00
- KENPRO KT400E 2.5W 70CM C/W CHGR £199.00
- KENPRO KT220EE 2.5W (5W) 2MTR LCD C/W CHGR £199.00
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- PORTABLES**
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## SCANNERS

YAESU FRG9600/RWC



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!

- YAESU FRG9600 RWC MK1 60-905MHZ IMPROVED RECEIVER £465.00
- YAESU FRG9600 RWC MK2 60-950MHZ IN CONNECTOR £495.00
- 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/GRV/PAC AC PSU COMPLETE £699.00
- 100KHZ-950MHZ ALL BAND ALL MODE RECEIVING STATION £857.00
- ICOM ICR7000 25-2GHZ ALL MODE SUPER RECEIVER £945.00
- ICOM ICR7000/AH7000 ABOVE WITH MATCHING DISCONE £219.00
- UNIDEN-BEARCAT UBC100XL SUPER HI-LED C/W NCDS PSU £199.00
- UNIDEN-BEARCAT UBC175XL SUPER DESK-TOP C/W PSU £245.00
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- REGENCY MX7000 SAME COVERAGE SAME MAKE AS ADR2002 £139.00
- FDK AIR BAND HANDHELD THUMBWHEEL MINI C/W NCDS PSU £139.00
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- MANY MORE MAKES AND MODELS IN STOCK PLEASE CALL FOR DETAILS
- INSURED P&P £10 ON SCANNERS
- SHORT WAVE RECEIVERS
- YAESU FRG8800/FRV8800 AS ABOVE WITH VHF CONVERTER £572.50
- ICOM ICR71 100KHZ-30MHZ A TOP CLASS RECEIVER £659.00
- £738.00

## NEW PRODUCTS

NEW

### INTERNATIONAL MODEL 877R AIR-BAND RECEIVERS

This new tunable 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

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INTRODUCTORY OFFER



## RAYCOM PRODUCTS

NEW

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

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Trade and Dealer enquiries welcome. Call for more details. P&P £2.50 per order

Business radio users call now!



## 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
- GR5RV FULL SIZE MULTIBAND HE 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.

NEW RWC are now appointed dealers for the West Midlands for Butternut, Cushcraft and MFJ products. Please ask for details of the range currently available.

## 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, LCLDNT CB 10MTRS FT757GX MK1 FAST TUNING MOD, STORNO COM713 PMR-2MTR KIT PYE A200 E BAND 50MHZ KIT call for technical details, prices and delivery.

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Most other products advertised in this magazine are available at RWC.

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# ICOM

## BASE STATIONS



### IC-275E/475E 25 Watt 2 metre/70cm. Multimode Transceivers.

#### Tech Talk from ICOM: THE EXCITEMENT OF SATELLITE COMMUNICATIONS

An ever increasing number of radio amateurs are joining the excitement of Phase 111 - type satellite communications. This new medium combines the communications range of the 20 and 80 metre bands with the line-of-sight reliability of 2 metres. It's equivalent to a totally new band, and a vast technical background is not necessary for enjoying the action. ICOM is able to help you enjoy the fascinating new capabilities of OSCAR and future amateur satellites. Its all mode 2 metre and 70cm base transceivers bring the operating conveniences of low band units to the VHF and UHF amateur bands. They can be used for local FM operations via repeaters or for SSB/CW communications via Phase 111 satellites. The IC-1271E all mode 23cm transceiver is in a class of its own, providing made L satellite uplink capability. (Mode L: 1269MHz uplink, 436 downlink) (Mode U: 435 uplink 145 downlink) Satellite relayed signals are somewhat weak in nature and the IC-275E's low noise/high

sensitivity receiver gives the highest performance for hearing everyone regardless of their uplink performance. The noise blanker prevents pulse type electrical interference from masking desired DX signals, the selectable AGC can follow fast fades associated with spin modulation. There are also the 99 mode memories which can be used for intermixed FM repeater and SSB/CW operators. When the IC-275E is equipped with the optional mast mounted AG25 GaAsFET pre-amp, it becomes a satellite operations dream come true. ICOM's IC-475E 70cms transceiver has a front panel continuously adjustable power output to allow for daily signal variations. This overcomes the practice of over loading a satellites on-board receiver. The IC-475E also includes 99 all mode memories for the ultimate in operating flexibility. Using the ICOM CT16 satellite communications interface these base stations will track together via the ICOM CI-V system. If you are interested in joining today's most exciting era of amateur communications ie, OSCAR and future Phase 111 satellites, ICOM is the logical choice for top performance equipment

**Icom (UK) Ltd.**

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

Count on us!

# MORE BASE STATIONS

## IC-1271E, 1.2GHz Multimode Transceiver



ICOM, a pioneer in 1.2GHz technology are proud to introduce the first full feature 1240-1300MHz base station transceiver. Features include: multimode operation, 32 memories, scanning and 10 watts RF output. The IC-1271E allows you to explore the world of 1.2GHz thanks to a newly developed PLL circuit that covers the entire band, a total of 60MHz, SSB, CW, and FM modes may be used anywhere in the band making the IC-1271E ideal for mobile, DX, repeater, satellite or moonbounce operation. The IC-1271E has outstanding receiver sensitivity, the RF amplifiers use a low noise figure and high-gain disc type GaAs FET's for microwave applications. The rugged power amplifier provides 10 Watts

which can be adjusted from 1 to 10 Watts. A sophisticated scanning system includes memory scan, programme scan, mode-selective scan and auto-stop feature. Scanning of frequencies and memories is possible from either the transceiver or the HM12 scanning microphone. 32 programmable memories are provided to store the mode and frequency in 32 different channels. All functions including memory channel are shown clearly on a seven digit luminescent dual colour display. The IC-1271E has a dial-lock, noise blanker, RIT, AGC fast or slow and VOX functions. With a powerful 2 Watt audio output the IC-1271E is easily audible even in a noisy environment. The transceiver operates with either a 240V AC (optional) or 12 volt DC power supply.

**IC-AG1200 Masthead pre-amp.** Designed to use with the IC-1271E, the D.C. voltage and T/R switching for the amplifier is superimposed on the R.F. coaxial cable and switched by the pre-amp switch on the IC-1271E front panel. The new pre-amp provides excellent performance as a low noise microwave amplifier (0.6 noise figure typical).

## 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, SR7 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.



**Helpline:** Telephone us free-of-charge on 0800 521 145, Mon-Fri 09.00-13.00 and 14.00-17.30. This service is strictly for obtaining information about or ordering Icom equipment. We regret this cannot be used by dealers or for repair enquiries and parts orders, thank you.

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### 13.8V PSU

SMC introduce three new models of their 13.8 volt dc power supplies. All have line regulation of less than 1% and RMS ripple of just 2mV. These power supplies are suitable for amateur transceivers, laboratory, telecommunications, marine and general application. The smallest RU120406 is designed for a constant 4 amps, but will provide a surge to 6 amps.

The RS120810 is suitable for up to 8 amps constant and 10 amps surge. It is also provided with overvoltage protection, which is most necessary when it is being used with very expensive equipment.

The SS122535 is suitable for 25 amps constant and 35 amps surge. Not only does it have overvoltage protection, but it also has a pair of terminals for remote voltage sensing, allowing the power supply to adjust to maintain the constant voltage at load.

Further details are available from: *Department A R, South Midlands Communications Ltd, S M House, School Close, Chandlers Ford Industrial Estate, Eastleigh, Hampshire, SO5 3BY. Tel: (0703) 255111.*

### SCANNER COMPUTER

The Aircastle 2002 Scanner Computer is the result of some very careful evaluation of the needs of the AOR2002 user and the combination of many years of hardware and

software expertise.

It is a stand-alone unit which runs off an external 9-12V dc supply and is connected to the AOR2002 by means of a ribbon cable. The unit is controlled by connecting any computer running an asynchronous scrolling terminal program to the built-in RS232 Interface (this is virtually any computer, such as the BBC, Amstrad, Spectrum, C64, IBM PC, etc).

The unit contains a large number of built-in facilities and features and no special software is required (other than as above).

Among these features are: Much faster scanning rates,

(up to 150 channels per second); in excess of 400 memories (8K RAM version); 1000 on RAM expansion option. There are individually programmed attributes for each memory, and memory can be backed up by fitting batteries (4AA size). A unique offset button monitors duplex transmissions, and there is an extended frequency range.

All popular frequency bands are supplied built in (including offsets where appropriate). There are also extended frequency step facilities (10kHz, 20kHz, 50kHz and 100kHz as well as 5, 12.5 and 25). A powerful scanner control language is used to



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

create many new features and programs, and there is A/D for accurate measurement of signal strength in 255 steps.

Special facilities are available as options for qualified users, and the retail price is £169.99 all inclusive.

For further information please contact: *Aircastle Products, PO Box 78, Bourne-mouth BH1 4SP. Tel: (0202) 581089.*

## ALINCO IN UK

Following meetings with Alinco of Japan, Waters and Stanton Electronics have been appointed a main distributor for the UK market of their range of amateur radio products. They will be able to carry out a full sales and after-sales service on Alinco's complete range of equipment.

Many of the products have unique features, whether it be size or technical specification, and the first model to be marketed is the ALR22E at £269 inc VAT. This makes it the cheapest FM rig on the market, as well as being one of the smallest.

Hot on its tail will be the Mini FM hand-held for two metres which is the smallest in the world. This will be joined by the exciting dual bander with full duplex, at a price that will make it affordable to the majority.

For further information please contact: *Waters and Stanton Electronics, 18-20 Main Road, Hockley, Essex SS5 4QS. Tel: (0702) 206835.*

## LOW-COST TIMER

It is claimed that high performance can now be achieved in low budget applications with the advent of the Philips PM6665 120MHz/1.1GHz timer/counter from Electronic Brokers. As the instrument features a single microchip that coalesces thousands of logic gate functions, plus complete counting logic circuitry, the number of integral parts is reduced considerably, with consequent increased reliability.

The Philips PM6665 offers a range of functions: frequency, period, time interval, RPM, ratio and totalise. In this instrument Philips have introduced a high stability MTCXO (Mathematically Temperature Compensated Xtal Oscillator) time base option, whereby temperature dependency curves of each crystal are factory measured and stored in non-volatile memory. The result is the stability of an oven controlled oscillator for the price of a TCXO.

Whilst the PM6665 comes in a variety of options to suit most users, all options can be installed by the customer and added to the basic version as and when needed.

The PM6665 is available direct from Electronic Brokers, and costs just £730.

For further information please contact: *Electronic Brokers Ltd, 140-146 Camden Street, London, NW1 9PB.*

## ELECTRONIC REPAIRS

A recently announced 1mm tip option for the Portasol gas powered soldering iron allows fine, delicate soldering work to be performed for all types of electronic and computer circuit servicing and repair.

Now available from Free-trade (TEP) Ltd, the 1mm replacement tips will be particularly attractive to the field servicing engineer who has the benefit of stable, adjustable temperatures of up to 400°C, simple refilling and freedom from mains sockets and trailing leads.

The tips are easily fitted, and include the patented catalytic converter that generates heat right at the tip for maximum efficiency. Powered by gas cigarette lighter fuel, the Portasol has a variable power output, equivalent to an electric iron's output power from 10 to 60W. One filling of gas gives up to 60 minutes of continuous operation.

No larger than a felt-tip pen, the fully portable Portasol can be carried in a top pocket and has a clip-on cover with a



built-in igniter.

For further information please contact: *Free-trade (TEP) Ltd, Moor Lane, Witton, Birmingham B6 7HH. Tel: (021) 356 2582.*

## POWER METER

New from Electronic Brokers is the Marconi Instruments 6950, an analogue RF power meter which is designed to work with a wide range of fully-interchangeable power sensors, with a low VSWR.

For the 6910 and 6912 sensors, full scale ranges are available from -25dB (3µW) to +20dB (100mW). With the 6920 sensor, the power meter has a unique magnetic scale to give unambiguous full scale values from -65dBm (0.3nW) to 20dBm (10µW).

The 6950 power meter is designed to minimise zero drift from temperature effects and over the 0 to +60°C temperature range, the temperature effect on zero is less than 2µW.

Other features include a 30kHz-20GHz frequency range; the ability to measure CW, AM, or FM signals as well as pulsed waveforms; and a fully variable response time from 30ms to 15s, enabling low repetition waveforms to be averaged out for easy interpretation.

The 6950 is ideal for power meter levelling applications and also for portable use.

For further information on the 6950 please contact: *Electronic Brokers Limited, 140-146 Camden Street, London NW1 9PB. Tel: 01-267 7070.*



BOOKS · CATALOGUES · BOOKS · CATALOGUES

**THE EARLY DAYS OF RADIO BROADCASTING**

by George H Douglas  
An American tale, this, but one which any ham on this side of the pond will find fascinating. Period pictures and a wealth of detail about the development of public broadcasts and the events and people who took part in those first pioneering days make this a book is hard to put down.

Enriched with anecdotes and scene-setting asides, the story begins with the discoveries of Hertz, Maxwell and Marconi and then moves across the Atlantic to describe the growth of the fledgling radio stations there.

From KDKA, which could be heard around the world in those far-off days, to the wavelength wars of the 1920s, thence to the early networks and advent of television; this journey through the past is one well worth taking.

Bailey Bros and Swinfen Ltd, £25.95. ISBN 0-89950-285-7.

**2MT WRITTLE**

by Tim Wander  
The full title of this book concludes: 'The Birth of British Broadcasting', so you can see that this is rapidly becoming nostalgia corner! 2MT was one of the early stations in this country, often a one man show, and with an individuality which will always remain as a pleasant memory to its broadcast audience.

The story of 2MT charts the struggle to achieve a broadcasting service in this country, from Dame Nellie Melba's famous broadcast from what is now the Marconi Company building in New Street, Chelmsford; through the success of the Writtle station to the birth of the British Broadcasting Corporation.

The book also includes separate appendices on the Chelmsford and 2LO transmitters, PCGG, Grindell Matthews, Reginald Fessenden and David Hughes, drawing on much previously unpublished archive material. The book is available from Capella Publications for £12.75 plus £4 p and p.

Capella Publications,  
44 Homefield Way,  
Earls Colne,  
Essex CO6 2SP.  
Tel: (07875) 2674.

**BATTERY CODE**

As part of a major initiative to provide battery safety in the UK, the newly-formed British Battery Manufacturers Association has issued guidelines for safer battery use.

The guidelines highlight two areas for concern: the swallowing of small button cell batteries, mainly by children under two years, and possible fire or explosion, if batteries are severely misused or abused.

Reported incidents are rare – under 40 per annum compared with over 400 million batteries sold – and the majority of these involve swallowing.

The Code calls on parents to keep button cells out of the reach of children and to ensure that the battery compartments of toys and other items, such as watches, calculators and hearing aids, are secure.

Misuse of all batteries, including button cells, can lead to leakage, or in extreme cases even fire or an explosion.

Batteries should be disposed of in normal household waste and should under no circumstances be heated or burned.

Similar problems can arise accidentally through incorrect fitting of batteries in equipment. Bad design of battery compartments – common in some imported toys – can make it difficult for consumers to decide which way round to insert the batteries.

Everyone knows the importance of keeping children away from power points, open fires and cookers; yet many parents do not realise that batteries can pose a threat, however slight, and the manufacturers hope the code will raise general public awareness to the problem.

Copies of the Battery Safety Code are available free from: The BBMA, 7 Buckingham Gate, London SW1E 6JS.

**STC Instruments**

STC Instrument Services has produced its largest ever catalogue, *The New Instruments Book*, which features items ranging from DMMs and power supplies to oscilloscopes and complete computer systems.

Offering products from over 70 leading suppliers, the 336-page catalogue has an entirely new section dedicated to the latest technical books, which includes publications for training and theory; electronic component data; component theory and applications; reference; test equipment; control and instrumentation; computers (hardware, software, languages and operating systems, interfacing plus microprocessors and design); quality and reliability; and communications.

Amongst the many new products available are over 20 Hitachi oscilloscopes/storage scopes; STC 200W power supplies; the Avo M2000 series multimeters and the highly sophisticated GP XR16 production programmer. Copies are available on request.

STC Instrument Service,  
Dewar House,  
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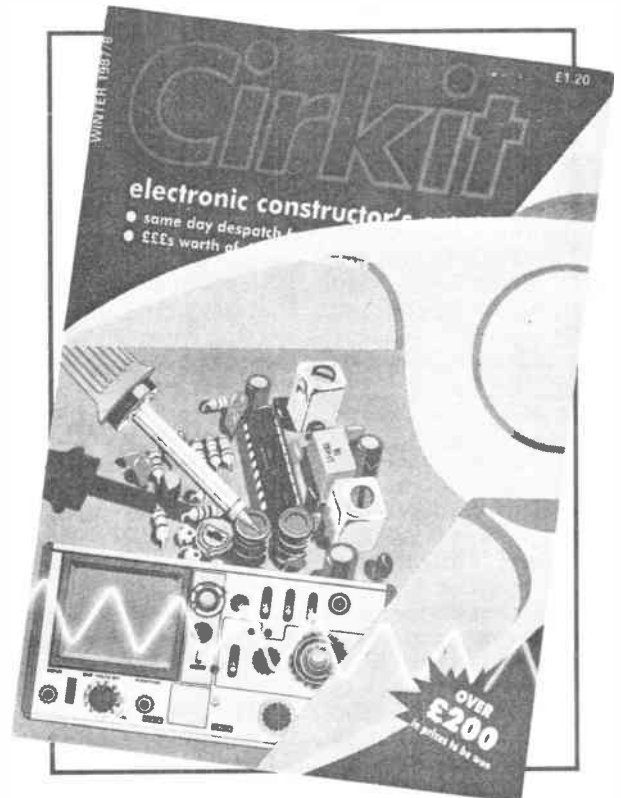
Cirkit's new catalogue for 1978/88 is presented in a different style to previous editions, and includes many new lines, such as an RF power head and three bench PSUs.

Cirkit has introduced volume discounts on small quantities to suit constructors – on packs of five, ten or twenty five instead of the more customary hundreds.

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## CLUB NEWS

### Calling all YLs

The Irish Radio Transmitters Society have sent us their new-style newsletter, as always full of interesting snippets from EI-land. One announcement concerns the recent arrival of EI2WRB, the first two metre beacon in EI, operated by the South-Eastern Radio Group.

Sited in County Waterford, the beacon has been on air since September '87. It is made up from an old 50 watt Pye FM transmitter modified for CW.

EI2FT is also lurking on two metres, a YL this time, complaining about the lack of female presence on the air. Give it time, Mary – who knows, if the mag staff get their act together, we may be out there by next year ... watch out, air waves!

### Gear and beer

Sunderland Amateur Radio Society is holding its annual sale of surplus equipment on Sunday January 10th – an excellent way to usher in the new year, and always a favourite way to invest any cash that the XYL might otherwise squander in the January sales!

The venue for the sale is the 'Porcupine Park', Queen Alexandra Road, Sunderland. The doors will open to receive goods at 11.30am, viewing will commence at 12pm and the auction will start at 12.45pm. A bar will be available and there will be talk-in on S22. For more details about this or any other club event, why not contact the secretary, Nigel G0ASM.

Club meetings take place at The Brewery, Westbourne Road, Sunderland, Tyne and Wear... now we know why there's going to be a bar at the surplus sale. Our sober judgement is – this sounds like a good club to join! Mine's a gin and tonic – now, if we only knew when they met (perhaps members want to keep the good news to themselves?). If not, why not let us know, and we'll tell all those hams thirsting for contact...

### Questions, questions!

Workshop Amateur Radio Society is starting the year with a natter night on January 12th, and being a sociable Yorkshire crew, they are having another one on January 26th – in fact, every other week the club settles down for a good natter, thus proving the old saying that they breed 'em tough up there – or, at least, with cast-iron jaws!

Brains must be in evidence too, as January 19th sees the second leg of a quiz contest between the club and Maltby ARS.

The club obviously meets every Tuesday, although the venue is unknown. Try asking Kevin G3MDQ, on (0909) 566724 for more details about the club's extremely prolific activities.

### Edgware calling

AGMs are in the air again, with Edgware and District RS holding their's on January 14th. An informal evening is planned for later in the month, with the club station going on the air on January 28th – if you hear them, let us know!

The club meets on the second and fourth Thursdays of the month at 8pm in the Watling Community Centre, 145 Orange Hill Road, Burnt Oak, Edgware.

The club net is on 1978MHz every Monday, and slow Morse is thoughtfully held at meetings and with G3ASR on 1978 on Mondays at 8.30pm till 10pm, as well as on the first and third Thursdays of the month from 7.30pm till 9. The Monday sessions are at 4-14 wpm and Thursdays are faster, at 8-18 wpm.

### Coming soon

Watch this space for further news about St Helens and District ARC, who are compiling a diary of events for the year.

Meanwhile, the information to hand is that the club meets every Thursday, from 7.45pm at the Community Resource Centre, Old Central Secondary School, College Street, St Helens. Morse tuition is available before meetings if required. More information can be obtained from the club secretary Derek G1OMY on (0744) 818455.

### ROMember the 8th

Coventry Amateur Radio Society's byte is worse than

its bark this month – a computer night is planned for January 8th, and the club adds that you should bring your own if possible – no, put the office mainframe down, please! You'll damage your hardware...

January 15th brings a night on the air and Morse tuition, and a talk and demonstration of Packet Radio is provisionally scheduled for January 22nd.

To round the month off, the club is holding its annual dinner on January 29th, so members will be able to break most of their New Year's resolutions all at once.

CARS usually meets every Friday at 8pm, in Baden Powell House, 121 St Nicholas Street, Radford, Coventry, and visitors are always welcome. Please contact Jon G4HHT, the club secretary, on (0203) 610408 for further information.

### Galactic hangovers

Another club who haven't yet prepared their programme for the New Year is MARS, the Midland Amateur Radio Society, although they attribute the delay to a massive post-Christmas hangover... that must have been some party! Not sparing our delicate sensibilities (yes, we have a massive hangover, too), they included a photo of the club members – as they proudly say, what a motley crew! (just joking, folks...)

The club is currently meeting at unit 5, Henstead House, Henstead Street, Birmingham B5 6QH, and we earnestly hope that this club house is still standing, unlike its predecessors! For more information, and updates on the stability of the club house, contact TB Brady G8GAZ, the MARS publicity officer.

### Anniversary year

The Stourbridge and District amateur radio society are preparing for a bumper celebration year, as 1988 is the club's 50th anniversary and they intend to have a special bash some time in late spring or early summer. They haven't yet sent details of their new year's events, perhaps 1988 is going to be so busy that the club diary is being published in book form...

The club must be working hard on plans for the year, but nevertheless will continue to

meet at G4CVK's shack unless otherwise notified, on the first and third Mondays of the month. For more information, contact the hon secretary Derek G3ZOM on Kingswinford 288900.

### Shout it out

Wirral and District ARC have kindly supplied a copy of their magazine, *Airwave 325* and details of club meetings for January. They seem worried that they haven't shouted loudly enough about their excellent club (not true – they have diligently sent us newsletters full of the latest goings on).

In any case, the events for January are as follows – the meeting on the 6th is at the D+W Railway Inn (a well trained club, this) and the AGM is on January 13th. The meeting on January 20th is at the Pensby Hotel, in Pensby, and a surplus equipment sale is planned for the 20th – let's hope for a good turnout.

Club contact is H R Court G1UHO on 051-625 5490, and club meetings are normally held on the second and fourth Wednesdays in each month, at Irby Cricket Club, Mill Hill Road, Irby.

### Standing room only

Verulam ARC has two meetings in January: on Tuesday 12th there is an activity evening, and on Tuesday 26th Mr Gerald Stancey G3MCK will give a talk entitled 'Standing Waves'. Meetings must be well attended if there's no room for them to sit down...

The club meets at the RAF Association Headquarters, New Kent Road, St Albans at 7.30pm on the second and fourth Tuesdays in each month. For further information contact Hilary G4JKS on St Albans 59318.

### 'Allo allo

Listen very carefully – ah will say this only once – we've been given ze instructions for obtaining the 'Diplôme du Calvados'. Thees ees un award you can get for 'earing or working ten stations located in ze Calvados district on any band or mode.

Eef you 'ear ze club station, who is FF6KCZ (HF)/FF1KCZ (VHF) zen zis weel count for two stations. No QSLs are necessary, just send your log details, certified by two ozzer amateurs to Pierre Roger, ze award manager, 8 Rue des

Petites Haies, F.14440 Douvres la Delivrande. Ze costees 10 IRCs including la p et p.

Ah must go now. Au revoir and good leestening.

## Rallies, rallies

And more rallies. We inform you well in advance, so you can save your pennies for these highlights of the year.

Bredhurst Receiving and Transmitting Society will be holding the third Rainham Radio Rally on Saturday February 27th, 1988 at the Parkwood Community Centre, Deanwood Drive, Rainham, Gillingham, Kent. The usual traders will be there, plus a bring and buy stall, raffle and door prize.

Parking is free, admission is only 50p and the club says that this may not be the largest rally of the year, but it's certainly the friendliest! There is talk-in on S22, SU22, 28.5MHz FM by GB4RRR, and further details can be obtained from Bob Mullett G1LKE on Medway (0634) 362154 or Prestel MBX819991488.

## Rallies II

Barry College of Further Education Radio Society (phew, what a title!) is also holding a rally - the 8th Annual Welsh Amateur Radio Rally, on March 6th 1988 at the Barry Leisure Centre.

All the Leisure centre facili-

ties will be open, trade stalls and bring and buy will of course be there, plus the RSGB bookstall and Morse testing facilities. The rally opens at 11am, 10.30am for the disabled.

All enquiries should be directed to Mike Adcock GW8CMU on (0446) 711426.

## Son of Rally

Wythall Radio Club is also rallying, this time on Sunday, March 13th at Wythall Park, Silver Street, Wythall.

Three large halls will be used, all open at twelve noon, with the usual trade stands, Morse tests, junk galore and a flea market (bring your dog?)

Parking is free, there is talk-in on S22 and admission is 50p except to OAPs and children, who get in free.

Stand bookings and further details can be obtained from Chris G0EYO on (021) 430 7267.

## Wombles are organised

Wimbledon and District Amateur Radio Society are doing it themselves this month - why face expensive repair bills when you could attend the club's 'Bring and Test Your Own Equipment' night on January 8th, courtesy of Nick G6AJY? Start the new year the right way by sprucing up the shack!

On January 29th Jim G4XLM will be giving advice on practical soldering, so you

can rectify all those faults weeded out at the earlier meeting. (There were none, I hear you cry?) Lucky indeed is the ham whose shack doesn't need a regular seeing to...

All Wimbledon meetings are held on the second and last Fridays of each month at 7.30pm, in St Andrews Church Hall, Herbert Road, Wimbledon, London SW19. For those wanting to know more about club activities, the man to contact is David Love on (07373) 51559.

## Och aye

BYLARA, the British Young Ladies Amateur Radio Association has recently introduced a Scottish award in addition to their normal one. This is awarded to anyone working fifteen bonnie lasses (who are BYLARA members) from across the border.

The award manager is Mrs Joy Stirling GM0GUU, 15 Methlick Brae, Glenrothes, Fife KY76UF - so listen out for those YLs!

## Roll up, roll up

BARTG, the British Amateur Radio Teleprinter Group, recently held their AGM and set their subscription rates for the year as follows: UK members, £8; Europe and Eire, £11; overseas surface mail, £11 and overseas air mail, £16.

Now is the time to send in those subscriptions as the membership year runs (how else?) from January to December. For this paltry sum, all members receive copies of *Datacom*, BARTG's quarterly journal, which usually runs to over a hundred info-packed pages.

Anyone interested in teleprinters, facsimile, Packet Radio or Amtor should rush out immediately and join, thus gaining access to the many club contests and specialist components which the club markets and develops.

Enquiries about this veritable feast of goodies should go to John GW6MOK and Pat GW6MOJ, on (0558) 822286.

## Elections

Elections are in the air, with the following clubs gaining new committee members:

*The Midland Amateur Radio Society*, President Peter Haylor G6DRN.

*Basingstoke Amateur Radio Club*, Secretary Jim Arnott G1WKK.

*Workshop Amateur Radio Society*, Chairman George Pool G0DKQ; secretary Carole Gee G4ZUN; Public Relations Officer Kevin Fox G4MDQ.

*Wimbledon and District Amateur Radio Society*, Chairman Peter Horbaczewskyj G4ZXO; hon secretary Peter Love G4RBQ.

Newly elected President of Midland Amateur Radio Society, Peter Haylor G6DRN, is congratulated by retiring President, Stewart Laing G8ODT. Photograph by Tim Jebbett G0GPZ



## A frightful friend

Out on the wild and windy wastes of Dartmoor, something is lurking... out of the mists it looms - what can it be? What will be revealed?

Actually, it's the West Devon Repeater Group, which has now been operational for four years; congratulations, chaps. Not that the group has had an easy time, having a local climate which is not kind to antennas. Attempts to locate the original antenna design have so far failed - the BBC are insisting on exact duplicates, and G3VEH, formerly of Bath University and the antenna inventor, seems to have done a vanishing trick that would do credit to some of the more infamous residents of the moors.

Someone out there must know where he is - if you do, contact Mike G4KXQ or Richard G1VKZ (sorry, no address for the club at pre-

sent).

Which leads to the next point – the group wants members, and it seems only fair that anyone who uses the repeater should help out – especially considering the repair bill which will face WDRG when the antenna is finally replaced. Support your local repeater group – they deserve it! And while you're at it, someone please find us an address for the group...

### The Rally strikes back

Yes, with parsley and sage etc on it this time – Scarborough ARS will be holding their rally on July 31st, so you really do have plenty of time to prepare for this one.

The venue is The Spa, Scarborough, and the doors will open at 11am. There will be talk-in on S22 (144MHz) and SU8 (432MHz), as well as RB0-GB3NY's contribution to the already addled airwaves.

Further details can be obtained from the rally secretary, Ian Hunter G4UQP QTHR or tel: (0723) 376847.

### Veni, vidi, GB

How long is a Roman foot? As long as a Roman shoe, possibly, but in any case, Hadrian's wall is ten of them thick (Roman feet, that is, not shoes). The connection between this prominent example of Roman doggedness and amateur radio is... Hazelrigg Amateur Radio Club.

Why? We hear you ask. Well, apart from the ancient Northern grouse, all the Romans really wanted was to stop shopping trips to Edinburgh. People up there have grown rather fond of this over-ambitious garden wall, and to prove it, Hazelrigg are going to march, en masse, down the Roman Road to Bardon Mill, which is only a hop, skip and a Roman jump from the well-known Housesteads camp.

The club will then ensconce themselves in the Vallum Lodge Hotel, from where they will be operating on 80, 20, 15, 10 and 2 metres on all modes over the weekend before Easter – that is, March 26th and 27th.

For anyone who fancies a spring trip, we can vouch for the scenery (spectacular), people (warm and wonderful) and the local brews... 'nuff said. The club want to see a good turn-out, and points out that the XYL and harmonics

can walk the wall, visit Vindolanda, Carvoran, Housesteads or browse around Haltwhistle itself (yes, it is so-called because this is where the trains stopped and blew their whistles...), giving the OM plenty of time to see about the serious business of the day.

If you fancy listening instead of looking, the club will issue special QSL cards to contacts; listen out for GB1 or 4HW from the Friday evening to Monday morning over the weekend before Easter.

### One hundred and sixty!

Loughton and District Amateur Radio Society just refuses to let a good New Year lie idle – on January 1st, members are having a celebratory drink at the Gardeners Arms in Loughton, from 8pm.

The club's meeting on January 15th is informal, but the 29th is reserved for the club project – a DF set for Top Band, with an introduction by Jack Atkinson G3OPA. 160m will never be the same...

### Chinese talkaway

After the October storms come brainstorm – but only for Sheffield Amateur Radio Club this time, who are holding one of their regular 'Open Forums', which they claim are brainstorming sessions – or do they just cause them? Please try and limit the damage, folks, we've had enough down here.

The club is going all mysterious and oriental on January 11th (the inscrutable North?) with a talk entitled 'That's China'. Tony Whittaker G3RKL repeats his tales from the orient by popular demand. Ah so... Yorkshire, the land of the rising sun?

A Committee meeting occupies the 18th, and January 25th brings a nostalgia night – members are invited to bring along gear and memories from the days when wireless was supposed to glow inside...

Sheffield ARC meets in the Firth Park Pavilion, Firth Park Road, Sheffield 5, and meetings start at 8pm (RAE and Morse from 7pm).

Further details about these or other club events can be obtained from Alan G0ILG on (0742) 395287. By the way, congratulations on the 'A' licence, chaps. The club is now worth five points towards the Sheffield award.

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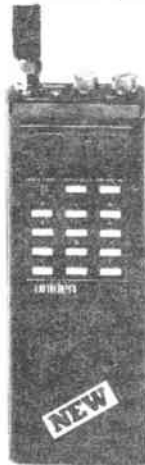
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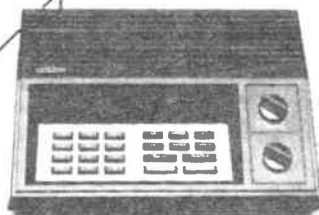
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AN6362	3.95	MC1327	1.70	STK085	8.95	TBA510	2.50	TDA2003	2.95	UPC1181H	1.25
AN7140	3.50	MC13270	0.95	STK415	7.95	TBA510Q	2.50	TDA2019	1.95	UPC1185H	2.95
AN7145	3.50	MC1349P	1.75	STK435	7.95	TBA520	1.10	TDA2300	2.95	UPD2114C	1.95
AN7145M	2.95	MC1350P	1.75	STK437	7.95	TBA530	1.10	TDA2311	1.95	UPD2593	2.95
AN7151	2.80	MC1351P	1.75	STK439	7.95	TBA530Q	1.10	TDA2500	2.95	UPD2593	2.95
BA521	3.35	MC1358	1.58	STK461	11.50	TBA540	1.28	TDA2510	2.50	UPD2593	2.95
CA1352E	1.75	MC1495	3.00	STK463	11.50	TBA540Q	1.38	TDA2520	2.50	UPD2593	2.95
CA3086	0.48	MC1496	1.75	STK0015	7.95	TBA550Q	1.95	TDA2521	1.95	UPD2593	2.95
CA3132E	1.95	MC1723	0.80	STK0039	7.95	TBA560Q	1.45	TDA2521	1.95	UPD2593	2.95
CA3132EM	2.80	MC3357	2.75	STK0049	1.48	TBA570	1.00	TDA2522	1.95	UPD2593	2.95
CA3140E	2.50	MC3401L	2.50	TA7072	2.50	TBA651R	2.50	TDA2530	1.95	UPD2593	2.95
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AC128	0.28	BC184BL	0.09	BD376	0.32	BF939	0.25	MRF475	2.95	2N1100	6.50
AC129K	0.32	BC204	0.25	BD379	0.45	BF940	0.25	MRF477	14.95	2N1308	1.30
AC141	0.28	BC207B	0.25	BD410	0.68	BF981	0.25	OC16W	2.50	2N1711	0.35
AC141K	0.34	BC208B	0.20	BD434	0.65	BF986	0.30	OC23	9.50	2N2219	0.28
AC142K	0.45	BC212	0.09	BD436	0.48	BF990	0.60	OC25	1.90	2N2626	0.50
AC147	1.25	BC228	0.15	BD437	0.75	BF991	1.75	OC26	1.95	2N2905	0.40
AC176K	0.31	BC213	0.09	BD438	0.75	BF992	0.35	OC28	5.50	2N3053	0.50
AC187	0.25	BC213L	0.09	BD510	0.95	BF994	0.35	OC29	4.50	2N3054	0.49
AC187K	0.28	BC214	0.09	BD518	0.75	BF995	0.55	OC32	5.50	2N3055	0.52
AC188	0.25	BC214C	0.09	BD520	0.65	BF997	0.15	OC42	1.50	2N2702	0.12
AC188K	0.37	BC214L	0.09	BD534	0.45	BF998	1.18	OC44	1.25	2N3703	0.12
AD142	0.50	BC237B	0.15	BD535	0.48	BF999	0.60	OC45	1.90	2N3704	0.12
AD143	1.25	BC238	0.15	BD538	0.65	BF999	0.60	OC45	1.90	2N3705	0.12
AD149	0.70	BC239	0.18	BD575	0.95	BF999	0.30	OC71	0.75	2N3706	0.12
AD161	0.80	BC251A	0.15	BD587	0.95	BF999	0.26	OC72	2.50	2N3708	0.12
AD162	0.80	BC252A	0.15	BD588	0.95	BF999	0.32	OC75	1.50	2N3733	2.50
AF106	0.50	BC258	0.25	BD597	0.95	BF999	0.30	OC81	1.00	2N3773	0.75
AF114	1.95	BC258A	0.39	BD695	1.50	BF999	0.25	OC84	1.50	2N3792	1.35
AF121	0.80	BC284	0.30	BD698	1.50	BF999	1.35	OC139	12.80	2N4280	3.50
AF124	0.65	BC300	0.30	BD701	1.25	BF999	0.32	OC171	4.50	2N4427	1.15
AF125	0.38	BC301	0.09	BD702	1.25	BF999	0.32	OC200	2.50	2N4929	1.95
AF126	0.65	BC303	0.26	BD707	0.90	BF999	0.30	OC201	5.50	2N5294	0.50
AF127	0.65	BC307B	0.09	BDX32	1.50	BLY48	1.75	OC205	10.00	2N5296	0.48
AF139	0.40	BC327	0.10	BDX53B	1.65	BR100	0.26	R20008B	1.45	2N5298	0.60
AF150	0.80	BC328	0.10	BF115	0.35	BR101	0.49	R2009	2.80	2N5485	0.45
AF178	1.95	BC337	0.10	BF119	0.65	BR103	0.55	R2010B	1.45	2N5496	0.95
AF239	0.42	BC338	0.09	BF127	0.39	BR303	0.95	R232	4.50	2SA329	0.95
AY100/34A	8.95	BC341	0.15	BF131	0.25	BR443	0.85	R232	4.50	2SA475	0.50
AY102	0.85	BC461	0.35	BF177	0.39	BR939	0.45	R2540	2.48	2SC486	0.80
BC107A	0.11	BC478	0.20	BF160	0.27	BSW64	0.95	RCA16029	0.85	2SC496	0.80
BC107B	0.11	BC527	0.20	BF173	0.22	BSX60	1.25	RCA16039	0.85	2SC784	0.75
BC108	0.10	BC547	0.10	BF158	0.22	BT100A/02	0.85	RCA16181	0.85	2SC785	0.75
BC108B	0.12	BC548	0.10	BF178	0.28	0.85	RCA16334	0.90	2SC769	0.75	
BC109	0.10	BC549A	0.10	BF179	0.34	BT106	1.49	RCA16335	0.85	2SC931D	0.95
BC109B	0.12	BC550	0.14	BF190	0.29	BT116	1.20	RCA16572	0.85	2SC937	1.95
BC109C	0.12	BC557	0.08	BF181	0.29	BT119	3.15	S2060D	0.95	2SC1034	4.50
BC114A	0.09	BC558	0.10	BF182	0.29	BT120	1.65	SKEF5	1.45	2SC1096	0.80
BC115	0.55	BC539/10	0.30	BF183	0.29	BU105	1.95	T6021V	0.45	2SC1106	2.50
BC116A	0.55	BCY33A	19.50	BF184	0.28	BU108	1.69	T6027V	0.45	2SC1124	0.95
BC116A	0.80	BD115	0.30	BF185	0.28	BU124	1.25	T6029V	0.45	2SC1162	0.95
BC117	0.19	BD124P	0.59	BF194	0.11	BU125	1.25	T6036V	0.55	2SC1172Y	2.20
BC119	0.24	BD131	0.42	BF195	0.11	BU126	1.60	T9002Z	0.55	2SC1173	1.15
BC125	0.28	BD132	0.42	BF197	0.11	BU204	1.55	T9011H	0.75	2SC1307	2.95
BC139B	0.20	BD133	0.45	BF198	0.16	BU205	1.30	T9015V	2.15	2SC1364	2.95
BC141	0.25	BD136	0.30	BF200	0.40	BU208	1.39	T9034V	2.15	2SC1413A	2.80
BC142	0.21	BD137	0.32	BF200	0.40	BU208A	1.82	T9038V	3.95	2SC1449	0.50
BC143	0.24	BD138	0.30	BF241	0.15	BU208D	1.80	THY15/80	2.25	2SC1628	0.75
BC147B	0.12	BD139	0.32	BF245	0.30	BU226	1.20	THY15/85	2.25	2SC1678	1.50
BC148A	0.09	BD140	0.30	BF256L	0.35	BU265	1.50	TIP25	0.40	2SC1945	3.75



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### A SELECTION FROM OUR STOCK OF BRANDED VALVES (Cont'd)

DL63	1.00	ECL85	0.95	HBC90	1.95	OM5B	3.00	R19	2.50	VR105/30	2.50	4-250A	79.50	6CA7	3.50	7K7	7.50	30PL13	0.60	3887	4.50
DL70	2.50	ECL86	0.95	HBC91	1.95	OM6	1.75	R20	1.20	VR150/30	2.50	4-400	47.50	6CB5	3.95	7L	1.50	30PL14	1.75	3888	4.50
DL73	2.50	ECL805	0.95	HF93	1.50	ORP43	2.50	R1169	95.00	VU29	4.50	1000A	425.00	6CB6	1.95	707	4.50	31J56C	5.60	3889	3.50
DL91	3.95	EF22	3.50	HF94	1.95	ORP50	3.95	R5559	5.00	VU39	1.50	4B32	35.00	6CD6GA	4.50	7Y4	2.50	33A/158M		3890	3.50
DL92	1.25	EF37A	2.50	HF95	1.50	P61	2.50	RG1-125	4.50	W21	4.50	4B1551B	8.00	6CF6	1.95	8B8	2.50	35A3	19.80	3891	6.15
DL93	1.10	EF39	1.50	HL41	3.50	P41	2.50	RG1-240A	14.50	W61	4.50	4C20	125.00	6CG7	3.50	8B10	2.50	35A5	4.50	3892	2.50
DL94	2.50	EF40	4.50	HL90	3.50	PABCS0	0.75	PC86	0.75	W77	5.00	4B27A	1.75	6CH6	6.95	8C05	1.95	35A6	4.50	3893	2.50
DL96	2.50	EF42	3.50	HL92	1.50	PC86	0.75	RG3-250A	6.50	W81M	4.50	4B28	1.75	6CL6	3.25	8C06	1.95	35C5	4.50	3894	2.50
DL10	13.60	EF50	2.50	HL3DD	3.50	PC88	0.75	RG3-1250A	35.00	W729	1.50	4C35	145.00	6CL8A	1.50	8E08	1.50	35LEGT	2.00	3895	2.50
DL15	10.00	EF54	4.50	KT8C	7.00	PC97	1.10	RK2K25	62.50	W739	1.50	4CX125C		6CM7	2.95	8F07	1.97	35Z3	1.95	3896	1.85
DM70	2.50	EF55	4.95	KT33C	3.50	PC990	1.05	RPY18	2.50	X24	4.50	Emac	190.00	6CS6	0.75	10CWS	1.97	35Z5GT	3.50	3897	2.55
DM160	79.50	EF73	3.50	KT44	2.00	PC995	2.50	RPY43	2.50	X66/X65	8.00	4CX250B	49.00	6CS7	0.95	10D2	1.25	38HE7	4.50	3898	550.00
DOD-006	79.50	EF73	3.50	KT44	2.00	PC998	0.70	RR3-250	15.00	X76M	1.95	4CX250M		6DC6	2.35	10DX8	2.50	40KD6	5.50	3899	3.25
DY51	1.50	EF80	0.55	KT45	4.00	PC998	0.70	RR3-1250	35.00	X824	1.50	Emac	59.50	6DJ8	0.95	10E08	1.95	47	6.00	3899A	9.50
DY86/87	0.75	EF83	3.95	KT61	8.00	PC998	0.70	RR3-1250	35.00	X825	1.50	4CX250M		6DK6	1.50	10E07	2.50	50A5	1.50	3899B	6.50
DY802	0.85	EF85	0.50	KT63	2.00	PC998	0.70	S6F17	5.95	XFW47	1.50	6CC	60.00	6DQ5	8.50	10F1	1.75	50B5	1.95	3899C	3.50
ES51	49.50	EF86	2.25	KT66 USA	9.00	PC998	0.70	S6F33	26.95	XFW50	1.50	4CX250K		6DQ6	2.50	10GK6	1.95	50C5	0.95	3899D	2.85
ER80C	19.50	EF86	2.25	KT66 USA	9.00	PC998	0.70	S11E12	38.00	XG1-2500		4CX250K		6DQ6	2.50	10H7	2.50	50CD5G	1.95	3899E	95.00
ER80C	19.50	EF86	2.25	KT66 USA	9.00	PC998	0.70	S307K	8.50	XG5 500	22.80	4CX250K		6E5	3.95	11R3	55.00	50EHS	1.95	3899F	13.95
ER80C	19.50	EF86	2.25	KT66 USA	9.00	PC998	0.70	S104/1K	10.00	XLG28FT	2.50	4CX350A		6E7	3.95	12A6	3.98	50JY6	2.95	3899G	39.80
ER80C	19.50	EF86	2.25	KT66 USA	9.00	PC998	0.70	S109/1K	15.00	XNP12	7.50	4CX350F	100.00	6E8	2.50	12AD6	1.98	53KU	4.50	3899H	4.50
ER80C	19.50	EF86	2.25	KT66 USA	9.00	PC998	0.70	S139P	5.55	XN12	2.50	4CX350G	95.00	6E9	2.50	12A6U	1.50	57B1	3.50	3899I	1.75
ER80C	19.50	EF86	2.25	KT66 USA	9.00	PC998	0.70	SC1/800	5.00	XR1-1800A		4CX1000A		6F14	1.00	12E1	4.50	75C1	5.50	3899J	2.15
ER80C	19.50	EF86	2.25	KT66 USA	9.00	PC998	0.70	SC1/1100	6.00	XR1-2500A		4CX1000A		6EJ7	0.65	12AH7GT	4.95	80	4.50	3899K	1.85
ER80C	19.50	EF86	2.25	KT66 USA	9.00	PC998	0.70	SC1/1200	5.00	XR1-6400A		4CX5000A		6EM5	2.50	12AL5	1.00	83	8.50	3899L	3.65
ER80C	19.50	EF86	2.25	KT66 USA	9.00	PC998	0.70	SC1/1300	6.00	Y65	149.50	4CX5000A		6EM7	2.50	12AT6	1.25	83A1	7.50	3899M	3.75
ER80C	19.50	EF86	2.25	KT66 USA	9.00	PC998	0.70	SC1/1400	6.00	Y65	149.50	4CX5000A		6EVB	1.75	12AT7	1.15	85A1	6.50	3899N	3.95
ER80C	19.50	EF86	2.25	KT66 USA	9.00	PC998	0.70	SC1/1500	6.00	Y65	149.50	4CX5000A		6EV7	2.95	12AT7WA	2.50	85A2	2.95	3899O	3.75
ER80C	19.50	EF86	2.25	KT66 USA	9.00	PC998	0.70	SC1/1600	6.00	Y65	149.50	4CX5000A		6EV8	1.75	12A7	1.15	85A1	6.50	3899P	3.95
ER80C	19.50	EF86	2.25	KT66 USA	9.00	PC998	0.70	SC1/1700	6.00	Y65	149.50	4CX5000A		6EV9	2.95	12A7WA	2.50	85A2	2.95	3899Q	3.75
ER80C	19.50	EF86	2.25	KT66 USA	9.00	PC998	0.70	SC1/1800	6.00	Y65	149.50	4CX5000A		6EWA	1.60	12A7WA	2.50	85A2	2.95	3899R	3.75
ER80C	19.50	EF86	2.25	KT66 USA	9.00	PC998	0.70	SC1/1900	6.00	Y65	149.50	4CX5000A		6EWB	1.60	12A7WA	2.50	85A2	2.95	3899S	3.75
ER80C	19.50	EF86	2.25	KT66 USA	9.00	PC998	0.70	SC1/2000	6.00	Y65	149.50	4CX5000A		6EWC	1.60	12A7WA	2.50	85A2	2.95	3899T	3.75
ER80C	19.50	EF86	2.25	KT66 USA	9.00	PC998	0.70	SC1/2100	6.00	Y65	149.50	4CX5000A		6EWD	1.60	12A7WA	2.50	85A2	2.95	3899U	3.75
ER80C	19.50	EF86	2.25	KT66 USA	9.00	PC998	0.70	SC1/2200	6.00	Y65	149.50	4CX5000A		6EWE	1.60	12A7WA	2.50	85A2	2.95	3899V	3.75
ER80C	19.50	EF86	2.25	KT66 USA	9.00	PC998	0.70	SC1/2300	6.00	Y65	149.50	4CX5000A		6EWF	1.60	12A7WA	2.50	85A2	2.95	3899W	3.75
ER80C	19.50	EF86	2.25	KT66 USA	9.00	PC998	0.70	SC1/2400	6.00	Y65	149.50	4CX5000A		6EWF	1.60	12A7WA	2.50	85A2	2.95	3899X	3.75
ER80C	19.50	EF86	2.25	KT66 USA	9.00	PC998	0.70	SC1/2500	6.00	Y65	149.50	4CX5000A		6EWF	1.60	12A7WA	2.50	85A2	2.95	3899Y	3.75
ER80C	19.50	EF86	2.25	KT66 USA	9.00	PC998	0.70	SC1/2600	6.00	Y65	149.50	4CX5000A		6EWF	1.60	12A7WA	2.50	85A2	2.95	3899Z	3.75
ER80C	19.50	EF86	2.25	KT66 USA	9.00	PC998	0.70	SC1/2700	6.00	Y65	149.50	4CX5000A		6EWF	1.60	12A7WA	2.50	85A2	2.95	3899AA	3.75
ER80C	19.50	EF86	2.25	KT66 USA	9.00	PC998	0.70	SC1/2800	6.00	Y65	149.50	4CX5000A		6EWF	1.60	12A7WA	2.50	85A2	2.95	3899AB	3.75
ER80C	19.50	EF86	2.25	KT66 USA	9.00	PC998	0.70	SC1/2900	6.00	Y65	149.50	4CX5000A		6EWF	1.60	12A7WA	2.50	85A2	2.95	3899AC	3.75
ER80C	19.50	EF86	2.25	KT66 USA	9.00	PC998	0.70	SC1/3000	6.00	Y65	149.50	4CX5000A		6EWF	1.60	12A7WA	2.50	85A2	2.95	3899AD	3.75
ER80C	19.50	EF86	2.25	KT66 USA	9.00	PC998	0.70	SC1/3100	6.00	Y65	149.50	4CX5000A		6EWF	1.60	12A7WA	2.50	85A2	2.95	3899AE	3.75
ER80C	19.50	EF86	2.25	KT66 USA	9.00	PC998	0.70	SC1/3200	6.00	Y65	149.50	4CX5000A		6EWF	1.60	12A7WA	2.50	85A2	2.95	3899AF	3.75
ER80C	19.50	EF86	2.25	KT66 USA	9.00	PC998	0.70	SC1/3300	6.00	Y65	149.50	4CX5000A		6EWF	1.60	12A7WA	2.50	85A2	2.95	3899AG	3.75
ER80C	19.50	EF86	2.25	KT66 USA	9.00	PC998	0.70	SC1/3400	6.00	Y65	149.50	4CX5000A		6EWF	1.60	12A7WA	2.50	85A2	2.95	3899AH	3.75
ER80C	19.50	EF86	2.25	KT66 USA	9.00	PC998	0.70	SC1/3500	6.00	Y65	149.50	4CX5000A		6EWF	1.60	12A7WA	2.50	85A2	2.95	3899AI	3.75
ER80C	19.50	EF86	2.25	KT66 USA	9.00	PC998	0.70	SC1/3600	6.00	Y65	149.50	4CX5000A		6EWF	1.60	12A7WA	2.50	85A2	2.95	3899AJ	3.75
ER80C	19.50	EF86	2.25	KT66 USA	9.00	PC998	0.70	SC1/3700	6.00	Y65	149.50	4CX5000A		6EWF	1.60	12A7WA	2.50	85A2	2.95	3899AK	3.75
ER80C	19.50	EF86	2.25	KT66 USA	9.00	PC998	0.70	SC1/3800	6.00	Y65	149.50	4CX5000A		6EWF	1.60	12A7WA	2.50	85A2	2.95	3899AL	3.75
ER80C	19.50	EF86	2.25	KT66 USA	9.00	PC998	0.70	SC1/3900	6.00	Y65	149.50	4CX5000A		6EWF	1.60	12A7WA	2.50	85A2	2.95	3899AM	3.75
ER80C	19.50	EF86	2.25	KT66 USA	9.00	PC998	0.70	SC1/4000	6.00	Y65	149.50	4CX5000A		6EWF	1.60	12A7WA	2.50	85A2	2.95	3899AN	3.75
ER80C	19.50	EF86	2.25	KT66 USA	9.00	PC998	0.70	SC1/4100	6.00	Y65	149.50	4CX5000A		6EWF	1.60	12A7WA	2.50	85A2	2.95	3899AO	3.75
ER80C	19.50	EF86	2.25	KT66 USA	9.00	PC998	0.70	SC1/4200	6.00	Y65	149.50	4CX5000A		6EWF	1.60	12A7WA	2.50	85A2	2.95	3899AP	3.75
ER80C	19.50	EF86	2.25	KT66 USA	9.00	PC998	0.70	SC1/4300	6.00	Y65	149.50	4CX5000A		6EWF	1.60	12A7WA	2.50	85A2	2.95	3899AQ	3.75
ER80C	19.50	EF86	2.25	KT66 USA	9.00	PC998	0.70	SC1/4400	6.00	Y65	149.50	4CX5000A		6EWF	1.60	12A7WA	2.50	85A2	2.95	3899AR	3.75
ER80C	19.50	EF86	2.25	KT66 USA	9.00	PC998	0.70	SC1/4500	6.00	Y65	149.50	4CX5000A		6EWF	1.60	12A7WA	2.50	85A2	2.95	3899AS	3.75
ER80C																					

# DX DIARY

News for HF operators compiled by Don Field G3XTT

Looking back through my log for November I see that propagation continued to be good, with some excellent openings to the Far East and North America on ten metres, and even some DX from the Pacific. I particularly enjoyed the opportunity to work some DX on 24MHz which at times was buzzing with activity.

A note of caution here, though. I heard several UK stations working on SSB, and openly stating their power levels to be 100 watts or more. Although there is a debate raging about the use of SSB on 10MHz, where the licence allows it but the IARU recom-

mends against it, we don't even have the luxury of a debate on 18 and 24MHz. Quite simply, for the time being UK amateurs are restricted by the DTI to 10 watts CW only and horizontal polarisation, with the antenna gain to be no more than that of a dipole. Please remember this.

## Top Band news

The good HF conditions continued over the weekend of the CQWW CW Contest, although I was busy on Top Band where conditions started off well, they deteriorated as the weekend went

on. Nevertheless, I was able to work 59 countries and 13 zones, which would have been unheard of on the band just a few years ago. A few Europeans also managed to work HS0A on Top Band on the Sunday evening and for at least some of them, including G3SZA and G3RBP, it was their very last zone on the band, so congratulations are definitely in order.

## OH1RY

As I said last month, OH1RY was workable on the LF bands from several of his Pacific stops. Peter is now back in Finland - his operation from

French Polynesia never materialised, unfortunately. Apparently, before leaving Europe he had been assured that his French reciprocal licence would permit him to operate from FO, but when he arrived there it was to discover that the local authorities now require much greater notice of an intended operation by a non-resident. It really must be very frustrating to travel so far only to be thwarted when you arrive, and this on top of the problems in Fiji which disrupted Peter's itinerary, and with it his operations from Nauru and Kiribati.

*This amateur radio station, callsign HB9/UK3F was displayed on the Russian stand at Telecom 87 in Geneva*



## QSLs for sale?

Two UK QSL managers have recently reported receiving QSLs from the same US amateur, in each case enclosing a 10 dollar bill and asking for a QSL card from the DX station for which the English amateur was the manager. Since then, other instances have come to light of blank QSL cards for rare stations being traded.

All this is nothing new. A few years ago there was a major scandal in the US when a group of amateurs with access to printing facilities produced replicas of cards from rare DXpeditions, and circulated these freely. All this might lead to getting on the Honor Roll a bit faster, but where is the satisfaction in cheating like this?

Happenings like these could, perhaps, lend weight to the view that QSL cards should not be required at all for awards purposes. Why shouldn't a certified log

extract be sufficient (it is for some awards)?

This view is put forward once again in a letter I have received recently from *DX Diary* reader John King G4VJK. John still awaits cards from ZD8LIK, 9N1RN, CO7AM, FR0FLO, VP5EE and 9X5BJ. In each case John has sent cards direct, with IRCs or green stamps. He acknowledges that no one has a duty to QSL, but in each of the above cases a card was promised at the time of the QSO.

I sympathise with John up to a point. FR0FLO, for example, used to be good QSLer, but nowadays has an appalling reputation, even with French amateurs. I can't recommend from personal experience on the others, though if any readers can help John I'm sure he would be pleased to hear.

This said, I believe it is important to retain the requirement for QSLs for major awards such as DXCC. In the heat of a pile-up it is quite possible to believe in good faith that you made a QSO with a DX station when, in actual fact, you are not in his log.

## Identity crisis

This can be particularly true if two expeditions are operating simultaneously on or near the same frequency, and each tuning the same frequency range. You may end up thinking you worked one, when actually you worked the other (yes, it does happen!). Problems of mistaken identity are also prone to occur in the heat of a contest, when call-signs are given very quickly.

Other problems can arise too. On one occasion this year I was assured by the MC of a list operation on 80 that I had made a 'good QSO', but the DX station didn't have me in the log when it came to QSL time. And on another occasion this year I thought I had worked a rare one on one of the low bands, and it turned out later that the DXpedition call-sign was being pirated at the time.

The receipt of a QSL will never be 100 per cent proof (some lazy QSL managers don't check in the log), but it does provide an added check. And, when all is said and done, isn't it rather fun to have a collection of QSLs from around the world? Any comments from you, the read-

ers, would, as always, be most welcome.

## The European syndrome

While amateur radio, no doubt like other hobbies, attracts its share of cheats, it also attracts those who are simply selfish or incompetent.

This charge has recently been levelled, by no means for the first time, at European DXers. NY6M/NH4 and KH2F/KH4, operating from remote Midway Island during the CQWW SSB Contest, complain of what they call 'European Behaviour' which caused them to go QRT in disgust on a couple of occasions.

Just what is this behaviour pattern? Well, very simply, if a DX station asks a pile-up of US or Japanese amateurs to stand-by while he works 'the station ending in alpha' then they will. If he says he is listening 'for sixes only' then only those with six in the call-sign will call. And so on.

With European stations, such requests tend to have absolutely no effect whatsoever. Indeed, anyone who has listened to a European pile-up on twenty metres chasing any sort of DX station will have observed this behaviour.

I'm not at all sure what brings it about. After all, European amateurs come from different races and cultures, but all but a few nationalities seem to be guilty (and UK stations can be quite as bad as our cousins in southern Europe).

## A chance for all

The silly thing is, that where discipline is preserved in a pile-up the DX station can work stations much more quickly and therefore everybody ends up with a better chance of getting into his log. I don't suppose things will change just because I have given the problem an airing, but there we are.

The other failing which UK amateurs often demonstrate is that, having finally made it through to the DX station, they then ask his name, QTH and what he had for breakfast. If he wants a chat, fine. But if it is a DXpedition, the aim will be to give as many people as possible a QSO in the time available.

All the above boils down to showing consideration for

your fellow amateurs, which often gets forgotten in the heat of the chase. I'm sure readers of *Amateur Radio* will avoid falling into the trap!

## Lebanon

Despite the troubles which afflict the Lebanon, there is still a high level of amateur radio activity from there. Perhaps there isn't much else to do in the evenings with a curfew in force! However, some of the more active OD5 stations are actually pirates, with no proper licence. OD5FH, secretary of RAL, the Lebanese amateur society, has written to the IARU asking it to urge amateurs everywhere to avoid contacts with unlicensed stations operating from the Lebanon.

Those which are ok (as of 22nd July 1987) are: OD5A, AO, AW, AZ, BC, BE, BU, CL, CN, EH, EP, FB, FE, FG, FH, FI, GB, GC, GI, HD, HJ, HO, HQ, HU, IG, IL, IM, IP, IW, IY, IZ, JD, JE, JU, JZ, KB (ex-OD5SM) KC, KE, KI, KO, KP, KS, KV, MD, MS, ME. Anyone else should be avoided.

## Africa

C9MKT was active in late November and early December from Mozambique. If you worked this one, the QSL route is SM5KDM. It looks as though this operation may have been properly authorised. If so, this would be the first legitimate operation from Mozambique for many years. Let's hope it's a sign of things to come.

5H1HK is now active from Zanzibar Island off Tanzania. The operator is JE3MAS, and he will be there for a year.

## Islands

While on the subject of islands, XFIC has been very active from Cedros Island. He is often to be found around 21007kHz from 1500GMT. A Brazilian group will operate as ZZ5IW, CW only on 40-10 metres, from Anhatormorin Island from 1st to 8th January. QSL to PP5IW. Meanwhile, LU1ZA is currently operational from the South Orkneys and will be there until about the end of January. QSL to LU2CN.

*Einar LA1EE (left) presents Richard Butler (Secretary General of the ITU) with a piece of rock from Peter 1st Island*



# DX DIARY

## Other DX news

VK2AU should be active from both Western and US Samoa during January. F6EKD is active from New Caledonia as FK0BA, and will be there until July.

DK1ZN and his XYL, DJ0CP, will operate /4S7 from Sri Lanka during their annual holiday from 28th December until 28th January. They will operate on 20-10 with SSB, CW and RTTY, and may even have Packet radio equipment with them.

There is talk of another operation from Revilla Gigedo planned for February. At the time of writing OH2BH was apparently looking for some European operators to join the group, with the aim of making a special effort to provide XF4 to the many European amateurs who still need this rare spot.

## Prefixes

Prefix hunters should look out for AX2SWJ, active until January 10th from the World Scout Jamboree taking place near Sydney in Australia. Check 14290, 21360 and

28990kHz. Also from Australia, VK2EKY and others will celebrate the bi-centennial during January by airing the call sign VI88ABC from Mount Buller.

No doubt there will be other unusual prefixes from down-under during this special year. And from 9-17th January look out for the special IQ9 prefix from Sicily, commemorating the emergency activity by amateurs in the Belice Valley when a major earthquake struck in January 1968.

## Ski-Trek

A joint Canadian-Soviet Transpolar Ski Trek will take place in the first few months of 1988, and amateur radio will feature extensively. VE3CDX and VE3CDM hope to operate /UA when the expedition leaves Severnaya Zemlya, and UA3CR and UA3AJH are expected to sign /VE as the group approach Ellesmere Island. At the time of writing, VE3CDX has already been active from Cornwallis Island as VE8CDX during preparations for the expedition.

## Worked all zones

*CQ Magazine* has recently carried details of the first amateurs to receive the RTTY Worked All Zones Award. JR2CFD came in first. All his contacts were made on 20 metres. There are no UK recipients to date.

The same magazine also carried some information about Mike Filippov UW0MF, the first Russian amateur to receive the 5-band WAZ Award. Mike has also provided many WAZ chasers with their first Zone 19 QSO. What a pity then to read in *DX News Sheet* that Mike has recently been closed down by the Soviet authorities for 'direct QSLing'. So much for glasnost! Mike is asking for letters of support to Box 88 in order to try and get his licence reinstated.

## Contests

As well as the *CQ Magazine* events which I mentioned last month, look out for the Hungarian DX Contest on 16/17th January (24 hours from 2200 on the Saturday), the French CW Contest on

30/31st January, and the various *73 Magazine* events. These latter are sponsored by *73 Magazine* of the USA, and have yet to attract the kind of worldwide following which attends the *CQ Magazine* events. All of these are SSB events.

## US DX

The 10 metre Contest takes place on 2/3rd January, the 15 and 20 metre event the following weekend, the 160 metre contest on 16/17th January, and the 40 and 80 metre event on 23/24th January. All of these contests are quite popular in the USA, so they are certainly a good opportunity to work some US DX. I don't have details of the scoring system to hand, but I believe there is a multiplier system based on 'countries' although *73* has its own countries list which doesn't match that of the ARRL.

That's it for another month. Do send me your news and views. My address is 105 Shiplake Bottom, Peppard, Henley-on-Thames RG9 5HJ. 73 de Don.

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# FT209 BASE STATION ADAPTOR

by STEVEN AND JOHN GOODIER

The manufacturers of today's hand-held transceivers can now offer features more in line with base station rigs. No longer are they limited by crystal control or thumbwheel switches and, by using microprocessors and frequency synthesizers, companies such as Yaesu, Kenwood and Icom can now offer more and more features in a smaller package. The Yaesu FT209 is one of the new generation of hand-helds. It incorporates a large easy to read LCD display, up/down movement in 25 or 12.5kHz steps, excellent scanning facilities plus keypad entry of frequency and ten memories. The FT209RH will deliver a full 5 watts output when running from a 12 volt supply and all versions of the rig will operate from 6-15 volts dc.

The above features make the 209 an attractive proposition as a base station unit. Yaesu offer the NC15 which is a quick charger/dc adapter and, when used in conjunction with the MH12 speaker microphone, will enable the FT209 to be used as a base station rig. Not wanting to trickle or fast charge my NiCad pack, I didn't think the NC15 would be suitable for my use, so I set out to design my own base station adapter. I decided my adapter would include the following features:

1. Internal 10.5 volt PSU
2. Built-in extension speaker
3. Microphone pre-amplifier
4. Front panel LEDs and switches
5. Facility to add a Wood & Douglas 25 watt linear at a later date.

The base station adapter is built around a diecast aluminium box and is big enough to hold the mic amplifier, PSU board and 25 watt amplifier if added. Although intended for use with an FT209 this design should be suitable for use with most hand-helds on the market today.

## About the unit

The diecast box holds two printed circuit boards, one being a PSU and switch unit and the other a microphone pre-amplifier. There is also an internal speaker and screening plate. A hole is cut into the top of the box so the rig can slide in, it is then supported from the back and bottom by a cradle. It was decided to run the FT209 from a 10.5 volt supply; the reason for this was to make the unit more compatible with other hand-helds that cannot operate from a 13.8 volt supply. On the front panel there are three switches, three LEDs and a

microphone socket. On the right hand side there is the on/off switch and above it a red LED. The centre switch is a hi/lo power switch, above and below this switch is an LED, 'red' for hi and 'green' for lo. On the left hand side is the microphone socket and above this is the Tx switch.

I decided to use a microphone socket on the prototype, because I wanted to connect tones from an RTTY unit, but if wished the socket can be replaced with an electret insert. When an electret insert is used in conjunction with the microphone amplifier to be described later, you will find that you can talk some

four to five feet away from the mic and still produce good clear audio. If wished, it is possible to leave out both the PSU and audio amplifier boards, and this will simplify construction.

If you leave out the PSU board, check that your hand-held can operate from a 13.8 volt supply first. On the back panel there are two SO239 sockets; these are intended for input and output to the 25 watt PA when fitted. Power leads are also taken in via the back panel. On the lid and to one side of the back support there are two holes. These carry audio/PTT lines from the mic amp to the mic socket on the 209, and

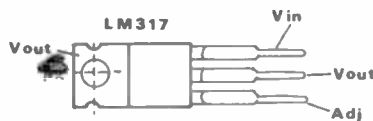
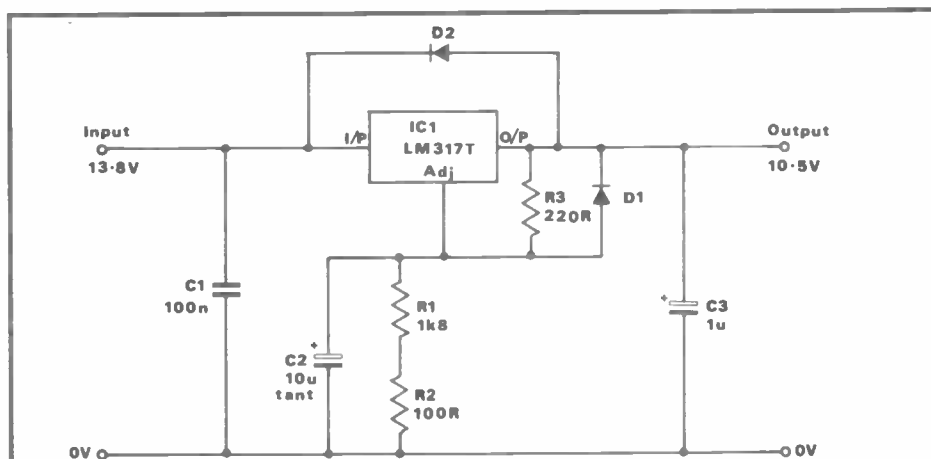


Fig 1 Showing the power supply circuit diagram along with the leadouts of the LM317T voltage reg

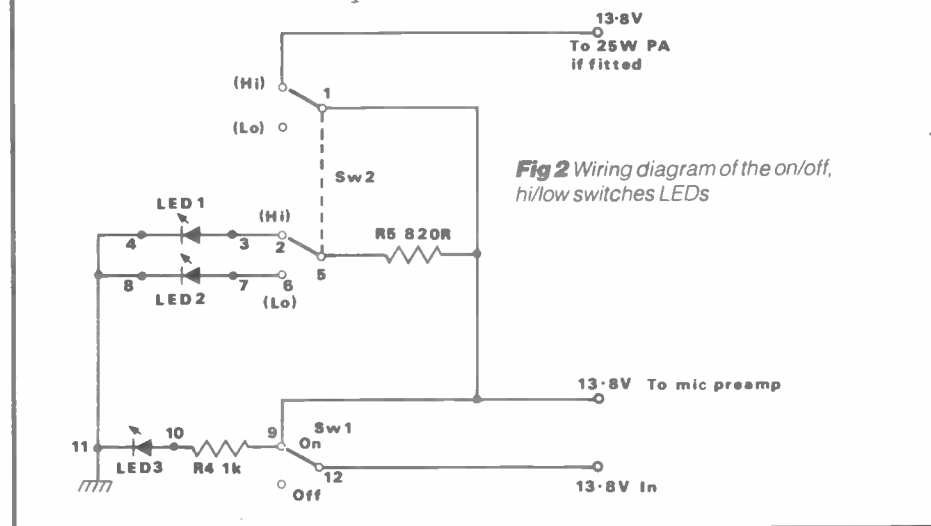
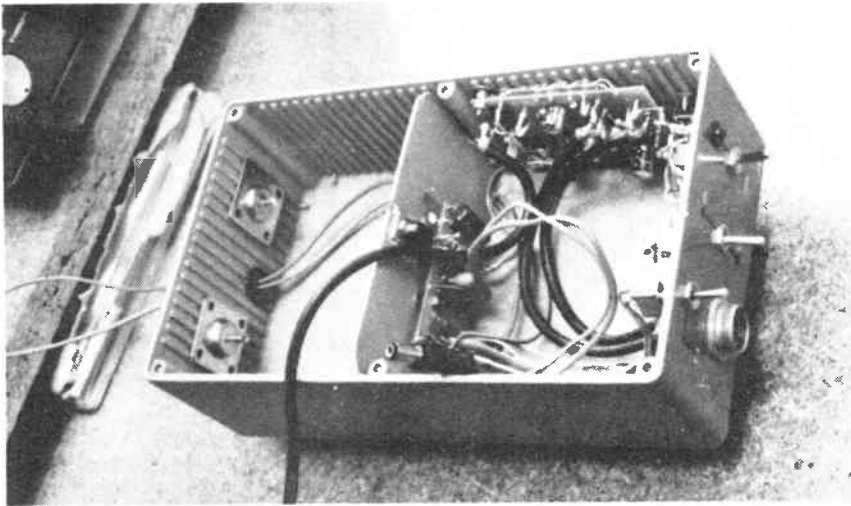


Fig 2 Wiring diagram of the on/off, hi/low switches LEDs



audio out of the 209 to the loudspeaker inside the adapter.

### The power supply and switching unit

Figure 1 shows the circuit diagram to the power supply, and it is based around

an LM317T IC in a TO220 package. The LM317T can operate with an input voltage of between 3-40 volts and can provide output voltages of between 1.2-37 volts at 1.5 amps. The device has three legs, one marked input (I/P), one marked

output (O/P) and adjust (ADJ). In our circuit we are going to drop the standard 13.8 volts down to about 10.5 volts. Resistors R1 and R2 set the output voltage and if wished can be replaced with a variable resistor of about 2k $\Omega$ . Regulator protection is provided by D1 and D2; these are included in case there is a short circuit on the input or output. Figure 2 shows the inter-wiring between the front panel switches, LEDs and the various boards. Most of the wiring is taken from the power supply PCB via ribbon cable, and this keeps things tidy. I have given each wire a number, which should make things easier to follow.

The power supply is built on a small PCB of about 60 x 25mm. Figure 3a shows the foil pattern to the board, and Figure 3b shows the PCB overlay and back view of both front panel switches. The board is simple to construct and you should have no real problems. Make sure you fit D1, D2 and the electrolytic capacitors the correct way round, and I would advise the use of miniature capacitors for C1, C2 and C3. Fit solder pins for the IC connections. The PCB and IC1 are mounted to the screening plate with IC1 using it as a heatsink.

The power supply can be tested if wished, and to do this you must first tag IC1 onto the solder pins. Connect 13.8 volts to point 9 on the PCB and wire the 0 volts line. Turn on your supply and place a voltmeter across C3; this should read about 10.5 volts. The next step is to wire a length of coloured ribbon cable to the numbered points on the PCB. If wished, it is possible to wire the ribbon to the LEDs and switches, before they are mounted to the front panel.

The 10.5 volt supply to the FT209 is taken by a length of twin ribbon cable to a standard 2.5mm power plug which then plugs into the NiCad pack of the rig. Make sure you wire this plug the correct way round, with the positive supply to the outer of the plug; there is a diagram of the plug on the NiCad information sheet supplied with the rig. When completed and tested, put the PSU board to one side until the time comes to mount it onto the screening plate.

### Microphone pre-amplifier

The next step is to construct the microphone pre-amplifier, and the circuit shown is a reprint of the general purpose microphone amplifier from the article *A Base Station Microphone* published in the November issue of *Amateur Radio*. Figure 4 shows the circuit diagram of a general purpose low noise microphone amplifier. This circuit is particularly suited to an electret type insert, but will also work well with a dynamic microphone. The amplifier is based around two BC108/109 transistors, and feedback is applied via R6; using the value shown will produce about 1 volt peak to peak output for a 10mV input. The circuit will happily run with a supply voltage of between 5 and 15 volts, and there is an onboard power supply based around R9, R10 and ZD1 to power an electret insert. The FT209 and similar hand-helds have a small dc voltage running up the audio line, this is used to

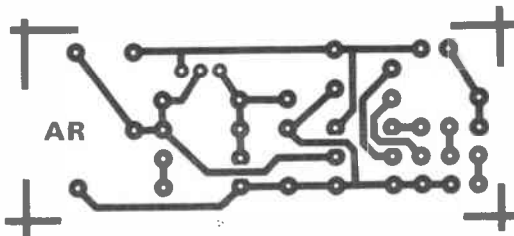


Fig 3a PCB pattern for the power supply and switch unit

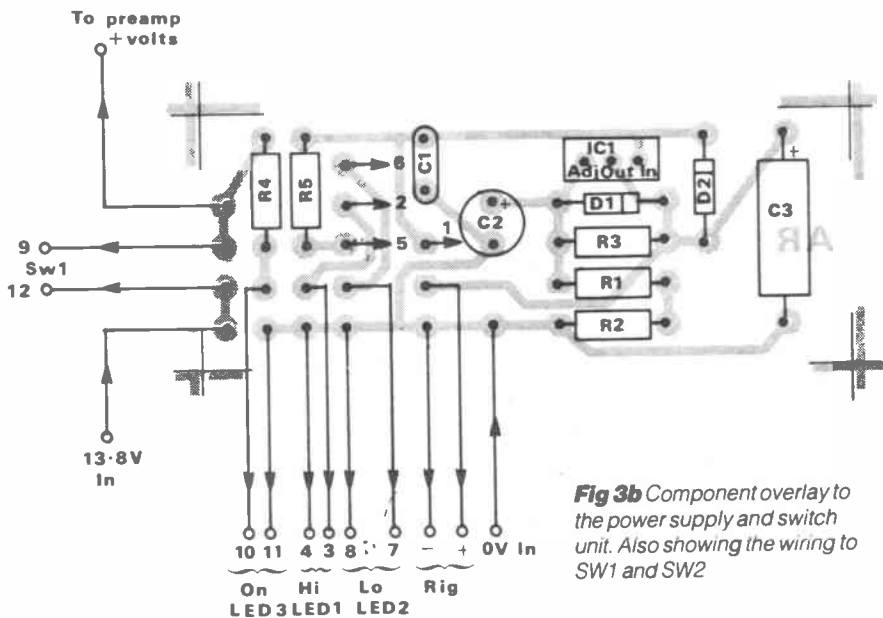
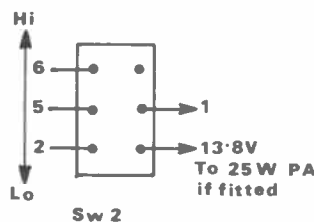
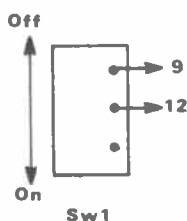
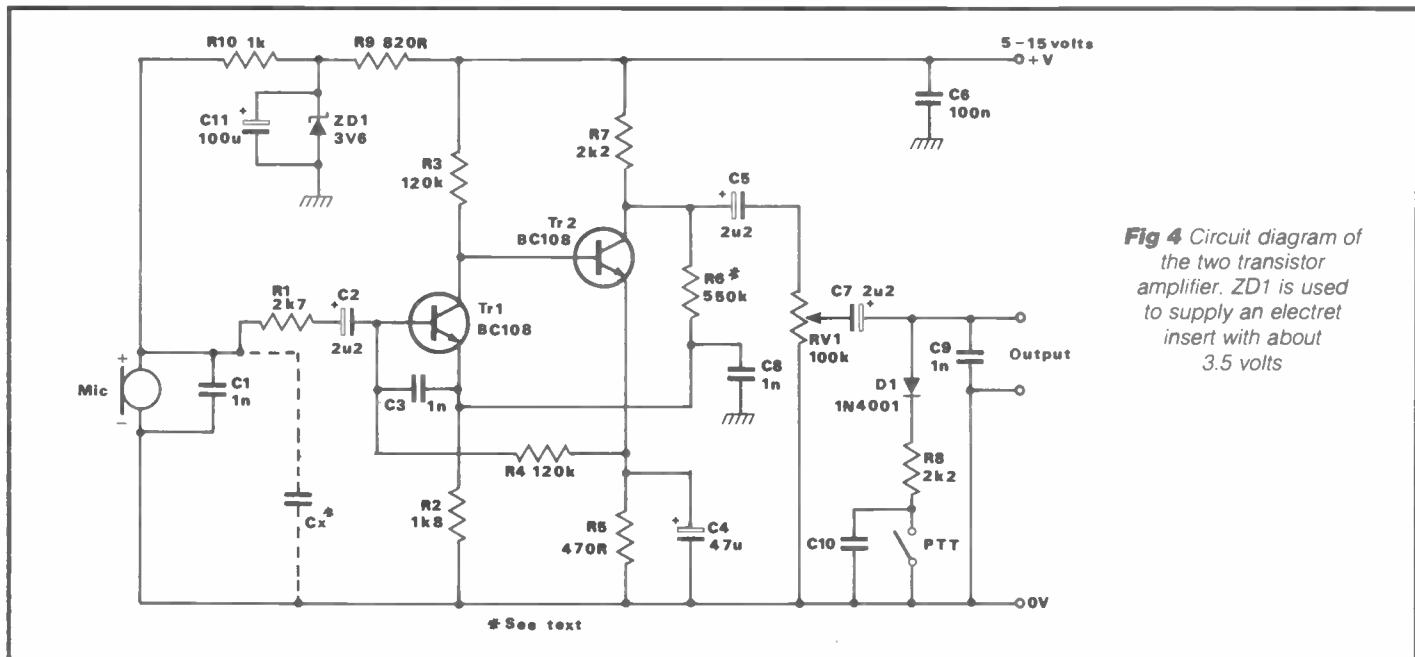


Fig 3b Component overlay to the power supply and switch unit. Also showing the wiring to SW1 and SW2





**Fig 4** Circuit diagram of the two transistor amplifier. ZD1 is used to supply an electret insert with about 3.5 volts

power an electret insert. When this voltage is shorted to earth (0V) via a 2k2 resistor it will put the rig 'on air'. D1, R8 and SW3 are used for this purpose.

**Mic amp construction**

Figure 5a and Figure 5b show the printed circuit board layout and component overlay, the PCB size is approximately 60 x 41mm. There are a lot of components packed onto this board, but construction is still very simple; again, I would recommend the use of miniature electrolytic capacitors. D1 was added at the last moment, so you will have to arrange it as shown in Figure 5b. When completed, this board will be mounted on the side of the box. Setting up and notes about Cx will be dealt with later.

**The box**

Probably the hardest part of constructing the adapter is the metalwork. My unit was housed in a 190 x 110 x 60mm diecast box, and as you can see from the diagrams and photographs, there is quite a bit of hole cutting and metal bending to be done. I will describe each part in turn and will start with the holes you will need in the box.

Figure 6 shows the layout on the top of the box, and all measurements are in millimetres and are given as an approximate guide. The first thing to do is cut the 65 x 36mm hole for the rig. I found that the best way to do this was to

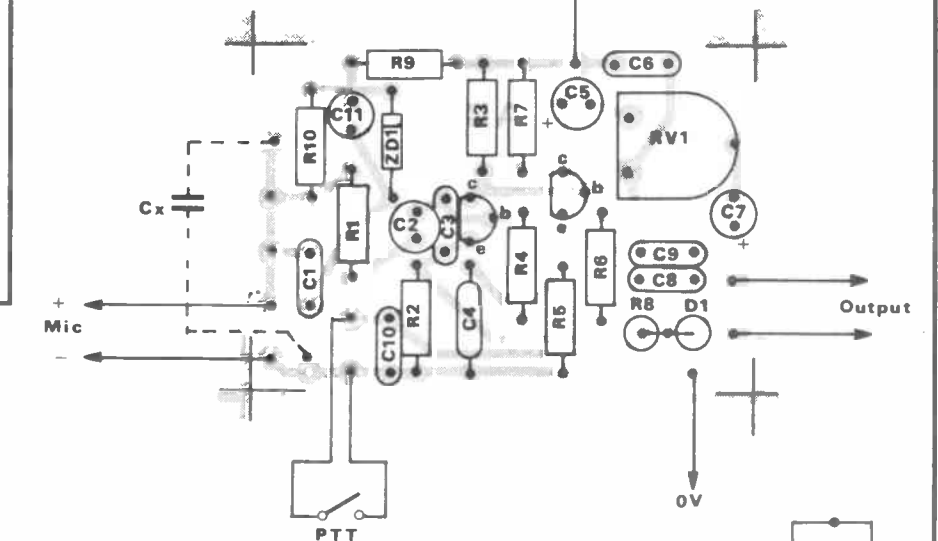
draw in pencil the outline of the cutout, then drill a number of small holes around the outline. Use a small saw or file to cut the shape out, using the drill holes as a guide. When this has been done, use a large file to shape the cutout, this time using the pencil lines as a guide. Check that the rig slides through the hole and that there is about 2mm clearance either side - this cutout will eventually be covered with a soft material to protect the rig. The next step is to mark out the holes for the loudspeaker grille; once marked, these can be drilled as shown in Figure 6. There are six more holes to be drilled in the top panel: two for the back support, two for the cradle and two to carry screened cables to the rig, but these are best left until later on.

There are seven holes to be drilled on the front panel, and if you study the

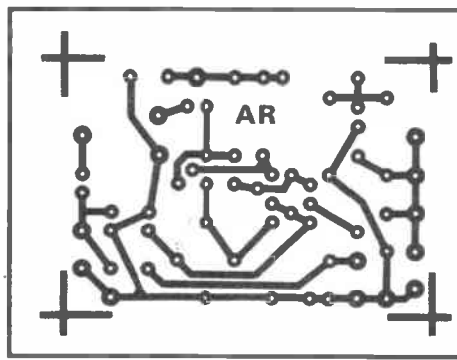
photographs, you will see that these are for switches and LEDs. As stated earlier, my unit was fitted with a multi-pin mic socket, but if you wish this can be replaced with a smaller hole to take an electret insert. Moving to the back panel, you can see that there are only three holes, two for SO239 sockets and one for the power cable. When these holes have been cut, put the box and lid to one side for the moment and we will return to it when the back support and cradle have been made.

Figure 8a shows the back support, which is used to stop the rig falling back when it is slid into the adapter. This support is made from a piece of aluminium measuring 145 x 55mm. Cut and shape the metal as shown; it's important to round the corners, as this will help prevent damage to the rig. Drill

**Fig 5b** Component overlay for the amplifier. R8 and D1 will have to be mounted as shown



**Fig 5** The printed circuit board pattern for the transistor amplifier





the two mounting holes and then bend it to shape as shown. The next step is to make the cradle and this is shown in Figure 8b. The procedure is very much as above; start by cutting a piece of aluminium 95 x 55mm in size. Drill the two mounting holes, round the corners and bend as shown. The back support and cradle can now be used as a template, to mark the four holes needed

to hold these in place. The remaining two holes on the lid are used to carry screened cable to the rig.

The last piece of metalwork is the screening plate and this is shown in Figure 8c. It is used to screen the microphone amplifier, PSU board etc from the 25 watt amplifier if fitted, it is also used to mount the PSU board and as a heatsink for IC1. If you are not planning

to fit the 25 watt amplifier then it is not needed, and the PSU board and IC1 can be bolted to the bottom of the box. The plate is made from a piece of aluminium 106 x 54mm, and is cut and shaped as shown. It fits into the slotted grooves which run along each side of the box. There are two slots cut into the plate, the top one is used to take audio cable to the loudspeaker, and the lower slot is used to feed the power supply cable to the switches etc. Screw type feed through capacitors may be used here if wished.

The next job is to paint the box, and the best way to do this is to use a car paint spray. I used a grey primer to prime both the inside and outside of the box, then it was painted a light blue. All metalwork that comes into contact with the rig must be covered with a soft material and this includes the cutout, back support and cradle. The material I used was a soft cloth intended for car seat covers. The best way to hold it in place is to use double sided tape and glue the overlapping edges with Evo-Stik impact adhesive.

Stick a piece of loudspeaker cloth over the speaker grille, and then stick the loudspeaker in place with impact adhesive. The loudspeaker can be of almost any type that fits, the one I used was from an old cassette player and it produced superb audio. The last job is to label the switches, LEDs etc with Letraset; this is available from most art shops, WH Smith's or from RS Components.

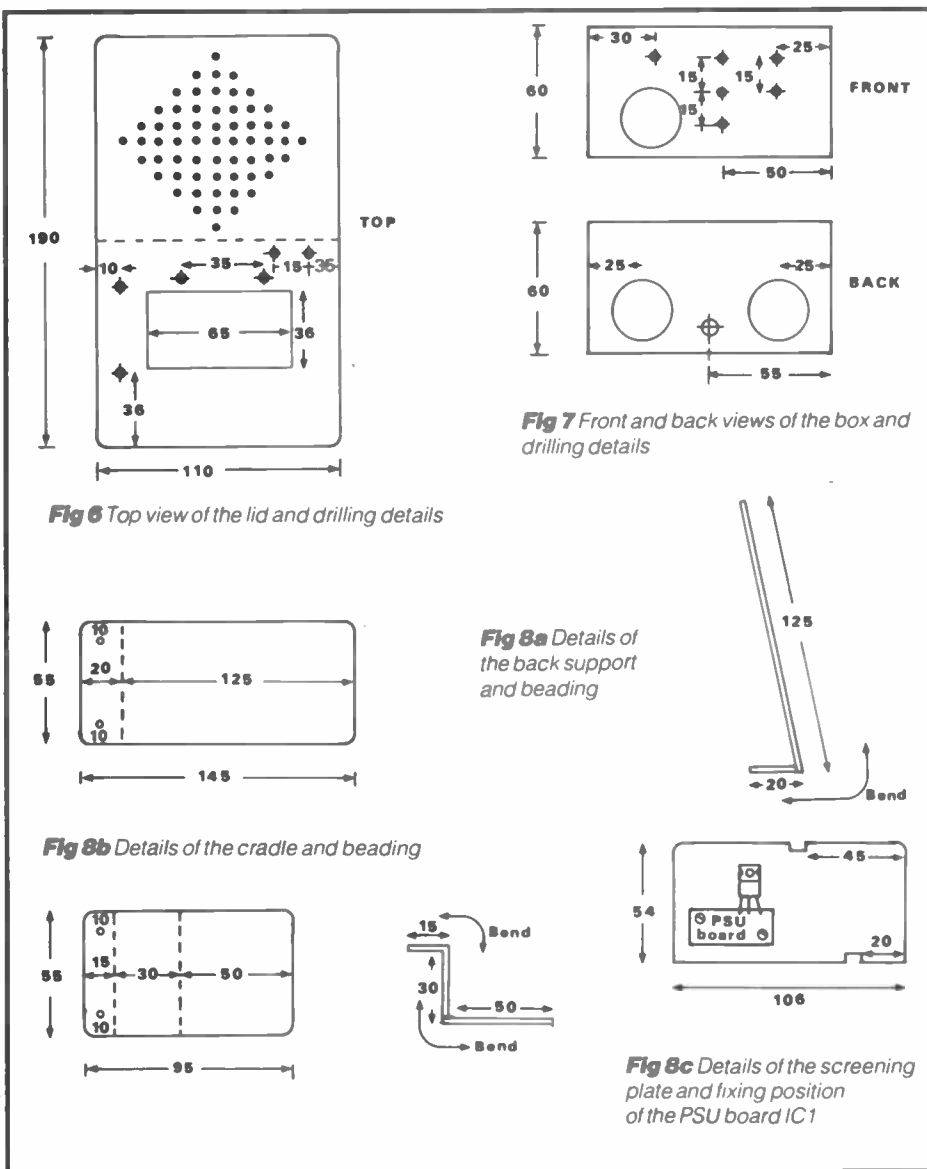
### Final construction

All the individual parts can now be put together to form the complete unit. Attach the back support and cradle to the lid of the box. IC1 can be bolted to the screening plate as shown in Figure 8c. It is important to use an insulating kit to mount the IC, this is because the IC case is connected to the output, and therefore must not short to earth. When fitted, check that there are no shorts to earth with an ohms meter. Make sure that all flying leads are connected to the PSU board and then fit this into place, solder the IC legs onto the solder pins. If you have not already done so, wire the front panel switches, LEDs and fit them into place on the front panel. Connect all wires to the microphone amplifier, make sure all audio lines are screened and fit this into place on the right hand side of the case.

The electret microphone has a positive and negative side, so make sure you wire this correctly. The amplifier output is taken through one of the holes in the top of the box, and is attached to a 2.5mm jack plug which then plugs into the 'MIC' socket on the FT209. The loudspeaker output (marked 'EAR' on the 209) is taken from a 3.5mm jack plug through the remaining hole and is connected directly to the speaker.

### Final testing and setting up

Check all wiring and when satisfied fit a 1 amp fuse in line with the power supply lead and connect 13.8 volts. Do not connect the rig for the time being. Set VR1 on the amplifier board to centre and



switch on. The 'ON' LED should light along with one of the other LEDs depending on the position of the hi-lo switch. Check for 10.5 volts on the 2.5mm power plug, remember positive is on the outside. If all is well switch off, connect the dc power plug to the rig and slide it into place. Connect the 'EAR' and 'MIC' plugs.

I used a small patch lead to connect the antenna to the rig. One end was fitted with a BNC plug and the other had a PL259 fitted; an in-line joiner was used to make the connection to the antenna lead. Switch back on and make sure the rig is receiving, the audio quality should be greatly improved by the use of the external speaker. Pressing the 'Tx' switch (SW3) should put the rig into transmit mode. Check for audio quality on transmit, the audio output level can be adjusted by using VR1. Cx on the amplifier board should not be needed, but it can be used to change the tone of the audio on transmit. Changing the value of R6 will alter the gain of the amplifier.

### Conclusion

There is no doubt that the FT209 is a very versatile piece of equipment, and when used in conjunction with the base station adapter makes a very useful home station. Using the power supply described, the rig will run just under 5 watts output on high power and about 1 watt output on low, the 1 watt being ideal to drive a 25 watt linear. At the moment I am looking at the possibility of fitting a 25 watt amplifier to the unit, and I hope to follow this article with a review and the fitting of the Wood & Douglas 144LIN25B linear amplifier in a future issue.

With a little thought, the unit could be



adapted to work with most other hand-helds. The nice thing about the FT209 is that once a dc power plug is pushed into the dc socket the NiCads are disconnected. I'm not sure how other hand-helds work with respect to this, so I cannot offer any help. As far as I know the audio and PTT lines should work the

same as the 209, ie shorting the inner to earth with a 2k2 resistor putting the rig onto transmit. I have found the adapter so useful that I would not hesitate to build another unit for a 70cm hand-held and run them side by side.

I would like to thank Rik Whittaker G4WAU for the photographs.

### Components List: Power Supply Board

#### Resistors 1/4 watt 5%

R1 - 1k8	R4 - 1k
R2 - 100R	R5 - 820R
R3 - 220R	

#### Capacitors

C1 - 0.1µF  
C2 - 10µF 16 volt Tant  
C3 - 1µF 16 volt min elec

#### Semiconductors

IC1 - LM317T voltage reg  
D1, D2 - 1N4001  
LED1 - 3mm red  
LED2 - 3mm green  
LED3 - 5mm red

Maplin WL32K  
Maplin WL33L  
Maplin WL27E

#### Miscellaneous

SW1 - sub-miniature SPDT  
SW2 - sub-miniature DPDT  
LED holders  
PCB board  
10 way ribbon cable  
Semiconductor mounting kit (TO68)

Maplin FH00A  
Maplin FH04E

Maplin XR06G  
Maplin WR23A

### Components List: Transistor Amplifier

#### Resistors 1/4 watt 5%

R1 - 3k7	R7 - 2k2
R2 - 1k8	R8 - 2k2
R3 - 120k	R9 - 820R
R4 - 120k	R10 - 1k
R5 - 470R	VR1 - 100k
R6 - 560k	

#### Capacitors

C1 - 1nF	C7 - 2µ2 16 volt min elec
C2 - 2µ2 16 volt min elec	C8 - 1nF
C3 - 1nF	C9 - 1nF
C4 - 47µF 16 volt min elec	C10 - 1nF
C5 - 2µ2 16 volt min elec	C11 - 100µF 16 volt min elec
C6 - 1nF	Cx - see text

#### Semiconductors

TR1/2 - BC108 or equivalent  
D1 - 1N4001  
ZD1 - 3V6 400mW

#### Miscellaneous

SW3 - sub-miniature SPDT  
Electret insert  
PCB board

Maplin FH00A  
Maplin QY62S

### Additional Components

Diecast box 190 x 110 x 60mm  
Aluminium plate  
Screened plug 2.5mm  
Screened plug 3.5mm  
Power plug 2.5mm  
SO239 chassis mounting socket - 2 off  
Mic socket  
1 amp fuse and holder  
Screened cable  
4 or 8 ohm speaker 76mm  
Speaker cloth (black)  
Soft material to cover metalwork  
Nuts, bolts etc

Maplin LH74R  
Maplin XY19V  
Maplin HF77J  
Maplin HF81C  
Maplin HH 62S

Maplin YW53H  
RY00A

# HF ANTENNAS FOR SMALL GARDENS

Don Field G3XTT continues with the third installment of his series and discusses the theory and practicalities of reducing the size of an antenna without losing out to an unacceptable degree in terms of performance.

In the first two articles in this series I concentrated on full-sized antenna systems which you might consider even in a small garden. However, although ten metre beams, for example, are relatively small and light, a twenty metre beam is another matter. So the question arises: to what extent is it possible to reduce the size of an antenna, without losing out to an unacceptable degree in terms of performance? And then the practical question, how can this be done?

Quite a lot of highly theoretical stuff has been written on the subject of achieving size reduction as close to the

theoretical limit as possible. For some users, such as the military, this is worthwhile, and they are prepared to go to extremes of effort and expense to achieve it.

For example, if they have to gold plate all the loading coils in order to reduce losses, so be it. For the average amateur this isn't a course of action with much attraction!

Before we go on to some practical designs, though, *Table 1*, which first appeared in *Electronics Letters* in 1973, gives some idea of what we are up against. Without going into too much

detail, basically it shows how far it is possible to go in reducing the length of a vertical antenna before efficiency falls below 50% of that which would be achieved with a full-sized quarter wave (the transition length). It also assumes that loading is by way of a loading coil, and the transition lengths are tabulated for a loading coil 'Q' factor of 100 and for a factor of 300.

The point to draw from the table is that the 'Q' of any loading components is critical if significant size reductions are required, and that the thicker the radiator, the more reduction in length that can be tolerated. Let's take the two extremes in the table, for example. With a thin radiator (ie a wire), together with a Q factor of 100 in the loading components, the vertical radiator can be reduced in size to 0.09 of a wavelength before the efficiency drops below 50%, whereas with a thicker radiator (eg tubing of some sort) and better quality (lower loss) loading components, a reduction in height to about 0.05 of a wavelength can be tolerated before a similar drop in efficiency occurs. On Top Band this could mean the difference between a 47ft radiator and a 26ft one, to achieve the same results.

Some amateurs can take full advantage of what I have described above. I know of one amateur who has constructed a small transmitting loop out of copper piping, and tunes it with a vacuum variable capacitor. Great care has been taken in the construction and only the highest quality materials are used throughout.

Usually though, it is only the commercial boys who can afford to go to the required lengths. Commercial antennas often have silver plated coils, for example. For most of us, more mundane materials have to suffice.

In general, a useful rule of thumb is that a reduction in antenna size by one third, down to two thirds of the full self-resonant size, is usually possible without any noticeable effect on performance. It is interesting in this respect to note that the majority of triband beams have elements of around 24ft in length, or two

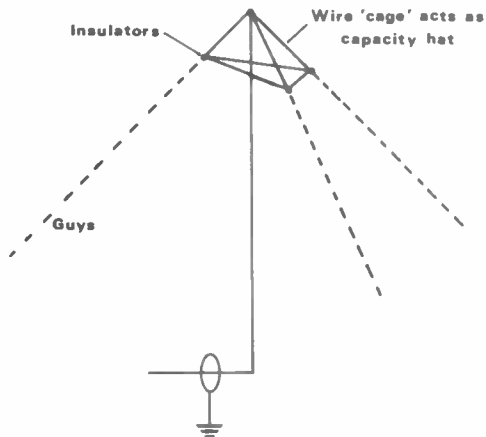
$h/a$	$h/\lambda$ Q = 300	$h/\lambda$ Q = 100
50	0.046	0.066
500	0.057	0.082
5000	0.065	0.094

$h$  = antenna height,  $a$  = antenna radius,  $\lambda$  = wavelength

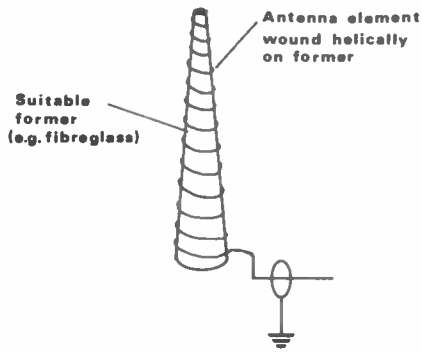
**Table 1** Antenna transition lengths



**Fig 1** Capacity hat.



**Fig 2** Alternative capacity hat made from top of guy wires



**Fig 3** Helically-wound vertical

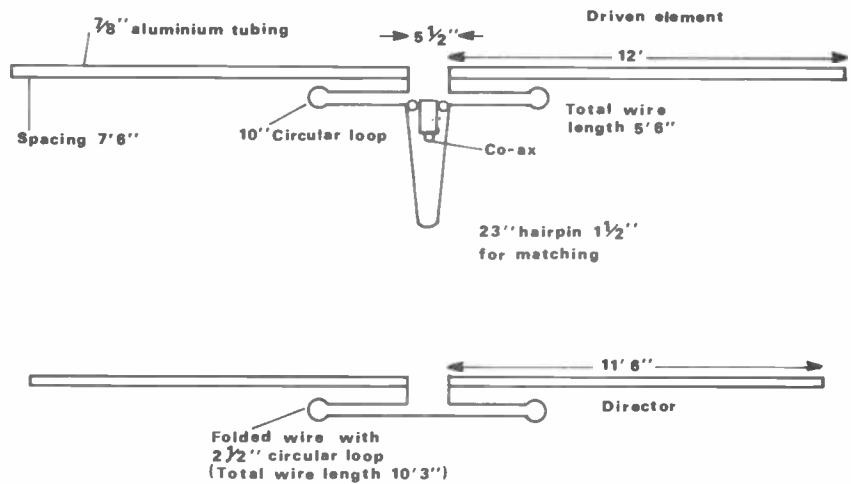
thirds the size of a full size twenty metre yagi. Anyway, enough of the theory. Let's have a look at some practical ways in which size reduction can be achieved.

Essentially, there are three approaches which can be used. One is to use inductive loading, usually by way of a coil inserted at some point along the antenna. Another is to use capacitive loading. The third is to use a combination of the two.

Each of the above approaches can be applied to the various sorts of antenna which we looked at in my earlier articles. Let's start by looking at the simple dipole or loop antenna. Inductive loading in the legs of a dipole is actually used quite frequently by amateurs. The traps in a trap dipole act as a parallel resonant tuned circuit at their resonant frequency, but appear as an inductive reactance on the lower bands.

Thus an 80/40 metre trapped dipole will be shorter than a full-size 80 metre dipole. Most traps, though, are designed for minimum weight in order to prevent too much sag in the wire, with the result that the thinnest and therefore lossiest wire is used in their construction. I have seen some very much more substantial traps originating from a Scandinavian manufacturer, but to support them the dipole itself would have to be made of very strong wire.

There is, of course, no need to use resonant traps to shorten a dipole. If single-band operation is all that is required, then a straightforward coil is all that is necessary. Remember that the inductance of the coil, and therefore the number of turns, required to achieve the necessary degree of size reduction will vary, according to where the coil is in the antenna. If it is close to the feed point fewer turns will be required, but the current is higher at this point, so losses will tend to be greatest. More turns are required to achieve the same effect if the



**Fig 4** WOYNF linear loaded 20m beam



**Fig 5** Combined capacitive and inductive loading as used in several commercial mini-beams

coil is further from the feed point, but the current flowing through the coil will be less. Some of the theorists have worked out that the optimum position for a loading coil is about two-thirds of the aerial length away from the feed point.

A similar approach to the above can be taken with loop antennas and, of course, with verticals. Remember though, that as an antenna is reduced to less than its normal resonant dimensions, its feed point impedance will fall. This can cause matching problems with both dipoles and loops, but becomes of especial significance with vertical antennas, where earth losses can very quickly account for a substantial proportion of the power which you are feeding to the antenna.

Therefore, with ground-mounted verticals, it is especially important to pay attention to good quality construction and, if possible, to getting the loading inductance away from the feed point (ie the high current part of the system), as discussed above. Of course this can be difficult in physical terms; it is much easier to mount a coil at ground level than high in the air.

In all cases, where inductive loading is used, when I talk about using the lowest loss, highest Q inductor, this means aiming to use good quality wire or tubing, preferably substantial enough to be self-supporting so that no coil former is required. Where the coil must be wound on a former, ensure that this is of a material such as fibreglass or ceramic rather than, say, PVC tubing which can be lossy at RF.

A much better alternative with vertical antennas is to make up their length by configuring them as an inverted-L (as discussed last month) or using a 'capacity hat'. The ideal capacity hat would be a circular metal disc sitting on top of the vertical radiator. In practice a number of 'spokes' projecting horizontally will have almost the same effect, especially if their ends can be joined (see Figure 1). Another alternative is to make the top of the guys into the capacity hat (see Figure 2). In the case of a horizontal capacity hat, a useful rule of thumb is that the height reduction achieved is about twice the diameter of the capacity hat. Thus, to make a 40ft radiator resonant on 80 metres would require a capacity hat of roughly 10ft diameter.

As I said earlier, a combination of inductive and capacitive loading can be employed. In the example above, for example, you might only be able to manage a capacity hat of 5ft diameter on the 40ft vertical; leaving the additional length to be made up by the use of a loading coil, but one of fewer turns (and therefore less lossy) than if no capacitive loading had been employed.

Another approach would be to use a helically wound radiator (ie to make the whole antenna like a long spring). A helical radiator can be made by winding on to a suitable insulating former (see Figure 3). The choice of former material is important, as described above in the context of loading coils. Many materials, such as those used in plastic water pipes, can be lossy to RF and are unsuitable.

# HF ANTENNAS

Fibreglass is a good choice, and the kind of lengths which are available for making quad spreaders are suitable.

Helically wound antennas have a more even distribution of voltage and current than those with 'lumped' inductance or capacitance, and this usually leads to a feed impedance which is easier to match to the feeder. However, making a helical radiator is quite difficult and the exact dimensions are hard to predict in advance, so this is an approach which is probably not suitable for beginners (neither is it favoured by manufacturers of commercial antennas).

We have looked at how the use of loading can be applied to simple antennas. Now let's look at some yagis and quads. *Figure 4* shows an inductively-loaded short yagi for 20 metres. This design is due to W0YNF and first appeared in *QST*. Many readers will also be familiar with the various commercially made small yagis available in this country which use a combination of inductive and capacitive loading at the ends of the elements (*Figure 5*). The difficulty with this approach is making the capacity hats sufficiently robust to withstand the rigours of winter weather.

One that I used to have tended to shed its capacity spikes during the winter, so that its resonant frequency gradually moved out of the band. Incidentally, that particular antenna was only about half-size on twenty metres, and on that band its performance was worse than that of a dipole or loop. On fifteen and ten where it was at least two-thirds full size it performed quite well, again justifying the rule of thumb which I gave you early on in this article.

A very different approach to size reduction in yagis, and one which is easier for the home constructor to use, is that typified by the VK2ABQ beam. The design for this first appeared in the UK in January 1974 and was then largely forgotten for some years, but has recently undergone something of a renaissance. The VK2ABQ approach (*Figure 6*) leads to a triband beam with a maximum wingspan of 24ft, admittedly not much less than that of most popular triband yagis, but much easier to home construct.

Gain and front-to-back ratio will be rather less than a full-size beam, due to coupling between the radiating element and the reflector, but performance is still significantly up on a dipole. This approach to size reduction can be taken further if steps are taken to 'neutralise' the coupling between the driven elements and the parasitic elements. G6XN is the great proponent of this technique and he has written about it in various articles and books over the years. However, getting such antennas trimmed for best results requires a lot of painstaking effort and is certainly not for the beginner.

In the case of quad antennas, once

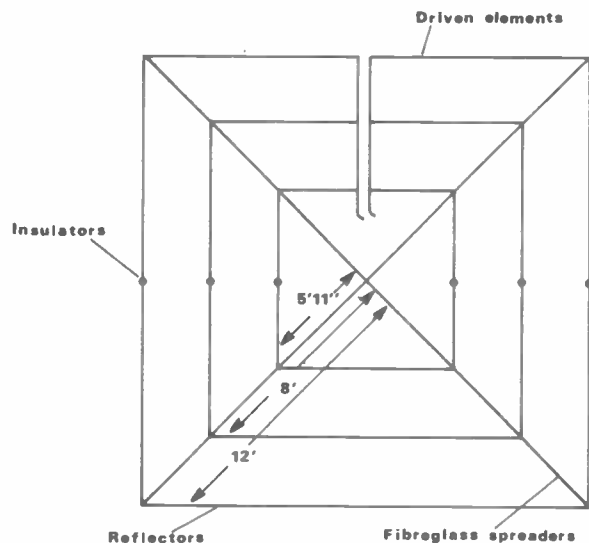
again it is possible to use either inductive or capacitive loading, and published designs have appeared for both approaches. In *Radio Communication* in October 1976, for example, G3YDX (now GW3YDX) described a capacitively loaded 20 metre quad almost exactly two-thirds full size. More recently in the same journal, 9H1GL took this approach a stage further (*Figure 7*) by inserting a tuned trap so that the capacitive loading element only came into play on twenty.

The end product is a three band quad which is exactly the same size as a fifteen metre quad. The results, according to the author, are good. Inductive loading would be less appropriate to quads, both because it would be more lossy, and because it would be physically more difficult to achieve.

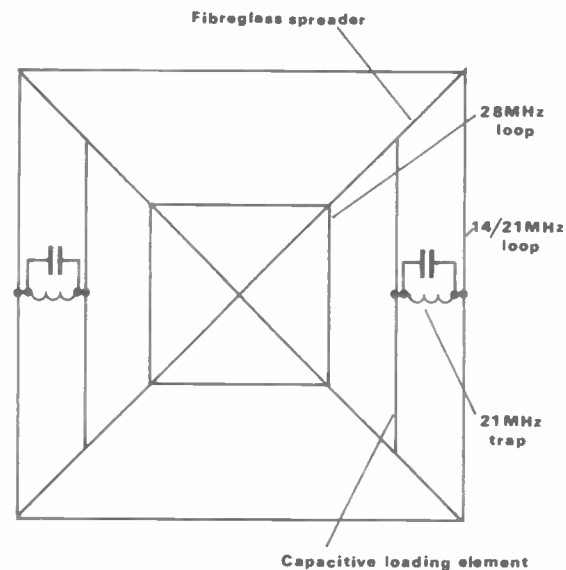
The approach to size reduction of yagis

which I describe above is basically only suitable for single-band antennas, at least as far as the home constructor is concerned. However, because a multiband quad antenna uses separate elements on each band, there is no reason why you shouldn't be able to make a multiband quad where, for example, the 20 metre elements are reduced in size by capacitive loading, and full-sized elements are nested within them for 15 and 10 metres.

Amateurs who have tried this approach have found that performance is perfectly satisfactory on all bands. The 9H1GL technique simply takes this a little further. I haven't said very much above about feeding any of these antennas, but I do intend to turn to this aspect next time, along with a discussion of some popular designs for multiband antennas which can fit into a confined space.



**Fig 6** VK2ABQ beam



**Fig 7** The 9H1GL quad



# ANGUS McKENZIE

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# TESTS

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## KENWOOD TR851E 70cm multimode mobile transceiver

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### A handsome twin for the excellent TR751E 2m multimode mobile

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In the Summer of 1985 I gave a very strong recommendation to the TR751E 2m multimode mobile, finding it by far the best in its class that I had ever reviewed. Many friends of mine purchased the model on my recommendation, and they have all said how delighted they still are with the rig!

The TR851E is almost identical to the 751E, but covers the 70cm band instead, from 430 to 440MHz. Although 70cm multimode mobile operation has not been particularly popular in the UK, FM mobile is now advancing at a faster rate, which is very encouraging. Only very rarely have I heard 70cm SSB mobile, but this is quite simply because of the absence of any commercially made mobile antennas suitable for the band. An Alford slot would be too large, but I would have thought somebody could have made a 70cm omni-directional clover leaf, rather like three halos in one, having some gain over a dipole.

Although this rig is primarily designed for mobile use, it will probably be used more as a home base station, especially as it is much cheaper than the Kenwood 811E, let alone the Icom 475E.

#### Facilities

The rig runs off 13V dc and delivers a nominal 25W from an N type socket on the rear panel. It incorporates FM, USB, LSB and CW, these modes being selected on light touch buttons on the front panel. When you press any of these, you actually hear on CW a letter signifying the mode as an immediate reminder. This facility will be particularly useful for blind operators, who will also be delighted that the Kenwood VS1 voice

frequency readout is available as an option, costing just £32.26 extra, including VAT.

The tuning knob rotates in well defined, but smooth, click steps, and on FM these give 5 or 12.5kHz channels. On SSB and CW the channelling can be switched to 50Hz, 1kHz or 5kHz, the 'F step' and 'Scan' buttons effecting the selection. The rig has ten memory channels accessed in the usual way, and these can retain mode, shift and frequency. Memories 9 and 0 can be used for storing completely separate Rx and Tx frequencies if a non standard split is required. Memory 1 can be selected to give priority alert, memory 7 contains the start frequency used during a search for an open channel when the DCL system is operating, memory 8 can be used for selecting a channel to be excluded in DCL scanning, and memory 0 is used to select the programme scan frequency range.

Two split concentric rotaries on the front panel adjust Rx audio gain (push for 13V on/off) and squelch behind it, whilst the second pair covers switchable RIT and Rx RF gain control. On the left side of the front panel are buttons selecting MHz up/down (doubling as memory up/down); speech frequency readout; function (applies second function for certain other buttons); 1750Hz toneburst on/off; high/low power (25/4W nominally, on all modes); noise blanker on/off; and RIT on/off. On the right side of the front panel are two rows each of five buttons, which select mode, reverse repeater, memory recall, A/B VFOs, offset (cycles between simplex, plus and minus shift), memory write, scan and tuning steps.

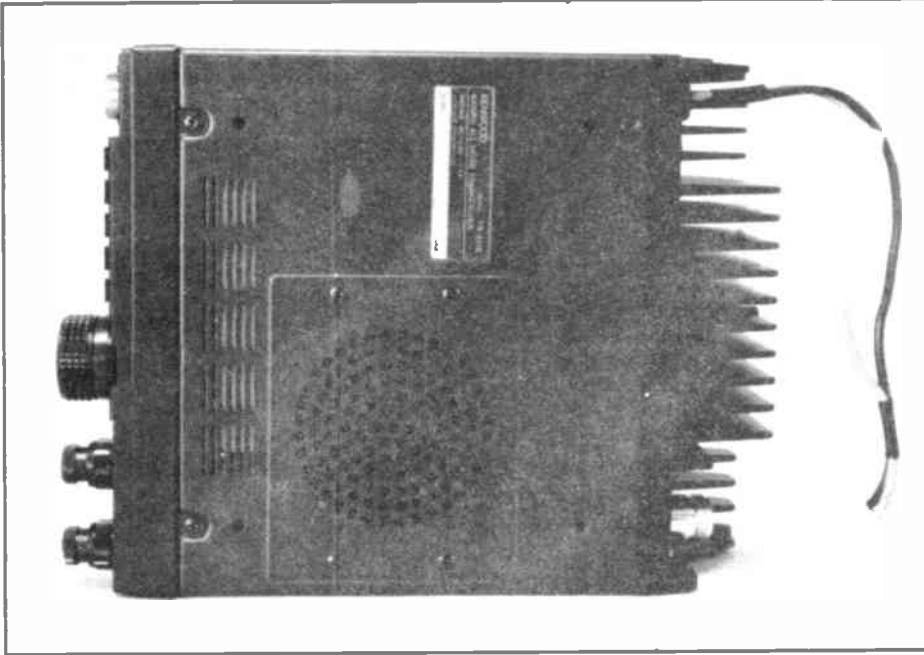
These ten buttons also select the required memory channel directly. The equipment can incorporate DCL with an optional board costing £30.95 including VAT. Five more buttons provide various DCL functions.

The digital frequency readout is black on green and is very easy to read. The display also includes some status indications, whilst others are indicated by a light above the appropriate button, eg mode. A standard Kenwood eight-pin mic socket is mounted on the front, and a hand mic including up/down scanning buttons and PTT is supplied, together with a mobile mount. The speaker is mounted underneath the chassis, and holes along the sides are provided for use with the mounting bracket so that the angle of the set can be adjusted. Within the set are adjustments for beep tone volume, side tone gain, low power level, and semi break-in delay time adjustment for CW.

#### Sockets and leads

The 13V input is on an attached lead with special flying socket, a very long extension being provided (2 metres), which is fused in both positive and negative lines. Miniature jack sockets are provided for external loudspeaker and Morse key. An accessory socket (plug supplied) allows control of an external linear, having connections for ALC return, earth and two relay connections (hooray – they are short circuit on Tx and open on Rx, with a maximum current of 0.5A through them on Tx, and 30V across them on Rx, which should be just fine for solid-state linears such as BNOS). The N type antenna socket

## G3OSS TESTS

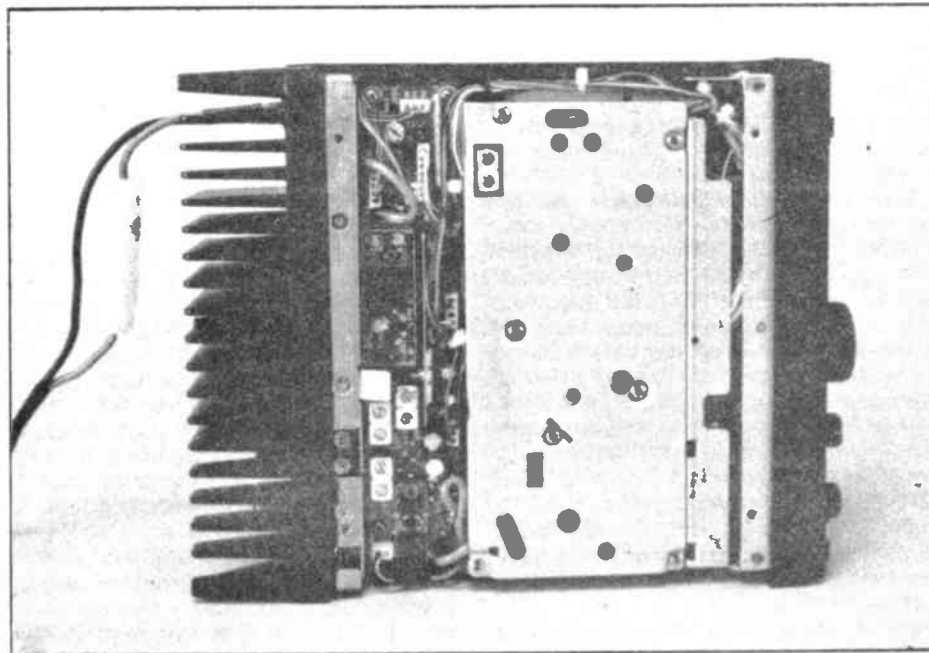
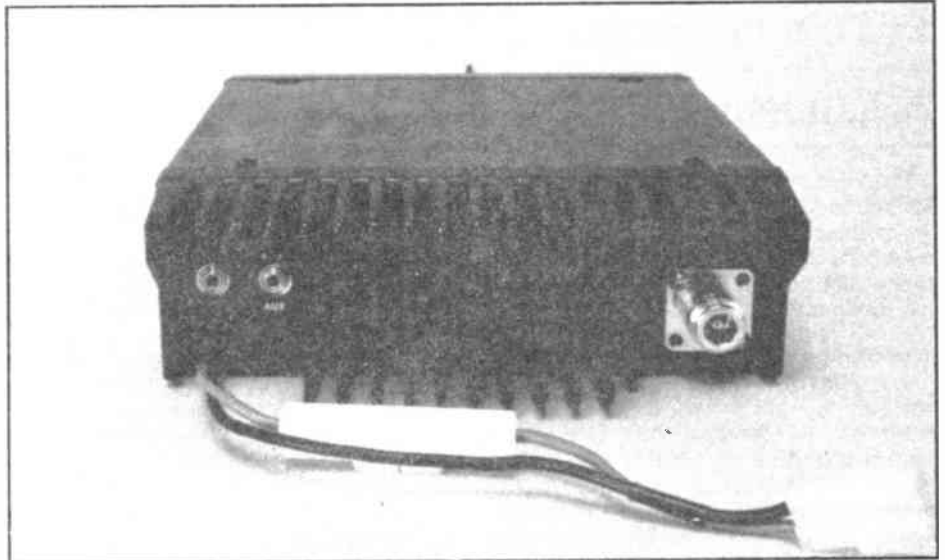


completes the back panel interconnections, and there is also a large heatsink, although there is no cooling fan.

### Subjective tests

I was able to give this rig a good subjective test just a few days before my entire VHF, UHF and microwave antenna system came crashing down in the dreadful October storm. The receiver was very sensitive, and certainly more so than its predecessor, the TR9500. Audio quality was excellent on SSB and FM and selectivity seemed adequate, although there was no facility for adding a proper CW filter.

The 50Hz steps on SSB and CW will be adequate for most people, but I found myself using RIT as my pitch sensitivity is unusually high. The squelch control operated on all modes, and on SSB there seemed to be plenty of RF gain which



could be backed off with the RF gain control. The transmitted quality was excellent, provided that I did not 'eat the microphone', and it was useful to be able to switch to low power on SSB as well as FM. I did not experience any intermodulation problems in the front end, and I did not note any spurious nor any other Rx problems.

I very much liked the feel and operation of all the buttons, and ergonomically the rig is extremely similar to the TR751E, both of which therefore have very fine ergonomics, a lot better than earlier models. I liked, in particular, the fact that memory channel access was easy, and the recovered channel is immediately put into VFO when the tuning knob is moved. Thus, there is an immediate memory to VFO function if you want it. It is also convenient that the memory can store frequency step, toneburst and duplex details.

And now to a few words of criticism. Fiona and I found some parts of the instruction book to be either much too

vague, too indirect or almost assuming that all users would be of below average intelligence. For example, when storing a VFO frequency into memory, a table did not infer directly that you should first press 'memory' and then, whilst it was beeping (for only one and a half seconds), you had to press a number key between 1 and 0 to put the VFO frequency into the chosen memory.

It inferred to us that one should push the memory write button and then press memory again during the beeps. This is why, for a while, I found I kept on using memory 8. I also do not like instructions in the form of a table. In addition, many of the memory functions are not dealt with in the 'memory' section, but you have to search for them in sections such as 'operation' or 'reception'.

How about a drawing of a hand, pulling out a mains plug from the wall by tugging at the power cord! By the side of this remarkable drawing is the wording 'always grasp the plug'. Above this is a drawing of a wet hand touching a mains

plug and getting a shock, with the caption 'touching the power plug when your hands are wet may result in a serious electric shock'. Could someone please remind Trio/Kenwood that the TR851E will not work for very long if directly connected to the mains, as it has a distinct preference for 13V dc.

And now for something that caused hilarity at my QTH. 'If an abnormal smell or smoke is detected, immediately turn the power off and pull out the power cord. Contact your dealer or nearest service station'. Perhaps the Japanese do not have Brussel sprouts fields by the side of the roads, nor do they have German Shepherd dogs like Fiona and I have, who seem to have a predelection for baked beans. I would most certainly tire of unplugging the rig and contacting the importer every time I detect a pong in the car! I think we all know an 'expensive' smell, and we can soon detect smoke coming from under the dash.

I have previously detailed the operation of the DCL system on more than one occasion. I do think it is quite a good idea, and at least the extra board is not too expensive, but unfortunately Kenwood have discontinued their little microprocessor operated screen which interconnected with the extension loudspeaker socket, and allowed you to see who had called you while you were out. If you have a computer, then you will probably be able to write a program to give a similar facility, but some people do not have a PC, whilst others may not have the ability or desire to fiddle about with programmes to get them to work.

## Laboratory tests

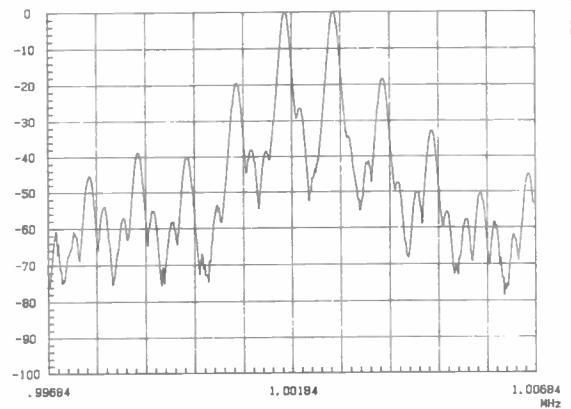
The front end sensitivity on FM measured as well as that of any other 70cm rig that I can remember, and on SSB I obtained a figure which was not far from being so good that I almost began to wonder if it was untrue! After thinking deeply about it, and taking into account the approximate noise bandwidth of the system, the measurement seemed to be pointing to a noise figure slightly better than 2dB, which is very remarkable on a black box. However, at this frequency I must add that I cannot guarantee my measurements to better than  $\pm 1$ dB, and since I am not prepared to believe an even more minus level, it might be better to suggest that the noise figure is somewhere between 1.5 and 2.5dB!

The RF input intercept point measured quite well for large spacings, and did not deteriorate too much for closer in spacings. Consequently there should not be any problem with this rig in terms of front end intermodulation. Reciprocal mixing tests are rather laborious at UHF, but we did check the ratio out at a 10kHz offset and noted a very remarkably good figure, which is why the rig sounded so clean on the band when strong signals were present.

SSB selectivity measured quite well, and the reciprocal mixing was so good that the -60dB measurement was at 4.6kHz bandwidth. This shows a well

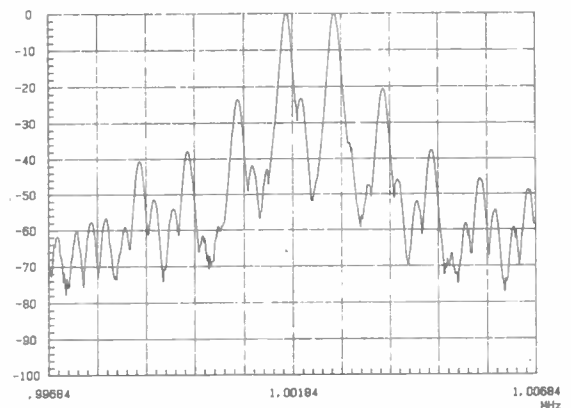
**Figure 1**

Kenwood TR851E Tx two tone test. 700/1700Hz tones at 30W PEP into ALC. Bandwidth resolution 100Hz. 1kHz per division



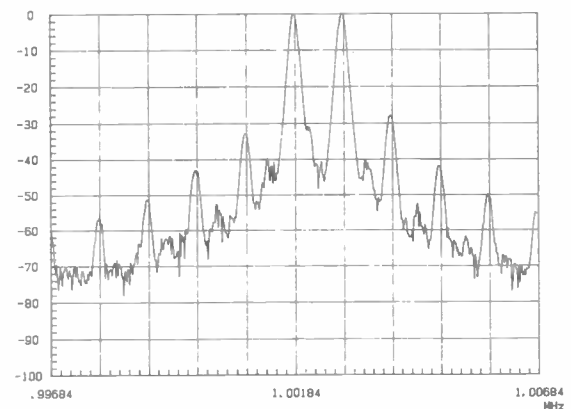
**Figure 2**

Kenwood TR851E Tx two tone test. 700/1700Hz tones at 25W PEP. Resolution bandwidth 100Hz. 1kHz per division



**Figure 3**

Kenwood TR851E Tx two tone test. 700/1700Hz tones at 2W PEP low level test. Resolution bandwidth 100Hz. 1kHz per division



designed IF filter with virtually no leakage across it, although some Icom filters are quite a lot steeper. FM selectivity was excellent for 25kHz channelling, and no problems should be experienced. The S meter was just about adequate, giving a range from S1 to S9 of 14dB on FM and 17dB on SSB. Above S9, the performance on SSB was surprisingly good, but on FM the meter was very optimistic!

When the rig was first switched on we checked the receiver frequency error, which was around 400Hz out, but after it had been on for a while the calibration was within 50Hz, which is very good indeed for a UHF rig, and it is quite normal for a UHF rig to drift for the first few minutes. On FM, the frequency channelling seemed to be absolutely correct, since no improvement in sensitivity occurred when we offset the generator. The AGC threshold on AGC

was at quite a low level (most useful for UHF), and so signals above around  $0.4\mu\text{V}$  EMF/2 would all reproduce at about the same peak level.

The AGC speed was an excellent compromise for a mobile rig, but a little faster than ideal for long relaxed ragchews with strong stations. On FM, the capture ratio measurement was excellent, and the limiting threshold was noted to be many dB below the 12dB sinad sensitivity point, so that all receivable FM signals should be heard at about the same level. The RIT control on SSB gave a useful range of adjustment of just over  $\pm 1.2$ kHz, and the noise blanker worked well.

On SSB and CW the product detector and audio amplifier distortion measured at a fairly low level of just over 1%, and this does include any amplitude and phase noise in the complete system. FM distortion measured quite satisfactorily,

## The Kenwood TR851E Laboratory Measurements

### Receiver tests

RF sensitivity, 12dB sinad		
FM		-125dBm
SSB		-128.5dBm (average)
RF input intercept point		
Wide spacing		-12dBm
Closer spacing		-15dBm
Reciprocal mixing ratio off-channel carrier/ channel input RF noise at 10kHz separation		90dB ratio
Selectivity SSB,		
3dB		2.3kHz
6dB		2.5kHz
40dB		3.7kHz
60dB		4.8kHz
Selectivity FM, tones on channel and on unwanted signal $\pm 25$ kHz		67.5dB
S meter		
	FM	SSB
S1	-116dBm	-111dBm
S3	-109dBm	-108dBm
S5	-105dBm	-105dBm
S7	-103dBm	-100dBm
S9	-102dBm	-94dBm
S9+20	-99dBm	-77dBm
S9+40	-96dBm	-56dBm
S9+60	-92dBm	-39dBm
SSB/CW product detector and audio amp distortion		1.1%
FM discriminator distortion etc		
5kHz deviation		2.4%
3kHz deviation		1.6%
1kHz deviation		0.6%
Audio output for 10% distortion		2.9W
8 ohms		4.5W
4 ohms		
Frequency accuracy well within $\pm 100$ Hz after warm up, 400Hz out on switch on		
Capture ratio (FM)		3.7dB
FM 3dB limiting threshold		-133dBm
<b>Transmitter tests</b>		
Typical power output FM/CW and SSB single tone		22W $\pm 0.5$ W from 430 to 440MHz
Two tone SSB approx maximum		30W PEP, well into ALC
Power output on low position		typically 4W
Max Tx current drawn		6A
Rx current when squelched		550mA
Typical speech deviation		5kHz (see text)
SSB carrier breakthrough, ref full output from 1kHz audio		-52dB
1kHz alternate SSB breakthrough		-57dB
Dimensions, including projections		180(W) $\times$ 63(H) $\times$ 233(D) mm

but was not particularly low. The maximum power output for 10% distortion was slightly above average into 8 ohms, and there was a very good power reserve increase into 4 ohms, so you would notice that two speakers in parallel would be distinctly louder than just one before the onset of clipping, and this might be beneficial in a noisy car.

### Transmitter tests

With the rig switched to FM on Tx, the output power was around 22W  $\pm 0.5$ W across the entire band, reducing to just

over 4W on low power. When the rig was switched to SSB, single carrier tests gave very similar powers to those measured for FM, but the characteristics of the ALC loop were such as to permit two tones of equal amplitude to produce slightly more PEP of around 28 to 30W when driven hard into ALC. The maximum current drawn from a 13.8V dc supply was 6A on FM and SSB when at full power, reducing to just over 3A on low power. When the rig was on Rx with squelch on, the current drain was 550mA. This shows that the rig is not particularly

efficient, but very few UHF ones are.

The three plots shown give the two tone output intermodulation distortion results well into ALC (Figure 1), just below ALC (Figure 2) and at 2W PEP (Figure 3). The two tone performances can be seen to be acceptable, but not as good as those found on a VHF rig. At least the high orders fall moderately quickly (not shown in plots), and the performance at low level was quite good. Carrier balance and alternate sideband rejection were both good, and should not cause any concern.

We checked the transmitted frequency accuracy very carefully over a period, and once the rig had settled down, transmissions were within  $\pm 100$ Hz of nominal, which is very accurate indeed. On FM, the maximum possible deviation varied with frequency, and on speech I just managed to touch 5.3kHz peak after appreciable shouting! Inserting a tone into the mic socket produced maximum deviations of up to 6.5kHz at 200Hz, but only 5.3kHz at 500Hz, whilst higher frequencies were more heavily limited, which is excellent. With normal speech, the effective deviation averaged just below 5kHz, the toneburst deviation also being well controlled; the toneburst frequency itself also being accurate. The transmitted frequency response also seemed well optimised, and no transmitted signal to noise problems were noted. All the repeater shifts were very accurate.

### Conclusions

Like its 2m counterpart, the Kenwood TR851E receives a very strong recommendation indeed if you want a multi-mode mobile for the band. Its small size, considering its facilities, and its fabulous ergonomics, makes it very suitable for portable and home base station use, especially where space is limited. It does not quite have the facilities of the Icom IC475, nor the Kenwood TS811, but its technical performance is much better than the latter, and nearly up to that of the former, both of the bigger rigs being a lot more expensive. Both the Kenwood rigs are head and shoulders above their predecessors, and they are also far superior to the much earlier Yaesu equivalent rigs. In my opinion the best buys in their category, and not likely to be easily superseded, as I consider both very good value for money as well as outstanding performers.

The cost of the rig itself is £699, including VAT, and this price includes hand mic and mobile mount. Lowe Electronics have informed me, just before going to press, that Kenwood found 60 TR9500 transceivers in their stores that had been forgotten, and they were subsequently offered to the UK for a knock down price. These are available from Lowe Electronics at £395 - quite a bargain, but only 10W PEP output.

Very many thanks to Lowe Electronics for the loan of the review sample, and to Fiona for helping me with the measurements and writing.



## YAESU FT211RH

### 2m FM mobile transceiver

I had rather a surprise when I checked back to see how long ago it was since I had reviewed a Yaesu 2m FM mobile, for it was just over two and a half years since I enthused over the FT270RH. The FT211E was introduced in the summer of 1987 as a less expensive mobile rig, to compete with such rigs as the Kenwood TM221ES and the Icom IC28. The Yaesu FT211RH is specified to give 45W output (but see lab tests), and so is quite a high power model, with specifications very similar to its competition.

It is supplied complete with a mobile mount, and a hand microphone type MH14A8, which incorporates PTT, up and down frequency stepping/scanning buttons, a stepping button lock switch, and a 1750Hz tone button. The mic plugs into a socket on the front panel with the usual eight pin plug. The rig's front panel is normally supplied with a slight upward tilt, but this can be rearranged to tilt downwards if required, which might be preferable for some installations.

The rig requires 13.8V dc  $\pm 15\%$ , and the dc interconnection lead is supplied with male and female bullet type connectors with a long extension of 2.75 metres, fused in both legs. The back panel also includes an SO239 socket for antenna connection, and a 3.5mm jack socket for feeding an external speaker. There is a large heatsink across the back, but there is no internal cooling fan, and good ventilation is recommended in the instruction book.

#### Front panel facilities

Although the front panel layout is fairly simple, ergonomics are good. Many of the push buttons do have second functions, however. A tuning knob is fitted, which has light click steps, but this does feel a little spongy. You can select 12.5 or 25kHz channelling on the B (European) version, but the knob can

also click round the ten memories. There are also up and down buttons in a group of eight buttons on the front panel, which can also go up and down memory channels, or MHz. Other buttons control low/high power, second function select,  $\pm$  repeater shift or simplex, reverse repeater, VFO or memory recall, sub-audible tone programming (if appropriate, the optional extra is fitted), and call frequency access.

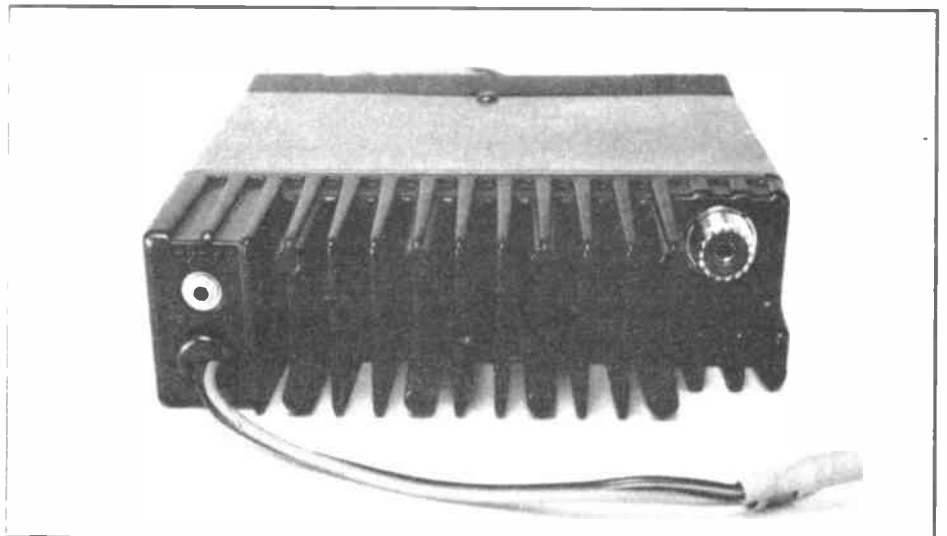
Second functions include memory write (including repeater shift info), frequency lock, priority operation (normally using memory 1, but other memories selectable for this if you are on VFO), channel steps, MHz up/down, and memory scan channel lock out. There is also a 'T call' button, which duplicates the 1750Hz toneburst, which is also on the mic. This tone, incidentally, is not an auto toneburst length, but is controlled by the length of time you actually hold the button down, the carrier also being transmitted at the same time without the

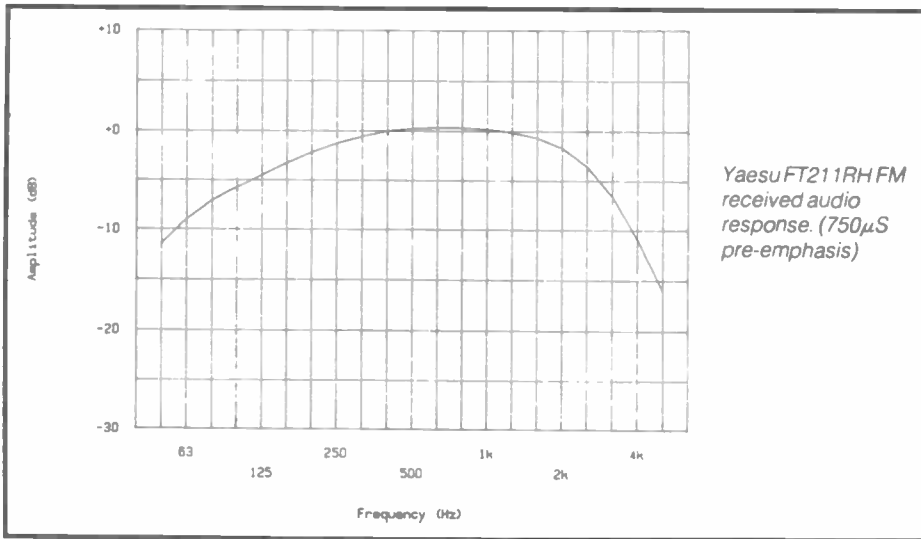
necessity of pressing PTT. A volume control with built-in on/off switch and a squelch control complete the functions on the front panel.

The display includes a digital frequency readout, adding the extra '.5' where necessary. It includes memory number, and all the usual status indications. The readout is very clear, and the various function buttons are also individually back illuminated, making it easier to see the main function of each in the dark.

#### Subjective tests

Received audio quality was very good, although perhaps just very slightly bassy on an external speaker, although the internal one was quite good. Selectivity was nowhere near adequate for 12.5kHz channelling, which is now becoming widely used in the metropolitan areas, the filter fitted being an E type intended for 25kHz channelling. I noted rather more front end intermodulation than





usual, a sort of low-pitched growl being audible across various parts of the band, with the odd PMR or police station coming in fairly weakly at various places when I used the rig with a large vertically polarised antenna. There would be no problem under normal circumstances when the rig was used with a mobile whip, however, but the existence of the effect showed that the intercept point was not quite good enough.

However, the RF sensitivity was superb, allowing very weak stations to be received, but I had the feeling that I could not get quite enough 'welly' from the internal speaker. All the controls were very easy to use, and I liked the feel of the mic, which was very lightweight, (electret type), and easy to hold and use.

I had mixed reports on the transmitted quality from the mic and rig, some stations finding the transmissions

slightly plummy and bass heavy, whilst others found it fairly smooth. In general most people preferred my old Trio TW4000A.

Considering the rig is a fairly inexpensive one, and that it can produce a lot of power, it offers a lot of very useful facilities, the majority of which you will almost certainly be using. The buttons are very well laid out, and the front panel could not be said to be cluttered in any way. The rig is quite small, but not the remarkably miniature size of the latest Icom.

#### Laboratory tests

The RF sensitivity was extremely good throughout the band, the performance being well up to the best FM only black boxes tested in the last two years or so. However, the RF input intercept point was not as good as I would expect from a

modern rig, being some 7.5dB inferior to that of its Kenwood competitor, the TM221ES, although the latter was just 1dB less sensitive.

Whilst the 25kHz selectivity was excellent, 12.5kHz selectivity was poor, and rejection of an adjacent 12.5kHz channel would be very inadequate unless the interfering station was weaker than the one you were listening to.

We noted 13dB difference between S1 and S9, and the S meter was, incidentally, in the form of pairs of black bars on a green background. The actual meter is not calibrated in any way, so the tabulated figures are a rough guide, and rather arbitrary.

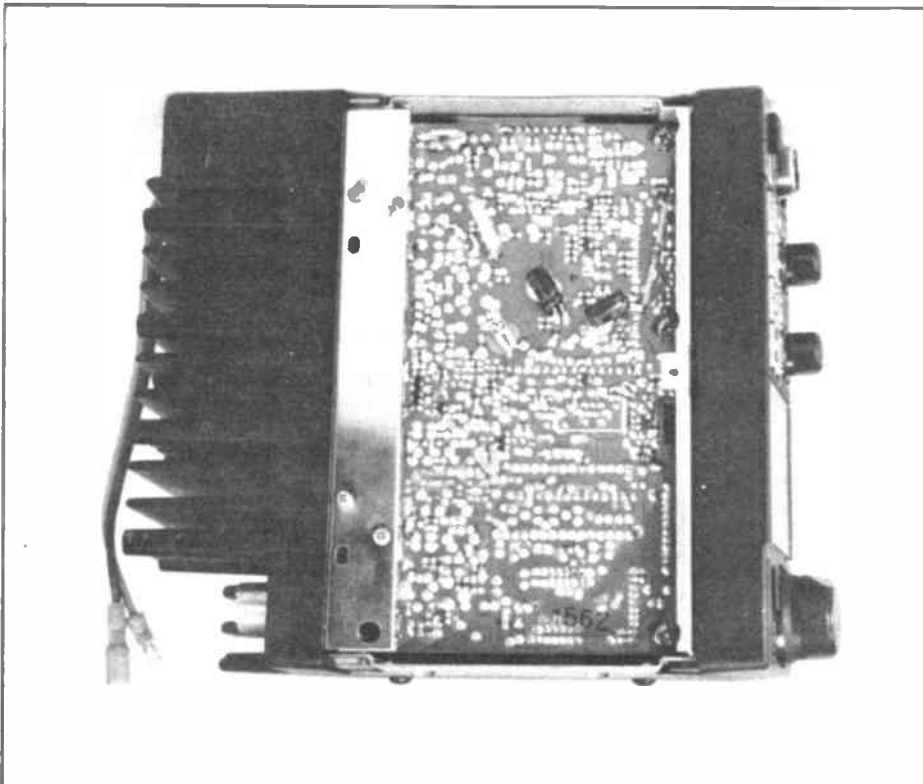
Capture ratio measured quite well, but we were a bit surprised to find that we obtained as much as 18dB quieting at the 12dB sinad sensitivity point. The receiver seemed to be sensibly on frequency, as no significant improvement was gained when we offset the generator. FM limiting performance was excellent, and discriminator and audio distortion were quite acceptable.

Maximum output power into 8 ohms and 4 ohms was slightly lower than I am used to seeing on mobile rigs. The reproduced frequency response showed a surprisingly flat LF end (see accompanying plot), which in my opinion is much too extended for a mobile rig, and HF was rolled off very rapidly above 2.5kHz, which is reasonable enough, although I would have preferred a slightly higher turnover.

#### The transmitter section

When we first checked the available power output in the 'high' position, I was rather surprised to find just 37W coming out, with the power supply set to 13.8V. Whilst testing this, we checked the actual dc voltage on the bullet connectors near the rig, and noted a 0.6V drop between the PSU and the connectors; increasing the supply voltage so that we obtained 13.8V nearer the rig did allow a power increase to 40W in the middle of the band, and slightly more than this right up at the top end. We noted that the maximum current was only around 7A, although the excellent instruction book claimed that this should have been around 9A, so my review sample must have been slightly substandard in this respect. Low power was typically around 5.5W across the band.

The rig was just over 200Hz off frequency after it had been allowed to warm up for a while, and this shows both good stability and accuracy. Repeater shift accuracy was excellent. Deviation was very well controlled on the rig, and peak deviation fell fairly rapidly above 3kHz audio to prevent excessive bandwidth being transmitted. Audio distortion of the complete transmitter was just 1.1% at middle frequencies at 4kHz deviation. This showed the transmitter itself to be very clean. Although the toneburst deviation was well set at 4.3kHz, its actual frequency was 5.7Hz out, quite unusual these days, although



not likely to be a problem. The transmitted LF response was reasonably flat down to 350Hz, and fell moderately quickly below this, the HF end being smooth up to 3kHz, followed by a rapid attenuation at higher frequencies.

With a minor wiring change internally it is possible to extend the rig's tuning range from around 130MHz up to 170MHz or so. I had the thought that as the front end is clearly intended to be broad banded, the rejection of out of band but very strong signals is comparatively poor, but a broad banded RF stage by its very nature needs to have an excellent RF input intercept point, and thus I would expect rather better from a good design than is given by this rig.

### Conclusions

This reasonably priced rig (£299 from Withers Communications), is obviously going to be a popular one, and it has some very good features including good ergonomics. However, you don't have to pay very much more for the Kenwood competition, which I rather preferred, as it has better selectivity and a significantly better intermodulation performance, at the expense of only a dB in sensitivity. The Kenwood also gave 46W output under the same test conditions.

I am most grateful to Ray Withers of Withers Communications for making his shop demonstrator available to me for this review. Also many thanks to Fiona for helping with everything.

## The Yaesu FT211RH Laboratory Test Results

### Receiver tests

RF sensitivity level for 12dB sinad	-125dBm (0.12µV)
Quieting at 12dB sinad point	18dB
RF input intercept point	-18.5dBm
Selectivity 12.5kHz	9dB
25kHz	71dB
<b>S meter</b>	
S1	-116dBm
S3	-112
S5	-108
S7	-105
S9	-103
S9+	-102
S9++	-98
3dB limiting threshold	-130dBm
Capture ratio	4.2dB
<b>Discriminator and audio distortion</b>	
5kHz deviation	2%
3kHz deviation	1.5%
1kHz deviation	0.9%
<b>Maximum audio output for 10% distortion</b>	
8 ohms	2.3W
4 ohms	3.7W

### Transmitter tests

<b>Tx power output high (13.8V supply)</b>	
145MHz	37W
145.975MHz	40W
<b>Tx power output high (13.8V at rig)</b>	
145MHz	40W
Tx power output low typically across band	5.5W
Toneburst frequency	1755.7Hz
Toneburst deviation	4.3kHz
Max deviation at 1kHz	4.6kHz
Frequency/deviation at maximum	400Hz at 5.1kHz dev
Typical 1kHz audio distortion from mic input socket to carrier at 4kHz deviation	1.1% THD
Tx frequency accuracy	typically 220Hz low
Dimensions (mm)	160W x 50H x 175D
Weight	1.5kg

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# SHORT WAVE LISTENER

TREVOR MORGAN GW40XB

During 1987, many of you will have been to one or more of the many radio rallies that are held throughout the country almost every weekend. As you know, I have attended a few myself, but I don't think any of ours can have been so well attended by the public or supported by the trade as the Virginia State ARRL Convention which was held in the Pavilion Tower Hotel on the 3rd and 4th of October.

Our friend Dr Harold Cones, president of the Great Circle Shortwave Society, sent us a report.

The Virginia Beach Hamfest (as it's known) opened at 0900 on the Saturday, and there was plenty to be seen or take part in. There were lectures by various notables on all subjects from contesting to emergency communications, and the listeners were very well catered for with Carol Shrader WI4K talking on the art of QSLing, Tom McElvy and Chuck Rippel WA4HHG joining yours truly in giving 'SWL Tips', and me, once again, 'Listening to the World'.

## DXpedition talks

The Virginia Packet Radio Association explained that system, while computer communications were dealt with in a panel discussion and individual lectures on the Apple, Commodore and 99/4A systems. There were also illustrated talks by a number of DXpedition groups including 3C1BC and YL (Carl and Martha Hanson) on their trip to Equatorial Guinea.

There were nearly 8,000 people there who were well served by the trade including Telex, Icom, Atari, Alinco, HAL, Kenwood and Yaesu and no less than fifty other radio and computer dealers. The Great Circle shared their stand with the Old Dominion DX Association, and used the space to exhibit a number of old valve radios and dispense a ton of handouts from the major International broadcasters...the BBC donated 500 copies of *London Calling*,

which were gone at the end of day one. Pennants and QSL cards from RBI and other stations were gone in the first couple of hours! I picked up two short wave receivers from the 1940s for next to nothing in the flea market, so my journey was not wasted! All in all, a very enjoyable weekend was had by all'.

## Glittering prizes

Harold sent some of the literature on and, looking at the programme, some interesting things were found. From 0900 continuously through each day, there was a film show for the children, and there was bingo for the ladies at 1300 each day with suitable prizes. The prizes in the main raffle were a Kenwood TS440S complete with auto ATU, an Icom IC900 with 2m module, a Yaesu FT2700 and a C Itoh 8510 printer, and the ladies' door prize was \$25 cash!

There were also amateur radio advancement exams from Technician grade to Extra grade throughout the weekend...and you could just pop in and try! Now, *that's* what I call a rally...and that was only a local one!

An interesting study was made recently by the Socony-Mobil Oil Company as part of their training programme. It showed that we remember only 10% of what we read, 20% of what we hear, 30% of what we see, 50% of what we see and hear and 80% of what we say and do. Some of you may have been educated in the 'parrot fashion' era and would probably agree with that, and the way we learned quickly by repeating vocally what we had previously written and done.

So, what's that got to do with radio? Well, many of you will be taking the RAE or learning the Morse code in the future, and you will find that your studies will be that bit more successful if you bear that in mind. Your *experience* in listening and all that involves *will* tell!

So, who's been doing the

listening over the past month? Well, Darrell Jacobs 1LA152, has for one! Darrell has claimed his Gold Prefix Award and has listed AH2 (Guam), H4A (Solomons), TV7 (St Paul), KH9 (Wake), 9M2 (W Malaysia), VS6 (Hong Kong), HL3 (Korea), HR1 (Honduras), 5H3 (Tanzania), 3D6 (Swaziland), A22 (Botswana), 5T5 (Mauritania) and C21 (Nauru) amongst a superb list. Darrell is shortly coming back to the UK, so his shack in France will have to be set up again, but he wanted to get the Gold before he left, what has proved to be a super QTH. Well done, Darrell!

Terry Lincoln 1LA225, of Weymouth, sent in his claim of 250 prefixes for the Bronze Award and included some very desirable ones amongst them, including 5H3, 5M2, YV5, VE7 (wonder if that was the YL up on the Arctic Circle?), PY7 and sundry others.

## Useful pile-up

Of course, Joan Slater 1LA185 of Matlock, has been working her HF125 into the ground and offered TL8, VK4, VP2, N4MJH/P/DU8, VK6 and SV2QO/P/SU on eighty, the /DU8 popped up again on forty with C31, TR8, OD5, LU6, YC0, ZP5, JA7, and ZD8. TA3, VK5, 6Y2, PZ1, 5H3, CX4, VE8, AL7, S79, and VP2 caught on twenty, while fifteen came up with 5N9, TI2, YV3 and ZY4. When she hooked onto KG4GN in Guantanamo Bay, who had a pile-up going, she was able to log a whole mass of very collectables. Nice logging, Joan!

Dennis Shepherd of Earl Shilton in Leics, asked if I accepted reports from listeners (new reader is our Dennis!) and offered WB2ULI, WD3YOD and WB9HAD logged on Top Band and a crop of ZLs and Js plus OD5VT, UA9UDI, 7X25AB and 3D2RY on eighty and all on SSB. He got the 3D2 a couple of times on different dates to make sure!

Dennis uses the HRO5T with 11 coils, which he got in

mint condition. The aerial is an inverted V with an 80ft top and 23ft vertical section...certainly seems to do the job, anyway! His main interests are in the 160/80m areas and the HRO is well suited.

Guy Dean of Ringwood has been ringing the changes in the shack, and now boasts the Icom R71E and the FRG9600 UHF/VHF scanner. Having logged VP8CP (Antarctica) and V85MI (Brunei) plus a clutch of VKs showed his inverted V trapped dipole is still doing the trick with the new set-up.

## Murphy's Law

Nice to hear from our old pal Charlie Morgan again. Charlie has moved into the Surrey area and, with a couple of weeks bedlam behind him, he decided to get the G5RV up before he started to get withdrawal symptoms. All went very well, with one end up in a sycamore tree and t'other attached to a short mast on the chimney, but good old dependable Murphy had to get his oar in! The feeder became detached from the centre and, in his efforts to get the top down for a solder job before darkness came, the thing parted in the middle and he was left with a 51ft vertical up in the tree and a similar sized sloper hanging over the roof!

Just to crown it, the XYL dropped her favourite cooking pot, so they spent the evening in abject misery! However, daylight came and a chat with his wife's homeland (Sweden) on the repaired G5RV, left both with satisfied grins. Charlie is now on Prestel/Micronet so if you would like a chat, his MBX is 01111801.

Brian Pearson 1LA180, Bradford, has not been too grand of late but has kept his chin up by swapping his old No 19 set for a Spectrum Plus which has got him on the SSTV/RTTY sides of the hobby. On Saturday, October 17th, he switched on his receiver to eighty metres...lo and behold, there was GB2WFF



belting in at summat over 20dB! This shocked him into remembering that this was JOTA weekend so, pencil at the ready, he started logging and finished up spending most of the weekend at it!

## GB2WFF again

Which gives us a nice intro to the Jamboree on the Air! This year's JOTA found GB2WFF on the air again (operated by yours truly) with customary sore throat and running nose! Having just taken delivery of a shiny new TS430S, I was just itching to give it its christening, so I opened the station at 0630 with an old timer in G2LV. After Dick had reported all sounded well, it was off on the chase for the rest of the Scout stations. It was pretty solid stuff then, until 1610, when it became a matter of shutting down before the throat gave out.

The Sunday began with my brother calling me at 0800 and another pretty solid session until 1500 when I closed the station down after a weekend covering 70-odd contacts in 16 call areas, which was quite a bit down on last year but, nevertheless, thoroughly enjoyable.

The listeners were obviously about, as the phone kept ringing with verifications of my signal being logged. The Tuesday postbag backed that up with early claims for the Jamboree Award! At the time of writing, the competition looks fierce with a couple of lads chasing the trophies with few points in it. The final result will be revealed next month!

## Top of the Rxs

A couple of weeks ago, I did a check on the receivers used by the listeners whose details I had received over the past two years or so. As a matter of interest, there were a lot more different receivers in use than I thought were even on the market, but amongst them were a lot of discontinued models and, the way the manufacturers keep changing the models, that's not surprising.

The top receiver in use was the Yaesu FRG7700 with 14%, with the Trio R2000 in second place with 11%. The 'high street' favourite was the Sony ICF7600D with 5% and the same company's ICF2001 came second with 4%, and

Panasonic's RF3100 third with 2%. Of the 'old timers', the Eddystones were used by 6% of listeners, while the Trio 9R59 was used by 3%. The Trio R600 and the Yaesu FRG7, although a bit tired now, are still in use by 5% each.

Not surprisingly, as it's still regarded as one of the best receivers by many listeners, the Racal RA17 captures 2% of the market but they were never marketed in the same way as the brand leaders, and are a surplus market receiver. Likewise, the good old AR88 is still warming 3% of shacks!

The 'Tandy' shops obviously had a good share of the market when they were more radio minded (a lot of comments on this) as their DX range still has 7% of shack space. Many listeners 'cut their teeth' on DX160s and 300s. Scanners were very widespread over the market with the SX200s and Search 9s almost level at about 22% of users, leading the Tandy 'Pro' range at 21% between three models.

Of the 'super rigs', the NRD525 was popular with 1.5% of listeners. A lot of listeners stated an interest in homebrew of one kind or another, and over 60% had 'had a go'. By far the most popular item was the ATU (as one listener put it, you can't damage anything if it doesn't work). The only kit mentioned was the Howes DCRX, and 2% of listeners said they'd built and used one.

## Computer survey

As one would expect, when it came to computers, the picture was one of the 'real' BBC versus the rest and, of the rest, the Spectrum and Commodore 64 outweighed everything else put together, although there are still a lot of VIC 20s about. The Speccy was favoured by many users because of the supply of programs still being available.

Interestingly, the question of reliability did not raise any great cause for complaint as few users seemed to have a lot of trouble (take this in context - many games users have problems with their computers...we're kinder to our micros!). This mini survey was done by analysis of over 480 listeners' letters that have been received over the past two years and not by any special poll.

Having had Harold Cones' report on the Virginia rally, it was my turn to go rallying at the Leicester show. Held, as is usual, in the Granby halls, this must have been one of the busiest I have been to this year.

The Leicester club had kindly allocated a space to me to represent the International Listeners Association and their idea of setting a room aside for clubs and groups was a winner. At least one could have a decent chat to visitors. The WAB, BARTG, RAFARS and other local groups shared the room.

The main hall was packed with dealer stands and, unlike previous rallies, there were some receivers for sale including a whopper of a surplus Marconi for only £245.00 that attracted plenty of attention...but no takers, a number of Racals and Eddystones and a few AR88s. There were a few more modern receivers such as the R300 and FRG7.

## Magnetic loop

There were plenty of aerial companies to be seen and CapCo attracted a lot of attention with their magnetic loop antenna. This claims to be a breakthrough in antenna technology. The receive only version, AMA7, costs £79.95 and covers 40m to 10m (41 to 11m on B/C) and needs no antenna tuner so, theoretically speaking, you save the cost of the aerial. The size is only 68cm across (it is circular) and is meant for table top use. Details of this range are available from G4OGP (QTHR), with an SAE.

Ray Withers Communications had the 877R Airband receiver on show, and I had a 'play' with it. It is a simple receiver, covering 108-145, 145-176, 162.5, 54-58 and 88-108MHz plus CB channels 1-80. Although the tuning was fairly coarse (the frequencies are printed below the tuning window, which has a logging scale), it was not too difficult to tune, and seemed very sensitive using the helical aerial. It has a squelch control fitted. There are two models available. Model one for use with dry cells costs £39.50, and the other complete with NiCads and charger, a tenner more including postage and packing.

During the time I was there, I had the pleasure of meeting

a number of members of the ILA and other listeners, made a lot of new friends and met some of those previously faceless WABers. Thank you all for your time!

So to the contesters amongst you! Derby and District ARS hold their National 144MHz contest on Sunday, March 13th. Listeners' entries are most welcome and should show time, station heard, station being worked, RST sent and county sent. RSGB logs and cover sheets are preferred but neat alternatives are acceptable. Mark each sheet with your RS/ILA/ISWL number.

The winner of the SWL section will receive a certificate, entries to: Derby and District ARC, 119 Green Lane, Derby DE1 1RZ to arrive by March 30th. For those who like Special Event station hunting, there is a handsome certificate available.

Issued by the 91st Leicester Scouts ARC, it is awarded to SWLs for confirmed reports with 100 GB/GV/GK stations on any band in any mode. Further stickers are available for 150, 200, 250 etc. Claims in the form of log extracts, verified by two amateurs or club officials and accompanied by a fee of £1.50 or 8 IRCs, should be sent to: M J Harriman G4SJX, PO Box 49, Leicester.

## Gozo award

The Worked All Gozo Award is presented for logging eight different Gozo Island (9H4) stations. Only contacts after August 1972 are valid and log extracts should be verified by two amateurs. Send claims with 12 IRCs or \$3.00 to G Galea, Greenfields, Triq Is SOKKORS, Kercem, Gozo Islands, Malta. (The award is free to blind/handicapped persons).

Well, that's about it for this month. Thank you all for your letters...please keep them coming (reception reports are welcome). Until next time, good listening and a happy New Year to all! Trevor

More news  
for SWLs  
next month

# 50MHz

## DETAILED REPORT OF THE FIRST TWO WAY QSOs WITH SOUTH AFRICA SINCE 1947

In last month's column I gave a brief report of the exciting TEP opening to Botswana. I am now able to include a detailed account of the contacts made with a report compiled by David Butler G4ASR, Editor of the RSGB VHF/UHF Newsletter published monthly by the RSGB.

### GM4DGT works A22KZ via TEP on 50MHz

What can be said about a band that gives so much excitement to so many operators? This year of geomagnetic minimum has provided the UK with a variety of contacts that some of us were not dreaming of for at least another two years. These contacts have included: prolonged transatlantic openings to the North American Continent, contacting W1, 2, 3, 4, 5, 8, VE1, 2, 3 and V0; selective openings to V2A and YV0 in the Caribbean area; the many reception reports of the FY7 beacon in South America; openings into the Mediterranean area and into Asia in the guise of ZC4VHF/5B4; contacts with CT3DK in Madeira, which (luckily) counted as the continent of Africa; and now, in October, contacts with Botswana and a reception report of ZS3E in Namibia.

By telephoning all stations involved and cross-checking reports, the following details were collated.

### Report from the UK

The first report of hearing South Africa came from Mike Walters situated in Hayling Island, Hampshire, on the south coast of England. On Thursday 8th October at 1720GMT, Mike heard A22KZ

calling CQ on 50.110MHz using SSB. A22KZ gave a short break in transmission and continued calling CQ. Having peaked in strength to 5:6, the signal promptly disappeared into the noise, failing to surface again.

At this time Ted G4UPS in Devon could hear 9H1BT and the Cyprus beacon 5B4CY via E layer propagation, thus supporting the view that the transmission was TEP plus E layer enhancement at the European end of the path.

On Saturday 17th October at 1040GMT, John G6XHQ (IO91UL) heard a station literally pop out of the noise on 50.110MHz, at 4:1 with rapid fading. The station was identified as ZS3E in Namibia, and John got the impression that he was working a station somewhere in the Mediterranean area. The signal peaked 5:4 with rapid QSB making copy difficult. Signals were heard for 1½ minutes only.

Thursday 22nd October heralded a day that six operators will not forget easily. At 1535GMT, Eric G2ADR (IO93KX) heard A22KZ on 50.110MHz calling CQ at 5:4, the first minute at T4, plus a chirp thought to be caused by the TEP and E layer propagation. The signal eventually went T9. Eric did not have time to run-up his 6 metre system by the time A22KZ had finished calling CQ, but luckily A22KZ then came on to 28885, which Eric was also monitoring. At 1537GMT G2ADR made two-way contact on ten metres with A22KZ. Eric then transmitted on 28.885MHz and received A22KZ on 50.110MHz CW. The roles were then reversed with A22KZ transmitting on 28.885MHz and G2ADR transmitting on

50.110MHz. Finally, at 1547GMT, both stations made two-way contact on 50.110MHz, with G2ADR giving out a report of 539 and receiving 519 from Botswana.

Throw away your PAs and antenna systems – Eric was running just 9 watts to a dipole! After alerting other stations, Eric continued to receive A22KZ at strengths varying between S1 and S6. The signal had no flutter at all and QSB was quite slow, but occasionally would dive and come straight back up – almost like a square wave. The next station to contact A22KZ was Roger G4HBA (IO93ES) at 1638GMT. Roger runs 15 watts and a three element yagi. Signals were T9 with fading. Between 1644-1648GMT G2ADR made a second contact, this time giving A22KZ a report of 569 and getting back 519.

### QSO between Scotland and South Africa

At 1650GMT the path extended into Scotland allowing Bill GM4DGT in IO86CD to work A22KZ over the 8860km path between Alloa and Maun. The signal in to GM4DGT was 539 with deep nulls and flutter fading at all times. Bill received a report of 519 from Botswana.


The next station to work A22KZ was G1AWP in Northumberland, who despite the limitations of his B class licence, made a two-way CW QSO at 1652GMT. Ken G4GAI in Rochdale (IO83VP) was next in line with a contact at 1655GMT. Ken gave out a 539 report and received 419 back. He was running 10 watts from a muTek transverter and a 3 element yagi.

The last of the lucky UK operators to work A22KZ was Johnny G3CCH at 1657. Johnny located in IO93QO was running 20dBW from his 5 element yagi. He gave A22KZ a report of 559 and received back 529. The signals exhibited quite a lot of fading, as would be expected. Both G4GAI and G3CCH heard Dave A22KZ using SSB just after 1700GMT with signal strengths varying up to S5. GM4DGT in Alloa heard Dave again at 1716GMT on SSB, when he was virtually unreadable, and at 1722GMT again on SSB but with severe TEP flutter.

### The Botswana connection

Dave Saul A22KZ may be better known to others as G4EKZ (Ventnor). He is located in Maun Botswana (KG19RX) and will be back in the UK sometime in December. Because of his prime location for TEP work, Dave was loaned an Icom IC551D (80 watts) and a 4 element beam by Hal Lund ZS6WB. Hal, incidentally, is the Editor of VHF News, a specialist South African news sheet for VHFers. David told me that when he heard G2ADR calling him on six metres,

QSL card confirming the 'all time first' two way QSO on 50MHz between GM and A22



To radio **GM4DGT**  
Confirming our QSO on  
**22-10-87** at **1646** GMT  
on **50.110** MHz **SSB/CW**  
Your report RST **519**  
Tx **15370** Ant **d-d**  
**80W**  
73's Dave Saul  
(A22KZ/G4EKZ)  
MAUN SECONDARY SCHOOL  
Private Bag 5  
**A22KZ MAUN - BOTSWANA**

by Ken Ellis G5KW

the fuse in his transceiver promptly blew when he went to reply! After that episode everything was just plain sailing. The TEP path was open to the Mediterranean area on 15 days (to 15th October), giving contacts with 9H1BT, 9H1CG, 9H1FL and SV1DH. No Portuguese amateurs have been worked or heard so far.

#### Report from Malta

Paul 9H1BT has provided me with the following information. Firstly, next year should see more activity from Malta on 50MHz. As well as 9H1BT and 9H1CG, 9H1EL, 9H1FL and 9H1GB are now QRV for the band. On 3rd October between 1735-1815 Paul heard the FY7THF beacon. On the 4th October he again copied the beacon, this time at 1930GMT.

Between 8th-13th October, Paul was having contacts almost nightly with A22KZ. The peak times have been between 1630-1730GMT with one QSO being recorded at 1815GMT. Signals on a few occasions have been badly chopped up, but some have produced signals that were very pure and very strong S9+.

#### The record's straight

I am indebted to John Baker GW3MHW for the correct information about the 'all-time first' two-way QSO on 50MHz between South Africa and the UK. The following was reported in *Short Wave Magazine* by G2XC in December 1947: 'G5BY made a CQ call on 50MHz at 0845 on 6th November 1947 and was answered by ZS1P, and contact was made at 0846. This was Hilton G5BY's first ever CQ on six metres. His permit was received on 5th November 1947 and he spent the night constructing a six metre transmitter, completing the job by 0400GMT'. The same story was reported in *CQ Magazine* in January 1948, and goes on to record that 45 minutes after contacting ZS1P, G5BY contacted W1HDQ, and after a further 30 minutes worked a 'local (presume G), so managed three continents in 1 hour 15 minutes. John could not find any reports of this first G-ZS1P QSO in either *QST* or the *RSGB Bulletin*, although he has all of them covering that period!

This possibly explains why the recent QSO between G2ADR and A22KZ was stated by GB2RS and others as an all time first. We confirm that the QSO between GM4DGT and A22KZ at 1650GMT on 22nd October 1987 was an all-time first between South Africa and Scotland.

#### The GM4DGT saga

To complement David Butler's report, I have received from Bill Stirling GM4DGT his own report, including a description of his station and some exclusive recent photographs. He writes: 'Thank you for your letter and congrats on my all-time first QSO, GM-A22. All I can say is that I

was in the right place at the right time, as with so many of these situations! I had been monitoring for a few weeks and checking conditions and I had been leaving work all that week at about 1700Z, but arrived earlier that day. Enclosed are the photos as requested, together with a copy of the QSL card which arrived on Monday, much to my delight. The SSB that I could just hear was Dave calling me at 1716Z and 1722Z, but he encountered some QRM from some FM TV on the frequency and as it was I could not make out much, except for his callsign.

'Since 22nd October, six metres here has been very dead. No more 59 on SSB with SZ2DH, only an occasional trace of the 9H1SIX and 5B4CY beacons, but I'm still around.

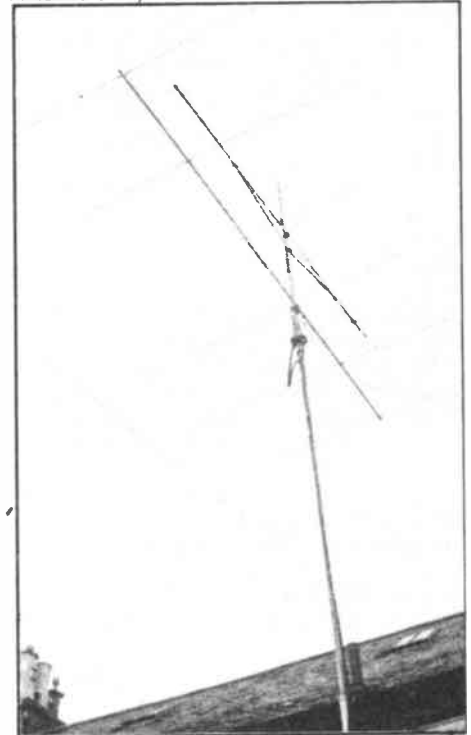
'The station set-up here is an FT101Z into a homebrew transverter QQV03-10 (mixer), QQV03-10 (amp) and QQV03-20 (PA). On Rx I use a 3N201 (RF) 40673 (mixer). The sensitivity has not been measured, but I can hear lots of things! The antenna is a five element yagi (as you will see from the photo, it has been updated to a six element to attract the next phase of DX from VK!). All the rest of the gear is homebrew including the memory keyer with timer and the LABAK up-converter for meteor scatter, the digit touch keyer, and the keys and audio can be routed to any rig independently without pulling out any plugs. The AF processor is an RF clipper using 1.4MHz filters and incorporates a two-tone oscillator, pulser and K-tone. The circuits are nearly all pinched from published designs.

'The peak-reading SWR meters are copies of the Bird thro'line, using water pipe fittings, and you may also notice the

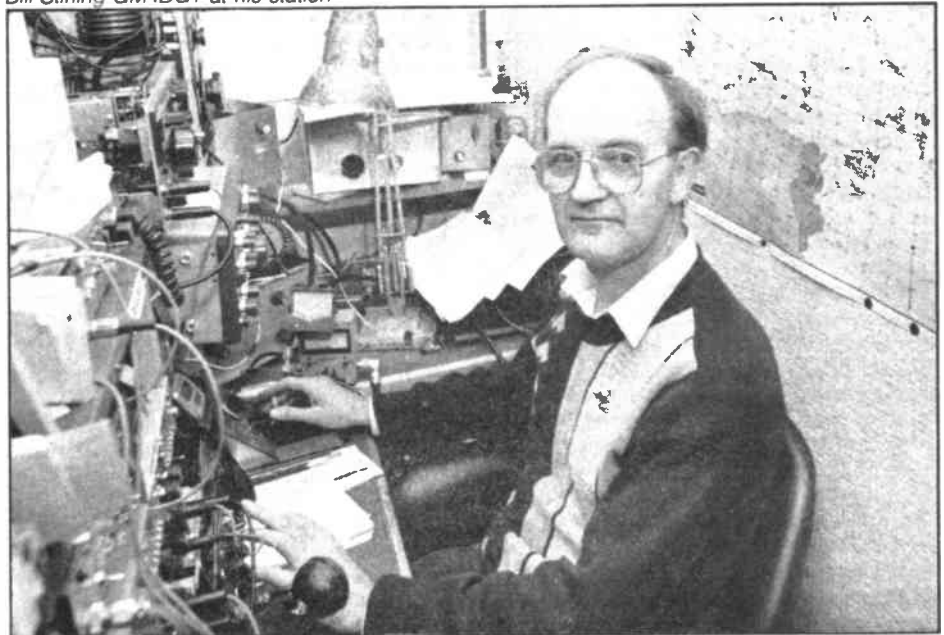
micro-bore coils in the HF Z-match. Before I forget - I do have another first that was with ZC4VHF/5B4 on 13th June 1987 at 1657Z. I worked VE1YX on 18th June 1987, but I don't know of any other GM working him'.

Next month I shall be giving details of the beacon being provided by the UK Six Metre Group for Ascension Island, ZD8 VHF on 50.025.5, operated by ZD8MB, ex G4MAB. Till then 73s and good DX on six de Ken Ellis, 18 Joyes Road, Folkestone CT19 6NK. Telephone: (0303) 53276.

Antenna array at GM4DGT



Bill Stirling GM4DGT at his station



# THE SURPLUS YEARS

H Humphries looks at how the influx of surplus MOD equipment into the amateur fraternity affected the hobby and the regard the equipment still holds today

The end of hostilities in 1945 must have come as no great surprise, for as early as January of that year *Wireless World* had published a letter from a Mr LEJ Clinch, who looked forward to the time when Service equipment would be demobbed. He proposed that ex-servicemen who were enthusiastic amateurs should be allowed to purchase items at concessionary rates, along with the trade and other recognised bodies. This drew a stinging rebuff the following month from one WH Cazaly, wondering who these self styled enthusiasts might be and asking who would adjudicate in the matter of eligibility. Such action, he warned, could lead to a situation whereby everyone might eventually demand the right to purchase government surplus at wholesale prices.

It is true that certain deserving cases were catered for in the post-war years. For instance from 1947-1958 old age pensioners were supplied with coupons entitling them to cheap tobacco. History however, records no such gratuity affecting ex-servicemen with regard to the purchase of MOD equipment.

The boom years of cheap ex-WD radio gear can generally be regarded as having come to an end in the mid seventies, by which time sets imported from Japan had taken over as far as volume sales to the radio amateur and short wave listener were concerned. If proof were needed, reference to one issue of *Short Wave Magazine* in 1975 shows that it contained not a single advert for so much as one piece of war surplus.

Most of us who were hobbyists back in the forties and fifties still retain a measure of nostalgia for such items as the RAF's R1155 receiver, the Army's R107 and the Navy's B28, the latter being the Marconi CR100 in uniform. However, wheels do eventually tend to turn full circle, and as recently as October 1985 one dealer, AH Supplies of Sheffield announced the impending arrival of a batch of R1155s. The asking price of £85 is certainly high compared with the £20 or so that these sets now fetch in car boot sales but, although store soiled, they were in original unmodified condition. Much of the 1155 circuitry is concerned with direction finding and of the dozen or so controls on the front panel over half are connected with this facility. Sets that came into private hands in the past tended to lose these in favour of modifications improving sensitivity and selectivity with perhaps the inclusion of a built-in power supply. To the purist collector or possibly the peripheral enthusiast whose criterion for judging a set may be 'the more knobs the better', these new releases will no doubt appeal irrespective of price.

One advantage of the 1155 over its counterparts in the other Services is the fact that it does not weigh an inordinate amount.

Add to this the glamour of the Royal Air Force, and it's not hard to see why this set stands head and shoulders above the rest in popular appeal, even though it can be bettered as a communications receiver from a technical standpoint.

That you cannot please everyone is aptly demonstrated by one letter to the amateur radio press some years back, that complained bitterly about the abundance of war surplus on the market. Recalling the days of the Berlin airlift, the writer described how in 1948 radio technicians were working round the clock, desperately cannibalising damaged 1155s while brand new versions were on sale in all the London junk shops for a few pounds each.

In those days a 1155 could be purchased for between £12 and £14 in unused condition, with a tailor-made mains power supply available for a further £4 or £5. In order to determine just how much of a bargain this was, it is necessary to know three things: firstly, the working man's average wage prevailing at the time; secondly, the cost of a domestic 5 valve radio by way of comparison, and lastly the relative purchasing powers of the pound then and now. *Practical Wireless* published a letter in its Feb 1951 issue which stated that the union rate for a builder's labourer was 2/4 (around 12p) per hour. After taking into account National Insurance contributions of 4/11 per week, it becomes clear that the cost of an 1155 represented several weeks pay, and was therefore quite expensive. Turning our attention to the price of a domestic radio in the postwar era we read, again in *Practical Wireless*, that early in 1948 with purchase tax at sixty six and two thirds percent, a mains receiver cost £28/9/8, so in that respect, the 1155 afforded a saving. When we compare the purchasing power of the pound over a 35 year period, we encounter a multiplying factor of around 8½, so £12 in 1950 represents £102 today, which I will write as £E102, an abbreviation for equivalence that will appear later in the text.

*Wireless World* described the 1155 in July 1946, and gave details for the construction of a power supply-cum-speaker with output stage. As early as 1945 it had published an article on the R107, referring to it as the Army's finest communications receiver. Also included in the same issue was a comprehensive list of Service valves, with their civilian equivalents. This was to prove so useful that it was reprinted in the fifties, to assist constructors who might otherwise

have found data on Service types hard to come by.

*WW's* article on the 1155 evidently became the standard work, achieving the dubious distinction of being reproduced unofficially in a number of later compilations of ex-WD circuits and notes. Bootleg versions of articles that originally appeared in bona fide journals are easily spotted by their typeface, and usually appeared with the author's name blacked out, the same applying to a call sign in the case of a radio amateur.

*Short Wave Magazine* regarded the 1155 as a useful addition to the radio shack, publishing a number of articles on it in the fifties. The March 1956 issue devoted a page to a suitable aerial coupler. In May 1956 another page reported on 'better results with the 1155'. July '56 saw a surplus converter for a surplus receiver based on the RF24 tuning unit and this ran to 2 pages. 'Top Band with the 1155' occupied a couple of pages in Sept '56 while the design, circuit and details occupied 4 pages in May '57. Reprints at 75p per article plus postage are available from *Short Wave Magazine*, Enefcou House, The Quay, Poole, Dorset BH15 IPP.

*Practical Wireless* also turned its attention to the set with improved sensitivity and the inclusion of a variable bandwidth filter, featured in Dec 1953. A converter for 1.8, 21 and 28MHz appeared in Feb '58 with mods in Sept '56. More recently, in-depth articles on a number of classic receivers have appeared with the 1155 covered in March and May of 1985. In summing up, the writer mentioned that old bone of contention, the transistor versus the valve, with regard to reliability. He reminded readers that a number of old receivers are still giving yeoman service, with their original valves intact, and he stated that he would be prepared to enter the discussion arena when someone produced a 40 year old transistor. Not a wholly convincing argument, but point taken nonetheless.

Just how 1155s were used was a matter of personal preference, since there were a number of options available regarding mods, tailor made conversions etc. Probably the most ambitious off-the-peg conversion was that supplied by Radiovision (Leicester) Ltd, who completely revamped the set and sold it as the Radiovision V55R. This entailed fitting a new front panel and including a mains power supply. The set retained only five of the original eleven controls, all the D/F circuitry being regarded as non-essential. Besides the basic receiver, there was a separate expander unit which provided reception of the 10 and 15 metre bands, otherwise denied to the user, since the unmodified set had an

upper frequency limit of 18.5MHz. A third unit comprised a loudspeaker with cabinet. The 1947 prices were as follows: V55R £29/10/0 (£E383.50); expander unit £18/2/10 (£E235.82); speaker £2/14/6 (£E35.36).

The R1155 continued in service as an airborne receiver for a number of years after the war, in both military and civilian roles. In 1951, the Air Ministry was still recruiting with advertisements showing a signaller operating an 1155 with its complementary transmitter, the T1154 as fitted in Lincolns, Hastings and Sunderlands. *Wireless World* of Jan '48 carried a photo showing the radio installation aboard the Tudor IV aircraft in service with British South American Airways. Two 1155/1154 combinations were included, one being for long range work, the other for short. One of the 40 watt T1154s had replaced the 100 watt Bendix xtal controlled transmitter aboard the Tudor I, with a subsequent saving as regards space, weight and power consumption. Although the higher powered Bendix offered 16 channels, these did not meet the airline's requirements because of the far ranging flight schedules involved. The only drawback mentioned in connection with the 1154 VFO was the operator skill needed to counteract frequency drift.

Besides such stalwarts as the R1155 and R107, many items were featured in journals of the period, forming the basis of worthwhile conversions. Of particular merit was the *Wireless World* general purpose oscilloscope, based on the Admiralty indicator unit type 6a, which employed the popular 6½ inch VCR97 cathode ray tube. The unit also contained seven valves, and could be bought for around £4.50 in 1951. *Practical Television* achieved something of a milestone in the same year, with the publication of constructional details for a television receiver costing £9 based on the RAF indicator type 62. This also contained the VCR97 along with 20 valves, and was a bargain at only £3/15/0.

In a retrospective survey of the dozens of firms selling literally hundreds of different items of surplus equipment, it is perhaps worth focusing on the extremes we might now expect to find in the record books. In a not too serious vein, the term 'largest stockist' could well refer to a somewhat portly individual with undeclared reserves, but in fact this honour goes to a firm trading from Manchester, the Altham Radio Co, which claimed to be the largest supplier of government surplus wireless equipment in Europe.

Better remembered, though, are firms with such slogans as 'prices slashed at Clydesdale' and 'Best Buy at Britains' that appeared month after month. The accolade for the smallest set goes to a one valve walkie-talkie, sold by Duke and Co of Romford in 1950. The fact that it utilised an ATP4 valve indicates it was an army set since the letters ATP stand for Army Transmitting Pentode. At the beginning of the war, each of the three Services had its own system of valve nomenclature, but by 1941 the advantage of a common system had become

obvious and as a result the common prefix CV was jointly adopted. Henceforth, the ATP4 was designated the CV1366.

The largest receiver known to the author was one advertised by a firm in Dorset as containing 85 valves and weighing 10cwt. Tantalisingly, no other details were given, and one can only wonder what particular task this goliath of a set was actually required to perform.

American dealers were particularly well organised in the matter of government surplus.

A one page advert by Radio Ham Shack of New York in *Wireless World* Jan '56 listed no fewer than 72 sets comprising receivers, transmitters and transceivers, 39 radar units, 69 dynamotors and 106 test sets. Each item was described as to its frequency range where applicable, associated equipment, function etc. Many of the big name dealers of that era have now ceased trading, those that remain tending to cater for the hi-fi, video and computer sections of the market. It is interesting to note that one European manufacturer became established in the forties as a result of entering the home constructor market. In 1948 the infant Grundig produced its first ever radio in Germany. Called the Heinzelman, it came in kit form but without the valves, which the purchaser was instructed to obtain from government surplus stockists.

While advertisements often provided a description of the unit's function, valve line-up etc, some were worded in such a way that they would fall foul of the Trades Descriptions Act if appearing today. One popular unit lending itself to the needs of the SWL was the receive section of the WS18 MkIII. This covered 6 to 9MHz and readers were led to believe that all that was necessary to get on the air was the provision of HT and LT. Not so, for the receiver had no tuned circuit across the input of the RF valve. When operated in conjunction with the transmitter, the missing L/C combination was provided by the tank circuit of the PA.

Copywriters also fell flat on their faces when advertising the WS38 AFV as a walkie-talkie. Many thousands of 38 sets were sold as walkie-talkies but in the case of the AFV model, these letters

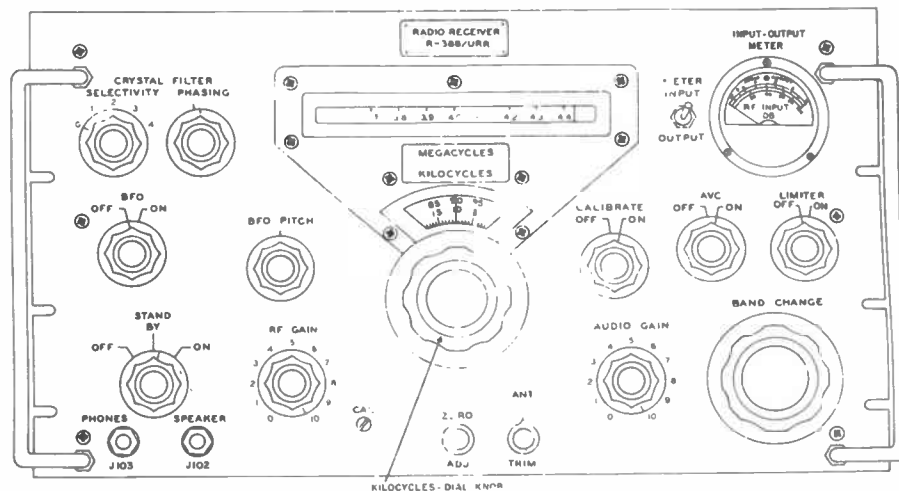
stand for Armoured Fighting Vehicle and the set operated from the vehicle's 12 volt supply with the off/receive/send switch on the portable model replaced by a relay for remote control.

The official manual for the WS38 gives a maximum range for two way working of 2 miles, depending on terrain, so the 15 miles claimed by Viners of Middlesborough in 1955 does seem rather optimistic. Bearing in mind the frequency range of 7.4 to 9MHz, the claim by Relda Radio for 65 stations heard is also surprising.

It is tempting in a survey such as this to point to what might be considered the best receiver of the period, but such an undertaking is not really feasible for the reason that, unless qualified, the word 'best' has no specific meaning. Best with regard to what? sensitivity? audio quality? portability? There is no doubt that the R107 mentioned earlier was improved upon, as far as general coverage is concerned, by the Army's R206. Whereas the former set had a limited frequency range of 1.2 to 17.5MHz, the R206 provided general coverage from 550kHz to 30MHz in six bands. An add-on unit, the adapter frequency range No 1, extended the lower end to 50kHz. The power supply was housed in a separate unit, which also contained a speaker. The set could be operated from either 100 to 250 volts ac or 12 volts dc. The attention paid to interference suppression, with regard to the vibrator circuit, is indicative of the high standard of design and construction throughout. The receiver was a single superhet using 11 valves with two stages of RF amplification and two of IF amplification, giving an overall bandwidth of 8kHz (-6dB). Two crystals in separate L/C circuits, situated immediately before the first IF amp, provided alternative bandwidths of 700Hz and 2.5kHz. The receiver saw service in 1945 and came onto the surplus market around 1961. Prices varied from £30 (£E195) to £17/2/6 (£E114.40) depending on the supplier. While affording fine reception, the layout of the controls was not aesthetically pleasing and could fairly be described as bitty.

More in keeping with the rugged good looks normally associated with military

Radio receiver R388/URR front panel controls



equipment, was the appearance of the set with which I shall end this survey. Being of US manufacture, one can hardly call it the Rolls-Royce of receivers, possibly the 'Cadillac of Communicators' might be a more appropriate epithet. My contender for the title 'Pride of the USA' goes to the R388/URR made by Collins, and used by all three of the American armed Services (in civilian clothes, it was marketed as the 51-J3). An advert in 1972 described it as 'an excellent and rare receiver' and the asking price of £157 (££753) certainly put it in the upper echelon.

The USAF manual states it to be 'a communications receiver having exceptional frequency stability and calibration accuracy. The receiver covers the frequency range of 0.5 to 30.5MHz. Although useful as a general purpose communications receiver, its accuracy and stability make it especially useful where it is desired to receive known frequencies without searching or frequent readjustment and for the reception of frequency shift keying transmissions'.

Technically it is one of the most interesting of the older types of receiver employing mechanical bandchange. It incorporates 18 valves, or tubes, as they are known in the US and operates as either a single, double or triple superhet depending on the band selected, of which there are 30, each one megahertz wide. Tuning is of the permeability type, with dust cores moved by cams on

rotating shafts. The first oscillator is crystal controlled, but careful selection of basic frequencies and harmonics means that only 10 crystals are required to provide the LO frequencies for all bands.

When operating as a triple superhet on band one only (0.5 to 1.5MHz), a single crystal oscillator provides different frequencies for the first two mixers, with separate tuned circuits in its anode selecting both the fundamental and required harmonic simultaneously. The standard to which the set is engineered can be gathered from the fact that a number of components are individually selected to match the particular requirements of each receiver. The VFO and buffer amplifier comprise a sealed unit that is manufacturer serviceable only, and this is followed by an L/C trap tuned to the IF in order to reduce the possibility of any such signal reaching the final mixer.

A received frequency readout to 1 kilohertz affords a high setting accuracy. Unlike the R206, the American receiver operates from 115/230 volts ac only. Straight through selectivity is 6kHz (6dB down), while a crystal filter with switchable series resistors provides four degrees of selectivity ranging from 200Hz to 2.0kHz. There is no add-on unit for low frequency working but a complementary receiver, the R389/URR, covers 15kHz to 1,500kHz in two bands.

One set of instructions to be found in military manuals that has no counterpart

in civilian use, is that concerning the destruction of equipment to prevent it falling into enemy hands. In this context the R388 user is ordered to smash the controls, tubes and switches using sledgehammers, axes or pickaxes. Cut cords with machetes. Burn technical manuals using gasoline, flame throwers or incendiary devices. Bend the cabinet, panels and chassis and further destroy using firearms, grenades or TNT. Bury what remains in trenches, foxholes or any other holes or throw the parts into streams. Finally destroy everything.

Thankfully, much equipment has survived. The RAF museum at Hendon, the Imperial War museum and the Army museum at Blandford provide opportunities to see sets dating back to WW2. Over the years, the enthusiast has had to rely on specialist dealers to supply information gleaned from REME manuals and other official publications. The high regard in which these old warhorses are now held is evident from the fact that one of Britain's leading manufacturers of military communications equipment has recently purchased a large quantity of manuals apertaining to valved receivers, from one of the few remaining suppliers, in order to complement its own collection.

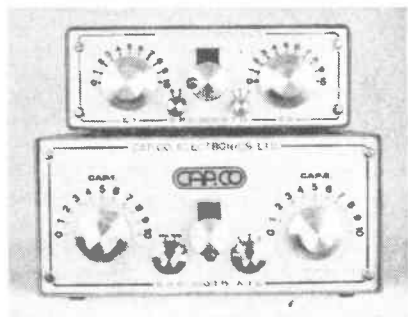
With more and more professional organisations and private individuals turning their attention to the preservation of these doyens of the airwaves, it does seem certain that their future is assured.



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CAP-25D DIFF 500 pfd	£18.95
<b>8kv 2.5mm plate spacing + £2.00 p&amp;p</b>	
CAP-31S S GANG 250 pfd	£17.95
CAP-31T T GANG 250 pfd	£22.95
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<b>12kv 4.5mm plate spacing + £2.50 p&amp;p</b>	
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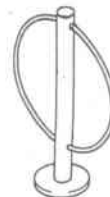
There are various models of loops – typically 2 antennas and 1 Control Box is required to cover the whole HF frequency range from 1 to 30 mcs. A reduction of £100.00 is allowed for two aerials. Prices range from £59.95 for the receiving Loop to £456.00. Power ratings for these versions are from 100-200 watts.

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# A 20M YAGI AND MAST FOR THE 20M BAND

ROY QUANTICK G3UGL DESPAIRED OF MAST AND ANTENNA DESIGNS THAT WERE CLEARLY NOT FOR 'SMALL PLOTS' – SO HE DESIGNED HIS OWN, AND TELLS US HOW HE DID IT

In the second and final part of the article we complete the aerial construction.

## Matching

It was now necessary to consider how to match the feeder to the antenna. Having made several gamma matching devices in the past, I elected to do the same again. The gamma rod used was 1/2in OD 16 gauge, 4 ft long (*Reference 3, p56*). I went to great lengths to waterproof a box to house a tuning capacitor; I have found water in previous boxes that must have got in through the screw threads! Water will get into antenna parts assisted by wind and flexing.

For this particular application, I hung the box below the boom and drilled a few drain holes, on the basis that water will get in whatever I do. However, I will not dwell on this aspect, despite getting the SWR down to 1.2: 1, as I found I could get better control of the matching by using a 'T' match.

I was never quite satisfied with the gamma match, although it is easy to construct and it works, though I got a touch of the TVI's from the immediate neighbours and was prompted to rethink this aspect through. A gamma matching system does not guarantee immunity from secondary radiation off the feeder braid. It is also asymmetric electrically and mechanically. I never did find what effect this has on the polar field diagram, but strongly suspect it shifts the lobe around a few degrees. Of course the

My first approach was to find out how much a pair of good tuning capacitors would cost. When I found out, I discarded this approach altogether. My good friend, G4NHN, convinced me that constructing a coaxial tuning capacitor was as easy as falling off a log. Furthermore, it would be easy to tune and weather-proof and, most importantly, it costs almost nothing. This seemed the ideal solution.

Unfortunately, I was forced to buy the T rods. These were two 5ft lengths of 1/2in 16 gauge aluminium (T match rods are longer than the gamma rod). The centre section of the T match was suspended by two non-conductive acrylic strips (see *Figure 4*). The attachments to the elements are preformed aluminium strips. Although I am able to drill and cut various materials, when it comes to slicing up strips, I had to find someone with a guillotine, which produces nice straight edges. It also saves time, hacksaw blades and avoids getting blood over the workmate.

A strip 3/4in wide offers a good compromise. I used 18 gauge, but I think that 16 gauge would have been better for this application. To preform the rounded part, press a slightly smaller diameter tube onto the strip over a gap in the workmate, then close the jaws to squeeze the extensions together. Take it out and place the extensions in the jaws and close them tightly. Use the former and a bit of strength to align the formed

rounded part with its centre, in line with the extensions, then trim them (see *Figure 5*). There are a number of different diameters to form in this way, as element diameters differ, and of course there are the T rods themselves. For these, I used the tommy bar from my box spanner set as the former.

The capacitors were two 1ft lengths of 1in OD 18 gauge tubes. I had to shop around to find suitable plastic tubing to act as the dielectric. A suitable material turned out to be flexible (clear) PVC tube, 19mm OD by 13mm ID. The system requires about 1m. This tubing can be inserted into the 1in aluminium capacitor tube, and the 0.5in T rod can be inserted into the centre. It is a nice fit, and slides quite easily; an important factor when it comes to tuning.

If this is assembled on a warm day, it may be necessary to use a bit of petroleum jelly to allow the plastic tube to be slid into the aluminium tube. It may bind, but once it's positioned, fine adjustment of the T rod is easy. I arranged for the PVC tubing to go across the gap at the centre to contribute to mechanical rigidity and ease of lining up the elements. I drilled through the 1in aluminium tubes, and straight through the PVC tubing near the centre section, which provided a means for electrical connection to suitable bolts, and data for the maximum insert position of the T rods.

Here are a few construction points to

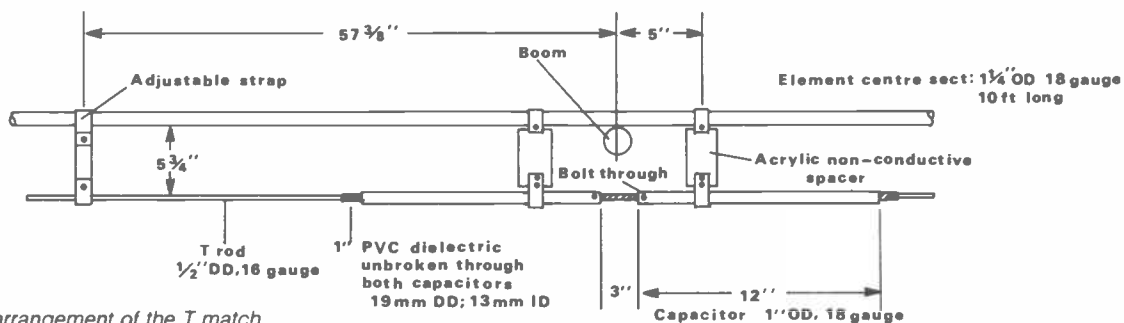


Fig 4 The arrangement of the T match

polar diagram is not that critical and any asymmetry would be academic, but the purists may sympathise. A symmetrical feed would be efficient and more pleasing to the eye; besides, it would reduce or eliminate any possible radiation from the feeder when the whole system was matched. It might also eliminate the TVI!

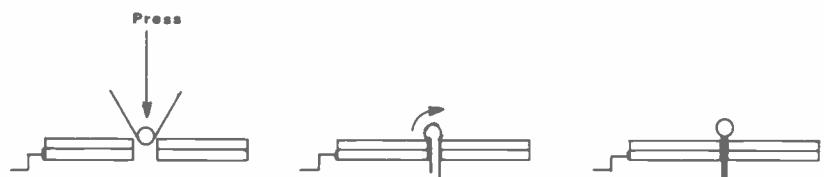
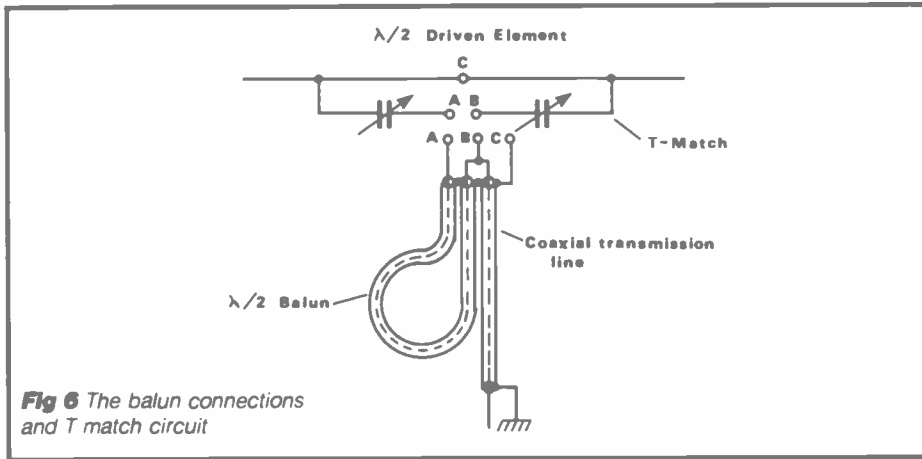


Fig 5 Forming the straps in the jaws of a 'Workmate'. Use 3/4in 16 gauge

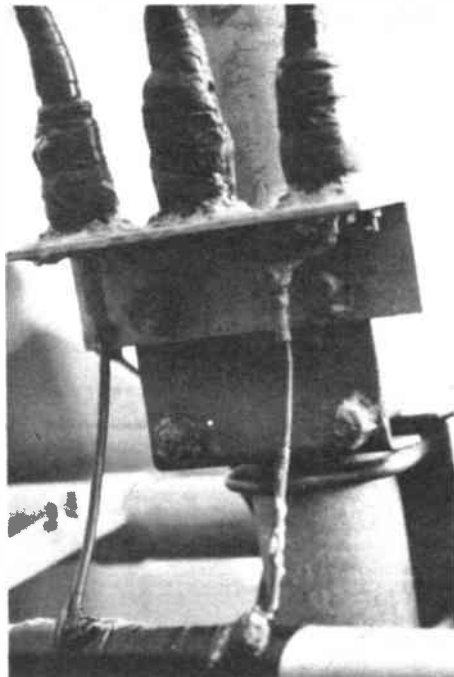


**Fig 6** The balun connections and T match circuit

think about. Try to use a drill press for all drilling through tubes – line of sight often misses the centre of the tube. If possible, cut all tubes with a hand tube cutter. After cutting a tube, clean the internal burr with a half round file, otherwise the insert tubing will be scored; this also goes for the compression slot. A 4in slot is my standard, and I can reach all of it with the appropriate half round file.

Attachment to the inner sections involves using acrylic insulator pieces as in *Figure 4*. The outboard straps were positioned at first at about 55in from the centre-line of the boom. It is best to mark the T rods with a soft pencil at points corresponding to the maximum insert position and at, say, within 2in of insert. Mark the T rods held together, with the ends on something flat, to make sure that these marks are at identical positions on both rods. This is a symmetrical system so it must be accurately assembled. The reason a mark is made with only 2in or so of insert, is to warn you that the T rod may come out on the next adjustment! This is the time to reposition the outboard straps and adjust the T rods back in again.

**Photograph 7** Showing the connections on the two baluns and the feeder



### Construction of the balun

I made up a half wave balun coil, as in *Figure 6*. The reasoning behind this is covered in the *RSGB Handbook*, and the *ARRL* reference and will not be enlarged upon here. One point to remember is that the characteristic impedance of the feeder (UR67) is 50 ohms, and this is transformed by a factor of 4 (200 ohms) at the antenna attachment points.

I must also mention that I have an 'antenna scope'. This is a transatlantic name for an RF bridge or antenna bridge. There are construction details for such a device in the *RSGB Handbook* (*Reference 1*, p18.10). Using this bridge in conjunction with my modified GDO as a source of RF makes all these measurements a breeze.

The half wave balun was made with a length of UR67 (velocity factor 0.66). I had to fit a plug on one end because, for one thing, it was going to be necessary when I connected it to the antenna, but at this stage it was necessary because it enabled connection to the RF bridge. It is also important for a half wave to short the inner conductor to the braid at the other end. This is done using a modified paper clip. To calculate the length of the cable, I used the following equation:

$$\frac{492 \times (\text{Velocity Factor})}{\text{Frequency (MHz)}} = \frac{492 \times 0.66}{14.300}$$

$$= 22.707 \text{ feet}$$

$$= 6.92\text{m}$$

I cut my first length of UR67 at 23ft 6in; a bad move – it resonated at a higher frequency than 14.300MHz. This would be the time to re-check calculations. However, there was nothing wrong with the calculations, the actual velocity factor worked out at 0.79, and it was 50 ohms at this frequency – the man in the shop had said that it was UR67! This was upsetting, as coaxial is expensive. Having decided never to go back to that shop again, I found a length of genuine UR67, with a reputable maker's name printed along it. However, I started with about 25ft and sliced bits off. Eventually, I got it to resonate at 14.300MHz, on the nose. Even with the correct cable, it was a trifle longer than the calculations indicated. It was then necessary to fit a plug, and check that it still resonated at 14.300MHz.

I think it advisable to assume a slightly

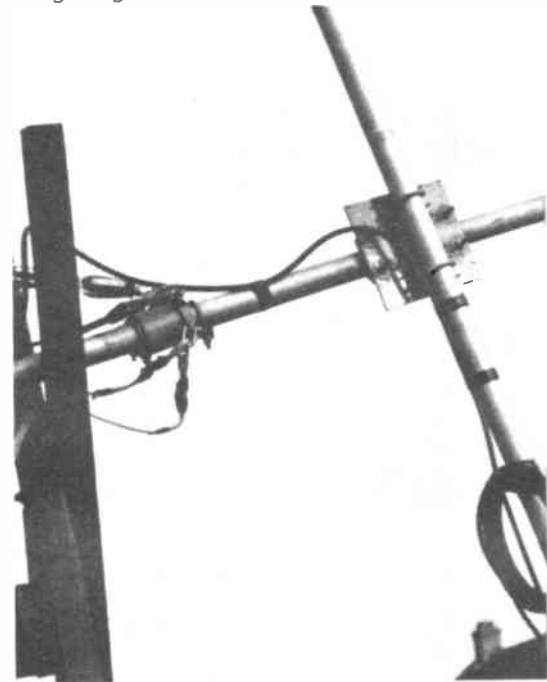
higher velocity factor for constructional purposes, and I would suggest 0.75 for UR67 or its equivalent, which would give about a 7% increase, and you will be on the right side with good quality cable. Remember that the frequency goes up as the velocity factor goes up. Frequency goes down as the length goes up. Therefore, if the frequency is too high – the length is too short, or the velocity factor must be too high.

As the balun cable was now ready, I wound it onto a coil of just under 30cm in diameter and secured the windings with jumbo sized cable ties from Radio Spares. Attachment to the boom was effected by using plastic insulation tape – yes, I know, it unwraps itself after a while, but wrap a couple of turns of self amalgamating tape over the last winding of plastic tape, and it won't come undone.

Incidentally, the plugs I use for all outdoor work for these frequencies are UHF – Greenpar GE40040 Cl. The specification indicates that they are waterproof. However, I also wrap plugs in connector sealant tape (Tandy – Radio Shack Cat No 278-1645). It's a bit expensive, but it works very well. It comes in a roll 150cm long by 1.3cm wide. It is possible to mould it with your hands until it completely covers the plug. It is also possible to remove it by slitting it open with a thin bladed knife and peeling it back like an overcoat. I have done this more than once on the same plug, and it is very satisfying to see a nice shiny plug being revealed, with the sealant still malleable. If it is not possible to obtain this kind of sealant then self amalgamating tape will do the job, although it is more difficult to remove.

The plugs must have sockets, and I used a piece of aluminium angle 1½in x 1½in x 5in. This was mounted on the boom and secured with the ubiquitous 51mm car exhaust clamp. Cutting the holes for the sockets can be hard going, and on the basis of standard use of these

**Photograph 8** Showing the boom to mast fixing using the U bolts and V sections





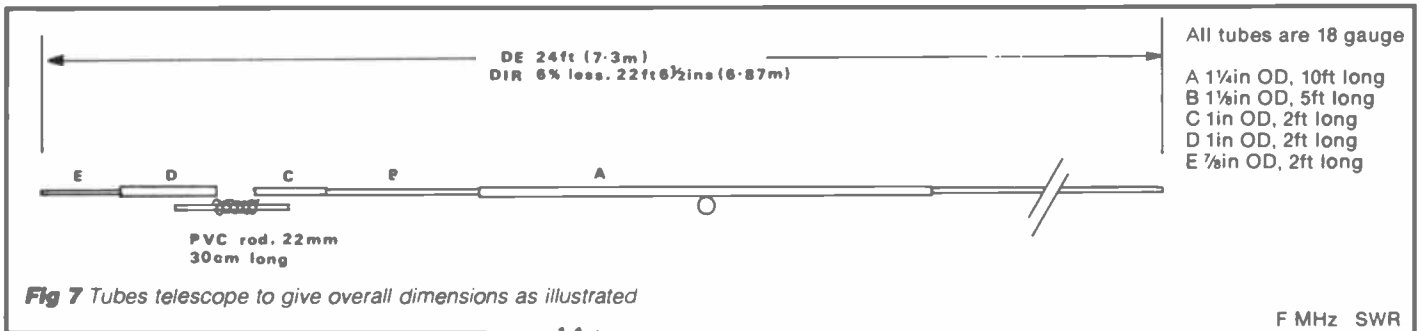


Fig 7 Tubes telescope to give overall dimensions as illustrated

sockets and plugs, I purchased some time ago a Q Max sheet metal punch. A 5/8in punch is the right size, and cutting holes for sockets is easy.

It is necessary to cut three holes for the sockets; two for the balun and one for the feeder (see Photograph 7). The final arrangement of the elements and dimensions are shown in Figure 7.

### Assembly of the antenna

Certain fittings for antennas are best purchased, as it is not always cost-effective to construct them. One example is the element-to-boom fixing. Some of the do it yourself fixings look easy enough, but often U bolts tightened against a flat plate against the boom are useless. U bolts on their own will turn eventually, no matter how tightly they are secured and if this happens with the elements, you are faced with an interesting problem (in a small plot) of how you are going to get the whole thing down, with an element at any angle except horizontal!

U Bolts used in clamps which have Vs cut in them, so that tightening the bolts causes the V section to bite into the boom, are much more satisfactory. I used clamps from the J Beam catalogue - universal clamp 1 1/2in element to 2in boom, No 9016. This is a galvanized clamp, which uses two U bolts and two V sections in a box arrangement. The 1 1/2in element is held in a formed section, which is squeezed up with a bolt. In the same catalogue is a smaller version: 1in element to 2in boom, again, using two U bolts.

The only problem I found with these clamps is that, on assembly, the element is sometimes not at right angles. They can be bent if you use a piece of iron pipe in the element section, but you may also break off a bit of the galvanising, so remember to paint it.

The boom to mast clamp I made myself (see Photograph 8). This was made from a piece of scrap duralumin. There are four U bolts around the mast pulling against four formed V sections. The boom uses two U bolts pulling against similar formed sections. This arrangement has withstood some very high winds, in the order of 80mph and the elements and alignment of the boom have not moved.

There is an interesting problem getting the boom and the elements horizontal to the mast. First, I assembled the antenna, making sure that the elements were in the same plane. Then, using the workmate and a short length of mast clamped vertically, I assembled the boom to mast clamp and attached the

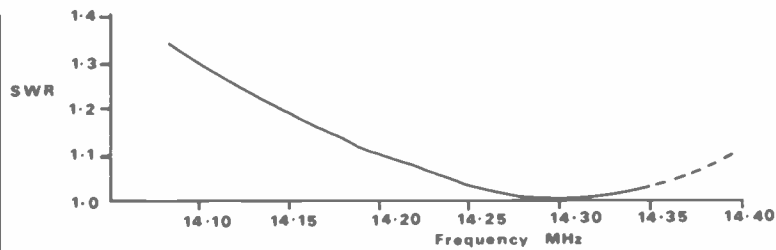


Fig 8 Plot of SWR

F MHz	SWR
14.100	1.30
14.150	1.20
14.200	1.10
14.225	1.05
14.250	1.02
14.275	1.01
14.300	1.01
14.325	1.01
14.350	1.05

antenna. Once the elements were 90 degrees to the mast, I could tighten the clamp to the boom. It need not be touched again. Now, when the boom is positioned at the real mast, it is only necessary to ensure that the boom is 90 degrees to the mast. I actually slotted one set of holes to allow a slight movement in this plane.

### Tuning

The tuning consists of two parts, one to get the resonance of the antenna as a whole onto the desired frequency, and two, to match the feeder. By careful tuning of the coils and resonant frequency of the elements in the first place, you should get close to the desired frequency. However, when the whole lot is brought together on a common boom, there could be some differences.

The first round of tuning must be done with the antenna on its trestle. I used the GDO and the antenna bridge with a very short length of UR67 to see if I was anywhere near. Interestingly, it resonated at 14.500MHz, showing a high impedance. I also substituted an SWR meter and the transmitter as a signal source and got a reading of somewhere around 2.5:1 at 14.300MHz.

My first lesson was in realising how sensitive the tuning capacitors happened to be, and my first attempts at getting a low SWR kept overshooting the optimum position. By moving out the outboard straps and then moving the T rods bit by bit, I was getting closer to an optimum SWR. It was interesting to see that for a particular outboard strap position, I could go through a minimum SWR with the T rods, and it would then rise again. Further movement outboard of the straps, and an adjustment of the T rods resulted in the minimum SWR getting closer to the magic 1:1. Adjustment of the T rods was easy and I began to wonder why I had never adopted this approach before.

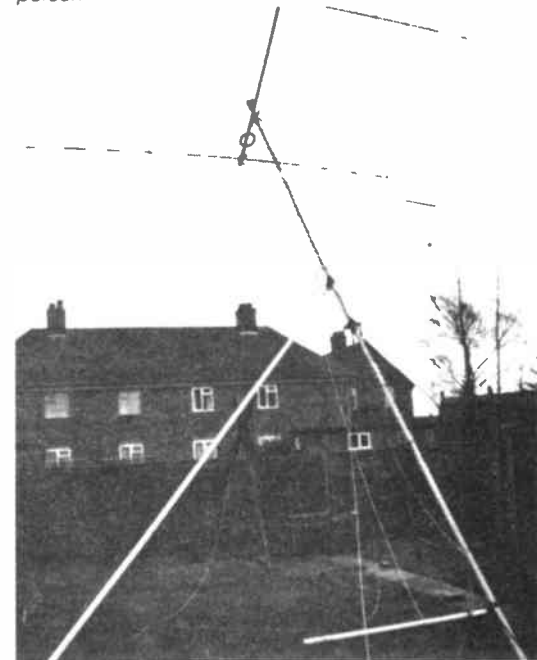
There was one problem; the antenna was almost on the deck, hence among other things, the impedance was somewhat high. When the mast was raised, the SWR minimum position moved up in

frequency. This did not come as a surprise as I have met this before. I thought the clever thing to do would be to tune for a lower frequency, and when the mast was raised, the SWR minimum would be right on the nose. Good thinking, but it doesn't work. You only have to consider the change in radiation, resistance and other criteria to realise this.

One thing I did do with the spare lengths of UR67 was to join two together (with proper plugs) and cut it so that I had two half waves for 14.300MHz, somewhere near 46ft (14.02m). Connecting this to the antenna and raising the mast to vertical now allowed the same situation to exist at the SWR meter as when it was connected directly to the antenna.

Now the measurements were correct with the antenna at its operating height. It did mean however, that to make further adjustments the mast had to be lowered. Further adjustments were made and

Photograph 9 Raising and lowering the complete assembly can be completed by one person



when the SWR reached its absolute minimum (zero reading on the instrument), I plotted the SWR curve. It turned out to be quite flat, if not a trifle high in frequency. Attempts to shift this curve lower in frequency did not work; it was possible to get a low SWR anywhere across the frequencies of interest, which could also be achieved by adjusting the tips, but the curve steepened at each end.

This exercise was repeated probably 20 times over several days, each time lowering the mast and pulling it up. It more than proved the system. The GDO and antenna bridge gave me a resonant frequency of 14.300MHz at 50 ohms. Measurements in the shack with the existing coaxial cable gave me 14.297MHz at 50 ohms, which was very satisfying. The final SWR curve is reproduced in Figure 8. I get a great deal of pleasure seeing the reflected needle not move off its stop while I am in QSO.

One point I should make is that it is necessary to decide the preferred frequency of operation before any metal is cut or coils wound. My particular preferred area is the high end of the 'phone band, and inspection of the SWR curve shows the result. At 14.300MHz the curve is as low as I could read on the instrument, which was the frequency I was aiming at in this construction. I am surprised to see how flat it turned out, even at 14.100MHz it is still only 1.3:1. However, when I attempted to move the curve lower in frequency, it changed its

shape. From my notes I find that I actually moved it to give an SWR of 1:1 at 14.200MHz, but at 14.100MHz it was 1.30:1. It seems that moving away from the design frequency steepens the low end of the SWR curve. The HF end of the band never went above 1.2:1.

I suspect that any further reduction in size of the antenna would see a progressive steepening of the SWR curve. The figures above are most encouraging, but I think it important to make sure of the preferred operating segment of the band at the design stage, not when it's aloft.

This project involved a great deal of effort, and would only appeal to those interested in making it (almost for its own sake) as well as using it. There is, of course a great deal of satisfaction in making something work from your own experiments, trials and errors, and I believe that the principles and construction techniques I have described will be of interest to those who are contemplating antennas for other frequencies.

My signals into ZS1 land are as good as, and often better than, other stations using three elements. I am sure that the reduction in size has had virtually no effect on the performance, all other things being equal. I do not think at this time that there is a comparable commercial product available.

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#### Acknowledgements

I would like to acknowledge assistance given in this project, in particular:

G8FAK for his assistance with the early experiments with the mast.

G4NHN for his insistence that telescoping capacitors for Gamma or T matches are easy to construct, effective and cheap. Also for his assistance in some of the heavy work.

G3GIQ for his assistance with computer derived diagrams for launch angles, and the effects of changing ground conductivity.

G3UDV for the loan of his camera.

ZS1AAQ for his critical comparative signal reports over the last 14 months or so.

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# MORSE REPORT



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

Reader A C Foley heard a general CQ message from BTI's Niton Radio on 19th September, announcing the end of the wireless telegraphy service, including the 500kHz distress watch at three UK coast stations, as from the end of October 1987. He comments, 'rather a sad day for W/T. I only hope the alternative service will provide the essential back-up to shipping.'

I asked BTI about this and was informed by Mike Wilton, their Maritime Services Manager, that the Department of Transport, the authority responsible for search and rescue, commissioned a study some time ago to assess the minimum number of coast stations needed to maintain an effective watch on 500kHz, bearing in mind the very few initial distress or urgency alerts received on this frequency nowadays.

As a result, it was decided that adequate coverage could be provided by the coast stations at Land's End/GLD, North Foreland/GNF, Cullercoats/GCC, Wick/GKR and Portpatrick/GPK, accepting that foreign coast stations also provide a listening watch, overlapping in many cases with UK coast stations.

Accordingly, the W/T service at Niton, Humber, and Stonehaven Radios ceased at midnight on 31st October, with the 500kHz distress watch continuing at the five remaining stations.

Regarding Morse traffic generally, Mike Wilton says, 'It is our intention to continue with an HF W/T service as long as it is economically viable. The medium frequency service on the 500kHz band is now very little used but, again, we intend to continue the service.'

Mike, himself an ex-MN Radio Officer, also comments, 'I am proud of our maritime service and its use of Morse, which makes it a little special'. He has offered a detailed article about the use of Morse by BTI and, all being well, this will appear in due course in *Morsum Magnificat*.

### FISTS CW Club

If you are a newcomer to Morse operating, or an experienced operator willing to make a special effort to encourage beginners, the FISTS CW Club may be of interest to you. It has three simple aims – to further the use of CW on the bands; to encourage newcomers to the mode; and to engender friendships within the membership.

Launching this laudable project is Geo Longden G3ZQS, who says, 'The club, whilst open to all, is directed primarily at newcomers who will find we have a nucleus of very experienced operators aware of the problems they are facing. To ensure the survival of CW we must actively encourage new blood.'

To newcomers, he says, 'I would counsel you to send no faster than you are able to copy and, if it enhances the readability of your code, even slower. A good operator is recognised in many ways but prime amongst these is the clarity of his code rather than the speed at which he sends. A love of CW is all you need to join FISTS. Membership of the RSGB will not be a factor and there is no requirement to send/receive at some specified minimum speed.'

All enquiries about FISTS should be sent to Geo at 119 Cemetery Rd, Darwen, Lancs BB3 2LZ, enclosing an sae.

### Commemoration

The set of stamps issued recently by the Post Office commemorating notable events during the reign of Queen Victoria has two distinct associations with Morse telegraphy. The 34p issue depicts a Morse key, to represent the transmission of the first wireless message across the English Channel by Marconi in 1899, while the 22p stamp depicts Brunel's 'Great Eastern', which laid the first successful transatlantic telegraph cable in 1866.

Purchasers of the presentation pack containing the full set of four stamps

have yet another, albeit less direct, link with Morse telegraphy. The pack contains a reproduction of the painting by R C Leslie of the Queen's coronation in 1838, an event attended by the inventor of the Morse Telegraph himself, Professor Samuel F B Morse.

Over the years there have been a good many stamps issued relating to Morse telegraphy and its achievements. I hope to mention some of these in future columns.

### Tribute

Derek Wilde G0FGB reports that Pat Andrews G2BSQ became a Silent Key last May, after a short illness. Derek says, 'Pat will be remembered by many for having got them through the Morse test – there must be hundreds – and if he could he would go down with them to Niton or wherever.'

'His last 'candidate' – just before the RSGB took over the tests – was Ken G0ERF, who told me that the Superintendent at Southampton specially asked Pat to look in on him, and congratulated him on the consistently high standard of candidates he had sent them over the years. Apparently as soon as one of his lads (or lassies) started on the key they would say 'It's Pat again!'

'Pat learned Morse as a young lad, copying maritime traffic to and from the old Seaforth Post Office station, and got his licence much later in the 30's. Most of his contacts were on 80, using his trusty old McElroy key. He is sadly missed in these parts and, I am sure, by a much wider spectrum.'

### 'Antique' net

The NRHF antique net mentioned last time has changed its frequencies. These are now 3.508MHz CW and (dare I mention it!) 3.603MHz phone (AM) on Saturdays at 0730 UTC.

### ... And Thou?

Malcolm Henchley G0CHZ writes from Cornwall, 'I took up amateur radio in April 1985 and spent most of my time practising Morse under the special dispensation for 'B' licensees. When I passed the Morse test in June 1985, I promised myself I would only use CW for the ensuing year.'

'Well, that has now gone and I just cannot bring myself to get my mike out. Somehow I can think better in dots and dashes and the task of trying to hear, and be heard by, a weak station makes me feel that this is possibly akin to the pioneering days of radio.'

'I find 15 watts on a long wire or a dedicated dipole is quite satisfactory. All the knobs and speech processors, etc, remain in pristine unused condition – just a straight key, a bit of power, an ATU and lengths of light wire provide me with the real pleasure that comes from trying to master the art of Morse. I am 50 years plus, and it has not been as easy for me as some young brain – but it really is fun!'

That seems a pretty good summing up of the attraction of Morse operating to a good many of its adherents. How do you see it? If you can add to what Malcolm says, just drop me a line, QTHR.

# DATA SHEET

by Ian Poole G3YWX

Since the advent of ICs, building power supply regulators has become very much easier. One of the first chips to gain widespread popularity was the famous 723. Its flexibility and convenience made it very easy to use, but it still needed a number of components around it to operate.

The 723 has been

superseded in many respects by a new generation of ICs which are even more convenient and easy to use. The most commonly used are probably the 7800 and 7900 series of regulators. They are very convenient to use as they are three terminal devices, requiring no other components in the majority of cases.

## Specification

The ICs come in a wide variety of types. Part of the reason for this is that they are essentially fixed voltage regulators, with no adjustment. Accordingly, they come in a range of preset voltages. Five and twelve volts are the most common, but if you are lucky it is also possible to obtain 6V, 9V, 15V,

18V and possibly a few other versions as well. The actual voltage of the device is indicated as part of the type number eg, a 7805 is a five volt version and a 7812 is a twelve volt version.

There are also different series, which are available for different current ratings. The standard 7800 series will deliver up to an amp if it is attached to a suitable heatsink. There is also the 78L00.

This is a lower current version, capable of regulating up to 100mA and ideal for small on board regulators to supply a single circuit or so. Then there is the big, beefy 78H00 series. These are capable of handling up to 5 amps. These ones are not seen so often, because people tend to use more sophisticated chips capable of full adjustment of the output if a supply of this size is to be made. Some manufacturers also make a 78M00 series which can deliver up to half an amp. Again, it is most unusual to see these ICs because it is usually easier to use an ordinary 7800.

Finally, there are the 7900 regulators. They come in the different current and voltage ratings and are essentially the same as their 7800 counterparts, except that they are designed for regulating negative supplies. They come in particularly handy when making dual supplies like the one shown in Figure 2.

Not only do these integrated circuits contain excellent regulators, they also have some other useful protection facilities as well. One is the thermal shutdown, which is provided to protect the output transistor in the event of the junction becoming too hot. This is particularly useful, even though it may not be used very often. It may prevent a catastrophic failure of the

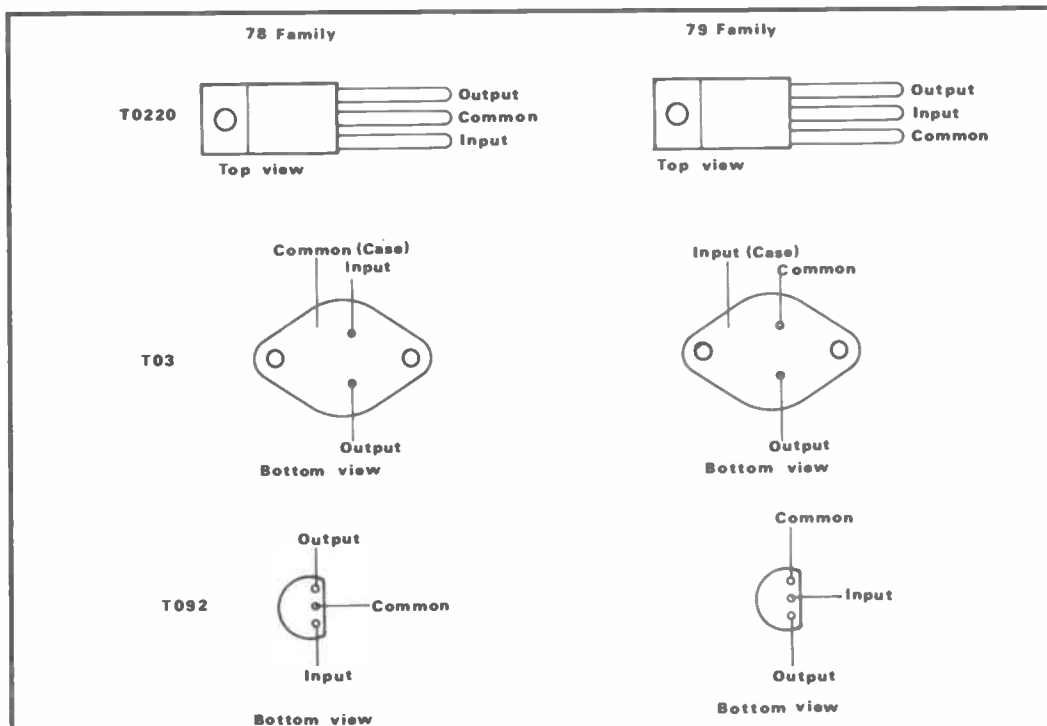


Fig 1 Pin connections for the more common packages for the 78 and 79 regulators

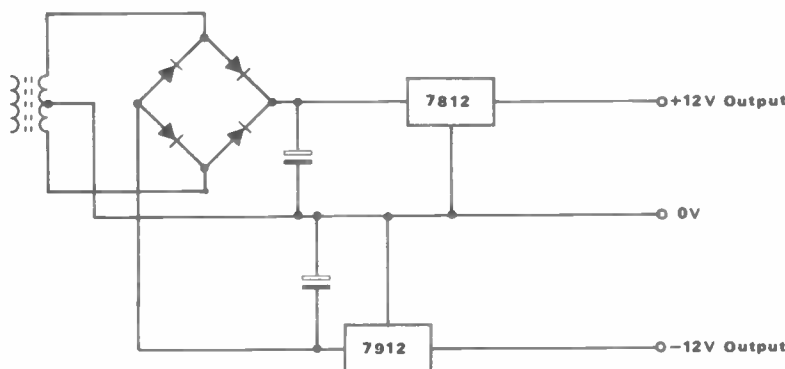


Fig 2 A dual supply giving  $\pm 12$  volts output

output transistor, and all the ensuing damage that may arise from the pre-regulator voltage getting onto the output.

Current limiting is also provided to limit the current to 'a safe value', as it says in the data books. The typical values for the short circuit current depend on the type of device and its voltage. For example, one manufacturer states that the typical short circuit current for a 7805 is 2.1 amps, whilst it is only 1.2 amps for a 7815.

One point to watch when using these chips is the tolerance on the output voltage. It is generally  $\pm 0.25$  volts for a 7805, which means that the output could be anywhere between 4.75 and 5.25 volts. Also for a 7812 the tolerance is  $\pm 0.6$  volts, meaning that its voltage can vary from 11.4 to 12.6 volts. In most cases, this sort of variation is quite acceptable, but in other cases some method of adjusting the voltage may be required.

#### In use

Essentially, the regulators need only be connected in the circuit as shown in Figure

2 to make a perfectly working regulator. Even so, there are a few useful 'tricks of the trade' which can be put to good use in some cases.

The first is that if the regulator is placed some distance away from the smoothing capacitor, it may need a small amount of decoupling to stop instability. In this case a  $0.1\mu\text{F}$  or  $1\mu\text{F}$  capacitor should be connected between the input and earth terminals quite close to the device, as shown in Figure 3. It is also useful to place a decoupling capacitor across the output in some cases. This can be done to improve the transient response.

Although these chips are essentially fixed voltage regulators, it is possible to give them an adjustable output. This can be done by adding two extra resistors as shown in Figure 4.

Normally, these ICs do not need any special mechanical precautions. The 7800 chips are very easy to mount onto a heatsink, requiring only one hole. They also do not require any insulating washers under most circumstances, because the metal tab on the IC is

connected to the common or 0V pin. Beware though, this is not so for the 7900 or if a 7800 is being used, as in Figure 4, with a variable output.

#### Summary

These ICs are remarkably easy to use, and they are probably more versatile than

one thinks at first sight. At about 50p for a 7805 or 7812 they are a very cheap and easy way of making a regulator for a PSU. Additionally, they can be made to have a variable output. I have used them on many occasions and had no problem with them.

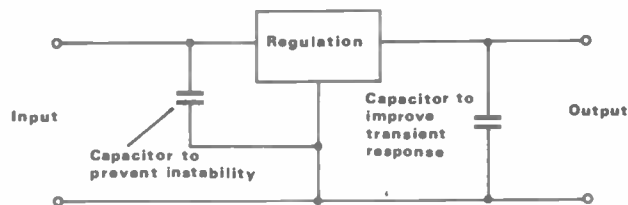


Fig 3 Extra capacitors to improve the performance

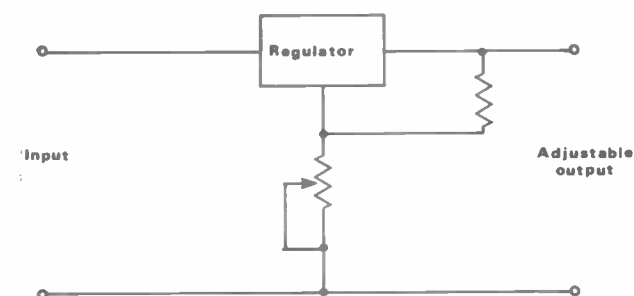
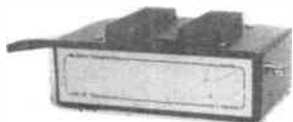


Fig 4 Creating an adjustable output

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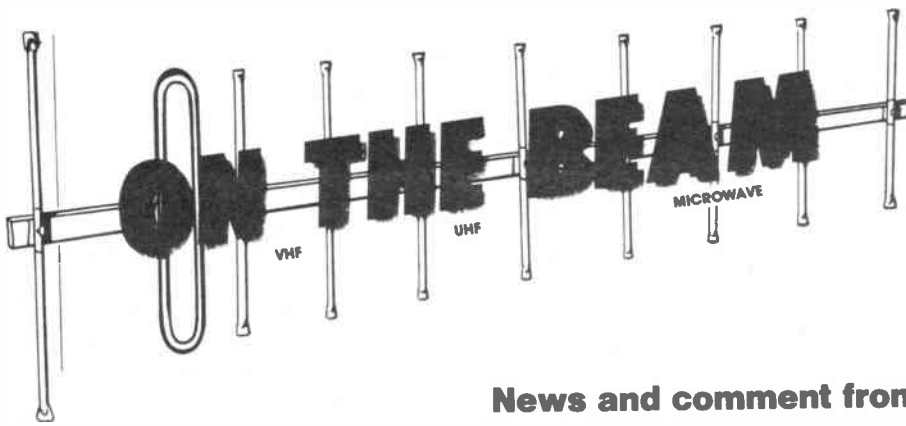
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## News and comment from Glen Ross G8MWR

If you missed the big opening at the start of November, you cannot say that you were not warned. A couple of months ago I gave you all the classic signs that show a major tropospheric opening to be likely and sure enough, they all arrived on cue. The constant weather and a large high pressure area slowly slipping away over the Continent brought some superb conditions for several days. We also had widespread fog and, of course, the immediate indicator of good conditions when the TV announcers started to apologise for interference to the pictures caused by weather conditions. If all that did not send you rushing into the shack, then you really deserved to miss all the action.

### More signs

For those of you who inhabit the FM end of two metres, another good indicator is the sudden appearance of long distance stations on the local repeater and a lot of co-channel interference. If you live away from the South East corner of the country, another good indicator is the appearance of the Aachen repeater on 145.800MHz complete with Belgian and Dutch voices. It goes without saying that the beacon network also shows the main direction of the lift conditions.

### Good DX?

This depends on what your own idea of DX is, but to whet your appetite it is known that there were plenty of contacts on two meters into OK and SP from G1, GM and EI and those really are long distances.

On seventy centimetres contacts were common into PA0, ON, DL and F, with some rarer ones also known to have been worked. Not all these needed high power, there are many reports of good Continental contacts being made from up North by people running only a couple of watts to small aeriels. On 23cm things were also excellent, with similar countries worked to those on two and seventy. This is something that surprises many people who know that path losses on the

higher bands are greater than on the lower ones.

### More gain

The answer to the similar ranges is that, because of the much smaller physical size of arrays for the higher bands, it is possible to use much higher gain aeriels. Frequently, the extra gain available when the gains at both ends are added is more than the extra path loss involved. This happened to me several times during the opening, when I was given stronger reports on 23 than on 70cm, although I was running about 100 watts on each band.

Again power was not the only answer; during a 23cm contact into Paris from Coventry I reduced power to only 100 milliwatts and was still getting a 5 and 5 report back. During a contact into Antwerp I added attenuators into the output from the transverter until I was sending just one milliwatt, or as close as I can measure at that level, to the aerial and was still getting a 5 and 2 report. In terms of power per mile this should earn a medal from George Dobbs and the G-QRP club or there is no justice!

### QSL

After the opening many people were heard discussing the QSL position and saying that they would have to join the RSGB to get the cards back from the DX stations. It seems to be not generally known that you do *not* have to belong to the society to receive your cards. All you need to do is to supply suitable stamped self addressed envelopes (the size that will take a building society or post office pass book is about right), marked with your call sign in the top left hand corner, to the QSL manager who looks after your call sign sequence. You can get the address if you send an SAE to Members Services dept, RSGB, Cranborne Rd, Potters Bar EN6 3JW.

### Outgoing

You might care to ask for a membership application form at the same time, if

you want to be able to send your cards via the same route. It is one thing to collect your cards for free, but you cannot really expect them to pay the postage on non-members cards, can you?

While we are on the subject, do not expect to get your cards back from the DX stations in a couple of weeks, the average is about four months and I have received cards as long as seven years after the contact was made. Patience is a virtue in getting the cards, as well as in cracking the pile-up to make the contact in the first place.

### World records

The mention last month of some new American records on the bands above 10GHz has been followed by more information on the equipment used for the attempts. For the 186km contact on 24GHz, WA3RMX/7 in CN93IQ used 20 milliwatts into a 73cm dish, and WB7UNU located at CN59DH used the same size aerial but with just 5 milliwatts of SSB. For the 22km contact on 47GHz, WA3RMX was located at CN58PL and used a 73cm dish with 3.5 milliwatts of SSB and WB7UNU and W7TYR, who were both located at CN58NH, used 24cm dishes and just 44 microwatts of power output.

When you remember that to use SSB at these frequencies you have to generate a carrier which has a stability of around plus or minus ten cycles in forty seven thousand million cycles, you can see what they were up against. You might like to work out the stability and then translate it in terms of two metres, I make it something like holding a two metre transmission to within .02Hz; now try doing it out portable on a hilltop. Incidentally, the actual world record for 24GHz is still held by HB9MIN and HB9AMH, who both used FM to work a path of just over 50km.

### More good things

Some more reports of DX worked during the recent openings have come to hand. First from G6MEN at Shrewsbury comes news of crossband contacts, 50MHz to 28MHz, with EA3CGN, EA3ADW and EA3DLV. Two metre contacts included some nice DX into DK and OK, with distances up to around 1400km. On seventy centimetres he lists contacts with DK, OK, F6 and Y22. Not bad going when you only run 30 watts and the QTH is only 30 feet above sea level, and on the western side of the country.

From up the road in Stafford comes news from G4OUT who runs 25 watts to a ZL special, which brought him two new countries and twenty new squares. The list is too long to give in full, but includes contacts with F2, DK3, GU4; OK1, Y25, ON4, PA3 and HB9. The number of new certificates issued has risen sharply since the opening, and I hope to give a full run down on those issued in the last four months in next month's issue. If you want details of the awards drop me a SAE, and if you are applying for a certificate please include a stamp for return postage.

### Light relief

As you may well know, the call for a

## ON THE BEAM

novice licence has been going on since the 1950s, and I thought you might like to see a comment on it which was made by GW3PHH in 1964:

'Let's hear no more these weary tales,  
Those jealous cries of mental snails,  
A curse on all these armchair critics,  
Seeking complimentary tickets,  
Let's hear instead the voice of men,  
Who though they fail will try again,  
And, when they finally succeed,  
Will think their Call a prize indeed!'

### The gear here

People applying for our awards usually give details of the gear in use, and often enquire as to what I use on the various bands. As it is nearly five years ago that I last gave details, I thought the time was ripe for a rerun. On 50MHz I use a TS700 as the driver to an excellent RN Electronics kit transverter, running around 20 watts to a dipole at 30 feet. On two metres I use a TS770, driving a home made QQV0-750 valve linear with 120 watts out on SSB, to an eight element Yagi.

FM runs 100 watts to a collinear. Seventy centimetres uses the TS770 dual bander to drive a home made 2C39ba valve linear to 80 watts output, which goes to a fifteen element yagi for SSB, or a collinear for FM use. 23cm uses the trusty TS700 to drive a MM transverter, which then drives a home made linear

using a 2C39 driving a pair of 2C39ba linears with 800 volts on the anodes to around 100 watts output. This then feeds a 180 element stacked yagi array at about 40 feet.

### Going up

13cm is taken care of with a LMW kit transverter running 1 watt output to a 40 element quad loop array. On 10GHz I use the Amrad FM system running 25 milliwatts to a two foot dish, and for 10GHz SSB I use a home made JVL transverter with FET pre-amp and low level linear running 6 milliwatts to the two foot dish. 24GHz is run using 7 milliwatts of FM to a one foot dish aerial. All bands from 144 to 13cm have low noise pre-amps mounted at the aerial.

For monitoring the HF bands I have a collection of fifteen receivers dating from 1924 to the modern day, and one or other of these is pressed into service as fancy dictates. My country scores at the moment are 3 on 50, 23 on 144, 16 on 23, 4 on 13, 2 on 10GHz and 2 on 24GHz. In my spare time I am into old cars and am currently rebuilding a 1947 Lea Francis. That wraps it up for another five years!

### Prevention

The winter months are now upon us with a threat of lousy weather and more importantly gale force winds, so now is the time to think about making sure that

the aerial system stays up. There is a theory that states that if the aerial did not fall down in the gales then it was not large enough anyway!

### Check it out

The best way to do the job is to take the whole lot down, thoroughly check it over, remake all the connections and then rebuild it. The very least you should do is to check all the fixings, such as Rawbolts or guy posts, and make sure that any guy wires are in first class condition.

If you use metal ropes it is worth spraying them with Waxoyl rust inhibitor which is obtainable in aerosols from most good motor supply shops. Then just to be on the safe side, make sure your insurance covers you for third party damage, some of them specifically name TV aerials and there could be an effective implied exclusion for any other types. Don't chance it; ask.

### Sign off

That wraps it up for another month. Thank you for your letters: your comments are always read with interest. The QTH is 81 Ringwood Highway, Coventry, CV2 2GT, or you can get me on Prestel using 203616941. The machine has been on the blink recently with some ingoing messages going astray, however, all seems well now.

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MONTH**

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# PROJECT

# BOOK

by Martyn Williams

The recent description of coaxial stub filters for 50MHz has brought in several requests for simple filters for other bands. As was stated in the original article, the stub system can be built for use on any frequency you care to name, but there are occasions when a more compact design is useful.

### Filter types

Filters fall broadly into two different types known as bandpass and bandstop, the function of each type is obvious from the name. The width of the frequency band passed or stopped is determined by the 'Q' of the filter; the higher the Q the narrower the bandwidth.

For many applications too high a Q can be a nuisance, and one such case would be where a filter is used simply to clean up the output of a rig so as to ensure that you get no TVI. In this case a high Q would mean having to retune the filter as you moved around in the band, and that is

obviously a bit of a drag. You rarely get something for nothing, and this case is no exception; all filters have an insertion loss but with careful design and building this can be kept to a very low level.

### Build them

Two designs are shown in the drawings, one being for two metres and the other for seventy centimetres. Both units are built in diecast boxes with dimensions of about 4.5 inches length and two inch square ends. The centre rod is made from .25 inch diameter copper tube and is fitted centrally in one end by forcing a .25 inch Whitworth bolt into it, so cutting a thread. Due to the fact that the ends of the box are at a slight angle, the rod will have to be bent slightly to keep it centrally placed in the box. Two earth tags are also held by the same fixing bolt. Because of the high currents that flow at the earthing point, it is essential that the metal parts are thoroughly cleaned and

that the bolt is really tightened down. If this is not done then losses will be high and the filter will be virtually useless.

### In and out

The input and output sockets on the two metre unit may be of virtually any type, but on the 70 centimetre unit they should be of BNC, N or some similar type. The SO type of socket is not really good enough at this frequency and, in fact, should be avoided on two metres if at all possible. The problem is that the plugs and sockets of the SO type are not of 'constant impedance' construction, and many of them are lossy above about 100MHz. As for the rod fixing, make sure that all the metal around the fixings for the sockets and the tuning capacitor are thoroughly cleaned before tightening down.

### Tuning

The tuning capacitors used in the originals were the type with ceramic endplates. If you cannot get the exact values required, do not worry. Get some with more than three moving vanes and carefully remove the excess quantity by gripping the moving vane with a pair of long nosed pliers and gently twisting the plate to remove it from the fixings. You should leave two moving and three fixed plates on the two metre version and three moving and four fixed on the seventy centimetre one.

To set up the units you simply tune to a strong local signal, then fit the filter into the aerial lead and peak for maximum response. Follow this up by finding a weak signal near the centre of the band and do a final tweak for best results.

Fig 1 Two metre filter

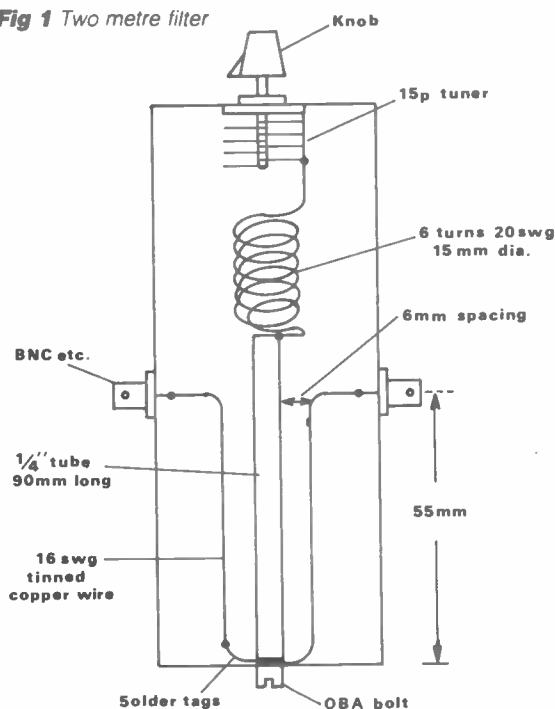
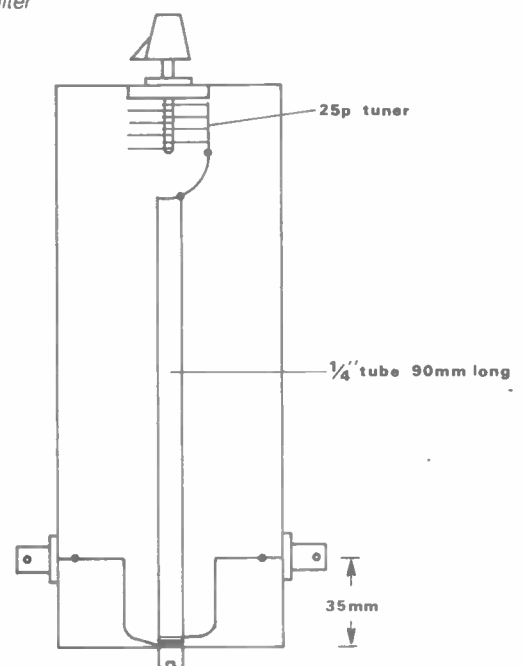


Fig 2 70cms filter





# SECONDHAND EQUIPMENT GUIDE

by Hugh Allison G3XSE

As far as I am aware, Cranfield was the first big 'bash' organised by the Milton Keynes radio club, and what a success it turned out to be. Following on from the Old Warden idea of holding a boot sale on an airfield (hence there is plenty of space) the Cranfield event was held on the perimeter track. I was a teensy bit worried about the advance publicity billing it as an amateur *and general* car boot sale, since it brought forth visions of rows of household tat, but on the day there were only one or two people selling that, and I'd guess a hundred or so selling amateur goods. An excellent event, well worth pencilling in for next year, though I'd recommend a portable oxygen system if using the toilets!

Bargains were too numerous to mention – though a sold as non-working Tonna power amplifier for two metres that subsequently proved to be working well, bought for a quid seems worth a mention.

## Let's stamp this out

At a couple of events I've been to recently, some people have tried on what I feel is a very dubious technique to relieve me of my money. The con is: you pick up an item, say a receiver and ask the price; say a fiver. You agree and hand over the readies, whereupon the seller then demands another quid for, say, the handbook which was lying with it. I've also had people try and charge me extra for a power lead plugged into a transceiver and an external loudspeaker connected up to a receiver. I consider what you see is what you are paying for, unless very clearly marked to the contrary. Where will it stop? You buy a rig and then, after paying for it, the seller whips out the PA valves?

I've dealt with it so far by refusing point blank to hand over any more; either they

give me my money back and the deal's off, or I walk off with what I consider is mine. One bloke got quite nasty (the 'extra' was the 12 volt power lead in the transceiver) and refused to do either, so I just walked off with the gear, including plug. This has got to be stopped!

## 'Noisy' oscillators

Over the years I've both bought receivers/transceivers sold as having the following fault, and also had the odd letter about it. I'm afraid the diagnosis of a noisy local oscillator can often be the result of the old maxim 'a little knowledge is a dangerous thing'.

First of all, thinking caps on. Refer to *Figure 1*, which is a bog standard single conversion superhet. To make the sums easy, we will assume a receiver tuned to receive 7MHz with a 10MHz IF and the local oscillator running high, so that's got to be a 17MHz ( $10+7=17$ , for those with a hangover). Now we assume that there is a lot of hiss coming out of the speaker, controllable by the volume control. This means that the excess noise is coming from upstream of the audio stages. So far, all good stuff.

The problem arises when the HF receiver/transceiver has either an external oscillator switch ('external VFO' for example, to allow transceive with an external Tx), or has facilities to allow for crystal control. Switch out the internal oscillator and the noise is dramatically reduced. The reasoning is then that the oscillator must be noisy. Right? No, wrong. Wrong for two reasons:

Item one, the easy one, the RF energy from the oscillator may be contributing towards the bias point of the mixer device, and the removal of the RF volts from the oscillator may bias it to a different, quieter, point.

Item two, the less obvious one,

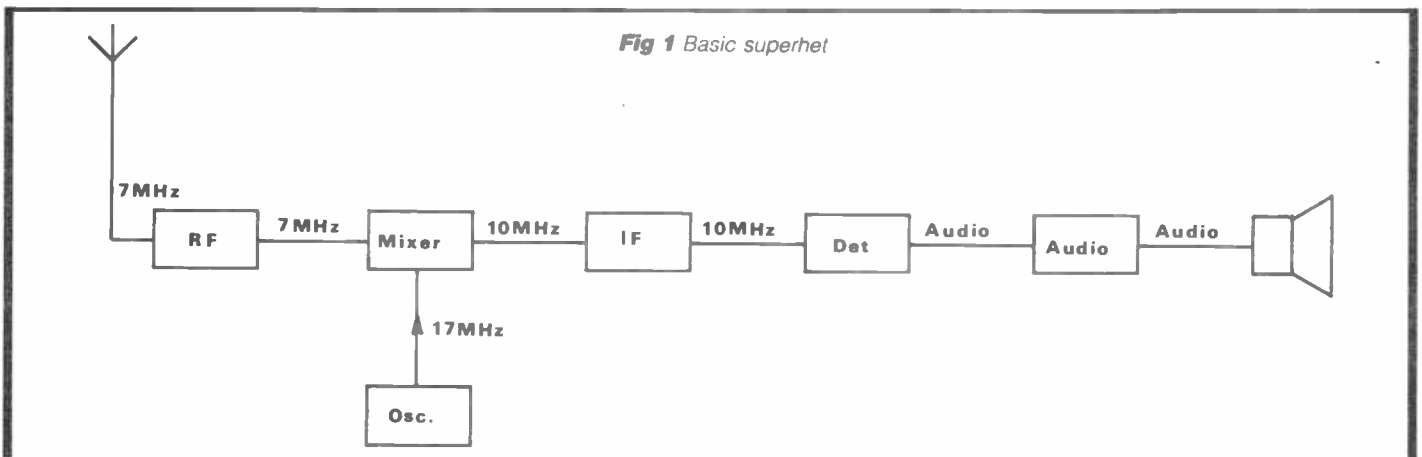
concerns noise at the received frequency, in this case 7MHz. I may be stating the obvious, but remember that the RF stage is tuned to the received frequency. Thus any wideband noise it generates will tend to be filtered by the coils in the RF stage to appear (relatively) only on, in our case, 7MHz. Note that, 7MHz – not 10MHz, our IF.

With no local oscillator running, there is nothing to convert our 7MHz 'noise' into the 10MHz IF, so the receiver goes quiet. This is how a receiver may appear to have a noisy oscillator when either the RF or mixer may be faulty.

There are several steps you can now take if faced with this situation. The most obvious is to listen to your local oscillator on another receiver: simply tune, in our case, a general coverage receiver to 17MHz and have a listen to it. You are unlikely to hear wideband noise, but crashes and crackles can be heard. These, incidentally, often have their origins in variable capacitance diodes used for IRT (independent receiver tune), however we are discussing noise which is not due to the oscillator, not that which is.

A good trick is to then stuff another local oscillator up the mixer, either poke a signal generator up the external VFO socket, or stuff it up the crystal socket. You can always try putting a reasonably appropriate crystal in the 'fixed' crystal controlled socket. Whichever way you give the set another oscillator, if the noise persists when driven externally, the fault isn't the local oscillator.

One final, easy way to check out the local oscillator may be built into the set already, that is, the pre-selector knob. I gave the above example of a 10MHz IF since this can be representative of a 9.98 or 10.7MHz IF often found in many HF rigs. As long as the IF lies within 3.5 to



30MHz, for the time it takes, it's worth tuning the set to the nearest amateur band to your IF, often the 7MHz, 10 or 14MHz band, then tweak the preselector from one end to the other *with the local oscillator off*. We agreed above that the RF front end coils will 'tune' any noise generated in the RF/mixer stages to the received (as distinct from the IF) frequency. If, however, you can tune the RF stages to the IF (via 'mis-tuning' the preselector), then the RF stage noise can get through. If the RF stage is generating the noise, there will be a noticeable peak of it as you go through the IF. Noise in RF stages is often the active device, be it valve or transistor, or grotty resistors; particularly the biasing ones.

#### 'Receive' converters

Most beginners to the hobby will soon become familiar with the idea of a converter. The most famous type is probably that which lets you into the action on two metres by placing a little box ahead of your short wave receiver. You convert 144 → 146MHz, which your receiver doesn't cover, to 28 → 30MHz, which it does.

What many beginners do not know is that there are available – only second-hand, but dirt cheap – so called 'short wave converters'. These often allow you to tune the amateur HF bands on a medium wave radio (you will need one with an aerial socket), or one or two tune the HF bands with a 3.5MHz receiver. This may seem particularly pointless. Why use a converter to tune amateur bands on a receiver that probably tunes them anyway? For starters, many early receivers only tuned up to 14MHz or so. Some went further, but their performance was poorer the higher you went. The converter thus allowed you to tune the higher bands with the same sort of sensitivity as you have at the lower bands.

These converters, often valved, change hands literally for pence; I bought one at Cranfield for 5p, for example. Although of some use to beginners for their intended purpose, bear in mind that most will require power to be nicked from the parent receiver unless self-powered (impossible with ac/dc sets) and all will require a BFO. Also note that if you are building a BFO it will have to be on the IF frequency of the parent receiver. I bought my example for the bits it contained. A full set of amateur band coils and a reasonable 3 gang variable seemed good value for 5p somehow – I later used the 14MHz coil to repair a Mohican receiver.

#### PL259/SO259

A PL259 plug fits an SO259 socket, we all know that. They are 50 ohm plugs and sockets, and therein lies the problem. The 'ohmage' of a plug depends on the ratio of the size of the inner of the outer part and the outer of the inner. Given that knowledge, it will be fairly obvious that a 75 ohm 'PL259' will be a different size to a 50 ohm one. This has never been a problem to date, 75 ohm variants have been rare, but there was a recent release of several thousand of them onto the

surplus market at a government surplus sale. These ex-army ones look similar, but they aren't. You have been warned!

#### Roller coasters

Also at the above surplus sale were loads of roller coasters. I've seen rollers of all shapes and sizes, but these were new to me; they had a tap on them and the tap was variable, as well as the total inductance. You could thus set up an inductor of, say, 40 turns with a tap at 4, or a coil of 20 tapped at 10. These went really cheaply and I've seen them on sale at rallies recently at a quid a go, which is very reasonable indeed. They look dirty, but a determined half hour with an old toothbrush and some cleaning fluid (IPA or similar) can bring them up a treat. They appear to happily take 150 watts+ and, with a couple of variable capacitors, can make up a quite cheap, compact, ATU.

#### Pull the label off

You buy your amateur wonderbox at an event and, as like as not, someone has stuck a label on it, normally with the price marked on it in felt tip. Here is a tip that I have only just learnt after twenty years of buying amateur rubbish – you must pull the label off straight after buying it. Not the next day, or a week later, but there and then. The label will come straight off in one piece without leaving a mess if pulled off shortly after being stuck on. Leave it any longer and it can be a twenty minute job, with sticky goo having to be painstakingly scraped off with the fingernails, often damaging plastic surfaces, so do it there and then.

The worst job of all, though, is where someone has marked the price straight on the unit with a felt tip, and the worst job of the lot is felt tip straight onto crackle finish paint. We are talking the best part of an hour with Jif, alternated with a good scrubbing with a solvent such as IPA. The marking is, of course, normally in the most prominent place, often the front panel. An ATU with '£1' emblazoned across it in quarter inch thick felt tip will hardly add to the overall appearance of the shack, so it has to come off. People who write on equipment with felt tip pens are animals!

#### Oscilloscopes, bandwidths and stuff

Your average shack hacking oscilloscope may have a bandwidth given as, say, within ±3dB from 20Hz to 30MHz. What this means, obviously, is that you can depend, ±3dB, on it being between these frequencies. This knowledge does not stop your average amateur trying to use it above 30MHz, of course. I recently got lumbered into resetting up a typical 12MHz starting, 144MHz producing × 12 multiplier rig 'set up' by someone using a 10MHz bandwidth scope.

Since the rig was still in the owner's shack, and so was your scribe, that meant that I was expected to set it up with said scope as well. I got quite intrigued to notice that a decrease in the dc volts that the emitter of the 144MHz stage was sitting at (ie the transistor was working less hard), was accompanied by an apparent increase in displayed 72MHz RF going into it. The scope was probably

showing an increase in low order harmonics whilst totally ignoring the higher frequency that the stage was trying to work at.

In a situation like the above I much prefer to only monitor the emitters of the multiplier transistors dc-wise and look for nulls or peaks there. Some early scopes used inductors to help 'prop up' their bandwidths at the higher end, and the cut off can be quite sharp.

#### Delayed timebase bandwidths

I've come across quite a few early all transistor scopes with delayed timebases, where the bandwidth has been well down on that stated in the handbook, and no amount of tweaking will get it back. Very often I have been in the classic condition of having good apparent bandwidth, but lousy square wave response or vice versa.

This is invariably due to the delay line itself. These are sometimes a coil within a coaxial braid, they look like standard co-ax but have two middle wires at each end. I understand that the problem is due to the multiple strands of the outside screening braid oxidising. The cure is simple: take the delay line out and chuck it around a bit. This will cause the wires of the braid to rub against each other and reduce the oxidation, thus restoring bandwidth. It really does work! Some years ago I had a 35MHz scope such as the one mentioned above, that dropped down to about 20MHz. Applying the prescribed procedure to the delay line restored it to 38MHz for two years, whereupon it needed 'chucking' again.

#### 'Polishing' plastic

I recently bought a working example of a rather nice general coverage receiver for £2. Since its normal value would be of the order of £35, you would be right to assume that there had to be something wrong with it. According to the seller he had accidentally made a small scratch on the front panel whilst moving the set to decorate his shack (moral; don't bother decorating the shack). He had then attempted to buff out the scratch using one of those compressed cotton 'polishing' wheels you can buy for attaching to your electric drill. This had melted the plastic but, undeterred by the mess that he had made, our hero then decided to try and remove the worst damage he had just achieved by going over it with wire wool. Arrgh!

Right, how to sort out the above? You need three dusters. First remove the front panel from set (sounds easy, huh?). Lay a clean (no nasty lumps of gunge stuck on it to crack the panel when you press on it) duster on a smooth flat table. Lay the panel on the duster (obviously). Use a fine grade wet and dry paper to remove the high spots from where the plastic has melted. Now comes the physically tiring bit, out with duster number two and the 'Brasso' type metal polish, and get polishing. This, incidentally, is what our hero should have done in the first place.

When, after half an hour's hard work, you have reduced the scratches (in my case mainly from the wire wool) from

appalling to just plain bad, it's time to stop for a rest, then out with duster number three. Put the 'Brasso' on it, then turn the duster over and use the other side of it, and get polishing again for half an hour. I don't profess to know why using the other side of a duster from that which you previously poured the 'Brasso' onto gives a better finish, though one theory has it that the fibres of the duster filter out the bigger bits of abrasive, but I do know it works.

All the above should have produced a moderate shine, not a good one, but a moderate one. *Do not* now reach straight for your average household spray-can type polish. Well you can, but spray it onto a paper hanky and gently try it out

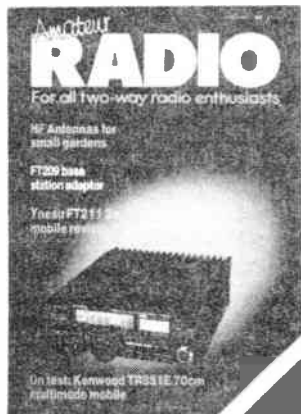
on the edge of the panel first, to make sure that there are no nasties in the polish to melt the plastic and get you back to square one again. The idea of a paper hanky (that's a posh way of saying toilet roll) is that if the plastic does melt, the paper will break up and stick to the edge and you know not to use that spray. If all is well, polish to perfection.

Many moons ago your scribe was working in a large instrument repair depot. A very early oscilloscope that had belonged to some famous person, who had used it to discover some major electronic breakthrough, was sent in for overhaul. A preservation group were going to open a museum in honour of the great man, and a recreated laboratory

was going to be the centrepiece of the show. Due to the immense historical value of the ancient oscilloscope the chief engineer of the depot himself repaired it, and having satisfied himself that it now worked to its original specification decided to clean it up. 'Chuck us a rag' he asked some nearby apprentice. Said apprentice obediently threw over the first rag that came to hand. Thirty seconds later came howls of agony from chief engineer – the front plastic panel of the historical oscilloscope was melting! I cannot bring myself to reveal the name of the apprentice that had handed over a rag soaked in paint thinners.

I prefer to remain anonymous!

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■ Signal R532 airband scanner for sale, £160 ono. Wanted: Realistic Pro 30 hand-held scanner, money waiting. Also wanted Sony ICF2001D short wave radio receiver, money waiting. R Keary, 18 Cardew Ave, Xacres, Wythenshawe M22 7XX. Tel: (061) 436 7224

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■ Complete HF station. Yaesu FT77 with matching power supply and tuner, all in mint condition, sorry will not split, £525 ono. NE England Tel: (0207) 508629

■ Dressler ARE30 active short wave antenna, as new. Cost £129, will accept £80. Also 3 element yagi beam, covers 10 mtr, 15 mtr, 20 mtr. Excellent SWR, as new, £30. Ron Smith, 55 Chester Road, Edmonton N9 8JH. Tel: 01-807 2462

■ National Panasonic 32 band RF3100L receiver. Double super heterodyne, FM LW MW SWB LSB ·USB AM wide and narrow band width, RF gain, BFO, digital readout mains or battery good condition, £90 ono. Postage paid. Tel: Elgin (0343) 45478 any time

■ Collins TCS12 (see article December issue). I have a spare TCS receiver which works well with built-in 240V PSU and spkr, which I want to exchange for a TCS transmitter. No other offers. Graeme G3GGL, QTHR, Bewdley (Worcs). Tel: (0299) 403372

■ Datong PC12m to HF receive converter, hardly used, cost £137 will accept £90 ono. Various Amstrad computer games/programmes, offers? Please phone Mark. Tel: (0278) 760303

■ Swap railway model magazines for a K40 microphone for Uniden. I have: *Railway Modeller* January 1987, Feb 1987, March 1987, May 1987, June 1987, Nov 1987. *Your Model Railway* Jan 1987, Feb 1987, May 1987, June 1987. *Practical Model Railways* Feb 1987, March 1987. *Model Railway Constructor* Dec 1986, Jan 1987, Feb 1987. Also have *Short Wave Magazine*, May 1986, April 1987, May 1987, June 1987, July 1987, August 1987, September 1987, October 1987, December 1987. *Ham Radio Today* mags, January 1987, April 1987, May 1987, June 1987, September 1987, November 1987, December 1987. Will swap radio mags for good homebase Rx pre-amp. Must be variable and capable of SSB, 25 watts max. The radio mags cost £16.00. HRT mags cost £8.90. *SWM* mags cost £11.60. Make me an offer for them all. Sorry! Will not sell the mags by one monthly issue at a time. Andrew Nevill, 1 Humber St, Old Goole, North Humbs, DN14 5UJ. Tel: Goole 2235

many other bits & pieces: For small or medium size, horizontal open crank stationary engine, condition not important, but must be near or complete or WHY. Tel: (0704) 892088, ask for Mike

■ ARA 30 active ant, pristine, £90, post paid. ARA Dressler 500, vgc, £90 ono, post paid. All with co-ax interface and original packing. Send cheque or phone number to S P Martin, 24 Collingwood Close, Worle, Weston-super-Mare, Avon BS22 9PQ

■ Super Star 360, as new, offers over £100. Amtec 300, offers. Frequency counter, £35 ovno. Two CB sets, one Rotel, perfect working order, offers over £25 each. Slim Jim aerial, £7. Silver rod, £15. Cobra 148GTL, £125. Wanted: Yaesu with FM board or 26 to 30MHz Cobra 148, or equivalent. Tarleton, 499 Burton Road, Midway, Burton. Tel: (0283) 221870

■ National Panasonic 32 band RF3100L receiver, double super heterodyne, FM, LW, MW, SWB, LSB, USB, AM, wide & narrow bandwidth, RF gain, BFO, digital readout, mains or battery, good condition, £90 ono. Postage paid. Tel: Elgin (0343) 45478

■ Yaesu FRG7 receiver, in mint condition, no mods. Boxed with original manuals and schematics, £100. Various meters, matchers and filters, with leads and connections. Offers on all small equipment, sell together or will separate. Buyer to collect. Tel: Wigan (0942) 712691

■ TS120S tcvtr, 200W PEP, plus Microwave KB4001 RTTY tcvtr, RCA keyboard, little used. Exchange for TS430S, tcvtr. Clegg 143/9m FM, variable output 1-25W tncvr, £150. 2 to 28MHz tncvr, £75. Dawe model 610B o/put meter, £15. 1986 foreign listings callbook, £100 would sell RTTY outfit separate. G4YUG QTHR. Tel: (0473) 830147 any time, not Sundays

■ Trio TR9130 2 metre multimode, good cond, complete with accessories, original box £335. MET 70cm crossed Yagi, as new, £18. Wanted: Trio/Kenwood TL922 HF linear. Paul G4XNF. Tel: (0293) 515201 evenings preferred

■ Twin section, wind up, tilt over, triangular steel tower for sale, 36 foot complete with base plate and winch, good condition, £80.00. Also Apple 2 Europlus computer, twin disc drives, printer, green screen monitor, 80 column card, ZX software card and all leads etc, in good working order, £150.00. Swap either or both for HF gear, for FT901DM or what have you. Tel: Wakefield (0924) 364822

■ Yaesu FT301D Tx/Rx, 160 to 10m, CW, SSB, FSK, AM, solid-state. VOX, MOX, RIT on Rx and Tx. Speech processor, dual calib, three position AGC notch, all filters fitted, with FP301D PSU, FV301 VFO, YO-301 monitor scope, FC301 ATU, £750. Will split if enough interest. Yaesu FVT107R transverter with 2m module, £85. Wanted: Pay £150 for German, Japanese, WWII, HRO. Tel: St Albans 39333

## ADVERTISERS PLEASE NOTE

Please ensure that your telephone number (if applicable) and address are included in the appropriate section of your ad.

If you do not wish to have your address published, please include it but state 'not for publication'.

Any ads submitted without an address and/or telephone number will not be printed. This condition has become necessary because a small number of ads have been submitted by bogus readers, causing considerable inconvenience to the holders of the telephone numbers quoted.

■ Yaesu FT707 HF transceiver, £300 AM. SSB, CW/W/N. Good condition. Tel: Newbury (0635) 33073. Ask for Joe

■ Army radio type R210 - covers 2MHz - 16MHz on 54 inch film scale - runs on 24V. (Would swap for R209, urgently wanted). Narfi receiver from WW2 - new and boxed, covers medium wave - runs on 6 volts. New lead gear for WS19, WS31, WS62 and good condition headgear for WS88, lots of accessories for WS19. Old Avo sig gen, US, radio altimeter type, RT7 - APN-1, from WW2 - new condition. Transmitter type 49, ex Air Ministry. Army wartime radio type R107, covers 1.2MHz - 17.5MHz. (mains or 12V input). Contact Tony Howard, tel: (0908) 73114

■ Exchange 2m/70cm Jaybeam dual band crossed Yagi, almost new. 6 mains input, various output transformers. 39 various capacitors, some heavy duty. 50 various power transistors, with few heatsinks. 3 power supplies, mains input with various outputs. 36 packs of various new resistors. 23 various relays. Various electrolytic capacitors, wafer switches, Vernier dials, small speakers, and

## WANTED

■ Philips world radio, digital, D2395, costs £189 - sell for £80, as mint. Wanted for cash or swap etc: Sony CRF5090 or Sony CRF330 or Zenith D7000 radio. Offers to Tony. Tel: (0462) 420515

■ Eddystone speaker, 2.5ohm for 770V Rx, in diecast plinth. Mr PH Boone, 19 Queens Road, Budleigh, Salterton, Devon EX9 6QJ

■ Circuit diagram - manual/parts list for Lafayette HA700 receiver. Original or clean readable copy. All expenses will be paid. E19CSB, P Thim, 1 The Orchards, PO Box 31, Gorey, Co Wexford, Ireland

■ Yaesu CPU2500R 2m FM trans, and Yaesu FT720R 2m FM trans, both must be in vgc please. Also Datong MK Morse keyboard. Tel: (0305) 813202

■ Kenwood TR751E 2 metre multimode transceiver, must be in good condition, reasonable price paid. Terry G4OXD after 6pm. Tel: (0462) 35248 (Hitchin)

■ Sony CRF220 onward model Rx. Must be excellent condition and sensibly priced, also Grundig 1200 SSB adaptor. Write: 60 Highfield Road, M6 5LA with SAE for quick answer, private cash buyer

■ Exchange my Eddystone model 770R MkII for a 2mtr transmitter or transceiver or WHY? Gingell, 82 Coulpark, Alness, Ross-shire

■ Help! Can anyone help me to find a variable voltage regulator 78HG +5 to 24V, 5 amp to complete a project. Have tried various sources, no luck, I am desperate. Wegg, 23 Kerdane, Dane Park



# Amateur RADIO SMALL ADS

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FOR SINGLE EARPHONE ON ANY OF  
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per single column centimetre:

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# SMALL ADS

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PLEASE RESERVE.....centimetres by.....columns

FOR A PERIOD OF 1 issue..... 3 issues..... 6 issues..... 12 issues.....

COPY enclosed..... to follow.....

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**NEXT ISSUE OF**

*Amateur*  
**RADIO**

**ON SALE**  
Thursday 28th January

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263 x 394	double page	£830.00	£780.00	£740.00	£660.00

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SPECIAL POSITIONS	
Covers:	Outside back cover 20% extra, inside covers 10% extra
Bleed:	10% extra (Bleed area = 307 x 220)
Facing Matter:	15% extra

DEADLINES		*Dates affected by public holidays			
issue	colour & mono proof ad	mono no proof & small ad	mono artwork	on sale thurs	
Jan 88	26 Nov 87	2 Dec 87	4 Dec 87	24 Dec 87	
Feb 88	24 Dec 87	6 Jan 88	8 Jan 88	28 Jan 88	
Mar 88	26 Jan 88	3 Feb 88	5 Feb 88	25 Feb 88	
Apr 88	3 Mar 88	9 Mar 88	11 Mar 88	31 Mar 88	

CONDITIONS & INFORMATION	
<p><b>SERIES RATES</b> Series rates also apply when larger or additional space to that initially booked is taken. An ad of at least the minimum space must appear in consecutive issues to qualify for series rates. Previous copy will automatically be repeated if no further copy is received. A 'hold ad' is acceptable for maintaining your series rate contract. This will automatically be inserted if no further copy is received. Display Ad and Small Ad series rate contracts are not interchangeable.</p>	<p>If series rate contract is cancelled, the advertiser will be liable to pay the unearned series discount already taken. <b>COPY</b> Except for County Guides copy may be changed monthly. No additional charges for typesetting or illustrations (except for colour separations). For illustrations just send photograph or artwork. Colour Ad rates do not include the cost of separations. Printed - web offset.</p>
<p><b>PAYMENT</b> Above rates exclude VAT. All single insertion ads are accepted on a pre-payment basis only, unless an account is held. Accounts will be opened for series rate advertisers subject to satisfactory credit references. Accounts are strictly net and must be settled by the publication date. Overseas payments by International Money Order or credit card. <b>FOR FURTHER INFORMATION CONTACT</b> Amateur Radio, Sovereign House, Brentwood, Essex CM14 4SE (0277) 219876</p>	<p>Commission to approved advertising agencies is 10%. <b>CONDITIONS</b> 10% discount if advertising in both Amateur Radio and Radio &amp; Electronics World. A voucher copy will be sent to Display and Colour advertisers only. Ads accepted subject to our standard conditions, available on request.</p>

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• Sovereign House • Brentwood • Essex • CM14 4SE

NAME .....

ADDRESS .....

POSTCODE .....

**PLEASE SUPPLY:** (state month and year of issue/s required) **NOTE:**  
Only issues from August 1986 are available  
..... at £1.45 each

**PAYMENT ENCLOSED:** £  -

Cheques should be made payable to **Amateur Radio** Overseas payment by International Money Order or credit card

**CREDIT CARD PAYMENT:**    EXPIRY DATE  /

SIGNATURE .....

C P I

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- 5- 3 flush electrical switches
- 7- 4in flex line switches with neons
- 8- 2 30 watt brass cased elements
- 9- 2 mains transformers with 6V 1A secondaries
- 10- 2 mains transformers with 12V 1/2A secondaries
- 11- 1 extension speaker cabinet for 6 1/2" speaker
- 12- 5 octal bases for relays or valves
- 13- 12 glass reed switches
- 14- 4 OCP 70 photo transistors
- 15- 4 tape heads, 2 record, 2 erase
- 17- 1 ultrasonic transmitter and 1 ditto receiver
- 18- 2 1500m mfd computer grade electrolytics
- 19- 2 light dependent resistors
- 20- 5 different micro switches
- 21- 2 mains interference suppressors
- 22- 2 25 watt crossover units 2 way
- 23- 1 40 watt 3 way crossover unit
- 28- 1 6 digit counter mains voltage
- 30- 2 Nicad battery chargers
- 31- 1 key switch with key
- 32- 2 humidity switches
- 34- 96 x 1 metre lengths colour-coded connecting wires
- 36- 2 air spaced 2 gang tuning condensers
- 37- 2 solid dielectric 2 gang tuning condensers
- 38- 10 compression trimmers
- 41- 6 Rocker Switches 10 amp mains SPST
- 43- 5 Rocker Switches 10 amp SPDT Centre Off
- 44- 4 Rocker Switches 10 amp DPDT
- 45- 1 24 hour time switch mains operated (s.h.)
- 46- 1 6 hour clock time switch
- 48- 2 6V operated reed switch relays
- 49- 10 neon valves - make good night lights
- 50- 2 12V DC or 24V AC, 4 CO relays
- 51- 1 12V 2CO very sensitive relay
- 52- 1 12V 4C relay
- 55- 1 locking mechanism with 2 keys
- 56- Miniature Uniselectors with circuit for electric jigsaw
- 57- 5 Dolls' House switches
- 60- 5 ferrite rods 4 x 5 1/2" diameter aeriols
- 61- 4 ferrite slab aeriols with L & M wave coils
- 62- 4 200 ohm earpieces
- 63- 1 Mullard thyristor trigger module
- 64- 10 assorted knobs 1/4" spindles
- 65- 5 different thermostats, mainly bi metal
- 66- Magnetic brake - stops rotation instantly
- 67- Low pressure 3 level switch
- 69- 2 25 watt pots 8 ohm
- 70- 2 25 watt pots 1000 ohm
- 71- 4 wire wound pots - 18, 33, 50 and 100 ohm
- 73- 4 3 watt wire wound pots 50 ohm
- 77- 1 time reminder adjustable 1.60 mins
- 78- 5 5 amp stud rectifiers 400V
- 85- 1 mains shaded pole motor 1/4" shaft 1/4" shaft
- 86- 25 ali fan blades fit 1/4" shaft
- 87- 23 plastic fan blades fit 1/4" shaft
- 88- Mains motor suitable for above blades
- 89- 1 mains motor with gearbox 1 rev per 24 hours
- 91- 2 mains motors with gearbox 16 rpm
- 93- 4 11 pin moulded bases for relays
- 94- 5 B7G valve bases
- 95- 4 skirted B9A valve bases
- 96- 1 thermostat for fridge
- 98- 1 motorised stud switch (s.h.)
- 101- 1 1/2" hours delay switch
- 103- 1 6V mains power supply unit
- 104- 1 4 1/2 V mains power supply unit
- 105- 1 5 pin flex plug and panel socket
- 107- 1 5" speaker size radio cabinet with handle
- 109- 10 1/4" spindle type volume controls
- 110- 10 slider type volume controls
- 112- 1 heating pad 200 watts mains
- 114- 1 1W amplifier Mullard 1172
- 115- 1 Wall mounting thermostat 24V
- 118- 1 Teak effect extension 5" speaker cabinet
- 120- 2 p.c.b. with 2 amp full wave and 17 other recs
- 122- 10 mtrs twin screened flex white p.c. outer
- 132- 2 plastic boxes with windows, ideal for interrupted beam switch etc
- 155- 3 varicap push button tuners with knobs
- 188- 1 plastic box, sloping metal front, 16 x 95mm, average depth 45mm
- 241- 1 car door speaker (very flat) 6 1/2" 15 ohm made for Radiomobile
- 243- 2 speakers 6" x 4" 15 ohm 5 watt made for Radiomobile
- 266- 2 mains transformer 9V 1/2A secondary split primary so OK also for 115V
- 267- 1 mains transformers 15V 1A secondary p.c.b. mounting
- 330- 2 6V 0.6V mains transformer 3a p.c.b. mounting
- 350- 40 double pole leaf switches
- 365- 1 7uf 660V 50hz metal cased condenser
- 453- 2 2 1/4 in 60 ohm loudspeakers
- 454- 2 2 1/4 in 8 ohm loudspeakers
- 463- 1 mains operated relay with 2 sets c/o contacts
- 464- 2 packets resin filler/sealer with cures
- 465- 35A round 3 pin plugs will fit item 193
- 466- 4 7 segment i.e.d. displays
- 470- 4 pc boards for stripping, lots of valuable parts
- 480- 1 3A double pole magnetic trip, saves repairing fuses
- 498- 4 1000uf 25V axial electrolytic capacitors
- 504- 1 Audax PM 8" speaker 15 ohm 5 watt rating
- 515- 100 4BA 1 1/2" cheesehead plated screws and 100 4BA nuts
- 541- 1 pair stereo tape head as in cassette recorder/players
- 546- 1 bridge rectifier 600V international rectifier ref 35B100
- 548- 2 battery operated relays (3-6v) each with 5A c/o contacts 2 pairs
- 553- 2 lithium 3V batteries (everlasting shelf life)

### TELEPHONE BITS

- Master socket (has surge arrester - ringing condenser etc) and takes B.T. plug.....£3.95
- Extension socket.....£2.95
- Dual adaptors (2 from one socket).....£3.95
- Cord terminating with B.T. plug 3 metres.....£1
- Kit for converting old entry terminal box to new B.T. master socket, complete with 4 core cable, cable clips and 2 B.T. extension sockets.....£11.50
- 100 mtrs 4 core telephone cable.....£8.50

### COMPACT FLOPPY DISC DRIVE EME-101

The EME-101 drives a 3" disc of the new standard which despite its small size provides a capacity of 500k per disc. which is equivalent to the 3 1/2" and 5 1/4" discs. We supply the Operators Manual and other information showing how to use this with popular computers BBC, Spectrum, Amstrad etc. All at a special snip price of £27.50 including post and VAT. Data available separately £2, refundable if you purchase the drive

### MULLARD UNILEX AMPLIFIERS

We are probably the only firm in the country with these now in stock. Although only four watts per channel, these give superb reproduction. We now offer the 4 Mullard modules i.e. Mains power unit (EP9002) Pre amp module (EP9001) and two amplifier modules (EP9000) all for £6.00 plus £2 postage. For prices of modules bought separately see TWO POUNDERS

### CAR STARTER/CHARGER KIT

Flat Battery! Don't worry you will start your car in a few minutes with this unit. 250 watt transformer 20 amp rectifiers case and all parts with data and case £17.50 post £2.

### THIS MONTH'S SNIP

is a 2 1/2 kW tangential heater, metal box to contain it and 3 level switch to control it. Special price £7.50 post paid.



### VENNER TIME SWITCH

Mains operated with 20 amp switch one on and one off per 24 hrs repeats daily automatically correcting for the lengthening or shortening day. An expensive time switch but you can have it for only £2.95 without case, metal case £2.95, adaptor kit to convert this into a normal 24hr time switch but with the added advantage of up to 12 on/off per 24hrs. This makes an ideal controller for the immersion heater. Price of adaptor kit is £2.30

Ex-Electricity Board. Guaranteed 12 months.

### 12 volt MOTORS BY SMITHS

Made for use in cars, etc. these are very powerful and easily reversible

Size 3 1/2" long by 3" dia. They have a good length of 1/4" spindle - 1 10 hp £3.45 1 8 hp £5.75, 1 6 hp £7.50



### SOUND TO LIGHT UNIT



Complete kit of parts for a three channel sound to light unit controlling over 2000 watts of lighting. Use this at home if you wish but it is plenty rugged enough for disco work. The unit is housed in an attractive two tone metal case and has controls for each channel, and a master on/off. The audio input and output are by 1/4" sockets and three panel mounting fuse holders provide thyristor protection. A four pin plug and socket facilitate ease of connecting lamps. Special price is £14.95 in kit form.

### 9" MONITOR

Ideal to work with computer or video camera uses Philips black and white tube ref M24 306W. Which tube is implosion and X-Ray radiation protected. VDU is brand new and has a time base and EHT circuitry. Requires only a 16V dc supply to set it going. It's made up in a laquered metal framework but has open sides so should be cased. The VDU comes complete with circuit diagram and has been line tested and has our six months guarantee. Offered at a lot less than some firms are asking for the tube alone, only £16 plus £3 post.

### LIGHT BOX

This when completed measures approximately 15" x 14". The light source is the Philips fluorescent "W" tube. Above the light a sheet of fibreglass and through this should be sufficient light to enable you to follow the circuit on fibreglass PCBs. Price for the complete kit, that is the box, choke, starter, tube and switch, and fibreglass is £5 plus £2 post, order ref 5P69.

### TANGENTIAL HEATERS

We again have very good stocks of these quiet running instant heat units. They require only a simple case, or could easily be fitted into the bottom of a kitchen unit or book case etc. At present we have stocks of 1.2kw, 2kw, 2.5kw, and 3kw. Prices are £5 each for the first 3, and £6.95 for the 3k. Add post £1.50 per heater if not collecting. CONTROL SWITCH enabling full heat, half heat or cold blow, with connection diagram. 50p for 2kw, 75p for 3kw.

### FANS & BLOWERS

5" £5 + £1.25 post, 6" £6 + £1.50 post 4" - 4" Muffin equipment cooling fan 115V £2.00 4" - 4" Muffin equipment cooling fan 230/240V £5.00 9" Extractor or blower 115V supplied with 230 to 115V adaptor £9.50 + £2 post.

All above are ex computers but guaranteed 12 months. 10" x 3" Tangential Blower. New. Very quiet - supplied with 230 to 115V adaptor on use two in series to give long blow £2.00 + £1.50 post or £4.00 + £2.00 post for two

### TELEPHONE LEAD

3 mtrs long terminating one end with new BT, flat plug and the other end with 4 correctly coloured coded wires to fit to phone or appliance. Replaces the lead on old phone making it suitable for new BT socket. Price £1 ref BD552 or 3 for £2 ref 2P164.

### POWERFUL IONISER

Generates approx. 10 times more IONS than the ET1 and similar circuits. Will refresh your home, office, shop, work room etc. Makes you feel better and work harder - a complete mains operated kit, case included. £9.50 + £2 P&P.

## J & N BULL ELECTRICAL

Dept. A.R., 250 PORTLAND ROAD, HOVE, BRIGHTON, SUSSEX BN3 5QT

MAIL ORDER TERMS: Cash, P.O. or cheque with order. Orders under £20 add £1 service charge. Monthly account orders accepted from schools and public companies. Access B/c card orders accepted. Brighton (0273) 734648 or 203500.

### NEW ITEMS

Some of the many described in our current list which you will receive with your parcel

### £2 POUNDERS\*

- 2P122 1 30s rotary switch surface mounting with pointer knob
- 2P123 1 25s rotary switch surface mounting cover engraved high medium low and off
- 2P124 1 128kv 001 mfd block condenser
- 2P132 1 ceiling heat stat for fire warning or protection
- 2P133 1 Circuit breaker 20A Crabtree ref 250
- 2P134 1 9V 500mA psu plugs into 13a socket
- 2P135 10m 10 conductor intercom cable
- 2P138 1 Mains transformer 20V 0.20V 1A upright mounting
- 2P141 1 rechargeable battery 7 size (4 AH) solder tag ended
- 2P142 10m 4 pair intercom cable White PVC outer
- 2P144 1 mains operated relay with 4 - 8a c/o contacts
- 2P148 1 Technical information on 3 FDD refundable if you buy fdd
- 2P149 5 diff battery operated model motors
- 2P150 1 PSU chassis with all components for 24V 2A dc unwired
- 2P151 1 Metal box 14 1/2" x 14" 4 with lid add £2 00 post
- 2P152 1 Motor start capacitor 80uf 250V
- 2P153 1 Two station intercom unused but fine reject
- 2P154 1 Nicad charger plug into 13a socket 5.2V 70A output
- 2P154b 1 Nicad charger plug into 13a socket 6V 9VA output
- 2P155 1 Mains transformer giving 16, 17, 18 & 20V 60W
- 2P158 1 Oven thermostat with temp calibrated knob
- 2P159 1 9V 500ma cased with mains lead and output lead
- 2P160 1 13ga plug adaptor fused takes 3 - 3a plugs
- 2P161 16 diagonal side cutters
- 2P162 1 Stereo Matrix PCB mounting deemphas K.35
- 2P163 1 AC Working capacitor 12uf 660V AC or 1500V dc
- 2P164 3 Phone lines 3 mtrs long tags one end B.T. plug other end

### £3 POUNDERS\*

- 3P17 1 DC voltage doubler or halver for 12V to 24V 12 to 6V 24 to 12V
- 3P8 1 24hr time switch Sangamo new condition Guaranteed 1 year
- 3P9 1 2V 500mA psu plugs into 13a socket regulated
- 3P10 1 Mains transformer 50V 2A with 6 3 pin pilot winding upright mounting fully shrouded plus £1 post
- 3P13 1 Noise filter to fit in mains lead of appliance up to 25a
- 3P15 1 waterproof case will take 150 watt transformer
- 3P16 1 signal box 3 lamps on face plate of metal box size 5 1/2" x 3 1/2"
- 3P17 1 choke and starter to work 8 fluorescent tube at 125W
- 3P20 1 0.5a ammeter 3 1/2" ac dc equipment
- 3P21 1 power factor correction condenser 35uf 350ac
- 3P22 1 200VA auto transformer 230 to 115V toroidal encapsulated £1 50 post
- 3P24 1 3 floppy discs for Amstrad etc
- 3P25 1 7 Electricians pliers

### £4 POUNDERS\*

- 4P12 50m low loss co ax 75ohm £1 post
- 4P13 3 Horstmann time and set switches 15amp
- 4P14 1 150w mains transformer c core 43V 3 5A secondary
- 4P15 1 powerful motor 2" stack fitted with gearbox final speed 60rpm mains operated, could operate door opener etc
- 4P17 1 Unselector 3 pole 25W 50V coil standard size
- 4P18 1 Volt meter with digital display (DIGIVISOR)
- 4P19 1 12V dc motor will fit to gearbox 4P20
- 4P20 1 Gear train giving speed reduction

### £5 POUNDERS\*

- 5P86 1 Transformer upright mounting 230/240V primary 2 - 100 1a secondary
- 5P88 1 Transformer in waterproof metal box 24V 5A add £2 post
- 5P89 1 4 bank heating element each 2kw ideal convector heater
- 5P90 1 18 long tangential blower with motor at one end
- 5P91 1 14 blower motor in middle
- 5P92 10m Audio co ax double screened 75ohm super low loss for TV
- 5P93 1 6 Alarm bell 24V dc or ac
- 5P94 1 Current transformer 14V out with 1A dc input
- 5P95 1 Vintage photo cell
- 5P99 1 Mains operated blower centrifugal output size app 5 - 1 1/2"
- 5P100 1 Mains splitter 45a switch 3 - 15a fused circuits
- 5P101 1 Model motor 1 rpm from 6V reversible

### £7 POUNDERS\*

- 7P1 1 Instant heat solder gun mains with renewable tip and job light

### £8 POUNDERS\*

- 8P1 1 Charger transformer 10a upright mounting 230/240 primary 16v 10a secondary
- 8P2 1 6" underdome alarm bell suitable for a fire alarm or burglar alarm mains operated
- 8P3 1 heat sink big powerful so ideal for power transmitter
- 8P5 1 1 1/2 hp motor 900 rpm capacitor run
- 8P6 1 24hr time switch 2 on offs 16a c/o contacts 3 - 3" x 1 1/2"
- 8P7 1 Silent Sentinel invisible ray kit
- 8P8 1 Papst fan 3 1/2" x 3 1/2" x 1 1/2" 230V metal bodied

### £10 POUNDERS\*

- 10P14 1 100a time switch 1 on off per 24hr extra triggers £1 per pair
- 10P15 1 Max demand meter 230 ac mains
- 10P16 1 powerful air mover 2 small type blowers with motor in middle
- 10P18 1 mains operated klaxon
- 10P19 1 12V alarm bell really loud, mains operated, in iron case - £5 post
- 10P22 1 sensitive volt meter relay
- 10P24 1 big panel meter face size 4 1/4" x 2 1/2" 200uA movement scaled 1-10
- 10P26 1 "Secretary" phone auto-dialer complete untested sold as such
- 10P30 1 instrument psu on pcb has 4 outputs 12V/ 5V 6A/12V 5A/5V 5A
- 10P31 1 17 day time switch 16a c/o contacts sep switches for each day
- 10P32 1 68 rpm 1/6th hp motor reversible

### £15 POUNDERS\*

- 15P1 1 kit for 115W hi fi amp
- 15P2 1 kit for psu to supply one or two 15P1 amps
- 15P3 1 time switch battery or mains operated - 16a c/o contacts 7 day programmable has 36hr reserve

## COMPUTER

The Acorn Electron as used in many schools works into colour or b/w TV. Proper price £199, our price, tested and working and guaranteed, £45 + £3 post.

Tested but slightly faulty £36 + £3 post. Tested but not working, but complete £20 + £3 post.

## ELMASET INSTRUMENT CASE

300x133x217mm deep £10.00 ea (£2.20)

## REGULATORS

LM317T Plastic TO220 variable £1  
LM317 Metal £2  
7812 Metal 12v 1A £1.00  
7805 12 15 24 plastic 80p 100 + 27p  
7805 12 15 24 plastic 80p 100 + 27p  
CA3085 T099 Variable regulator £1  
LM338 5A variable £8

## COMPUTER ICs

27128 250n<sup>3</sup> NEW £3.30  
88008 Processor Ex-Equip £6  
27256-30 ex-eqpt £3.00  
2764-30 USED £2  
1702 EPROM ex equip £6.00  
2732-45 USED £2 100 + £1.80  
2114 EX EQPT 80p 4116 EX EQPT 70p  
6284LP15 8K static ram £2.80  
8116-3 (TC5517AP) £1.60  
4416 RAM £3.60

## SURFACE MOUNTED TRANSISTORS

BCW30 BCW31 BCW72 NTAV70 1s2838 min 50/type 100/£2.80

## POWER TRANSISTORS

POWER FET IRF9531 8A 80V 2/E1  
2N3055H RCA House numbered 5/E2  
2SC1520 sim BF259 3/E1 100/£22  
TIP141, 142/146, £1 ea, TIP112, 125, 42B 2/E1  
TIP35B £1.30 TIP35C £1.80  
SE9302 100V 10A DARL SIM TIP121 2/E1  
2N3055 Ex eqpt tested 4/E1  
Plastic 3055 or 2955 equiv 50p 100/£38  
2N3773 NPN 25A 180V £1.80 10/£18  
BD132 8/E1

## QUARTZ HALOGEN LAMPS

A1/216 24v 150w £2.25  
H1 12v 55w (car spot) £1.80

## MISCELLANEOUS

To - 220 Heat Sink sim RS 403-162 10/2.50  
D.I.L. Switches 10 Way £1 8 Way 80p, 4 5 6 Way 80p  
180 Volt 1 watt ZENERS ALSO 12V 20/£1  
Miniature co-axial cable RG316U £0.80/metre  
Olivetti logos calculator keyboard (27) key plus 12 Digit fluorescent display on driver board (ie calculator less case, transformer and printer) £1.30  
Plastic Equipment case 9x6x1.25" with front and rear panels containing PCB with eeprom 2764 -30 and ICS 7417 LS30 LS32 LS74 LS367 LM311 7805 Reg, 9 way D plug, push button switch, din socket £1.90  
VNIOLM 60V 1/2 5ohm TO-92 mosfet 4/£1, 100/£20  
MIN GLASS NEONS 10/£1  
RELAY 5v 2 pole changeover looks like RS 355-741 marked STC 47WB05T 2/£1  
OMRON RELAY 3.6volt coil 2p c/o contacts marked G4D-287P-BT2 2/£1  
MINIATURE CO-AX FREE PLUG RS 456-071 2/£1  
MINIATURE CO-AX FREE SKT RS 458-273 2/£1.50  
STRAIN GAUGES 40 ohm Foil type polyester backed balco grid alloy £1.50 ea 10- £1  
DIL REED RELAY 2 POLE n/o CONTACTS £1  
Zettler 24v 2p c/o relay 30x20x12mm sim. RS 348-649 £1.50 100- £1  
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Linear Hall effect IC Micro Switch no 613 SS4 sim RS 304-267 £2.50 100- £1.50  
Hall Effect IC UGS3040 - MAGNET £1.00  
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NEW BT PLUG + LEAD £1.50

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12V MES LAMPS 10/£1  
STEREO CASSETTE HEAD £2  
MONO CASS. HEAD £1 ERASE HEAD 80p  
THERMAL CUT OUTS 50 77 85 120C £1 ea  
THERMAL FUSE 121C 240V 15A 5/£1  
TRANSISTOR MOUNTING PADS TO-5 TO-18 £3/1000  
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TO-3 micas + bushes 20/£1  
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PTFE min screen cable 10m/£1  
Large heat shrink sleeving pack £2  
CERAMIC FILTERS 6M/9M 10.7M 80p 100 £20  
TOKIN MAINS RFI FILTER 250V 15A £3  
IEC chassis plug rfi filter 10A £3  
Potentialmeters short spindles values 2k5 10k 25k 1M 2M5 new value 5/£1  
500k 1ln 500k log 4/£1  
40Khz ULTRASONIC TRANSDUCERS EX-EQPT NO DATA £1/pr  
PLESSEY INVERTER TRANSFORMER 11.5-0-11.5V to 240v 200VA £8 (£3)

## ZENERS

56V IW3 Semikron 50K available £25/1000

## DIODES & RECTIFIERS

BAW76 Equiv IN4148 £50/10,000  
1N4148 100/£1.50  
1N4004 SD4 1A 300V 100/£3  
1N5401 3A 100V 10/£1  
BA158 1A 400V fast recovery 100/£3  
BA159 1A 1000V fast recovery 100/£4  
120v 35A stud 85p  
12FLO 12A 200V small stud 4/£1.80 100/£25  
BY127 1200V 1.2A 10/£1  
BY254 800v 3A 8/£1  
BY255 1300v 3A 8/£1  
6A 100V Similar MR751 4/£1  
VM88 800mA 100V DIL b/REC 8/£1  
1A 800v bridge rectifier 4/£1  
4A 100V bridge 3/£1  
6A 100v bridge 80p  
8A 200V Bridge 2/£1.25  
10A 200v bridge £1.50  
25A 200v bridge £2 ea 10/£18  
25A 400v bridge £2.50 10/£22

## SCRs

2P4M equiv C106D 3/£1 100/£20  
MCR71-6 10A 600v SCR £1  
35A 600v stud £2  
TICV106D .8A 400v SCR 3/£1 100/£15  
MEU21 Prog. unijunction 3/£1

## TRIACS

NEC Triac ACO8F 600V TO 220 2/£1  
NEC Triac 150L Tab TO220 6A 400V 3/£1  
ACOV8FGM 800mA 400V T092 TRAC 3/£1  
Diacs 4/£1  
TXAL225 8A 400V 5mA gate 2 £1 100/£35  
TRAL 2230D 30A 400V isolated stud £4 each

## CONNECTORS

Centronics BBC Printer lead £3.50  
Centronics 36way IDC plug £4 10+ £3.50  
Centronics 36way IDC skt £4  
Centronics 36way plug (solder type) £40  
USED Centronics 36W plug & socket £3  
D' 9-way £1; 15-way £1.50; 25-way £2  
37-way £2; 50-way £3.50; covers 50p ea

## WIRE WOUND RESISTORS

W21 or Sim 2.5W 27R 10 of one value £1  
R10 0R15 0R22 2R0 4R7 5R0 5R6 8R2 10R 12R 15R 18R 20R 22R 27R 33R 36R 47R 56R 62R 3R9 91R 100R 120R 180R 390R 430R 470R 560R 680R 820R 910R 1K15 1K2 1K5 1K8 2K4 2K7 3K3 3K0 5K0 10K R05 (50 milli-ohm) 1% 3W 4 for £1

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R47 R62 1R0 1R5 1R8 3R3 6R8 9R1 10R 12R 20R 24R 27R 33R 51R 58R 62R 68R 100R 120R 180R 220R 270R 390R 560R 820R 910R 1K0 1K2 1K5 1K8 2K7 3K3 3K9 4K7 8K2 10K 15K 16K 20K W23 or Sim 9W 6 of one value £1  
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W24 or Sim 12W 4 of one value £1  
R50 1R0 2R0 8R8 9R1 10R 18R 22R 27R 56R 68R 75R 82R 100R 150R 180R 200R 220R 270R 400R 820R 8K8 8K2 1K0 10K 15K

## PHOTO DEVICES

Slotted opto-switch OPCOA OPB815 £1.30  
2N5777 80p only  
TIL81 T018 Photo transistor £1  
TIL38 Infra red LED 5/£1  
OPI2252 Opto isolator 80p  
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LEDs RED 3mm or 5mm 12/£1 100/£5  
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## SUB MIN PRESETS

1K 4K7 10K 22K 47K 1M 10M 15/£1 100/£5

## HORIZONTAL

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TURN PRESETS 10R 20R 100R 200R 250R 500R 80p

2K 5K 10K 22K 50K 100K 200K 2K2 2K5 47K 500K 2M2

## IC SOCKETS

8-pin 15/£1 8-pin 12/£1; 14-pin 10/£1.00; 18-20-pin 7/£1; 22-24/28 pin 4/£1 40 pin 30p

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Grey 1.5 to 6.5pF Grey larger type 2 to 25pF purple Transistors 2N4427 80p

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250v AC Zero voltage switching Control voltage 8-28v DC £2.50

40A 250V AC Solid State relays £18

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2u2 160v rad 22mm 100/£10

33n/47n 250v AC X rated rad 15mm 10/£1.00

1u 600V Mixed dielectric 50p ea

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2u2 20V 8/£1 100/£8

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10n 50V di package 0.3" rad £4/100 £35/1000

100n 50V di package 0.3" rad £10/100

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65p OTHERWISE (LIGHT ITEMS)

ADD 15% VAT TO TOTAL

ELECTRONIC COMPONENTS BOUGHT FOR CASH

